

# TECHNICAL MEMORANDUM



To: Mike Gross, PE, U.S. Army Corps of Engineers – Portland District

From: Mark Cecchini, Laura McWilliams, PhD, LG, and Jeff Wallace, RG

Date: October 28, 2008

Subject: Second Quarter Groundwater, Seep, and Surface Water Sampling Results  
Bradford Island Upland Operable Unit Remedial Investigation  
Cascade Locks, OR

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## 1.0 Introduction

The United States Army Corps of Engineers (USACE) Portland District is performing a remedial investigation/feasibility study (RI/FS) at Bradford Island at Bonneville Dam, Oregon. This memorandum describes the methods and results of the second quarter of groundwater/seep/surface water sampling at the Upland Operable Unit (OU) on the eastern portion of Bradford Island (site).

In accordance with Contract No. W9128F-04-D-0001, Task Order No. DT07, groundwater samples were collected from 14 of 15 monitoring wells at the site. Due to insufficient water volumes, one of the monitoring wells (MW-9) was not sampled and another (MW-1) was only analyzed for a subset of the analyte list. Due to dry conditions, seep samples and accompanying surface water samples were not collected. The locations of the monitoring wells are shown in Figure 1. Monitoring wells MW-1 through MW-9 are located in the Landfill Area of potential concern (AOPC), and were installed in late 1990s and early 2002. MW-11 through MW-15 were installed in the Sandblast Area AOPC during the spring of 2008. And, MW-10 was installed in the Reference Area during the spring of 2008. This is the second groundwater sampling event to include the new wells.

All field activities were carried out in accordance with the *Draft Quality Assurance Project Plan (QAPP) Upland Operable Unit Remedial Investigation* (Upland QAPP, URS, 2008a). The Bradford Island Technical Advisory Group (TAG) is currently reviewing the Upland QAPP. Based on consultation with the TAG, the USACE elected to install the monitoring wells (URS, 2008b) and commence quarterly groundwater sampling prior to the finalization of this Upland QAPP to compress the schedule by approximately six months.

## 2.0 Sampling Methodology

The following subsections describe the techniques used to collect groundwater. Seep and surface water samples were not collected during this sampling event due to dry conditions at the seeps. This section also discusses sample handling and shipping, the

method used to decontaminate field equipment and the disposition of investigation derived waste generated by the sampling. The sampling locations are shown in Figure 1.

## 2.1 Groundwater Sampling Method

Prior to purging, the depth to groundwater was measured in each well using a decontaminated water level meter. Groundwater levels in the wells located within the Landfill and the Sandblast Area AOPCs were measured on July 14, 2008. Table 1 summarizes the water level elevations. Groundwater elevation data were contoured for each AOPC. These data are plotted and show in Figure 2 (Landfill AOPC) and Figure 3 (Sandblast Area AOPC).

The volume of water in each well was calculated based on the depth to groundwater measurement and well construction data. Except in the case of MW-1, the monitoring wells were purged and the groundwater samples were collected via peristaltic pump with clean disposable polyethylene tubing. A decontaminated stainless steel Grundfos submersible pump with clean disposable polyethylene tubing was used to purge MW-1 due to the depth of water in the well.

During purging, temperature in degrees Celsius ( $^{\circ}\text{C}$ ), conductance in milliSiemens per centimeter (mS/cm), dissolved oxygen (DO) in milligrams per liter (mg/L), oxidation/reduction potential (ORP) in millivolts (mV), and pH were periodically measured using a calibrated YSI 556 water quality meter attached to the peristaltic pump with a flow-through cell. The turbidity, clarity, and color of the purge water were measured visually and recorded on the sampling form. A summary of water quality data at the site is presented in Table 2. In general, each well was purged until water quality readings stabilized<sup>1</sup> or until one well volume was removed if stabilization could not be achieved due to slow groundwater recharge. Groundwater sampling forms and calibration logs for the field instruments are included in Attachment A.

Once purging was completed, the flow through cell was detached from the pump outlet, the groundwater sampling team donned clean nitrile gloves, and the labeled sample containers were filled. The sample bottles being analyzed for VOCs and TPH-Gx were filled first and special care was taken to avoid aerating the groundwater as it was slowly pumped into the sample container. After all unfiltered sample volume was collected, a filtered sample for dissolved metals analysis was collected by attaching the pump outlet to a 0.45 micron ( $\mu\text{m}$ ) disposable filter and filling the required sample containers.

Compared to the previous sampling event, anomalous water quality parameter readings were noted in the field at MW-1, MW-3, MW-5, and MW-7. The negative values for DO that were observed at MW-1, MW-5, and MW-7 are likely the result of a faulty sensor

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<sup>1</sup> Groundwater stabilization criteria are as follows: conductivity +/- 3% of the total range; dissolved oxygen +/- 10% of the total range or 0.2 mg/L, whichever is greater; pH +/- 0.1 units; +/-10 mV.

that could not be remedied in the field. The extremely high pH readings and extremely low ORP observed at MW-3 were likely the result of a calibration error. These results are not included in Table 2. The water quality meter was recalibrated and checked for accuracy before being used at another well location. In addition, ORP values for MW-4 and MW-8 were found to be significantly different than those measured in the 1<sup>st</sup> Quarter sampling event (see Table 2), the cause of this difference is unknown.

## *2.2 Seep and Surface Water Sampling*

Neither seep, nor surface water samples were collected during this sampling round. URS inspected each of the four seep locations and determined that they were dry. Since the seep samples were not collected, the accompanying surface water samples were also not collected.

## *2.3 Sample Handling and Shipping*

Once a groundwater sample was collected, the sample containers were placed in a cooler with ice for preservation. Samples were labeled with a unique alpha-numeric code indicating the date that the sample was collected, the station location, and the matrix as specified in the Upland QAPP (i.e., the groundwater sample collected at MW-1 on July 17, 2008 was labeled 080717MW1GW) (URS, 2008a). At the end of each sampling day, all samples were checked for proper labeling and packed inside a trash bag that was filled with ice, goose necked, and sealed with packing tape. Temperature and trip blanks were also placed in the bag, as necessary. The bag containing the samples and ice was then placed inside a cooler supplied by the analytical laboratory along with packing material to prevent breakage of the sample containers during transit. Prior to pickup by the laboratory courier, a chain of custody (COC) form documenting sample names, sample date and time, and required analyses was completed and placed inside the coolers.

## *2.4 Decontamination Method*

The water level meter and centrifugal pump were decontaminated prior to being used at each well. As specified in the Upland QAPP (URS, 2008a), decontamination was achieved by first submerging the equipment in a phosphate-free soap and deionized water mixture, then methanol, and finally a deionized water rinse. The equipment was thoroughly scrubbed before being submerged in the methanol. The pump was allowed to run while submerged in each stage of the decontamination process.

## *2.5 Investigation Derived Waste Disposal*

Purge water generated during the groundwater sampling was pumped into 5-gallon buckets and transferred into labeled 55-gallon drums. The drums were staged at the Hazardous Materials Storage Area for characterization and disposal by the USACE, per the instructions of the Bonneville Dam Environmental Compliance Coordinator (ECC).

Disposable sampling equipment, including tubing and filters was treated as standard municipal waste.

### 3.0 Analytical Results

Fourteen groundwater samples were collected for laboratory analysis. A groundwater sample was not collected at MW-9 due to insufficient volume at the time of collection. Field duplicates were collected at MW-6, MW-10, and MW-13. Additional sample volume was collected at MW-5, MW-10, and MW-15 so that the laboratory could run matrix spike and matrix spike duplicate samples. Groundwater samples were analyzed as described below.

Depending on their location, groundwater samples were analyzed for different parameters, as described in the Upland QAPP (URS, 2008a). Groundwater samples associated with the Landfill and Sandblast Area AOPCs were analyzed for total petroleum hydrocarbons (TPH), selected volatile organic compounds (VOCs), selected semivolatile organic compounds (SVOCs), butyltins, the pesticide 4-nitrophenol, and selected metals (total and dissolved). The groundwater sample from the Reference Area well (MW-10) was analyzed for the complete list of metals in both the total and dissolved fractions.

The complete results of the laboratory analyses are presented in Tables 3 through 5. For comparison purposes, the first quarter analytical results are reproduced alongside the second quarter results. A data quality review of the analytical results, prepared in accordance with the Upland QAPP (2008a), is provided in Attachment B.

Tables 3 through 5 include a column listing the most conservative water quality criteria for each analyte, as identified in Table 10 of the Draft Upland QAPP (URS, 2008a). Table 10 of the QAPP has been modified to include Oregon Department of Environmental Quality (ODEQ) Risk-Based Criteria (RBC), revision 3, updated October 2008 (EPA, 2008) and EPA Regional Risk-Based Screening Levels, updated September 2008 (ODEQ, 2008). Although many of these screening criteria are not applicable to groundwater at the site (i.e., they were developed for surface water or drinking water), they are provided for reference. Concentrations of organic constituents are highlighted in the tables where they exceed most conservative water quality criteria. Concentrations of tetrachloroethene (PCE) and its dechlorination products, trichloroethene (TCE), cis-dichloroethene, chloroform and vinyl chloride are the only organic constituents that exceed the screening criteria (see Tables 3 and 4). For inorganic constituents, concentrations from the Reference Area well (MW-10) are interpreted as background concentrations of naturally occurring metals that leach into groundwater from local soils. Therefore, only those inorganic analytes that exceed both background concentrations and the most conservative water quality criteria are highlighted (see Tables 3 and 4). Metals exceeding these criteria are arsenic, iron, lead and manganese.

## 4.0 Variances from QAPP

The groundwater sampling at Bradford Island was conducted in general accordance with the procedures described in the Upland QAPP (URS, 2008a). However, some minor variances from the procedures described in the QAPP occurred, as described below:

- Turbidity was qualitatively rather than quantitatively measured. Turbidity will be quantitatively measured during all future groundwater sampling events.
- The full suite of analytical parameters was not collected at MW-1 because of the extremely slow groundwater recharge rate (~0.5 ft/day) in this well. MW-1 was purged on July 17, at a rate near the lower limit of the peristaltic pump (~100 mL/minute). Despite the slow purge rate, the well was pumped dry within 15 minutes. The well was allowed to recharge and pumping resumed with a submersible pump. After the well was purged dry with the submersible pump, the well was sealed and allowed to recharge overnight. On July 18, the well was sampled, but was again purged dry during sampling. Thus, samples could only be collected for VOCs, TPH-Gx, total metals, and dissolved metals. Samples for Butyltins, SVOCs, and TPH-Dx were not collected at MW-1.
- A submersible pump was used to purge and sample the groundwater at MW-1 because the water level in the well was too deep to be sampled with a peristaltic pump. A rinsate blank was collected by pouring deionized water onto the decontaminated pump and into sample containers in order to verify the cleanliness of the submersible pump and the efficacy of the decontamination method.
- MW-9 was not sampled during this round. Upon arrival at the well, depth to water was measured as 16.01 ft below top of casing (btoc). The total depth of the well was measured as 16.73 ft btoc. Thus, there was only 0.72 ft of water in MW-9. This water column was too small to allow for groundwater sample collection.
- Seep and surface water samples were not collected due to dry conditions at the sampling locations.

## References

URS, 2008a. *Draft Quality Assurance Project Plan*. Upland Operable Unit Remedial Investigation, Bradford Island. May 2008.

URS, 2008b. *Groundwater Monitoring Well Installation Report*. Upland Operable Unit Remedial Investigation, Bradford Island. June 9, 2008.

ODEQ, 2008. Risk Based Decision Making for the Remediation of Petroleum Contaminated Sites, Revision October 2008.

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EPA, 2008. EPA Regional Screening Levels (Regions 3, 6 and 9) Human Health Medium-Specific Screening Levels, updated September 12, 2008.

## **Figures**

Figure 1 – Bradford Island Groundwater, Seep, and Surface Water Sample Locations

Figure 2 – Landfill and Reference Area Groundwater Elevations

Figure 3 – Sandblast Area Groundwater Elevations

## **Tables**

Table 1 – Groundwater Elevations

Table 2 – Groundwater Field Parameters

Table 3 – Analytical Results from Landfill Area Wells

Table 4 – Analytical Results from Sandblast Area Wells

Table 5 – Analytical Results from Reference Area Well

## **Attachments**

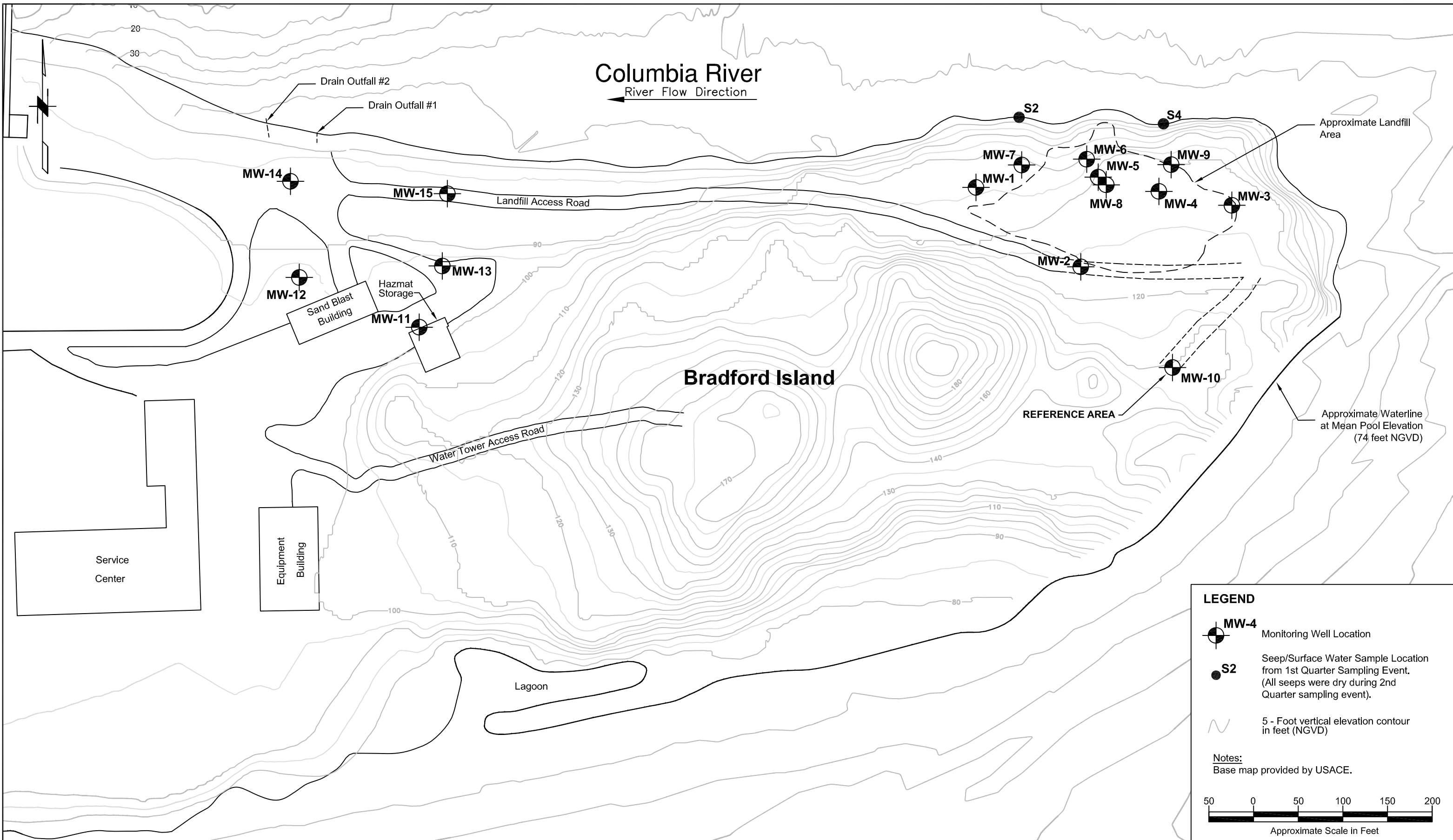
Attachment A – Field Notes, Groundwater, Seep, and Surface Water Sampling Forms

Attachment B – Quality Control Summary Report for Analytical Chemistry

# FIGURES



O:\25692709 USACE\53-F0072173.00 Bradford1\Omaha DT-07\Deliverables\20 Monitoring Report\Figures -non-pdf\FIG 1 Bradford Island CW Seep and Surface Water Sample Locations.dwg Oct 28, 2008 - 10:00am



**LEGEND**

- MW-4 Monitoring Well Location
- S2 Seep/Surface Water Sample Location from 1st Quarter Sampling Event. (All seeps were dry during 2nd Quarter sampling event).
- 5 - Foot vertical elevation contour in feet (NGVD)

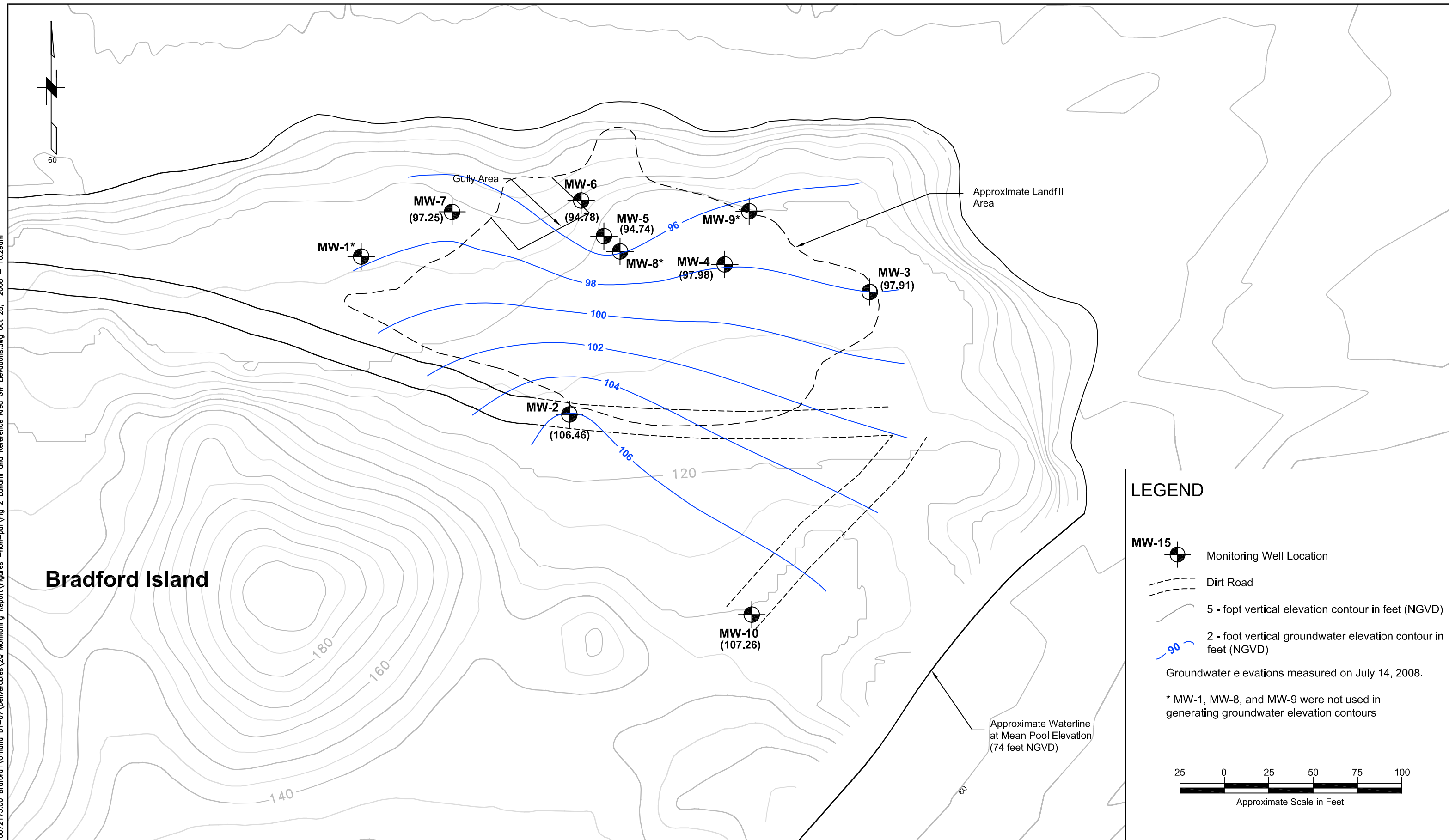
**Notes:**  
Base map provided by USACE.

50 0 50 100 150 200  
Approximate Scale in Feet

JOB No. 25695679		DESIGNED: LSM	PROJ. MANAGER: JTW	<b>URS</b> 111 SW Columbia, Suite 1500 Portland, Oregon 97201-5814 (tel) 503-222-7200 (fax) 503-222-4292 www.urscorp.com	<b>BRADFORD ISLAND</b>  <b>CASCADE LOCKS, OREGON</b>	<b>BRADFORD ISLAND GROUNDWATER SEEP AND SURFACE WATER SAMPLE LOCATIONS</b>	DRAWING NUMBER: <b>FIGURE 1</b>	
SCALE: 1"=100'		DRAWN BY: SPB	APPROVED BY: LSM				CAD FILE NUMBER: <b>FIG 1</b>	
No. DATE BY REVISION		CHECKED BY:	DATE: OCT 08				SHEET: OF	REV.



O:\25692709 USACE\53-F0072173.00 Bradford1\Omaha DT-07\Deliverables\20 Monitoring Report\Figures-non-pdf\Fig 2 Landfill and Reference Area GW Elevations.dwg Oct 28, 2008 - 10:29am



**LEGEND**

- Monitoring Well Location
- Dirt Road
- 5 - foot vertical elevation contour in feet (NGVD)
- 2 - foot vertical groundwater elevation contour in feet (NGVD)

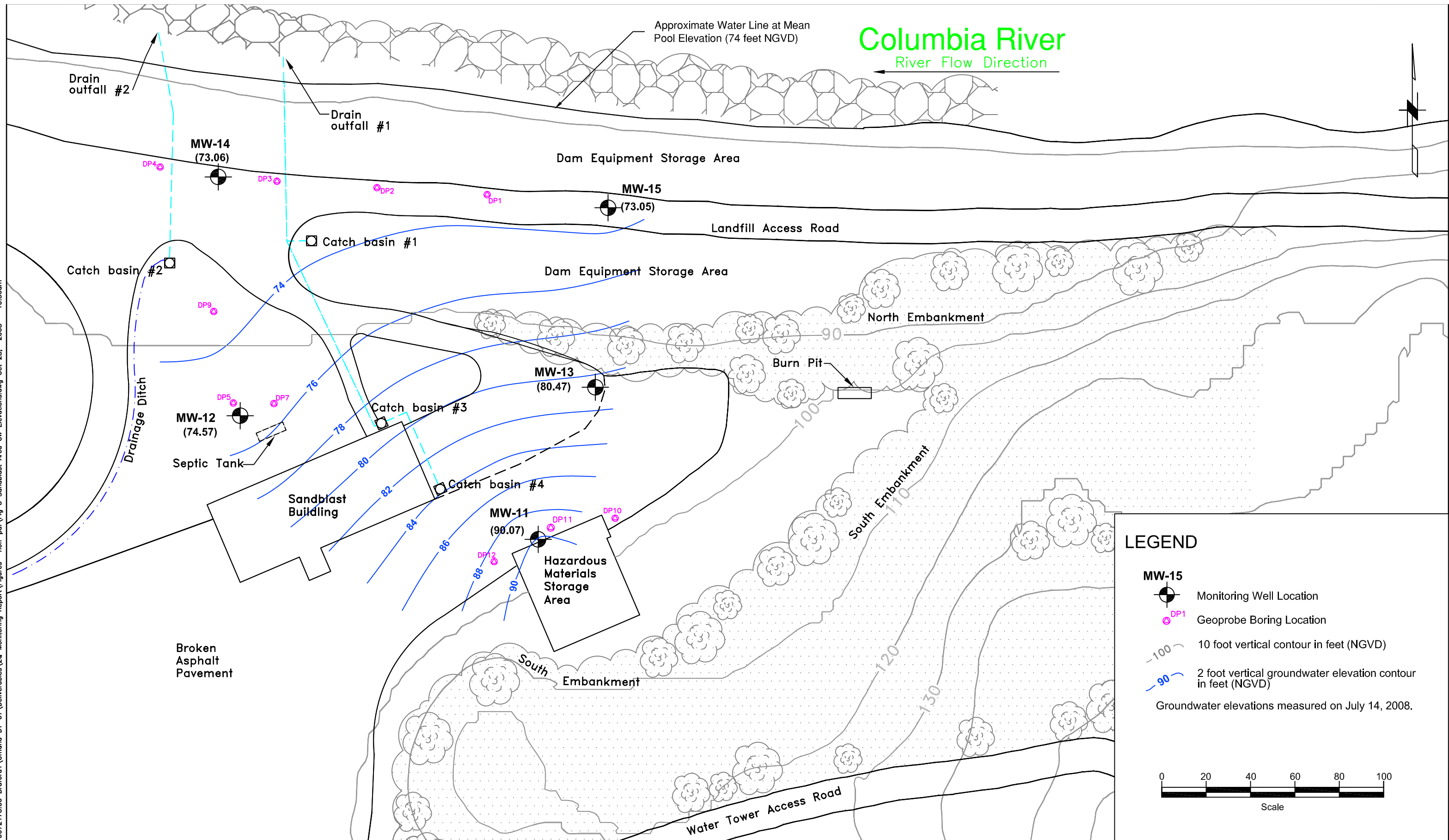
Groundwater elevations measured on July 14, 2008.

\* MW-1, MW-8, and MW-9 were not used in generating groundwater elevation contours

Approximate Scale in Feet

No.	DATE	BY	REVISION	JOB No. 25695767	DESIGNED: LSM	PROJ. MANAGER: JTW	 111 SW Columbia, Suite 1500 Portland, Oregon 97201-5814 (tel) 503-222-7200 (fax) 503-222-4292 www.urscorp.com	<b>BRADFORD ISLAND</b>  <b>CASCADE LOCKS, OREGON</b>	<b>LANDFILL AND REFERENCE AREA</b> <b>GROUNDWATER ELEVATIONS</b>	DRAWING NUMBER: FIGURE 2	
				SCALE: 1"=100'	DRAWN BY: SPB	APPROVED BY: LSM				CAD FILE NUMBER: FIG 2	
				CHECKED BY:	DATE: OCT 08					SHEET: OF	REV.

O:\25692709 USACE\53-F0072173.00 Bradford1\Omaha DT-07\Deliverables\20 Monitoring Report\Figures-non-pdf\Fig 3 Sandblast Area GW Elevations.dwg Oct 26, 2008 - 10:30am



**LEGEND**

- MW-15 Monitoring Well Location
- DP1 Geoprobe Boring Location
- 10 foot vertical contour in feet (NGVD)
- 2 foot vertical groundwater elevation contour in feet (NGVD)

Groundwater elevations measured on July 14, 2008.

Scale

		JOB No. 25695767		DESIGNED: LSM		PROJ. MANAGER: JTW		<b>URS</b>	<b>BRADFORD ISLAND</b>	<b>CASCADE LOCKS, OREGON</b>		<b>SANDBLAST AREA GROUNDWATER ELEVATIONS</b>		DRAWING NUMBER: <b>FIGURE 3</b>	
		SCALE: 1"=40'		DRAWN BY: SPB		APPROVED BY: LSM								CAD FILE NUMBER: <b>FIG 3</b>	
				CHECKED BY: LSM		DATE: OCT 08		111 SW Columbia, Suite 1500 Portland, Oregon 97201-5814 (tel) 503-222-7200 (fax) 503-222-4292 www.urscorp.com		<b>CASCADE LOCKS, OREGON</b>		SHEET: OF		REV.	
A		XX/XX/XX		XXX											
No.		DATE		BY		REVISION									

# TABLES



**Table 1**  
**Groundwater Elevations**  
Bradford Island - Upland OU Remedial Investigation  
2nd Quarter Sampling Event - July 2008

Well ID	Groundwater Elevation (ft msl)	
	1st Qtr <sup>1</sup>	2nd Qtr <sup>2</sup>
<b>Landfill AOPC</b>		
MW-1	78.38	77.74
MW-2	106.31	106.46
MW-3	101.75	97.91
MW-4	101.43	97.98
MW-5	96.83	94.74
MW-6	96.82	94.78
MW-7	98.17	97.25
MW-8	73.66	88.63
MW-9	101.69	99.17
<b>Reference Area</b>		
MW-10	112.75	107.26
<b>Sandblast AOPC</b>		
MW-11	91.71	90.07
MW-12	76.54	74.57
MW-13	81.2	80.47
MW-14	73.73	73.06
MW-15	73.81	73.05

**Notes:**

<sup>1</sup> = Depths to groundwater were measured over the course of one week, immediately prior to sampling each well.

<sup>2</sup> = Depths to groundwater measured on 7/14/2008

AOPC = area of potential concern

ft msl = feet above mean sea level

**Table 2**  
**Groundwater Field Parameters**  
Bradford Island - Upland OU Remedial Investigation  
2nd Quarter Sampling Event - July 2008

Well ID	Temperature (°C)	Conductivity (mS/cm)	Dissolved Oxygen (DO) (mg/L)	pH	ORP (mV)	Turbidity
<b>Landfill AOPC</b>						
MW-1	17.11	2.009	--	8.34	69.4	turbid <sup>4</sup>
MW-2	13.20	0.292	5.6	8.62	143.4	C
MW-3	11.15	0.104	3.7	--	--	C
MW-4	13.39	0.340	1.39	6.58	-22.9 <sup>3</sup>	AC
MW-5	12.46	0.588	--	6.6	-83.4	C
MW-6	13.03	0.646	0.23	6.76	-106.9	C
MW-7	12.78	0.471	--	6.61	100.4 <sup>3</sup>	C
MW-8	19.27	3.392	0.45	7.71	44.7	C
MW-9	NOT SAMPLED <sup>1</sup>					
<b>Reference Area</b>						
MW-10	15.27	0.186	2.35	8.14	67.7	C
<b>Sandblast AOPC</b>						
MW-11	14.71	0.373	0.70	8.65	-51.3	C
MW-12	13.80	0.170	2.31	6.32	136.6	C
MW-13	12.51	0.307	0.93	7.43	63.4	C
MW-14	13.60	0.132	4.92	6.59	111.1	C
MW-15	14.89	0.190	6.13	6.27	204.8	C
<b>Seep</b>						
NOT SAMPLED <sup>2</sup>						
<b>Surface Water</b>						
NOT SAMPLED <sup>2</sup>						

**Notes:**

Readings shown are final readings recorded prior to sampling.

<sup>1</sup> = MW-9 was not sampled due to insufficient sample volume at time of collection.

<sup>2</sup> = No seeps were visible during sample collection, therefore seeps and surface water were not collected.

<sup>3</sup> = These ORP values differ significantly from those measured during the 1st Quarter sampling event, the source of the difference is unknown, but may be due to a malfunctioning meter.

<sup>4</sup> = Limited water volume. The well was pumped dry, allowed to recharge over night and then sampled for a limited analyte list.

-- = not measured due to malfunctioning meter

AOPC = area of potential concern

AC = almost clear

C = clear

SC = slightly cloudy

ORP = oxidation reduction potential

**Table 3**  
**Analytical Results for Landfill Area Wells**  
Bradford Island - Upland OU Remedial Investigation  
2nd Quarter Sampling Event - July 2008

Well ID	MW-01	MW-01	MW-02	MW-02	MW-03	MW-03	MW-04	MW-04	MW-05	MW-05	Most Conservative Screening Criteria <sup>1</sup>	Maximum Concentration Reference Area Well <sup>2</sup>
Screen Interval (feet bgs)	19.84-29.84	19.84-29.84	22.21-32.21	22.21-32.21	10.99-20.99	10.99-20.99	8.21-28.21	8.21-28.21	10.36-35.36	10.36-35.36		
URS ID	080416MW1GW	080718MW1GW	080416MW2GW	080715MW2GW	080417MW3GW	080717MW3GW	080417MW4GW	080717MW4GW	080416MW5GW	080716MW5GW		
Sample Date	04/16/08	07/18/08	04/16/08	07/15/08	04/17/08	07/17/08	04/17/08	07/17/08	04/16/08	07/16/08		
Quarter	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd		1st and 2nd
<b>Total Petroleum Hydrocarbons per NWTPH Gx/Dx Methods (µg/L)</b>												
Gasoline Range Organics	250 U	250 U	250 U	250 U	18 J	250 U	250 U	250 U	120 J	110 J	100	250 U
Diesel Range Organics	110 U	-	120 U	110 U	110 U	110 U	110 U	130	490	980	88	130 U
Residual Range Organics	110 U	-	120 U	110 U	110 U	110 U	110 U	140 U	180	370	290	130 U
<b>VOCs per EPA Method 8260B (µg/L)</b>												
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.2	0.1 J	0.5 U	0.5 U	0.18	0.5 U
Tetrachloroethene (PCE)	0.5 U	0.5 U	0.5 U	0.5 U	6.8	7.2	0.25 J	0.5 U	0.5 U	0.5 U	0.091	0.5 U
Vinyl Chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.41 J	0.18 J	0.31 J	0.025	0.5 U
<b>SVOCs and Pesticides per EPA Method 8270C (µg/L)</b>												
1,4-Dichlorobenzene	0.21 U	-	0.2 U	0.2 U	0.21 U	0.22 U	0.22 U	0.19 U	0.19 U	0.20 U	0.480	0.23 UJ
4-Nitrophenol	2.1 U	-	2 U	2 U	2.1 U	2.2 U	2.2 U	1.9 U	1.9 U	2 U	150	0.025 J
Phenanthrene	0.21 U	-	0.2 U	0.2 U	0.21 U	0.22 U	0.22 U	0.19 U	0.21	0.3	NE	0.23 U
Phenol	0.53 U	-	0.49 U	0.5 U	0.52 U	0.55 U	0.53 U	0.48 U	0.48 U	0.48 U	11,000	0.56 U
<b>Butyltins per Krone, et. al. (µg/L)</b>												
Di-n-butyltin	0.05 U	-	0.1 U	0.1 U	0.02 J	0.09	0.050 U	0.110 J	0.05 U	0.05 U	NE	0.05 U
n-Butyltin	0.05 U	-	0.1 U	0.0 J	0.05 UJ	0.09 U	0.050 U	0.087 UJ	0.05 U	0.09 U	NE	0.038 J
<b>Total Metals per EPA Methods 6010/6020 (µg/L)</b>												
Arsenic	21.3	19.6	6.93	9.06	0.35 J	0.4 J	0.55	0.3 J	2.65	2.85	0.018	1.29
Iron	75.5	7,910	185	178	112	57.8 U	746	14,700	19,300	21,500	300	120
Lead	0.558	6.36	0.397	0.556	0.154	0.056 U	26.9	4.96	0.442	0.074 U	2.5	0.142
Manganese	3.85 U	291	6.74 U	4.5 J	6.25 U	4.2 J	53.2	780	2,210	2,460	50	262
<b>Dissolved Metals per EPA Methods 6010/6020 (µg/L) (Field Filtered)</b>												
Arsenic	19.3	18.3	7.98	9.11	0.50 U	0.22 J	0.50 U	0.41 J	2.52	2.97	0.018	1.33
Calcium	42,000	-	9,510	-	12,300	-	98,000	-	66,300	-	NE	30,400
Iron	14.6 J	534	20.1	20 U	5.8 J	20 U	8.8 J	13,200	18,800	19,800	300	12.3 J
Lead	0.281	0.536	0.05 U	0.052 U	0.012 J	0.03 U	3.5	1.62	0.014 J	0.030 U	2.5	0.142 J
Magnesium	2,810	-	1,210	-	4,200	-	7,550	-	21,800	-	NE	8,340
Manganese	0.28 U	-	0.12	-	0.55	-	53.1	-	2,200	-	50.0	262
Potassium	4,620	-	5,020	-	808 J	-	3,750	-	7,310	-	NE	4,960
Sodium	355,000	-	77,400	-	4,100	-	4,040	-	15,400	-	NE	5,640 U

**Notes:**

**Bold** = indicates detections above the quantification limit.

- = not analyzed

CAS = Columbia Analytical Services

DUP = field duplicate

mg/L = milligrams per liter

µg/L = micrograms per liter

MDL = Method detection limit

MRL = Method reporting limit

NE = Not Established

J = The result is an estimated concentration.

U = The analyte was not detected at or above the CAS MDL. The non-detect values reported in this table are CAS MRLs. If an analyte was detected above the MDL, but below the MRL, that analyte was qualified and flagged 'J'.

UJ = The analyte was not detected. The reported sample quantification limit is an estimate.

VOCs = Volatile Organic Compounds

SVOCs = Semivolatile Organic Compounds

**Yellow background** = reported concentration exceeds screening criteria (organics) or exceeds both screening criteria and reference well concentration (Inorganics).

<sup>1</sup> = most conservative water quality criteria identified in the Upland QAPP (URS, 2008a). Updated to include both Oregon Department of Environmental Quality (ODEQ) Risk-Based Criteria (RBCs) revision 3, October 2008 and EPA Regional Risk-Based Screening Levels, updated September 2008.

<sup>2</sup> = highest non-detect or detected value from 1st and 2nd quarter sampling events.

MW-01 had insufficient sample volume to complete the full analyte list, TPH-Gx, VOCs and Metals were given priority over the other constituents.

MW-09 was not analyzed due to insufficient sample volume.

**Table 3**  
**Analytical Results for Landfill Area Wells**  
Bradford Island - Upland OU Remedial Investigation  
2nd Quarter Sampling Event - July 2008

Well ID	MW-06	MW-06	MW-06-DUP	MW-07	MW-07 DUP	MW-07	MW-08	MW-08	MW-09	MW-09	Most Conservative Screening Criteria <sup>1</sup>	Maximum Concentration Reference Area Well <sup>2</sup>
Screen Interval (feet bgs)	25-30	25-30	25-30	5.24-30.24	5.24-30.24	5.24-30.24	52.99-57.99	52.99-57.99	15.18-20.18	-		
URS ID	080417MW6GW	080716MW6GW	080716MW21GW	080416MW7GW	080416MW22GW	080717MW07GW	080418MW8GW	080716MW8GW	080417MW9GW	-		
Sample Date	04/17/08	07/16/08	07/16/08	04/16/08	04/16/08	07/17/08	04/18/08	07/16/08	04/17/08	-		
Quarter	1st	2nd	2nd	1st	1st	2nd	1st	2nd	1st	2nd		1st and 2nd
<b>Total Petroleum Hydrocarbons per NWTPH Gx/Dx Methods (µg/L)</b>												
Gasoline Range Organics	30 J	35 J	36 J	13 J	13 J	250 U	250 U	14 J	250 U	-	100	250 U
Diesel Range Organics	360	470	460	120 U	110 U	110 U	15 J	110	65 J	-	88	130 U
Residual Range Organics	120 U	230	230	120 U	110 U	110 U	120 U	100 U	130	-	290	130 U
<b>VOCs per EPA Method 8260B (µg/L)</b>												
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.22 J	-	0.18	0.5 U
Tetrachloroethene (PCE)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.6	-	0.091	0.5 U
Vinyl Chloride	0.16 J	0.17 J	0.17 J	0.94	0.97	0.88	0.5 U	0.5 U	0.5 U	-	0.025	0.5 U
<b>SVOCs and Pesticides per EPA Method 8270C (µg/L)</b>												
1,4-Dichlorobenzene	0.19 U	0.2 U	0.2 U	0.23 U	0.22 U	0.2 U	0.23 U	0.19 U	0.2 U	-	0.480	0.23 UJ
4-Nitrophenol	1.9 U	2 U	2 U	2.3 U	2.2 U	2 U	2.3 U	1.9 U	2 U	-	150	0.025 J
Phenanthrene	0.19 U	0.2 U	0.2 U	0.23 U	0.22 U	0.2 U	0.23 U	0.19 U	0.2 U	-	NE	0.23 U
Phenol	0.48 U	0.49 U	0.49 U	0.56 U	0.53 U	0.49 U	0.57 U	0.48 U	0.5 U	-	11,000	0.56 U
<b>Butyltins per Krone, et. al. (µg/L)</b>												
Di-n-butyltin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.13 J	0.050 U	0.050 U	0.05 U	-	NE	0.05 U
n-Butyltin	0.05 U	0.09 U	0.09 U	0.05 U	0.05 U	0.09 UJ	0.087 U	0.087 U	0.087 U	-	NE	0.038 J
<b>Total Metals per EPA Methods 6010/6020 (µg/L)</b>												
Arsenic	2.69	3.21	3.2	15.8	16.0	16.8	6.86	5.76	0.72 U	-	0.018	1.29
Iron	25,100	23,700	23,900	29,300	28,700	30,700	854	631	2,550	-	300	120
Lead	0.056	0.030 U	0.030 U	0.258	0.285	0.136 U	0.463	0.54	0.718	-	2.5	0.142
Manganese	3,280	2,910	2,950	1,430	1,460	1,710	265	173	103	-	50	262
<b>Dissolved Metals per EPA Methods 6010/6020 (µg/L) (Field Filtered)</b>												
Arsenic	2.33	3.28	3.07	10.7	10.6	14.7	7.92	5.65	1.4	-	0.018	1.33
Calcium	76,600	-	-	42,600	43,600	-	172,000	-	11,600	-	NE	30,400
Iron	24,200	23,200	22,300	25,300	26,000	27,900	5.8 J	20 U	176	-	300	12.3 J
Lead	0.017 J	0.030 U	0.030 U	0.05 U	0.05 U	0.030 U	0.046 U	0.046	0.107	-	2.5	0.142 J
Magnesium	25,800	-	-	16,800	16,900	-	13,000	-	2,560	-	NE	8,340
Manganese	3,200	-	-	1,440	1,470	-	238	-	48.9	-	50.0	262
Potassium	7,240	-	-	3,170	3,220	-	12,900	-	2,680	-	NE	4,960
Sodium	41,300	-	-	7,180	7,500	-	740,000	-	11,800	-	NE	5,640 U

**Notes:**

**Bold** = indicates detections above the quantification limit.

- = not analyzed

CAS = Columbia Analytical Services

DUP = field duplicate

mg/L = milligrams per liter

µg/L = micrograms per liter

MDL = Method detection limit

MRL = Method reporting limit

NE = Not Established

J = The result is an estimated concentration.

U = The analyte was not detected at or above the CAS MDL. The non-detect values reported in this table are CAS MRLs. If an analyte was detected above the MDL, but below the MRL, that analyte was qualified and flagged 'J'.

UJ = The analyte was not detected. The reported sample quantification limit is an estimate.

VOCs = Volatile Organic Compounds

SVOCs = Semivolatile Organic Compounds

**Yellow background** = reported concentration exceeds screening criteria (organics) or exceeds both screening criteria and reference well concentration (Inorganics).

<sup>1</sup> = most conservative water quality criteria identified in the Upland QAPP (URS, 2008a). Updated to include both Oregon Department of Environmental Quality (ODEQ) Risk-Based Criteria (RBCs) revision 3, October 2008 and EPA Regional Risk-Based Screening Levels, updated September 2008.

<sup>2</sup> = highest non-detect or detected value from 1st and 2nd quarter sampling events.

MW-01 had insufficient sample volume to complete the full analyte list, TPH-Gx, VOCs and Metals were given priority over the other constituents.

MW-09 was not analyzed due to insufficient sample volume.



**Table 4**  
**Analytical Results for Sandblast Area Wells**  
Bradford Island - Upland OU Remedial Investigation  
2nd Quarter Sampling Event - July 2008

Well ID	MW-11	MW-11 DUP	MW-11	MW-12	MW-12	MW-13	MW-13	MW-13-DUP	MW-14	MW-14	MW-15	MW-15	Most Conservative Screening Criteria <sup>1</sup>	Maximum Concentration Reference Area Well <sup>2</sup>
Screen Interval (feet bgs)	26-36	26-36	26-36	16-26	16-26	26-36	26-36	26-36	13-23	13-23	12-22	12-22		
Sample ID	080415MW11GW	080415MW20GW	080715MW11GW	080415MW12GW	080715MW12GW	080414MW13GW	080714MW13GW	080714MW23GW	080414MW14GW	080714MW14GW	080414MW15GW	080714MW15GW		
Sample Date	04/15/08	04/15/08	07/15/08	04/15/08	07/15/08	04/14/08	07/14/08	07/14/08	04/14/08	07/14/08	04/14/08	07/14/08		
Quarter	1st	1st	2nd	1st	2nd	1st	2nd	2nd	1st	2nd	1st	2nd		1st and 2nd
<b>Total Petroleum Hydrocarbons per NWTPH Gx/Dx Methods (µg/L)</b>														
Gasoline Range Organics	14 J	13 J	250 U	250 U	250 U	15 J	33 J	14 J	250 U	250 U	250 U	250 U	100	250 U
Diesel Range Organics	110 U	110 U	18 J	120 U	17 J	110 U	100 U	100 U	100 U	100 U	120 U	110 U	88	130 U
Residual Range Organics	110 U	120 U	110 U	120 U	110 U	110 U	100 U	100 U	100 U	100 U	120 U	110 U	290	130 U
<b>VOCs per EPA Method 8260B (µg/L)</b>														
2,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NE	-
Chloroform	0.18 J	0.18 J	0.5 U	0.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.18	0.5 U
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	550	660	2.0	2.1	2.1	46	10	0.44 J	0.17 J	61	-
Tetrachloroethene (PCE)	0.5 U	0.5 U	0.5 U	5.1	5.1	0.36 J	0.49 J	0.45 J	1.5	1.1	1.8	1.6	0.091	0.5 U
Trichloroethene (TCE)	0.5 U	0.5 U	0.5 U	3.2	3.0	1.9	3.0	2.9	0.82	0.61	0.27 J	0.23 J	0.029	-
Vinyl Chloride	0.5 U	0.5 U	0.5 U	4.1	0.9	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.025	0.5 U
<b>SVOCs per EPA Method 8270C (µg/L)</b>														
Benzo(b)fluoranthene	0.21 U	-	0.2 U	0.018 J	0.2 U	0.23 U	0.2 U	0.2 U	0.22 U	0.2 U	0.21 U	0.22 U	0.0038	0.025 J
Benzo(k)fluoranthene	0.21 U	-	0.2 U	0.21 U	0.2 U	0.23 U	0.2 U	0.2 U	0.22 U	0.2 U	0.21 U	0.22 U	0.0038	0.23 U
Phenanthrene	0.21 U	-	0.2 U	0.21 U	0.2 U	0.084 J	0.2 U	0.2 U	0.22 U	0.2 U	0.21 U	0.22 U	NE	0.23 U
<b>Butyltins per Krone, et. al. (µg/L)</b>														
n-Butyltin	0.026 J	-	0.087 U	0.05 U	0.1 U	0.014 J	0.09 U	0.087 U	0.05 U	0.09 U	0.05 U	0.09 U	NE	0.038 J
<b>Total Metals per EPA Methods 6010/6020 (µg/L)</b>														
Arsenic	11.6	-	1.13	0.61	0.76	1.86	0.82	0.75	0.79	1.02	0.54	0.75	0.018	1.29
Iron	1,500	-	179	50.4 U	108	55.6 U	219	224	188	25.7	163	190	300	120
Vanadium	5.9 J	-	0.86	1.1 J	1.27	1.0 J	0.2 U	0.2 U	1.8 J	1.64	1.4 J	1.68	180	1.7 J
<b>Dissolved Metals per EPA Methods 6010/6020 (µg/L)</b>														
Arsenic	8.99	-	1.11	0.61	0.87	1.79	0.72	0.84	0.84	1.01	0.51	0.63	0.018	1.33
Calcium	6,690	-	-	30,900	-	44,300	-	-	22,700	-	28,200	-	NE	30,400
Iron	20 U	-	52.5	20 U	7.1 J	12.4 J	201	203	20 U	20 U	6.4 J	20 U	300	9.1 J
Magnesium	883	-	-	8,430	-	14,000	-	-	6,140	-	7,120	-	NE	8,180
Potassium	2,610	-	-	2,260	-	1,480 J	-	-	1,170 J	-	782 J	-	NE	4,950
Sodium	89,400	-	-	13,400	-	18,400	-	-	6,860	-	7,620	-	NE	5,050
Vanadium	3.1 J	-	0.69 U	10 U	1.05	1.1 J	0.2 U	0.2 U	1.1 J	1.68	0.9 J	1.19	180	10 U

**Notes:**

**Bold** = indicates detections above the quantification limit.

- = not analyzed

CAS = Columbia Analytical Services

DUP = field duplicate

mg/L = milligrams per liter

µg/L = micrograms per liter

MDL = Method detection limit

MRL = Method reporting limit

NE = Not Established

J = The result is an estimated concentration.

U = The analyte was not detected at or above the CAS MDL. The non-detect values reported in this table are CAS MRLs. If an analyte was detected above the MDL, but below the MRL, that analyte was qualified and flagged 'J'.

UJ = The analyte was not detected. The reported sample quantification limit is an estimate.

VOCs = Volatile Organic Compounds

SVOCs = Semivolatile Organic Compounds

**J** = reported concentration exceeds screening criteria (organics) or exceeds both screening criteria and reference well concentration (Inorganics).

<sup>1</sup> = most conservative water quality criteria identified in the Upland QAPP (URS, 2008a). Updated to include both Oregon Department of Environmental Quality (ODEQ) Risk-Based Criteria (RBCs) revision 3, October 2008 and EPA Regional Risk-Based Screening Levels, updated September 2008.

<sup>2</sup> = highest non-detect or detected value from 1st and 2nd quarter sampling events.



**Table 5**  
**Analytical Results for Reference Area Well**  
Bradford Island - Upland OU Remedial Investigation  
2nd Quarter Sampling Event - July 2008

Well ID	MW-10	MW-10 DUP	MW-10	MW-10 DUP	Maximum Concentration	Most Conservative Screening Criteria <sup>1</sup>
Screen Interval (feet bgs)	47-57	47-57	47-57	47-57		
Sample ID	080415MW10GW	080415MW21GW	080716MW10GW	080716MW22GW		
Sample Date	04/15/08	04/15/08	07/16/08	07/16/08		
Quarter	1st	2nd	1st	2nd	1st and 2nd	
<b>Total Metals per EPA Methods 6010/6020 (µg/L)</b>						
Aluminum	212	209	45.9	50.9	212	36,500
Antimony	0.082	0.078	0.029 J	0.031 J	0.082	5.60
Arsenic	1.32 U	1.32 U	1.16	1.29	1.29	0.018
Barium	26.5	26.5	20	21.6	26.5	1,000
Beryllium	0.01 J	0.02 U	0.02 U	0.02 U	0.01 J	5.30
Cadmium	0.057 U	0.074 U	0.02 U	0.02 U	0.074 U	0.25
Calcium	29,200	29,500	31,000	30,900	31,000	18
Chromium	0.57 U	0.57 U	0.21	0.21	0.21	11 (VI)
Cobalt	0.295	0.295	0.162	0.178	0.295	11
Copper	0.67 U	0.70 U	0.23	0.29	0.29	9
Iron	436 U	434 U	112	120	120	300
Lead	0.363 U	0.585 U	0.118	0.142	0.142	2.5
Magnesium	8,290	8,340	8,150	8,130	8,340	NE
Manganese	246	243	255	262	262	50
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2	0.77
Nickel	20 U	20 U	1.02	1.12	1.12	52
Potassium	4,790	4,810	4,960	4,950	4,960	NE
Selenium	1 U	1 U	1.2 U	1.2 U	1.2 U	5
Silver	0.184 U	0.066 U	0.03 U	0.03 U	0.184 U	0.1
Sodium	5,640	5,610	5,240	5,270	5,640	NE
Thallium	0.02 U	0.02 U	0.020 U	0.020 U	0.02 U	0.24
Vanadium	1.4 J	1.7 J	0.13 J	0.22	1.7 J	180
Zinc	5.5 J	6.8 J	1.6	1.9	6.8 J	120
<b>Dissolved Metals per EPA Methods 6010/6020 (µg/L)</b>						
Aluminum	2.3	2.2	2.4	2.3	2.4	36,500
Antimony	0.051	0.049 J	0.09 U	0.09 U	0.051	5.60
Arsenic	1.33	1.31	1.09	1.17	1.33	0.018
Barium	22.6	23.1	19.4	19.5	23.1	1,000
Beryllium	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	5.30
Cadmium	0.027	0.035	0.02 U	0.02 U	0.035	0.25
Calcium	29,500	30,100	30,400	29,800	30,400	18
Chromium	0.18 J	0.18 J	0.1 J	0.14 J	0.18 J	11 (VI)
Cobalt	0.079 U	0.084 U	0.11	0.107	0.11	11
Copper	0.30 U	0.30 U	0.10 J	0.09 J	0.10 J	9
Iron	9.1 J	12.3 J	11.4 J	8.2 J	12 J	300
Lead	0.012 J	0.032 J	0.030 U	0.030 U	0.032 J	2.5
Magnesium	7,990	8,180	7,910	7,770	8,180	NE
Manganese	214	222	233	222	233	50
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.77
Nickel	20 U	20 U	1.06	1.08	1.08	52
Potassium	4,810	4,950	4,760	4,660	4,950	NE
Selenium	1 U	1 U	1.2 U	1.2 U	1.2 U	5
Silver	0.071	0.163	0.03 U	0.03 U	0.163	0.1
Sodium	5,440 U	5,600 U	5,050	4,900	5,050	NE
Thallium	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.24
Vanadium	10 U	10 U	0.2 U	0.2 U	10 U	180
Zinc	10 U	10 U	1.1	1.5	1.5	120

**Notes:**

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DUP = field duplicate

mg/L = milligrams per liter

µg/L = micrograms per liter

MDL = Method detection limit

MRL = Method reporting limit

NE = Not Established

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U = The analyte was not detected at or above the CAS MDL. The non-detect values reported in this table are CAS MRLs. If an analyte was detected above the MDL, but below the MRL, that analyte was qualified and flagged 'J'.

UJ = The analyte was not detected. The reported sample quantification limit is an estimate.

VOCs = Volatile Organic Compounds

SVOCs = Semivolatile Organic Compounds

**[Yellow Highlight]** = reported concentration exceeds *both* screening criteria and maximum reference well concentration.

<sup>1</sup> = most conservative water quality criteria identified in the Upland QAPP (URS, 2008a). Updated to include both Oregon Department of Environmental Quality (ODEQ) Risk-Based Criteria (RBCs) revision 3, October 2008 and EPA Regional Risk-Based Screening Levels, updated September 2008.

<sup>2</sup> = highest non-detect or detected value from 1st and 2nd quarter sampling events (including primary and duplicate samples).

# **Field Notes and Groundwater Sampling Forms**

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Location Bradford Island Date 4/18/08  
 Project / Client Upland OU RI / USACE

- 1430 Measure location of S2 =>  
 ~78' along shore to West from  
 MW-7.
- 1445 Measure location of S4 =>  
 ~43' East of MW-6, ~25' South  
 of Seep location.
- 1455 Clean up, pack up equipment.
- 1530 Hand over well keys to  
 Carlton Morris.
- 1535 Hand in security badges @  
 front bldg.
- 1540 Offsite.

45

Location Bradford Island Date 7/14/08  
 Project / Client Upland OU RI / USACE

Mark C.

- 0800: Zack Oremland onsite @  
 Bonneville Dam Zack = "Z0"
- 0830: Mark Cecchini onsite. Mark = "MC"  
 Proceed to security check-in.
- 0905: Z0 + MC meet Carlton Morris, USACE  
 and mobilize to BI.
- 0920: Check calibration on YSI 556 meters  
 SN: ~~05027~~ 20
- |      | standard:                     | reading:           |
|------|-------------------------------|--------------------|
| pH   | 4.0                           | 4.0 (calibrated)   |
| pH   | 7.0                           | 7.0 (calibrated)   |
| Cond | 1.413 $\mu\text{S}/\text{cm}$ | 1.216 (calibrated) |
| ORP  | 240 mV                        | 240                |
- SN: 06M1536
- | pH   | 4.0                           | 4.02 checked       |
|------|-------------------------------|--------------------|
| pH   | 7.0                           | 7.0 checked        |
| Cond | 1.413 $\mu\text{S}/\text{cm}$ | 1.330 (calibrated) |
| ORP  | 240 mV                        | 233.5 (calibrated) |
- 0925: MC conducts Health & Safety  
 tailgate discussing Bonneville  
 Dam emergency procedures, slip  
 trip fall, and general site orientation.
- 0940: Z0 + MC collect site-wide  
 water levels

Location Bradford Island Date 7/14/08Project / Client Upland OURI / USACEMark Cook

## BI Water Levels (ft. b.toc.)

MW-1	27.76'
MW-2	10.10'
MW-3	17.30'
MW-4	16.81'
MW-5	19.33'
MW-6	18.24'
MW-7	9.67'
MW-8	26.66'
MW-9	15.99'
MW-10	25.94'
MW-11	8.05'
MW-12	26.05'
MW-13	17.08'
MW-14	13.61'
MW-15	<del>13.81'</del> <sup>MC</sup> 13.81'

1045: ZO sets up @ MW-13 see purge log Bradford

1115: MC sets up @ MW-11

1155: Collect sample 080714MW13GW1207: Collect MW-13 field duplicate 080714MW23GW

1200: MC takes down equipment @ MW-11

initial water level not yet stabilized. MC

sets up @ MW-15, see purge log

Location Bradford Island Date 7/14/08Project / Client Upland OURI / USACEMark Cook

- 1300: ZO sets up @ MW-14, see purge log
- 1320: Collect sample 080714MW15GW
- 1325: Collect sample 080714MW15GWMS
- 1330: Collect sample 080714MW15GWMSD
- 1342: Collect sample 080714MW15GW
- 1426: Begin site cleanup.
- 1450: ZO + MC offsite to Cascade Locks to purchase ice and pack coolers.
- 1510: ZO offsite to Portland, MC offsite to Hood River

7/14/08

Mark Cook

Location Bradford Island Date 7/15/08  
 Project / Client Upland OU RI / USACE  
Mark Cook

0800: ZO onsite, begin calibrating YSI meter  
 standard Reading  
 Cond 1.413 mS/cm 1.323 → calibrated  
 ORP 240 mV 242.7 → calibrated  
 pH 7.0 7.00 → checked.

YSI SN: 06M1536

0831: MC onsite w/ tools to clear  
 brush in landfill area. Conduct  
 H&S tailgate, discuss poison oak/ivy  
 in landfill area.

0835: ZO begins setup @ MW-11, see  
 purge log for details.

0840: MC calibrates YSI SN: 05D2720  
 Standard Reading  
 Cond 1.413 mS/cm 1.448 → calibrated  
 ORP 240 mV 238.3 → calibrated  
 pH 7.0 7.04 → calibrated  
 pH 4.0 3.98 → calibrated

0920: MC sets up @ MW-12, see purge log  
 for details.

1030: Collect sample 080715MW12GW

1103: Collect sample 080715MW11GW

1110: MC to landfill to begin clearing  
 brush @ monitoring wells.

Location Bradford Island Date 7/15/08  
 Project / Client Upland OU RI / USACE  
Mark Cook

1235: ZO sets up @ MW-8, see  
 purge log for details. MC inspects  
 seep locations.

1305: All seep locations dry. MC  
 documented this w/ photographs.  
 MC sets up @ MW-2, see purge log  
 for details.

1445: MW-8 drawn down below pumping  
 depth of peristaltic pump. Recharge  
 ~ 0.1 ft/hr, too slow to allow recharge  
 and sampling today. ZO packs tubing  
 for MW-8 in clean plastic bags and  
 tapes a garbage bag over the  
 top of the well head secured  
 with tape to the outside of  
 the casing. If MW-8 is not  
 recharged sufficiently by 7/16, will  
 use submersible pump to complete  
 purge + sampling.

1510: Begin sampling MW-2  
 Sample time: 080715MW2GW @ 1430

1550: ZO offsite to PDX to pack  
 samples for shipping.

1605: MC offsite.

Location Bradford Island Date 7/16/08Project / Client Upland OU RI / USACEMark Cook

- 0802: MC + ZO onsite @ BI landfill  
 0805: MC conducts HAS tailgate meeting discuss heat stress.

0810: Calibrate YSI meters

SN: 05D2720

	Standard	Reading
COND	1.413 mS/cm	1.420 → calibrated
ORP	240 mV	243.4 → calibrated
pH	7.0	6.96 → calibrated
pH	4.0	3.91 → calibrated

SN: 06M1536

COND	1.413	1392 → calibrated
ORP	240	242.9 → calibrated
pH	4.0	4.0 → checked
pH	7.0	7.0 → checked

- 0830: ZO resumes purging @ MW-8  
 MC sets up @ MW-10, see purge log.  
 0845: Due to slow recharge @ MW-8  
 ZO decides to use Grundfos submersible pump to sample MW-8. There is not enough water column in MW-8 to allow sampling w/ a peristaltic pump.

Location Bradford Island Date 7/16/08Project / Client Upland OU RI / USACEMark Cook

0930: Carlton Morris (USACE) @ landfill to inspect ruts on access road. Carlton stated that the road will need to be scraped to a level surface w/ a Bobcat. Also showed Carlton the location of the "Maverick Box" near MW-8.

- 1149: Collect sample 080716 MW 8 GW <sup>MC</sup>  
 1153: Collect sample 080716 MW 8 GW MS <sup>MC</sup>  
 1159: Collect sample 080716 MW 8 GW MSD <sup>MC</sup>

1230: Collect Rinseate blank <sup>MC</sup> (see NOTE 1336) off of Grundfos submersible pump after decontaminating w/ Alcomox/DI scrub + DI water triple rinse.

080716-RB. Rinseate collected by pouring laboratory provided DI water over decontaminated pump and into sample containers. A dissolved metal (filtered) sample could not be collected b/c field team could not capture and filter rinse water.

1253: ZO offsite to Cascade Locks to purchase more ice.



Location Bradford Island Date 7/16/08Project / Client Upland OU RI / USACEMark Cal...1305: Collect sample 080716MW10GW1310: Collect sample 080716MW10GWMS1315: Collect sample 080716MW10GWMSDField duplicate 080716MW22GW

Sample Time = 1245.

1336: ZO onsite, begin setup @ MW-6, <sup>see purg log</sup>

NOTE: Rinse blank not collected

@ 1230 on 7/16 b/c laboratory

DI water is not onsite.

Will collect rinse blank tomorrow.

1413: NOTE: ZO collected sample

080716MW8GW @ 09351501: Collect sample 080716MW6GW

1522: Collect field duplicate @ MW-6

080716MW21GW

1525: Begin site cleanup.

1540: MC + ZO offsite.

Mark Cal...  
7/16/08Location Bradford Island Date 7/17/08Project / Client Upland OU RI / USACEMark Cal...

0802: MC onsite Calibrate YSI

SN: 05D2720

	Standard	Reading
COND	1.413 mS/cm	1.316 → calibrated
ORP	240 mV	242.6 → calibrated
pH	7.0	-5.94 → calibrated
pH	4.0	3.85 → calibrated

SN: 06M1536

COND 1.413 mS/cm

ORP 240 mV

pH 7.0

pH 4.0

0810: ZO onsite MC conducts HAS

tailgate meeting discuss slip, trip, fall hazard around overgrown wells.

0820: MC begins setup @ MW-3, see purg log for details.

0900: Collect rinse blank off of Groundfos pump w/ lab. DI water as described on p. 51 (1230).

080717RB, no dissolved metal sample collected (unable to filter)

0935: YSI 05D2720 is giving anomalous pH and ORP readings @ MW-3.

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Location Bradford Island Date 4/18/08  
 Project / Client Upland OU RI / USACE

- 1430 Measure location of S2 =>  
 ~78' along shore to West from  
 MW-7.
- 1445 Measure location of S4 =>  
 ~43' East of MW-6, ~25' South  
 of Seep location.
- 1455 Clean up, pack up equipment.
- 1530 Hand over well keys to  
 Carlton Morris.
- 1535 Hand in security badges @  
 front bldg.
- 1540 Offsite.

Location Bradford Island Date 7/14/08 45  
 Project / Client Upland OU RI / USACE

Mark C.

- 0800: Zack Oremland onsite @  
 Bonneville Dam Zack = "Z0"
- 0830: Mark Cecchini onsite. Mark = "MC"  
 Proceed to security check-in.
- 0905: Z0 + MC meet Carlton Morris, USACE  
 and mobilize to BI.
- 0920: Check calibration on YSI 556 meters  
 SN: ~~05027~~ 20
- |      | standard:                     | reading:           |
|------|-------------------------------|--------------------|
| pH   | 4.0                           | 4.0 (calibrated)   |
| pH   | 7.0                           | 7.0 (calibrated)   |
| Cond | 1.413 $\mu\text{S}/\text{cm}$ | 1.216 (calibrated) |
| ORP  | 240 mV                        | 240                |
- SN: 06M1536
- | pH   | 4.0                           | 4.02 checked       |
|------|-------------------------------|--------------------|
| pH   | 7.0                           | 7.0 checked        |
| Cond | 1.413 $\mu\text{S}/\text{cm}$ | 1.330 (calibrated) |
| ORP  | 240 mV                        | 233.5 (calibrated) |
- 0925: MC conducts Health & Safety  
 tailgate discussing Bonneville  
 Dam emergency procedures, slip  
 trip fall, and general site orientation.
- 0940: Z0 + MC collect site-wide  
 water levels



Location Bradford Island Date 7/14/08Project / Client Upland OURI / USACEMark Cook

## BI Water Levels (ft. b.toc.)

MW-1	27.76'
MW-2	10.10'
MW-3	17.30'
MW-4	16.81'
MW-5	19.33'
MW-6	18.24'
MW-7	9.67'
MW-8	26.66'
MW-9	15.99'
MW-10	25.94'
MW-11	8.05'
MW-12	26.05'
MW-13	17.08'
MW-14	13.61'
MW-15	<del>13.81'</del> <sup>MC</sup> 13.81'

1045: ZO sets up @ MW-13 see purge log Bradford

1115: MC sets up @ MW-11

1155: Collect sample 080714MW13GW1207: Collect MW-13 field duplicate 080714MW23GW

1200: MC takes down equipment @ MW-11

initial water level not yet stabilized. MC

sets up @ MW-15, see purge log

Location Bradford Island Date 7/14/08Project / Client Upland OURI / USACEMark Cook

1300: ZO sets up @ MW-14, see purge log

1320: Collect sample 080714MW15GW1325: Collect sample 080714MW15GWMS1330: Collect sample 080714MW15GWMSD1342: Collect sample 080714MW15GW

1426: Begin site cleanup.

1450: ZO + MC offsite to Cascade Locks  
to purchase ice and pack coolers.1510: ZO offsite to Portland, MC  
offsite to Hood River

7/14/08

Mark Cook

Location Bradford Island Date 7/15/08  
 Project / Client Upland OU RI / USACE  
Mark Cook

0800: ZO onsite, begin calibrating YSI meter  
 standard Reading  
 Cond 1.413 mS/cm 1.323 → calibrated  
 ORP 240 mV 242.7 → calibrated  
 pH 7.0 7.00 → checked.

YSI SN: 06M1536

0831: MC onsite w/ tools to clear  
 brush in landfill area. Conduct  
 H&S tailgate, discuss poison oak/ivy  
 in landfill area.

0835: ZO begins setup @ MW-11, see  
 purge log for details.

0840: MC calibrates YSI SN: 0502720  
 Standard Reading  
 Cond 1.413 mS/cm 1.448 → calibrated  
 ORP 240 mV 238.3 → calibrated  
 pH 7.0 7.04 → calibrated  
 pH 4.0 3.98 → calibrated

0920: MC sets up @ MW-12, see purge log  
 for details.

1030: Collect sample 080715MW12GW

1103: Collect sample 080715MW11GW

1110: MC to landfill to begin clearing  
 brush @ monitoring wells.

Location Bradford Island Date 7/15/08  
 Project / Client Upland OU RI / USACE  
Mark Cook

1235: ZO sets up @ MW-8, see  
 purge log for details. MC inspects  
 seep locations.

1305: All seep locations dry. MC  
 documented this w/ photographs.  
 MC sets up @ MW-2, see purge log  
 for details.

1445: MW-8 drawn down below pumping  
 depth of peristaltic pump. Recharge  
 ~ 0.1 ft/hr, too slow to allow recharge  
 and sampling today. ZO packs tubing  
 for MW-8 in clean plastic bags and  
 tapes a garbage bag over the  
 top of the well head secured  
 with tape to the outside of  
 the casing. If MW-8 is not  
 recharged sufficiently by 7/16, will  
 use submersible pump to complete  
 purge + sampling.

1510: Begin sampling MW-2

Sample time: 080715MW2GW @ 1430

1550: ZO offsite to PDX to pack  
 samples for shipping.

1605: MC offsite.

Location Bradford Island Date 7/16/08Project / Client Upland OU RI / USACEMark Cook

0802: MC + ZO onsite @ BI landfill  
 0805: MC conducts HAS tailgate meeting  
 discuss heat stress.

0810: Calibrate YSI meters

SN: 05D2720

	Standard	Reading
COND	1.413 mS/cm	1.420 → calibrated
ORP	240 mV	243.4 → calibrated
pH	7.0	6.96 → calibrated
pH	4.0	3.91 → calibrated

SN: 06M1536

COND	1.413	1392 → calibrated
ORP	240	242.9 → calibrated
pH	4.0	4.0 → checked
pH	7.0	7.0 → checked

0830: ZO resumes purging @ MW-8  
 MC sets up @ MW-10, see purge log.

0845: Due to slow recharge @ MW-8  
 ZO decides to use Grundfos  
 submersible pump to sample  
 MW-8. There is not enough water  
 column in MW-8 to allow sampling  
 w/ a peristaltic pump.

Location Bradford Island Date 7/16/08Project / Client Upland OU RI / USACEMark Cook

0930: Carlton Morris (USACE)  
 @ landfill to inspect ruts  
 on access road. Carlton stated  
 that the road will need to  
 be scraped to a level surface  
 w/ a Bobcat. Also showed Carlton  
 the location of the "Maverick Box"  
 near MW-8.

1149: Collect sample 080716 MW 8 GW <sup>MC</sup>1153: Collect sample 080716 MW 8 GW MS <sup>MC</sup>1159: Collect sample 080716 MW 8 GW MSD <sup>MC</sup>

1230: Collect Rinseate blank <sup>MC</sup> see NOTE 1336  
 off of Grundfos submersible pump  
 after decontaminating w/ Alcomox/DI  
 scrub + DI water triple rinse.

080716-RB. Rinseate collected  
 by pouring laboratory provided  
 DI water over decontaminated pump  
 and into sample containers. A dissolved  
 metal (filtered) sample could not  
 be collected b/c field team could  
 not capture and filter rinse water.

1253: ZO offsite to Cascade Locks  
 to purchase more ice.

Location Bradford Island Date 7/16/08Project / Client Upland OU RI / USACEMark Cal...1305: Collect sample 080716MW10GW1310: Collect sample 080716MW10GWMS1315: Collect sample 080716MW10GWMSDField duplicate 080716MW22GW

Sample Time = 1245.

1336: ZO onsite, begin setup @ MW-6, <sup>see purge log</sup>

NOTE: Rinse blank not collected

@ 1230 on 7/16 b/c laboratory

DI water is not onsite.

Will collect rinse blank tomorrow.

1413: NOTE: ZO collected sample

080716MW8GW @ 09351501: Collect sample 080716MW6GW

1522: Collect field duplicate @ MW-6

080716MW21GW

1525: Begin site cleanup.

1540: MC + ZO offsite.

Mark Cal...  
7/16/08Location Bradford Island Date 7/17/08Project / Client Upland OU RI / USACEMark Cal...

0802: MC onsite Calibrate YSI

SN: 05D2720

	Standard	Reading
COND	1.413 mS/cm	1.316 → calibrated
ORP	240 mV	242.6 → calibrated
pH	7.0	-5.94 → calibrated
pH	4.0	3.85 → calibrated

SN: 06M1536

COND	1.413 mS/cm
ORP	240 mV
pH	7.0
pH	4.0

0810: ZO onsite. MC conducts HAS  
tailgate meeting discuss slip, trip, fall  
hazard around overgrown wells.0820: MC begins setup @ MW-3, see  
purge log for details.0900: Collect rinse blank off of  
Groundfos pump w/ lab. DI water  
as described on p. 51 (1230).080717RB, no dissolved metal  
sample collected (unable to filter)0935: YSI 05D2720 is giving  
anomalous pH and ORP readings @ MW-3.

Location Bradford Island Date 7/17/08Project / Client Upland OU RI / USACEMark Cook

an attempt to check and recalibrate the instrument did not work. Readings are orders of magnitude different from those recorded during the first quarter sampling event. MC plans to call Pine Environmental tech. support after sampling MW-3. PH + ORP not reported @ MW-3.

0936: ZO sets up @ MW-1

see purge log for details

1013: Collect sample 080717MW3GW

1050: MC begins setup @ MW-4, see purge log for details. ZO sets up

on MW-7 while MW-1 recharges

1100: MC calls Pine Environmental Tech. Support. The rep. had MC erase the calibration memory on YSI SN: 05D2720 and recalibrate PH + ORP. See below for cal. results

	Standard	reading
PH	7.0	7.14 → cal'd
PH	4.0	4.08 → cal'd
ORP	240mV	231.8 → cal'd

1136: Collect sample 080717MW07GWLocation Bradford Island Date 7/17/08Project / Client Upland OU RI / USACEMark Cook

1145: ZO reports that MW-1 is recharging @ a rate of ~ 0.1' every 1.5 hours. The well has a ~ 4' water column and draws down rapidly even when purging slowly (~ 50mL/min). Plan to purge as much as possible on 7/17 w/ peristaltic pump, allow MW-1 to recharge over night, and collect minimum sample volumes on 7/18.

1153: ZO sets up @ MW-9.

1158: MW-9 DTW = 16.01', TD = 16.83 (soft) ∴ water column is mostly in well sump. Decide to not collect a water sample @ MW-9 due to insufficient water column.

1215: Collect sample 080717MW4GW

1245: MW-1 DTW = 29.05', TD = 31.5'

call J. Wallace for approval to purge well dry and return on 7/18 to collect sample. Jeff concurred w/ this plan. Decide to use submersible pump to purge MW-1 dry.



Location Bradford Island Date 7/17/08Project / Client Upland OU RI / USACEMark Col

1320: While being lowered into MW-1 the submersible pump became stuck inside the well casing. Suspect that the tubing has lodged on something inside the well and is preventing the pump from being pulled up. Plan to go offsite to purchase a tool to push the pump deeper and dislodge the tubing.

1335: ZO + MC offsite to hardware store.

1430: ZO + MC onsite.

1454: Successfully remove pump + tubing from MW-1. Refit tubing and place submersible Grundfos pump ~1' off bottom of well. Plan to purge well dry @ low flow rate. See purge log for details.

1530: MW-1 drawn down below top of pump. Remove pump and tubing from well. Will return and sample on 7/18. Begin site cleanup.

1600: ZO + MC offsite.

Mark Col 7/17/08

Location Bradford Island Date 7/18/08Project / Client Upland OU RI / USACEMark Col

0830: MC onsite. Check WL in MW-1  
DTW: 29.75' TD: 31.5'  
Plan to await arrival of ZO before sampling.

0840: MC receives a voice mail from L. McWilliams with analyte priority. Plan to fill: 1. VOC/TPH-GX, 2. Metals, 3. TPH-DX, 4. SVOC, 5. Butyltins.

0852: ZO onsite, begin setup for sampling MW-1 with Grundfos pump.

0913: Collect sample 080713 MW1GW

Note: there was insufficient water in MW-1 to collect sample for all analytes. Filled bottles for VOCs, TPH-GX, and Metals.

0930: Begin site cleanup.

1000: Depart Landfill site and lock gate.

1007: Empty purge water into labeled drum @ hazmat storage area and deposit trash into dumpster near sandblast building.

1019: MC + ZO offsite.

Mark Col 7/18/08

Monitoring Well Sampling Field Log

Well Number: **MW-1**  
Date: **7/17/08**

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<b>Project Information</b>	
Project Name:	<b>BI</b>
URS Project Number:	<b>25096679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>ZO/MC</b>
Purge Method:	<b>P-Pump/Submersible</b>
Pump Intake Depth (ft btc):	<b>~28</b>
Flow-Through Cell:	<b>451 536</b>
Sampling Method:	<b>Low Flow</b>
Decontamination Method:	<b>NA - Dedicated</b>
Purge Water Disposition:	
Field Conditions:	<b>Sandy Calm ~70°</b>
<b>Comments:</b>	
1012: Pump off + check recharge.	
DO readings are likely incorrect.	
Collected VOC, TPH-GX, Metals insufficient water in well to fill all bottles (recharge ~0.5'/day)	

<b>Well Information</b>				Stick-up or Flush (circle one)	
Well Diameter (in)	Drilled Well Depth (ft bgs, ft btc)		Top of Screen (ft bgs, ft btc)		Screen Interval (ft bgs)
<b>2"</b>			<b>20</b>	<b>7</b>	<b>20 - 30</b>
<b>Well Volume Calculation:</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>31.73'</b>	<b>27.68</b>	<b>4</b>	<b>17</b>	<b>~.75</b>	<b>2.25</b>
$3\frac{1}{4}" = 0.023 \text{ gal/ft}$ $2" = 0.17 \text{ gal/ft}$ $4" = 0.66 \text{ gal/ft}$ $6" = 1.5 \text{ gal/ft}$					
<b>Sample Containers:</b>					
Number	Type	Preservative	Analytical Parameters	Filtered?	
1	1L Poly	HNO <sub>3</sub>	Total Metals		
1	1L Poly	HNO <sub>3</sub>	Dis. Metals	X	→ Not collected
<del>1</del>	<del>1L Poly</del>	<del>-</del>	<del>Butyltin</del>	<del>MC</del>	
3	40ml WA	HCl	VOCs		
<del>1</del>	<del>1L Amber</del>	<del>-</del>	<del>SVOEs</del>	<del>MC</del>	→ Not collected
3	40ml VOA	HCl	TPH-GX		
<del>1</del>	<del>500ml Amber</del>	<del>HCl</del>	<del>TPH-DX</del>	<del>MC</del>	→ Not collected

Well Purge Data		Total Volume to Purge (gal) =								
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mv)	Turbidity (NTUs)	Clarity/Color/Remarks
957	Pump On		Initial 27.68	-	±3%	±10%	±0.1	±10mv	±10%	≤ Stabilization Criteria
1007	< 1	< 100	28.30	14.52	1866	-0.02	8.40	92.6	Clear	
1012	Pump	GFF	Lack of water							
1017										
1022	Slow	Recharge	will	Return	later	in	Day.			
1257	NA	NA	27.98							
1317	Pump	On	28.05							
1330	Pump	Off	- No water.							
1506	Pump	On	28.60							
1511	~2.5	~500	29.38	14.11	1873	-0.02	8.26	411.2	Dirty Brown	
1516		~250	29.66	16.91	2008	-0.02	8.35	119.7	"	
1521		~250	29.87	17.11	2009	-0.02	8.34	69.4	"	
1526		250	-	WL below	top of	pump				
1530	Pump	Off	will	return	on	7/18	to	collect		
0909	Pump	ON	for	sample						
0923	Pump	OFF	DTW=	30.47	@	Top	of	pump.		
Start Sampling	0909	Sample Time: 0913								
End Sampling	0923	Sample Number: 080718MW1GW								
			30.70							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

*Mark Cook* 7/18/08

Monitoring Well Sampling Field Log

Well Number: **MW-2**

Page 1 of **1**

Date: **7/15/08**

Project Information	
Project Name: <b>BI</b>	
URS Project Number: <b>25096679.00006</b>	
Sampling Information	
Field Team: <b>20 + MC</b>	
Purge Method: <b>peristaltic</b>	
Pump Intake Depth (ft btc): <b>27'</b>	
Flow-Through Cell: <b>yes</b>	
Sampling Method: <b>low flow</b>	
Decontamination Method: <b>n/a dedicated sampling equipment</b>	
Purge Water Disposition: <b>onsite drum</b>	
Field Conditions: <b>80's partly cloudy wind 5-15</b>	
Comments:	
<b>Collected minimum volume for Metals + Butyltins analysis due to drawdown while collecting sample</b>	

Well Information		Pick-up or Flush (circle one)			
Well Diameter (in)	Drilled Well Depth (ft btc)	Top of Screen (ft btc)	Screen Interval (ft bgs)		
<b>2"</b>			<b>22 - 32</b>		
Well Volume Calculation					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>34.2</b>	<b>9.99</b>	<b>24.21</b>	<b>X 0.17</b>	<b>4.1</b>	<b>12.4</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft					
Sample Containers					Filtered?
Number	Type	Preservative	Analytical Parameters		
1	1L Poly	HNO <sub>3</sub>	Total Metal.		
1	1L Poly	HNO <sub>3</sub>	Dis. Metal		X
1	1L Poly	—	Butyltins		
3	VOA	HCl	VOCs		
1	1L Amber	—	SVOCs		
3	VOA	HCl	TPH-GX		
1	Small Amber	HCl	TPH-DX		

Well Purge Data		Total Volume to Purge (gal) =									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
<b>1306</b>	Pump On		<b>9.99</b>		±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria	
<b>1311</b>	<b>0.5</b>	<b>~450</b>	<b>-</b>	<b>12.58</b>	<b>290</b>	<b>26.33</b>	<b>8.57</b>	<b>162.8</b>	<b>CC</b>		
<b>1316</b>	<b>0.9</b>	<b>~450</b>	<b>-</b>	<b>12.66</b>	<b>289</b>	<b>8.19</b>	<b>8.58</b>	<b>160.4</b>	<b>CC</b>		
<b>1321</b>	<b>1.4</b>	<b>~450</b>	<b>-</b>	<b>13.08</b>	<b>293</b>	<b>6.10</b>	<b>8.60</b>	<b>149.2</b>	<b>CC</b>	✓	
<b>1326</b>	<b>1.8</b>	<b>~450</b>	<b>-</b>	<b>13.19</b>	<b>294</b>	<b>5.50</b>	<b>8.67</b>	<b>141.8</b>	<b>CC</b>	✓	
<b>1331</b>	<b>2.2</b>	<b>~450</b>	<b>20.45</b>	<b>13.20</b>	<b>292</b>	<b>5.60</b>	<b>8.62</b>	<b>143.4</b>	<b>CC</b>	✓	
<b>1332</b>	<b>Pump shut off to allow well to recharge prior to sampling</b>										
<b>1505</b>	<b>Resume pumping after 5 minutes. DTW = 16.23'. Plan to collect sample after 5 minutes of purge.</b>										
<b>Mark Lund</b> <b>7/15/08</b>											
Start Sampling	<b>1510</b>										
End Sampling	<b>1553</b>										
	<b>22.84'</b>		Sample Number: <b>080715MW26W ST: 1430</b>								

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy CI=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear



Monitoring Well Sampling Field Log

Page 1 of 1

Well Number: **MW-3**  
Date: **7/17/08**

<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>MC + 20</b>
Purge Method:	<b>peristaltic</b>
Pump Intake Depth (ft btc):	<b>19'</b>
Flow-Through Cell:	<b>yes</b>
Sampling Method:	<b>low flow</b>
Decontamination Method:	<b>n/a dedicated sampling equipment</b>
Purge Water Disposition:	<b>onsite drum</b>
Field Conditions:	<b>70's, clear, w wind 10-20</b>
Comments: <b>pH + ORP sensors malfunctioning ∴ readings not reported. Disregard reading marked w/ *</b> <b>NOTE: pH + ORP readings stable for last 3 readings.</b>	

<b>Well Information</b>					
Stick-up or Flush (circle one)					
Well Diameter (in)	Drilled Well Depth (ft bgs) (ft btc)		Top of Screen (ft bgs) (ft btc)		Screen Interval (ft bgs)
			<b>11</b>		<b>11 - 21</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>22.8</b>	<b>17.44</b>	<b>5.36</b>	<b>0.17</b>	<b>0.9</b>	<b>2.7</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft					

Sample Containers				Filtered?
Number	Type	Preservative	Analytical Parameters	
1	1L Poly	HNO <sub>3</sub>	Total Metals	
1	1L Poly	HNO <sub>3</sub>	Dis. Metals	X
1	1L Poly	-	Butyltins	
3	40mL VOA	HCl	VOCs	
1	1L Amber	-	SVOCs	
3	40mL VOA	HCl	TPH-6X	
1	500mL Amber	HCl	TPH-DX	

Well Purge Data		Total Volume to Purge (gal) = <b>2.0</b>									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
0930	Pump On		<sup>Initial</sup> 17.44	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria	
0935	0.7	~150	17.44	12.29	121	15.65	19.49*	-515.6*	C		
0940	1.5	~150	17.45	11.32	118	9.46	-	-	C		
0945	2.2	~150	17.45	11.39	108	5.59	-	-	C		
0950	2.9	~150	17.45	11.42	104	4.4	-	-	C	✓	
0955	3.6	~150	-	11.50	104	4.04	-	-	C	✓	
1000	4.3	~150	-	11.15	104	3.70	-	-	C	✓	
<i>Mark Cook 7/17/08</i>											
Start Sampling	<b>1004</b>		<b>Sample Time: 1013</b>								
End Sampling	<b>1029</b>		<b>Sample Number: 080717MWBGW</b>								
			<b>17.47</b>								

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy CI=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Monitoring Well Sampling Field Log

Well Number: **MW-4**  
Date: **7/17/08**

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<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>MC + 20</b>
Purge Method:	<b>peristaltic</b>
Pump Intake Depth (ft btc):	<b>26' (due to DTW)</b>
Flow-Through Cell:	<b>yes</b>
Sampling Method:	<b>low flow</b>
Decontamination Method:	<b>n/a dedicated sampling equipment</b>
Purge Water Disposition:	<b>onsite drain</b>
Field Conditions:	<b>80's clear W wind 10-20</b>
Comments:	<b>some rusty orange biomass in purge water initially.</b>

<b>Well Information</b>						Stick-up or Flush (circle one)	
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)		
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)			
<b>2"</b>			<b>8</b>		<b>9 - 28</b>		
<b>Well Volume Calculation</b>							
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)		
<b>32.2</b>	<b>16.93</b>	<b>15.57 x 0.17</b>	<b>2.6</b>	<b>7.8</b>			
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft							

Sample Containers				Filtered?
Number	Type	Preservative	Analytical Parameters	
1	1L Poly	HNO <sub>3</sub>	Total Metals	
1	1L Poly	HNO <sub>3</sub>	Dis. Metals	X
1	1L Poly	-	Butyltins	
3	40ml VOA	HCl	VOCS	
1	1L Amber	-	SVOCs	
3	40ml VOA	HCl	TPH-6X	
1	500ml Amber	HCl	TPH-DX	

Well Purge Data											Total Volume to Purge (gal) = <b>2.5</b>
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
11.27	Pump On		<b>16.93</b>		±3%	±10%	±0.1	±10mv	±10%	≤ Stabilization Criteria	
11.30	0.4	~150	17.21	17.30	460	9.93	6.62	30.7	SC		
11.35	1.1	~150	17.23	14.66	452	5.05	6.61	32.4	AC		
11.40	1.9	~150	-	13.26	440	4.15	6.62	34.0	AC		
11.45	1.6	~150	-	13.44	399	2.80	6.61	31.5	AC		
11.50	2.3	~150	-	13.44	373	2.24	6.57	33.9	AC		
11.55	3.1	~150	-	13.30	359	1.88	6.53	22.7	AC		
12.00	3.8	~150	17.28	13.40	348	1.64	6.49	-1.7	AC		
12.05	4.5	~150	-	13.37	343	1.54	6.53	-13.7	AC	✓	
12.10	5.2	~150	-	13.40	341	1.42	6.57	-20.5	AC	✓	
12.15	5.9	~150	-	13.39	340	1.39	6.58	-22.9	AC	✓	
<i>Mark C... 7/17/08</i>											
Start Sampling	<b>1216</b>		Sample Time: <b>1215</b>								
End Sampling	<b>1240</b>		Sample Number: <b>080717MW4GW</b>								
			Final								

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Monitoring Well Sampling Field Log

Well Number: **MW-5**

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Date: **7/16/08**

<b>Project Information</b>	
Project Name: <b>BT</b>	
URS Project Number: <b>25696679.00006</b>	
<b>Sampling Information</b>	
Field Team: <b>ZC / MC</b>	
Purge Method: <b>P-Pump</b>	
Pump Intake Depth (ft btc): <b>30'</b>	
Flow-Through Cell: <b>451 556</b>	
Sampling Method: <b>Low Flow</b>	
Decontamination Method: <b>NA - Dedicated</b>	
Purge Water Disposition:	
Field Conditions: <b>Sunny Calm ~75°</b>	
Comments:	

<b>Well Information</b> (Stick-up or Flush (circle one))					
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2"</b>			<b>10</b>	<b>33</b>	<b>10-35</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>35</b>	<b>19.40</b>	<b>15.5</b>	<b>.17</b>	<b>2.6</b>	<b>~8</b>

3/4"=0.023 gal/ft    2"=0.17 gal/ft    4"=0.66 gal/ft    6"=1.5 gal/ft				
<b>Sample Containers</b>				Filtered?
Number	Type	Preservative	Analytical Parameters	
1	1L Poly	HNO <sub>3</sub>	Total Metals	
1	1L Poly	HNO <sub>3</sub>	Dis. Metals	X
1	1L Poly	-	Butyltins	
3	40ml VOA	HCl	VOCS	
1	1L Amber	-	SVOCs	
3	40ml VOA	HCl	TPH-6X	
1	500ml Amber	HCl	TPH-DX	

<b>Well Purge Data</b>		Total Volume to Purge (gal) =									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
1047	Pump On		19.40 <sup>initial</sup>	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria	
1052	~1			12.42	616	-0.02	6.55	-90.9		Almost Clear	
1057	~3			12.13	605	-0.02	6.55	-90.7		Clear	
1102	~5			12.42	600	-0.02	6.57	-89.7		Clear	
1107	~8	~400	19.40	12.39	599	-0.01	6.58	-89.7		Clear	✓
1112		~300		12.43	593	-0.02	6.59	-83.9		Clear	✓
1117	~11	~300		12.46	588	-0.02	6.60	-83.4		Clear	✓
Extra Volume for MS/MSD collected.											
MS ST = 1153											
MSD ST = 1159											
Start Sampling	1132										
End Sampling	1217		Sample Number: <b>080716 MW05GW</b> ST: <b>1149</b> <b>7/16/08</b>								
			19.41 <sup>Final</sup>								

Note: bgs= below ground surface    btc=below top of casing    DTW=depth to water  
Clarity: VC=very cloudy    Cl=cloudy    SC=slightly cloudy    AC=almost clear    C=clear    CC=crystal clear

*Mark Cook*

Monitoring Well Sampling Field Log

Well Number: **MW-6**  
Date: **7/16/08**

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<b>Project Information</b>
Project Name: <b>BI</b>
URS Project Number: <b>25696679.00006</b>
<b>Sampling Information</b>
Field Team: <b>ZO/MC</b>
Purge Method: <b>P-Pump</b>
Pump Intake Depth (ft btc): <b>28'</b>
Flow-Through Cell: <b>751 536</b>
Sampling Method: <b>Low Flow P-Pump</b>
Decontamination Method: <b>NA - Dedicated</b>
Purge Water Disposition:
Field Conditions: <b>Sunny, Calm ~75°</b>
Comments: <b>Extra Volume collected for field duplicate</b> <b>Field Dup = 080716MW21GW</b> <b>ST = 1522</b>

<b>Well Information</b>		Stick-up or Flush (circle one)			
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2"</b>					<b>25-30</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>32</b>	<b>18.30</b>	<b>14</b>	<b>.17</b>	<b>2.4</b>	<b>7.2</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft					

Sample Containers				Filtered?
Number	Type	Preservative	Analytical Parameters	
<b>2</b>	<b>1L Poly</b>	<b>HNO3</b>	<b>Total Metals</b>	
<b>2</b>	<b>1L Poly</b>	<b>HNO3</b>	<b>Dis. Metals</b>	<b>X</b>
<b>2</b>	<b>1L Poly</b>	<b>-</b>	<b>Butyltins</b>	
<b>6</b>	<b>40mL VOA</b>	<b>HCl</b>	<b>VOCs</b>	
<b>2</b>	<b>1L Amber</b>	<b>-</b>	<b>SVOCs</b>	
<b>6</b>	<b>40mL VOA</b>	<b>HCl</b>	<b>TPH-6X</b>	
<b>2</b>	<b>500mL Amber</b>	<b>HCl</b>	<b>TPH-DX</b>	

Well Purge Data		Total Volume to Purge (gal) =								
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks
<b>1400</b>	<b>Pump On</b>		<b>Initial 18.30</b>		<b>±3%</b>	<b>±10%</b>	<b>±0.1</b>	<b>±10mv</b>	<b>±10%</b>	<b>&lt;= Stabilization Criteria</b>
<b>1405</b>										
<b>1410</b>	<b>2-3</b>	<b>~350</b>	<b>18.35</b>	<b>12.91</b>	<b>650</b>	<b>0.44</b>	<b>6.73</b>	<b>-100.6</b>	<b>Cloudy</b>	
<b>1415</b>	<b>5</b>	<b>~350</b>	<b>18.35</b>	<b>12.49</b>	<b>641</b>	<b>0.47</b>	<b>6.76</b>	<b>-100.0</b>	<b>Cloudy</b>	
<b>1420</b>				<b>12.50</b>	<b>639</b>	<b>1.16</b>	<b>6.75</b>	<b>-99.5</b>	<b>Almost Clear</b>	
<b>1425</b>	<b>10</b>	<b>~400</b>	<b>18.35</b>	<b>12.49</b>	<b>637</b>	<b>0.39</b>	<b>6.84</b>	<b>-106.2</b>	<b>Almost Clear</b>	
<b>1430</b>	<b>~12</b>	<b>~250</b>	<b>18.35</b>	<b>12.86</b>	<b>644</b>	<b>0.28</b>	<b>6.76</b>	<b>-104.2</b>	<b>Almost Clear</b>	
<b>1435</b>	<b>~14</b>	<b>~250</b>	<b>18.35</b>	<b>13.00</b>	<b>647</b>	<b>0.27</b>	<b>6.76</b>	<b>-106.6</b>	<b>Clear</b>	
<b>1440</b>	<b>14</b>	<b>~200</b>		<b>13.06</b>	<b>648</b>	<b>0.24</b>	<b>6.76</b>	<b>-106.9</b>	<b>Clear</b>	
<b>1445</b>			<b>18.35</b>	<b>13.03</b>	<b>646</b>	<b>0.23</b>	<b>6.76</b>	<b>-106.7</b>	<b>Clear</b>	
<b>DUP: 080716MW21GW ST=1522</b>										
Start Sampling	<b>1447</b>									
End Sampling	<b>1517</b>	Sample Number:	<b>080716MW06GW</b>							
	<b>18.35</b>		<b>ST=1501</b>							
			<b>7/16/08</b>							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

*Mark [Signature]*

Monitoring Well Sampling Field Log

Well Number: MW-7  
Date: 7/17/08

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<b>Project Information</b>	
Project Name: <u>BI</u>	
URS Project Number: <u>25696679.00006</u>	
<b>Sampling Information</b>	
Field Team: <u>ZO/MC</u>	
Purge Method: <u>P-Pump</u>	
Pump Intake Depth (ft btc): <u>~30</u>	
Flow-Through Cell: <u>YS1 556</u>	
Sampling Method: <u>Low Flow</u>	
Decontamination Method: <u>NA - Ded. catcol</u>	
Purge Water Disposition:	
Field Conditions: <u>Sunny, Calm, ~80°</u>	
Comments: <u>ST = 1138</u>	

<b>Well Information</b>		Stick-up or Flush (circle one)	
Well Diameter (in)	Drilled Well Depth		Top of Screen
	(ft bgs)	(ft btc)	(ft bgs) (ft btc)
<u>2"</u>			<u>5 - 30</u>

<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<u>32</u>	<u>9.81</u>	<u>22</u>	<u>0.17</u>	<u>3.75</u>	<u>11.25</u>
3/4"=0.023 gal/ft <u>2"=0.17 gal/ft</u> 4"=0.66 gal/ft    6"=1.5 gal/ft					

Sample Containers				Filtered?
Number	Type	Preservative	Analytical Parameters	
<u>1</u>	<u>1L Poly</u>	<u>HNO3</u>	<u>Total Metals</u>	
<u>1</u>	<u>1L Poly</u>	<u>HNO3</u>	<u>Dis. Metals</u>	<u>X</u>
<u>1</u>	<u>1L Poly</u>	<u>-</u>	<u>Butyltins</u>	
<u>3</u>	<u>40mL VOA</u>	<u>HCl</u>	<u>VOCS</u>	
<u>1</u>	<u>1L Amber</u>	<u>-</u>	<u>SVOCs</u>	
<u>3</u>	<u>40mL VOA</u>	<u>HCl</u>	<u>TPH-6X</u>	
<u>1</u>	<u>500mL Amber</u>	<u>HCl</u>	<u>TPH-DX</u>	

Well Purge Data		Total Volume to Purge (gal) = <u>3.0</u>								
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks
<u>1050</u>	<u>Pump On</u>		<u>7.81</u>		<u>±3%</u>	<u>±10%</u>	<u>±0.1</u>	<u>±10mv</u>	<u>±10%</u>	<u>Stabilization Criteria</u>
<u>1055</u>	<u>~2</u>	<u>~400</u>	<u>10.00</u>	<u>12.94</u>	<u>479</u>	<u>-0.02</u>	<u>6.63</u>	<u>131.0</u>	<u>131.0</u>	<u>Almost Clear</u>
<u>1100</u>	<u>~4</u>	<u>~250</u>	<u>10.04</u>	<u>12.78</u>	<u>475</u>	<u>-0.03</u>	<u>6.61</u>	<u>103.6</u>	<u>103.6</u>	<u>Almost Clear</u>
<u>1105</u>	<u>~5</u>	<u>~250</u>		<u>12.78</u>	<u>473</u>	<u>-0.02</u>	<u>6.62</u>	<u>98.9</u>	<u>98.9</u>	<u>Clear</u>
<u>1110</u>		<u>~250</u>		<u>12.88</u>	<u>473</u>	<u>-0.02</u>	<u>6.61</u>	<u>97.6</u>	<u>97.6</u>	<u>Clear</u>
<u>1115</u>	<u>~10</u>			<u>12.78</u>	<u>471</u>	<u>-0.02</u>	<u>6.61</u>	<u>100.4</u>	<u>100.4</u>	<u>Clear</u>
<i>Mark Cook</i> <u>7/17/08</u>										
Start Sampling <u>1121</u>										
End Sampling <u>1140</u>		Sample Number: <u>080717MW07GW</u>								
		<u>ST = 1138</u>								

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Monitoring Well Sampling Field Log

Well Number: **MW-8**

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Date: **7/15 - 7/16/08**

<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>ZO / MC</b>
Purge Method:	<b>P-Pump</b>
Pump Intake Depth (ft btc):	<b>55.5'</b>
Flow-Through Cell:	<b>YSI 556</b>
Sampling Method:	<b>P-Pump / Low Flow</b>
<b>Decontamination Method:</b>	
<b>NA - Dedicated</b>	
<b>Purge Water Disposition:</b>	
<b>Field Conditions: Sunny Hot ~80°</b>	
<b>Comments:</b>	
<b>Tubing is in Sun light.</b>	
<b>31' water column, 80% = 24' or DTW = 34'</b>	

<b>Well Information</b>					
(Stick-up or Flush) (circle one)					
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2"</b>					<b>53-58</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>58</b>	<b>26.63</b>	<b>31</b>	<b>.17</b>	<b>5.25</b>	<b>15.75</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft					
<b>Sample Containers</b>					Filtered?
Number	Type	Preservative	Analytical Parameters		
1	1L Poly	HNO <sub>3</sub>	Total Metals		
1	1L Poly	HNO <sub>3</sub>	Dis. Metals X		
1	1L Poly	-	Butyltins		
3	40mL VOA	HCl	VOCs		
1	1L Amber	-	SVOCs		
3	40mL VOA	HCl	TPH-6X		
1	500mL Amber	HCl	TPH-DX		

Well Purge Data		Total Volume to Purge (gal) = <b>2.0</b>									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
1248	Pump On		<b>26.63</b>		±3%	±10%	±0.1	±10mv	±10%	⇐ Stabilization Criteria	
1253	NA										
1258	2.1	~50		16.87	3263	1.26	7.85	71.2	Clear		
1303	1	50		17.15	3295	0.83	7.96	63.8	Clear		
1308	~1.5	~50		17.27	3291	0.62	8.00	57.6	Clear		
1313	2.0	~50		17.76	3305	0.51	8.01	52.3	Clear		
1318	2.5	~50	31.19	18.57	3353	0.46	8.00	48.7	Clear		
1323	3.0	~50	31.72	18.92	3371	0.45	7.95	46.4	Clear		
1328	3.5	~50	31.86	19.27	3392	0.45	7.91	44.7	Clear		
835			30.70								
854	PUMP ON										
859	PUMP OFF										
<i>Mark Call</i>											
<b>ST-1351</b>											
Start Sampling	<b>859</b>	<b>925</b>	SAMPLE RENAMED: 080716 MW08 GW								<b>ST=0936</b>
End Sampling	<b>951</b>		Sample Number: 080715 MW08 GW								
			<b>41.15</b>								

Note: bgs=below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

1328 - Pump Off to allow recharge. Then will sample.

SAMPLING Postponed due to slow recharge. Well sealed overnight.

Monitoring Well Sampling Field Log

Well Number: **MW-9**  
Date: **7/17/08**

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Project Information	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
Sampling Information	
Field Team:	<b>ZC/MC</b>
Purge Method:	<b>P-Pump</b>
Pump Intake Depth (ft btc):	<b>20'</b>
Flow-Through Cell:	<b>YS1556</b>
Sampling Method:	<b>Low Flow</b>
Decontamination Method:	<b>NA - Dedicated</b>
Purge Water Disposition:	
Field Conditions:	<b>Sunny Calm 80°</b>
Comments:	<b>Two extra 50 volumes collected for MS/MSD. No MS/MSD. DTW=15.99 DT Bottom=16.4 bttc</b>

Well Information					
		Stick-Up or Flush (circle one)			
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2"</b>					<b>15-20</b>
Well Volume Calculation					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>22</b>	<b>15.99</b>	<b>75</b>	<b>0.17</b>		
3/4"=0.023 gal/ft    2"=0.17 gal/ft    4"=0.66 gal/ft    6"=1.5 gal/ft					
Sample Containers					Filtered?
Number	Type	Preservative	Analytical Parameters		
<b>3</b>	<b>1L Poly</b>	<b>HNO<sub>3</sub></b>	<b>Total Metals</b>		
<b>3</b>	<b>1L Poly</b>	<b>HNO<sub>3</sub></b>	<b>Dis. Metals</b>		<b>X</b>
<b>3</b>	<b>1L Poly</b>	<b>-</b>	<b>Butyltins</b>		
<b>9</b>	<b>40ml VOA</b>	<b>HCl</b>	<b>VOCs</b>		
<b>3</b>	<b>1L Amber</b>	<b>-</b>	<b>SVOCs</b>		
<b>9</b>	<b>40ml VOA</b>	<b>HCl</b>	<b>TPH-6X</b>		
<b>3</b>	<b>500ml Amber</b>	<b>HCl</b>	<b>TPH-DX</b>		

Not Sampled

Well Purge Data		Total Volume to Purge (gal) =								
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks
	Pump On		Initial	-	±3%	±10%	±0.1	±10mv	±10%	≤ Stabilization Criteria
<p><b>WATER DEPTH = 16.01' bttc</b>  <b>WELL DEPTH = 16.73' bttc</b></p> <p style="font-size: 2em; transform: rotate(-30deg); opacity: 0.5;">Marked out 7/17/08</p>										
	Start Sampling									
	End Sampling	Sample Number: <b>No Sample Collected</b>								
		Final								

Note: bgs=below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Monitoring Well Sampling Field Log

Well Number: **MW-10**  
Date: **7/16/08**

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<b>Project Information</b>	
Project Name:	<b>BI</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>MC + 20</b>
Purge Method:	
Pump Intake Depth (ft btc):	<b>52'</b>
Flow-Through Cell:	<b>yes</b>
Sampling Method:	<b>low flow</b>
Decontamination Method:	<b>n/a dedicated sampling equipment</b>
Purge Water Disposition:	<b>onsite drum</b>
Field Conditions:	<b>80's clear w wind S-15</b>
Comments:	<b>v. soft silty bottom of well</b>
	<b>Collected minimum sample volume due to drawdown while sampling</b>

<b>Well Information</b>		Stick-up or Flush (circle one)			
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2"</b>	<b>57.5</b>	<b>-</b>	<b>47</b>	<b>-</b>	<b>47-57</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>58.4</b>	<b>26.11</b>	<b>32.29</b>	<b>0.17</b>	<b>5.5</b>	<b>16.5</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft					
<b>Sample Containers</b>					Filtered?
Number	Type	Preservative	Analytical Parameters		
<b>4</b>	<b>1L Poly</b>	<b>HNO<sub>3</sub></b>	<b>Total Metals</b>		
<b>4</b>	<b>1L Poly</b>	<b>HNO<sub>3</sub></b>	<b>Dis Metals</b>		<b>X</b>
<b>Extra volume collected for MS/MSD and field duplicate (MW 22)</b>					

Well Purge Data:		Total Volume to Purge (gal) =									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
			<sup>Initial</sup> 26.11		±3%	±10%	±0.1	±10mv	±10%	≤ Stabilization Criteria	
<b>0952</b>	<b>Pump On</b>										
<b>0955</b>	<b>0.2</b>	<b>~400</b>	<b>29.66</b>	<b>12.38</b>	<b>178</b>	<b>9.26</b>	<b>7.15</b>	<b>761.6</b>	<b>VC</b>		
<b>1000</b>	<b>1.4</b>	<b>250</b>	<b>29.73</b>	<b>12.67</b>	<b>180</b>	<b>6.39</b>	<b>7.13</b>	<b>748.8</b>	<b>SC</b>		
<b>1005</b>	<b>2.7</b>	<b>250</b>	<b>-</b>	<b>12.83</b>	<b>180</b>	<b>4.63</b>	<b>7.14</b>	<b>733.5</b>	<b>AC</b>		
<b>1010</b>	<b>3.9</b>	<b>250</b>	<b>-</b>	<b>12.40</b>	<b>179</b>	<b>3.56</b>	<b>7.12</b>	<b>723.6</b>	<b>C</b>		
<b>1015</b>	<b>5.1</b>	<b>250</b>	<b>31.64</b>	<b>12.50</b>	<b>174</b>	<b>2.33</b>	<b>7.16</b>	<b>714.0</b>	<b>C</b>		
<b>1020</b>	<b>6.3</b>	<b>250</b>	<b>31.88</b>	<b>12.67</b>	<b>179</b>	<b>2.07</b>	<b>7.14</b>	<b>-86.0</b>	<b>C</b>		
<b>1025 MC</b>											
<b>1021:</b>	<b>Water drew down below limit of peristaltic pump. Shut pump off to allow recharge. Recalibrate ORP probe due to anomalous readings</b>										
<b>1209:</b>	<b>Resume purge. DTW = 27.0'</b>										
<b>1210</b>	<b>6.5</b>	<b>~100</b>	<b>27.54</b>	<b>15.12</b>	<b>191</b>	<b>5.34</b>	<b>8.24</b>	<b>90.2</b>	<b>C</b>		
<b>1215</b>	<b>7.0</b>	<b>~100</b>	<b>27.87</b>	<b>15.06</b>	<b>190</b>	<b>4.38</b>	<b>8.18</b>	<b>81.1</b>	<b>C</b>		
<b>1220</b>	<b>8.5</b>	<b>~100</b>	<b>28.25</b>	<b>15.14</b>	<b>186</b>	<b>3.70</b>	<b>8.14</b>	<b>75.8</b>	<b>C</b>	<b>✓</b>	
<b>1225</b>	<b>8.0</b>	<b>~100</b>	<b>28.41</b>	<b>15.22</b>	<b>187</b>	<b>3.07</b>	<b>8.13</b>	<b>72.0</b>	<b>C</b>	<b>✓</b>	
<b>1230</b>	<b>8.5</b>	<b>~100</b>	<b>28.62</b>	<b>15.27</b>	<b>186</b>	<b>2.35</b>	<b>8.14</b>	<b>67.7</b>	<b>C</b>	<b>✓</b>	
<b>1232:</b>	<b>Pump off to allow recharge prior to sampling</b>										
Start Sampling	<b>1300</b>	<b>080716MW106WMS@1310 080716MW106WMSD@1315</b>									
End Sampling	<b>1344</b>	<b>Sample Number: 080716MW106W ST: 1305</b>									
		<sup>Final</sup> <b>30.76</b>	<b>Field Duplicate: 080716MW22GW @ 1245</b>								

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

*Mark Cook* 7/16/08  
(Updated: 05/10/05)



Monitoring Well Sampling Field Log

Well Number: **MW-11**  
Date: **7/15/08**

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<b>Project Information</b>	
Project Name: <b>BI</b>	
URS Project Number: <b>25696679.00006</b>	
<b>Sampling Information</b>	
Field Team: <b>MC + 20</b>	
Purge Method: <b>Peristaltic Pump</b>	
Pump Intake Depth (ft btc): <b>31'</b>	
Flow-Through Cell: <b>yes</b>	
Sampling Method: <b>Low Flow</b>	
<b>Decontamination Method: n/a dedicated sampling equipment</b>	
Purge Water Disposition: <b>onsite drum</b>	
Field Conditions: <b>80's, clear, w wind 10-20</b>	
<b>Comments:</b>	
28' water column, 80% = ~22.5' or DTW of <b>13.5'</b>	
948 - Pump off to allow recharge	
1008 - DTW rose 1.73' in 20 min.	
1020 - Pump On, DTW = 11.09	
1040 - Pump off to recharge for sample	

<b>Well Information</b>				Stick-up or <b>Flush</b> (circle one)	
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2"</b>					<b>26 - 36</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>36</b>	<b>7.78</b>	<b>28</b>	<b>.17</b>	<b>4.76</b>	<b>14.3</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft					

Sample Containers				Filterect?
Number	Type	Preservative	Analytical Parameters	
1	1L Poly	HNO3	Total Metals	
1	1L Poly	HNO3	Dis. Metals	X
1	1L Poly	-	Butyltins	
3	VOA	HCl	VOCs	
1	1L Amber	-	SVOCs	
3	VOA	HCl	TPH-6X	
1	500ml Amber	HCl	TPH-DX	

Well Purge Data										
Total Volume to Purge (gal) =										3.0
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks
907	Pump On		Initial 7.40	-	±3%	±10%	±0.1	±10mv	±10%	<< Stabilization Criteria
912	~1	200		12.74	350	1.14	8.57	164.4	Clear	
917	~3	300		12.73	349	1.38	8.62	149.9	Clear	
922	4			13.31	358	1.14	8.62	141.1	Clear	
927	5	200		13.59	360	1.06	8.63	122.0	Clear	
932	6	200		13.99	365	1.00	8.64	81.4	Clear	
937	7	200		13.80	365	0.88	8.65	52.3	Clear	
942	8	200	13.39	13.78	365	0.81	8.64	40.4	Clear	
947	9	100	13.51	14.19	369	0.73	8.62	24.4	Clear	
1025		<100	11.66	14.96	377	1.23	8.64	-14.1	Clear	
1030		<100	12.12	14.84	376	0.87	8.64	-35.0	Clear	
1035		<100	12.45	14.76	374	0.76	8.64	-44.8	Clear	
1040		<100	12.68	14.71	373	0.70	8.65	-51.3	Clear	
<div style="position: relative; width: 100%; height: 100%;"> <span style="position: absolute; top: 10px; left: 40%; font-size: 1.2em;">7/15/08</span> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); border: 2px solid black; border-radius: 50%; padding: 10px; font-size: 1.5em; font-weight: bold;">ST = 1103</div> </div>										
Start Sampling	1048									
End Sampling	1155		Sample Number: 080715MW11GW							
			Final 13.66							

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Parameters mostly stable. ORP changes as water level drops.

Monitoring Well Sampling Field Log

Well Number: **MW-12**

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Date: **7/15/08**

<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>20 + MC</b>
Purge Method:	<b>peristaltic</b>
Pump Intake Depth (ft b/c):	<b>21'</b>
Flow-Through Cell:	<b>yes</b>
Sampling Method:	<b>low flow</b>
Decontamination Method:	<b>n/a dedicated sampling equipment</b>
Purge Water Disposition:	<b>onsite drum</b>
Field Conditions:	<b>80's partly cloudy 40-45-10</b>
Comments:	

<b>Well Information</b>		(Stick-up) or Flush (circle one)	
Well Diameter (in)	Drilled Well Depth (ft bgs)	Top of Screen (ft bgs)	
<b>2'</b>			
		Screen Interval (ft bgs)	
		<b>16-26</b>	
<b>Well Volume Calculation</b>			
Well Depth (ft b/c)	DTW (ft b/c)	Water Column (ft)	Convert Factor (gal/ft)
<b>29.35</b>	<b>25.75</b>	<b>3.6 x 0.17</b>	<b>0.61</b>
		One Well Volume (gal)	Three Well Volumes (gal)
		<b>1.8</b>	<b>5.4</b>
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft			
<b>Sample Containers</b>			
Number	Type	Preservative	Analytical Parameters
1	1L Poly	HNO <sub>3</sub>	Total Metals
1	1L Poly	HNO <sub>3</sub>	Dis. Metals X
1	1L Poly	-	Butyltins
3	40ml VOA	HCl	VOCs
1	1L Amber	-	SVOCs
3	40ml VOA	HCl	TPH-6X
1	500ml Amber	HCl	TPH-DX

Well Purge Data		Total Volume to Purge (gal) = <b>1.5</b>									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft b/c)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
<b>0950</b>	Pump On		<sup>Initial</sup> <b>25.75</b>	-	±3%	±10%	±0.1	±10mv	±10%	≤ Stabilization Criteria	
<b>0955</b>	<b>0.1</b>	<b>~160</b>	-	<b>16.62</b>	<b>188</b>	<b>18.18</b>	<b>6.38</b>	<b>152.8</b>	<b>C</b>		
<b>1000</b>	<b>0.3</b>	<b>~160</b>	-	<b>14.42</b>	<b>174</b>	<b>4.86</b>	<b>6.25</b>	<b>141.5</b>	<b>C</b>		
<b>1005</b>	<b>0.5</b>	<b>~160</b>	-	<b>14.05</b>	<b>168</b>	<b>3.08</b>	<b>6.27</b>	<b>140.0</b>	<b>C</b>	✓	
<b>1010</b>	<b>0.6</b>	<b>~160</b>	-	<b>14.10</b>	<b>169</b>	<b>2.57</b>	<b>6.26</b>	<b>143.8</b>	<b>C</b>	✓	
<b>1015</b>	<b>0.8</b>	<b>~160</b>	-	<b>13.80</b>	<b>170</b>	<b>2.31</b>	<b>6.32</b>	<b>136.6</b>	<b>C</b>	✓	
<i>Mark Good</i> <b>7/15/08</b>											
Start Sampling	<b>1022</b>		<b>Sample Time: 1030</b>								
End Sampling	<b>1058</b>		<b>Sample Number: 080715MW126W</b>								
		<sup>Final</sup> <b>25.78</b>									

Note: bgs= below ground surface b/c=below top of casing DTW=depth to water  
 Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Monitoring Well Sampling Field Log

Well Number: **MW-13**  
Date: **7/14/08**

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<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>Z. Orland / M. Cecchin</b>
Purge Method:	<b>P-Pump</b>
Pump Intake Depth (ft btc):	<b>31</b>
Flow-Through Cell:	<b>YSI 556</b>
Sampling Method:	<b>Low Flow</b>
Decontamination Method:	<b>NA - Dedicated</b>
Purge Water Disposition:	
Field Conditions:	<b>Sunny light Breeze ~ 8'</b>
Comments:	<b>Water Column = 19'</b> <b>80% Drawdown = 16' or DTW = 33'</b>
<b>Field Duplicate: 080714MW13GW</b> <b>ST = 1207</b>	

<b>Well Information</b>		Stick-up or <u>Flush</u> (circle one)		(circle one)	
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)	
<b>2</b>					<b>26-36</b>
<b>Well Volume Calculation</b>					
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)
<b>36</b>	<b>17.08</b>	<b>19'</b>	<b>3.25</b>	<b>3.25</b>	<b>~10</b>
3/4" = 0.023 gal/ft    2" = 0.17 gal/ft    4" = 0.66 gal/ft    6" = 1.5 gal/ft					
<b>Sample Containers</b>					Filtered?
Number	Type	Preservative	Analytical Parameters		
1 x 2	1L Poly	HNO <sub>3</sub>	Total Metals		
1 x 2	1L Poly	HNO <sub>3</sub>	Dis. Metals		X
1 x 2	1L Poly	-	Butyltins		
3 x 2	40mL VOA	HCl	VOCs		
1 x 2	1L Amber	-	SVOCs		
3 x 2	40mL VOA	HCl	TPH-6X		
1 x 2	500mL Amber	HCl	TPH-DX		

Well Purge Data					Total Volume to Purge (gal) =						
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
1111	Pump On		17.08 <sup>initial</sup>	-	±3%	±10%	±0.1	±10mv	±10%	Stabilization Criteria	
1116	~1	~200		12.10	311	2.00	7.35	-45.5		Clear	
1121	~3	~300		12.21	308	1.06	7.39	-64.4		Clear	
1126	~5	~300		12.51	308	1.01	7.42	-62.8		Clear	
1131	7	~300		12.44	307	0.97	7.44	-64.1		Clear	
1136	~10			12.51	307	0.93	7.43	-63.4		Clear	
<i>Mark Cell</i> <span style="float: right;">7/14/08</span>											
<b>ST = 1155</b>											
Start Sampling		<b>1145</b>									
End Sampling		<b>1224</b>		Sample Number: <b>080714 MW13 GW</b>							
		<b>19.18<sup>final</sup></b>									

Note: bgs= below ground surface    btc=below top of casing    DTW=depth to water  
Clarity: VC=very cloudy    Cl=cloudy    SC=slightly cloudy    AC=almost clear    C=clear    CC=crystal clear

*M*

Monitoring Well Sampling Field Log

Well Number: **MW-14**  
Date: **7/14/08**

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<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>Z. Orembo / M. Cecchini</b>
Purge Method:	<b>P-Pump</b>
Pump Intake Depth (ft btc):	<b>18</b>
Flow-Through Cell:	<b>YS1556</b>
Sampling Method:	<b>P-Pump Low Flow</b>
Decontamination Method:	<b>NA Dedicated</b>
Purge Water Disposition:	<b>On Site Drum</b>
Field Conditions:	<b>Sunny Breezy ~80°</b>
Comments:	<b>80% water column = DTW of #15.75' btoe</b>

<b>Well Information</b>		Stick-up or <b>Flush</b> (circle one)	
Well Diameter (in)	Drilled Well Depth		Top of Screen
	(ft bgs)	(ft btc)	(ft bgs) (ft btc)
<b>2</b>			<b>13-23</b>
<b>Well Volume Calculation:</b>			
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)
<b>23</b>	<b>13.73</b>	<b>9.75</b>	<b>0.17</b>
One Well Volume (gal) <b>1.66</b> Three Well Volumes (gal) <b>5</b>			
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft			

Number	Type	Preservative	Analytical Parameters	Filtered?
1	1L Poly	HNO3	Total Metals	
1	1L Poly	HNO3	Dis. Metals	X
1	1L Poly	-	Butyltins	
3	40ml VOA	HCl	VOCs	
1	1L Amber	-	SVOCs	
3	40ml VOA	HCl	TPH-6X	
1	500ml Amber	HCl	TPH-DX	

Well Purge Data		Total Volume to Purge (gal) = <b>3.0'</b>									
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	
<b>1305</b>	Pump On		<b>13.69</b>	-	±3%	±10%	±0.1	±10mv	±10%	≤ Stabilization Criteria	
<b>1310</b>	<b>1</b>	<b>200</b>		<b>13.85</b>	<b>130</b>	<b>6.36</b>	<b>6.83</b>	<b>112.9</b>	<b>Clear</b>		
<b>1315</b>	<b>2.5</b>	<b>250</b>	<b>13.65</b>	<b>13.63</b>	<b>132</b>	<b>5.44</b>	<b>6.65</b>	<b>112.4</b>	<b>Clear</b>		
<b>1320</b>	<b>~3.5</b>			<b>13.52</b>	<b>132</b>	<b>5.12</b>	<b>6.62</b>	<b>108.2</b>	<b>Clear</b>		
<b>1325</b>		<b>~300</b>	<b>13.62</b>	<b>13.50</b>	<b>132</b>	<b>5.01</b>	<b>6.65</b>	<b>107.5</b>	<b>Clear</b>		
<b>1330</b>		<b>200</b>	<b>13.62</b>	<b>13.60</b>	<b>132</b>	<b>4.92</b>	<b>6.59</b>	<b>111.1</b>	<b>Clear</b>		
<b>7/14/08</b>											
<b>ST = 1342</b>											
Start Sampling		<b>1334</b>									
End Sampling		<b>1358</b>		Sample Number: <b>080714 MW14GW</b>							
		<b>13.48</b>									

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
Clarity: VC=very cloudy C=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

Monitoring Well Sampling Field Log

Well Number: **MW-15**  
 Date: **7/14/08**

Page 1 of \_\_\_\_

<b>Project Information</b>	
Project Name:	<b>BT</b>
URS Project Number:	<b>25696679.00006</b>
<b>Sampling Information</b>	
Field Team:	<b>MC + 20</b>
Purge Method:	<b>peristaltic pump</b>
Pump Intake Depth (ft btc):	<b>17'</b>
Flow-Through Cell:	<b>yes</b>
Sampling Method:	<b>low flow</b>
Decontamination Method:	<b>n/a dedicated sampling equipment</b>
Purge Water Disposition:	<b>onsite drum</b>
Field Conditions:	<b>80's, clear w wind 10-20</b>
Comments:	<b>Two extra volumes collected for MS/MSD</b>

<b>Well Information</b>					Stick-up or Flush (circle one)	
Well Diameter (in)	Drilled Well Depth		Top of Screen		Screen Interval (ft bgs)	
	(ft bgs)	(ft btc)	(ft bgs)	(ft btc)		
<b>2"</b>					<b>12-22</b>	
<b>Well Volume Calculation</b>						
Well Depth (ft btc)	DTW (ft btc)	Water Column (ft)	Convert Factor (gal/ft)	One Well Volume (gal)	Three Well Volumes (gal)	
<b>22.5</b>	<b>13.81</b>	<b>8.69</b>	<b>x 0.17</b>	<b>1.48</b>	<b>4.43</b>	
3/4"=0.023 gal/ft 2"=0.17 gal/ft 4"=0.66 gal/ft 6"=1.5 gal/ft						
<b>Sample Containers</b>						
Number	Type	Preservative	Analytical Parameters		Fillers?	
<b>3</b>	<b>1L Poly</b>	<b>HNO<sub>3</sub></b>	<b>Total Metals</b>			
<b>3</b>	<b>1L Poly</b>	<b>HNO<sub>3</sub></b>	<b>Dis. Metals</b>		<b>X</b>	
<b>3</b>	<b>1L Poly</b>	<b>-</b>	<b>Butyltins</b>			
<b>9</b>	<b>40ml VOA</b>	<b>HCl</b>	<b>VOCS</b>			
<b>3</b>	<b>1L Amber</b>	<b>-</b>	<b>SVOCs</b>			
<b>9</b>	<b>40ml VOA</b>	<b>HCl</b>	<b>TPH-6X</b>			
<b>3</b>	<b>500ml Amber</b>	<b>HCl</b>	<b>TPH-DX</b>			

Well Purge Data											Total Volume to Purge (gal) =
Time	Volume Purged (L)	Purge Rate (mL/m)	DTW (ft btc)	Temp. (°C)	Conductivity (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTUs)	Clarity/Color/Remarks	<b>2.5</b>
1227	Pump On		<b>13.81</b>	-	±3%	±10%	±0.1	±10mv	±10%	<= Stabilization Criteria	
1230	0.1	~250	-	15.81	201	15.07	6.37	127.7	CC		
1235	1.5	~250	-	14.53	191	8.46	6.32	184.1	CC		
1240	2.25	~250	-	14.58	190	6.98	6.33	185.1	CC		
1245	3.0	~250	-	14.57	188	6.87	6.40	176.1	CC		
1250	3.75	~250	-	14.65	190	6.62	6.30	204.1	CC	✓	
1255	4.5	~250	-	14.44	189	6.40	6.31	195.4	CC	✓	
1300	5.25	~250	-	14.89	190	6.13	6.27	204.8	CC	✓	
<i>Mark Caudill</i>											
<b>7/14/08</b>											
Start Sampling			<b>1315</b>	<b>MS: 080714MW156WMS @ 1325 / MSD: 080714MW156WMSD @ 1330</b>							
End Sampling			<b>1426</b>	<b>Sample Number: 080714MW156W @ 1320</b>							
			<b>13.80</b>								

Note: bgs= below ground surface btc=below top of casing DTW=depth to water  
 Clarity: VC=very cloudy Cl=cloudy SC=slightly cloudy AC=almost clear C=clear CC=crystal clear

# **Quality Control Summary Report for Analytical Chemistry**

UPLAND OPERABLE UNIT REMEDIAL INVESTIGATION

QUALITY CONTROL SUMMARY REPORT FOR ANALYTICAL CHEMISTRY

2<sup>ND</sup> QUARTER UPLAND SAMPLING EVENT – JULY 2008

OCTOBER 2008

*Prepared by:*

**URS**

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Portland, Oregon 97201-5850

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## 1.0 Executive Summary

The overall assessment of the 2<sup>nd</sup> quarter groundwater results show the quality of the data is acceptable to support project objectives. Seeps were dry at the time of sample collection and therefore seeps and the associated surface water were not collected during this sampling event. The contracted laboratory provided all requested analyses and delivered data reports were complete. Some data were qualified as estimated and flagged with a 'J' or 'UJ'. Some data were qualified as not detected and flagged with a 'U'. All data qualifiers resulting from this review have been added to both the project database and the data tables within the main body of the attached report.

## 2.0 Project Description

URS collected 17 groundwater samples (14 primary and three field duplicates), one rinsate blank, and five trip blanks during the second quarter upland sampling event on Bradford Island. Samples were collected from July 14 through July 18, 2008. Table 1 summarizes the sample stations, URS and laboratory identification numbers and the requested analyses.

## 3.0 Sampling and Analytical Procedures

Samples were collected according to the Quality Assurance Project Plan (QAPP) *Draft: Upland Operable Unit Remedial Investigation* (URS 2008). All water samples were submitted to Columbia Analytical Services (CAS) located in Kelso, Washington and logged in by the laboratory under three CAS sample delivery groups (K0806414, K0806516 and K0806519). The following table lists the parameters analyzed on one or more of the samples.

Method	Analytical Parameter
EPA 8260B	VOCs
EPA 8270C	SVOCs
EPA 6000 series	Metals
Krone (Krone 1998)	Butyltins
Total Petroleum Hydrocarbons (Ecology 1997)	Northwest Total Petroleum Hydrocarbons – Diesel Range (DRO) and Residual Range (RRO) (NWTPH-Dx) NWTPH – Gasoline Range (GRO) (NWTPH-Gx)

## 4.0 Data Validation

Analyses were performed in general accordance with the above-referenced methods. The analytical results for all samples were subjected to a quality assurance/quality control (QA/QC) review. This QA/QC review includes evaluation of representativeness (sample

collection/handling), accuracy (spike and/or standard recoveries), analytical precision (duplicate relative percent difference), comparability (use of standard methods) and completeness (percent of usable data). Specifically, the following items were reviewed when appropriate: compliance with the QAPP, chain-of-custody (COC), laboratory case narrative, proper sample preservation and handling procedures, holding times, field/method/trip blank analyses, matrix/matrix spike duplicate recoveries, laboratory duplicate results, field duplicate results, blank spike recoveries (laboratory control samples), data completeness and format, data qualifiers assigned by the laboratory, and analyte identification. The following items were reviewed on 15% or greater of the data: initial and continuing calibration verification (6000/7000 series), instrument calibration and a verification of the reported electronic data with the hard copy deliverable. The data were reviewed in accordance with the QAPP (URS 2008). The data results were reviewed in accordance with the criteria contained in the DoD QSM (DoD 2006), the above-listed methods, and the following EPA guidance documents; EPA's *Contract Laboratory Program National Functional Guidelines (EPA NFGs) for Organic Data Review* (USEPA 1999) and EPA's *NFGs for Inorganic Data Review* (USEPA 2004) in that order. Project-specific QC criteria are listed in the QAPP.

A summary of qualifiers assigned to results in this investigation is included in Table 2. Samples are represented by their URS sample identification assigned in the field as well as the laboratory identification. The laboratory was requested to report analytical results above the method detection limit (MDL) but below the method reporting limit (MRL). These results were flagged 'J' by CAS and for simplicity are not included in Table 2 unless otherwise qualified based on quality control issues identified in this report. The 'J' qualifiers assigned to results reported between the MDL and MRL are included in the database and are included in the data tables in the main body of the remedial investigation report. Qualifiers that may be assigned to the results of this investigation include the following:

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

- DNR - Do Not Report. Another result is available that is more reliable or appropriate.

Final sample results and qualifiers are presented in the analytical tables provided in the sampling report.

### 4.1 Chain-of-Custody, Sample Preservation and Holding Time

The COC forms indicate that samples were maintained under chain-of-custody protocols and forms were signed upon release and receipt. Three separate COCs are associated with sample delivery group K0806516; however, two of these were inadvertently left out of the laboratory data package. These COCs have been added as an addendum to the end of the package. All samples were released by URS to a CAS courier and were received and logged in by the laboratory on the same day. All coolers were submitted at temperatures within the EPA-recommended temperature range of 6°C or below.

The TPH samples were preserved with hydrochloric acid (HCl) to extend sample holding time from 7 days (listed in QAPP) to 14 days as described in the NWTPH-Gx and NWTPH-Dx methods. All samples were analyzed within the technical and contracted holding time with the following exceptions:

- The extraction of butyltins for samples K0806516-007, K0806516-008, K0806516-009 and K0806516-0010 were performed 28 days past the recommended 7 day hold time. This was due to a laboratory tracking error, this error has been remedied and should not occur in the future. The analytical results for butyltins for these samples have been estimated and flagged 'J' due to potential low bias from possible sample degradation.

### 4.2 Instrument Calibration

The laboratory performed initial multipoint calibrations for all target and surrogate compounds as required by the analytical methods. Initial calibrations (ICALs) and continuing calibrations (CCALs) were analyzed at the proper frequency and at the appropriate concentrations required by the methods. Instrument calibrations were acceptable for all sample analyses.

### 4.3 Review of Blanks

Method blanks were used to check for laboratory contamination and instrument bias. The laboratory analyzed at least one method blank for each analysis and for each analytical batch, per QAPP requirements. Qualification of samples due to method, rinsate, or trip blank contamination followed guidelines set forth in the EPA NFGs.

Organic sample results less than five times (5x) and inorganic sample results and common organic laboratory contaminants less than ten times (10x) the associated blank concentration and between the method detection limit (MDL) and the method reporting limit (MRL) were qualified

as non-detect and flagged with a 'U' at the MRL. When sample results were less than 5x (or 10x) the blank concentration but above the MRL, the reported result was qualified as non-detect and flagged with a 'U'. Target compounds detected in the method blank but reported as not detected in the associated samples were not qualified. Target compounds reported with concentrations greater than 5x (or 10x) the blank concentration were not qualified.

### ***Rinsate Blanks***

One rinsate blank was collected by running laboratory-provided deionized water through the *Monsoon* submersible pump used to sample well MW-01 (all other wells were sampled using dedicated tubing and a peristaltic pump). Chloroform, 1,4-dichlorobenzene, total magnesium, DRO, and RRO were detected in the rinsate blank at concentrations above the MDLs and below the MRLs. All detected sample results for MW-01 were greater than 10x (inorganic constituents) and 5x (organic constituents) the concentrations detected in the rinsate blank.

### ***Trip Blanks***

VOCs and GRO samples were submitted to CAS in five separate submittals, which resulted in five trip blanks. All trip blanks were non-detect for all VOCs and GRO with the following exceptions:

- GRO and chloroform were detected above the MDL and below the MRL in trip blank 080718TB (K0806516-013) associated with sample delivery group K0806516. GRO and chloroform in the associated sample K0806516-012 and the associated method blank were both reported as non-detect. GRO and chloroform results were not qualified based on trip blank detections. (*Note: The COC showing this trip blank and the associated sample was inadvertently missing from the original laboratory data report and is added as an addendum to the data package K0806516*).

### ***Method and Calibration Blanks (Inorganics)***

- Vanadium was detected in the method blank associated with sample delivery group K0806414 at the MDL. All detected vanadium results were greater than 10x the method blank concentration with the exceptions of samples K0806414-001, K0806414-001 (dissolved), K0806414-002, K0806414-002 (dissolved), and K0806414-007 (dissolved). Vanadium was qualified as not detected and flagged 'U' at the MRL for these samples (See Table 2).
- Thallium and zinc were detected at or above the MDL but below the MRL in the method blank associated with sample delivery group K0806519. Additionally, antimony, lead, nickel, silver and thallium were detected above the MDL but below the MRL in the calibration blanks bracketing the samples in this delivery group indicating possible instrument contamination and not preparatory contamination. Detected results for the above-listed metals were greater than 10x the blank concentrations with the exceptions of lead in samples K0806519-001 (dissolved) and K0806519-002 (dissolved), and thallium

in sample K0806519-001. These results were qualified as not detected and flagged 'U' using the criteria described above. (see Table 2).

- Iron was detected above the MDL but below the MRL in the method blank associated with sample delivery group K0806516. Additionally, lead was detected above the MDL but below the MRL in the calibration blanks bracketing the samples in this delivery group indicating possible instrument contamination and not preparatory contamination. Detected results for iron and lead not exceeding 10x the blank were qualified as non-detect and flagged 'U' using the criteria described above. The specific sample results are listed in Table 2.

### *Method Blanks (Organics)*

- DRO and RRO reported in sample delivery group K0806414 were reported from two extraction lots. The method blank associated with extraction lot KWG0806857 had detections of DRO and RRO above the MDLs and below the MRLs. The method blank associated with the extraction lot KWG0806970 had detections of RRO above the MDLs and below the MRLs. All detected sample results were greater than 5x the blank concentrations with the exception of DRO and RRO in samples K0806414-001 through K0806414-004 and RRO in samples K0806414-006 and K0806414-007. These results were qualified as not detected and flagged 'U' at the MRL as indicated in Table 2.
- DRO and RRO were detected above the MDLs and below the MRLs in the method blank associated with sample delivery group K0806516. All detected sample results were greater than 5x the blank concentration with the exception of DRO and RRO in samples K0806516-005, K0806516-007, K0806516-008, K0806516-009 and RRO in samples K0806516-001 and K0806516-010. These results were qualified as not detected and flagged 'U' at the MRL.

## 4.4 Surrogate Recovery Review

Each sample analyzed for organic compounds was spiked with surrogates (system monitoring compounds). Surrogate recoveries are a measure of accuracy for the overall analysis of each individual sample. When more than one surrogate per fraction (acid or base/neutral) was spiked in the sample, SVOCs were qualified if two or more surrogate recoveries for a given fraction were outside DoD QSM sample criteria. When only one surrogate per fraction was spiked, all sample results associated with that fraction were qualified when the surrogate recovery was outside DoD QSM sample criteria. Surrogate recoveries were acceptable for all analyses with the following exceptions:

- The percent recovery for the VOC surrogate toluene-d8 in one of the method blanks associated with sample delivery group K0806414 was above the upper control limit of 120% at 121%. No analytes were detected in the method blank and all other surrogates were in control for the primary samples and the associated QC samples. Data were not qualified based on this surrogate recovery exceedance in the method blank.

- The percent recovery for the SVOC surrogate 2-fluorobiphenyl was below the lower DoD QSM control limit of 50% at 43% for sample K0806516-001. Recoveries of four other SVOC surrogates within this sample were acceptable; therefore, results were not qualified based on the low 2-fluorobiphenyl recovery in this sample.

### 4.5 Laboratory Control Samples and Matrix Spike/Matrix Spike Duplicate Review

Laboratory control/laboratory control duplicate (LCS/LCSD) samples are used to monitor the laboratory's day-to-day performance of routine analytical methods independent of matrix effects and to assess accuracy for the target compounds. Matrix spike/matrix spike duplicate (MS/MSD) samples are analyzed to assess the ability of the laboratory to recover the target compounds from the sample matrix. At least one LCS and one MS/MSD for each analysis and for each batch were analyzed per method requirements.

LCS/LCSD and MS/MSD recoveries were acceptable for all analytical tests with the following exception:

- The MS/MSD performed on sample K0806516-002 had recoveries for iron and manganese below the DoD QSM control limit of 80%; however, sample concentrations for these analytes were greater than 4x the spike concentrations. Additionally, post-spike recoveries were in control. Data were not qualified based on MS/MSD recoveries.

### 4.6 Duplicate Review

Field duplicates are used to evaluate the variability associated with sample collection. Relative percent difference (RPD) calculations were performed on the analytical results from the three field duplicates associated with sample locations MW-06, MW-10 and MW-13, and identified as MW-21, MW-22, and MW-23, respectively. Specific field duplicate precision control limits were not defined in the QAPP; however, all field duplicate results were below the DoD QSM laboratory precision control of 30%.

To evaluate laboratory precision, CAS performed duplicate analyses (i.e. LCS/LCSD and MS/MSD) as discussed above. RPD precision was within project-specific control limits with the following exception:

- The n-butyltin RPD for the LSC/LCSD pair in extraction lot KWG0806964 and associated with sample delivery groups K0806414 and K0806516 exceeded the 30% laboratory criterion at 34%. The LCS and LCSD percent recoveries meet the laboratory-specific criterion for n-butyltin (DoD QSM criterion not available). Two of the three LCS control parameters were within the control limits; therefore, data were not qualified based on the elevated RPD.

### 4.7 Compound Quantification

- CAS assigned 'L' and/or 'Y' flags in reporting RRO and DRO sample results for samples K0806516-001, K0806516-002, K0806516-003, and K0806516-004 to indicate that 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 ('L') or the elution pattern does not match the calibration standard ('Y'). Further qualification was not necessary.
- CAS assigned 'O' and/or 'H' flags in reporting RRO and DRO sample results for samples K0806516-009 and K0806516-010 to indicate that the chromatographic fingerprint of the sample resembles a petroleum product, but the pattern indicates the presence of more heavier molecular weight constituents than the calibration standard (H) and the chromatographic fingerprint resembles an oil but does not match the calibration standard (O). Further qualification of the data was necessary.

### 4.8 Reporting Limits

If sample results were detected at concentrations below the MRL but above the MDL, they were identified by the laboratory and flagged with a 'J'. As stated above, these flags are recorded within the database and are reported in the data tables included in the main body of this report but are not included in Table 2 of this report.

### 5.0 Completeness

The laboratory reported all requested analyses and the deliverable data reports were complete. Some data were qualified as estimated and flagged with a 'J' or a 'UJ'. Some data were qualified as not detected and flagged with a 'U.' A summary of qualifiers can be found in Table 2.

The electronic and .pdf versions of the deliverables were cross-checked for accuracy at a frequency of 20% or greater. Any minor discrepancies found between the deliverables were reported to CAS and corrected by updating the database to reflect the .pdf deliverable.

- *Technical Completeness* = (number of usable results/total reported results) x100

$$= (357 \text{ compliant} / 357 \text{ total results}) = 100\%$$

All samples results are considered usable.

- *Analytical Completeness* = (number of unqualified results/total reported results) x100

$$= (304 \text{ compliant} / 357 \text{ total results}) = 85\%$$

Data were qualified non-detect and flagged 'U' and some were qualified as estimated and flagged 'J' or 'UJ.' Data qualified 'J' due to detections between the MRL and the MRL were not included in this calculation.

- *Contract Completeness* = (number of contract compliant results/total reported results) x100  
= (348 compliant /357 total results) = 97%

All samples analyzed met laboratory contract requirements with the exception of the above-mentioned holding time exceedance for butyltins in sample delivery group K0806516.

- *Field Sampling Completeness* =(number samples collected/total reported results) x100  
= (17 compliant / 17 total results) = 100%

All samples collected and submitted to CAS for analysis had acceptable results.

### 6.0 References

- DOD 2006. Department of Defense Environmental Data Quality Workgroup. Department of Defense (DOD) Quality Systems Manual (QSM) for Environmental Laboratories. Final Version 3. January 2006. Retrieved from [http://www.navylabs.navy.mil/Archive/DoDV3.pdf] on 3/3/06
- Krone 1998. Krone, C.A. et al, A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Livers from Puget Sound, Environmental Conservation Division, Northwest and Alaska Fisheries Center, National Marine Fisheries Service, NOAA, November, 1998.
- URS 2008. Quality Assurance Project Plan, *Draft: Upland Operable Unit Remedial Investigation*, Bradford Island, Bonneville Lock and Dam Project, Cascade Locks, Oregon. May 2008.
- USEPA 2004. U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. October 2004.
- USEPA 1999. U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Organic Data Review. October 1999.





**Table 1**  
**Sampling ID and Analysis Summary**  
Quality Control Summary Report for Analytical Chemistry  
2nd Quarter Sampling Event - July 2008

Station Number	URS Sample ID	CAS ID	Collection Date	Anaytes						
				Butyltins	VOCs	SVOCs	Metals (Total/Dissolved)	Mercury (Total/Dissolved)	TPH-Dx	TPH-Gx
MW-01	080718MW1GW	K0806516-012	7/18/08		X		X			X
MW-02	080715MW2GW	K0806516-005	7/15/08	X	X	X	X		X	X
MW-03	080717MW3GW	K0806516-007	7/17/08	X	X	X	X		X	X
MW-04	080717MW4GW	K0806516-010	7/17/08	X	X	X	X		X	X
MW-05	080716MW5GW	K0806516-002	7/16/08	X	X	X	X		X	X
MW-06	080716MW6GW	K0806516-003	7/16/08	X	X	X	X		X	X
MW21 (duplicate of MW-06)	080716MW21GW	K0806516-004	7/16/08	X	X	X	X		X	X
MW-07	080717MW07GW	K0806516-009	7/17/08	X	X	X	X		X	X
MW-08	080716MW8GW	K0806516-001	7/16/08	X	X	X	X		X	X
MW-10	080716MW10GW	K0806519-002	7/16/08				X	X		
MW-22 (duplicate of MW-10)	080716MW22GW	K0806519-001	7/16/08				X	X		
MW-11	080715MW11GW	K0806414-007	7/15/08	X	X	X	X		X	X
MW-12	080715MW12GW	K0806414-006	7/15/08	X	X	X	X		X	X
MW-13	080714MW13GW	K0806414-001	7/14/08	X	X	X	X		X	X
MW 23 (duplicate of MW-13)	080714MW23GW	K0806414-002	7/14/08	X	X	X	X		X	X
MW-14	080714MW14GW	K0806414-004	7/14/08	X	X	X	X		X	X
MW-15	080714MW15GW	K0806414-003	7/14/08	X	X	X	X		X	X
Rinsate Blank	080717RB	K0806516-008	7/17/08	X	X	X	X		X	X
Trip Blank	080708TB3	K0806414-005	7/14/08		X					X
Trip Blank	080715TB4	K0806414-008	7/15/08		X					X
Trip Blank	080716TB2	K0806516-006	7/16/08		X					X
Trip Blank	080717TB1	K0806516-011	7/17/08		X					X
Trip Blank	080718TB	K0806516-013	7/18/08		X					X

**Notes:**

Seeps were not present at time of collection; therefore, no seep or surface water samples were collected.

MW-09 not analyzed due to insufficient volume for sample collection.

SVOCs = Semivolatile Organic Compounds

TPH = Total Petroleum Hydrocarbons: Diesel Range (DRO), Residual Range (RRO), or Gasoline Range (GRO)

VOCs = Volatile Organic Compounds

**Table 2**  
**Qualifier Summary**  
Quality Control Summary Report for Analytical Chemistry  
2nd Quarter Sampling Event - July 2008

Station ID	URS ID	CAS ID	Analyte	Qualifiers	Rationale		
MW-13	080714MW13GW	K0806414-001	vanadium	0.20U	method blank detection		
MW-13	080714MW13GW	K0806414-001 Diss		0.20U			
MW 23 (duplicate of MW-13)	080714MW23GW	K0806414-002		0.20U			
MW 23 (duplicate of MW-13)	080714MW23GW	K0806414-002 Diss		0.20U			
MW-11	080715MW11GW	K0806414-007 Diss		0.69U			
MW-22 (duplicate of MW-10)	080716MW22GW	K0806519-001 Diss	lead	0.030U			
MW-10	080716MW10GW	K0806519-002 Diss		0.030U			
MW-22 (duplicate of MW-10)	080716MW22GW	K0806519-001	thallium	0.020U			
MW-08	080716MW8GW	K0806516-001 Diss	iron	20U			
MW-02	080715MW2GW	K0806516-005 Diss		20U			
MW-03	080717MW3GW	K0806516-007		57.8U			
Rinsate Blank	080717RB	K0806516-008		23.4U			
MW-13	080714MW13GW	K0806414-001	Diesel Range Organics (DRO)	100U			
MW 23 (duplicate of MW-13)	080714MW23GW	K0806414-002		100U			
MW-15	080714MW15GW	K0806414-003		110U			
MW14	080714MW14GW	K0806414-004		110U			
MW-02	080715MW2GW	K0806516-005		100U			
MW-03	080717MW3GW	K0806516-007		100U			
Rinsate Blank	080717RB	K0806516-008		110U			
MW-07	080717MW07GW	K0806516-009		110U			
MW-08	080716MW8GW	K0806516-001		Residual Range Organics (RRO)	110U		
MW-12	080715MW12GW	K0806414-006			110U		
MW-11	080715MW11GW	K0806414-007	110U				
MW-04	080717MW4GW	K0806516-010	140U				
MW-08	080716MW8GW	K0806516-001 Diss	lead	0.046U	continuing calibration blank		
MW-05	080716MW5GW	K0806516-002		0.074U			
MW-05	080716MW5GW	K0806516-002 Diss		0.030U			
MW-06	080716MW6GW	K0806516-003		0.030U			
MW-06	080716MW6GW	K0806516-003 Diss		0.030U			
MW21 (duplicate of MW-06)	080716MW21GW	K0806516-004		0.030U			
MW-02	080715MW2GW	K0806516-005 Diss		0.052U			
MW-03	080717MW3GW	K0806516-007		0.056U			
MW-03	080717MW3GW	K0806516-007 Diss		0.030U			
Rinsate Blank	080717RB	K0806516-008		0.055U			
MW-07	080717MW07GW	K0806516-009		0.136U			
MW-03	080717MW3GW	K0806516-007		butyltins		J/UJ	hold time
Rinsate Blank	080717RB	K0806516-008					
MW-07	080717MW07GW	K0806516-009					
MW-04	080717MW4GW	K0806516-010					

**Note:**

Diss = field filtered dissolved phase