RETURN TO ESD AR INDEX

SDMS DocID 457486

New Bedford
2
457486

US ARMY CORPS
OF ENGINEERS
New England District

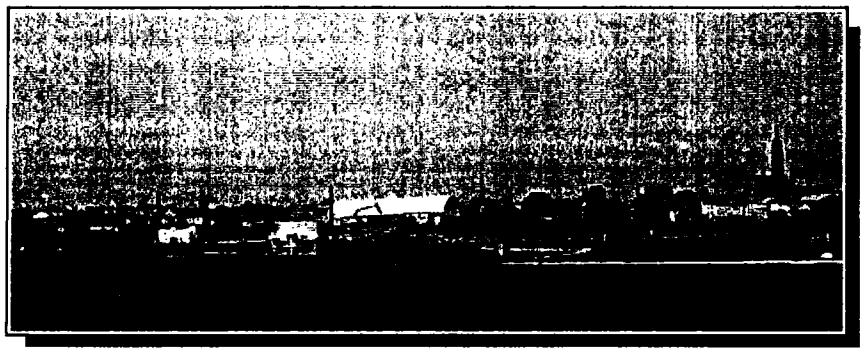
Contract No. DACW33-03-D-0004

Delivery Order No. 22

June 2009

Final

Sawyer Street 2008 Semi-annual Groundwater Monitoring Technical Memorandum



Environmental Monitoring, Sampling, and Analysis

New Bedford Harbor Superfund Site

New Bedford Harbor, MA

Final Technical Memorandum

Date:	June 2009
To:	Robert Leitch, USACE North Atlantic Division New England District
From:	Deirdre Dahlen, Battelle
Subject:	Sawyer Street 2008 Semi-annual Groundwater Monitoring Results

This Technical Memorandum presents a summary of the groundwater monitoring activities conducted at the Sawyer Street Confined Disposal Facility (CDF) in New Bedford, Massachusetts during the 2008 semi-annual monitoring period. The 2008 monitoring study is a continuation of a multi-year groundwater sampling program to sample six groundwater wells located at the perimeter of the CDF. Results from previous programs are presented in ENSR (2006) and Battelle (2008a).

Results from the monitoring study are used to assess potential trends in concentrations of polychlorinated biphenyls (PCBs) as Aroclor and selected metals (cadmium, chromium, copper, and lead) and to evaluate the integrity of the CDF. At the request of the U.S. EPA, groundwater sampled in 2008 was also analyzed for volatile organic compounds (VOCs).

Field Activity Summary

Sampling was conducted in the spring and fall of 2008, on May 19-20, 2008 and November 6-7, 2008. During both events, *in-situ* water quality measurements (temperature, specific conductivity, dissolved oxygen [DO], pH, Oxidative Redox Potential [ORP], turbidity), groundwater levels, and samples of groundwater were collected at six wells located at the perimeter of the CDF, identified as MW-1, MW-3, MW-4A, MW-5, MW-6, and MW-7A (Figure 1). All field measurements and groundwater collection were conducted according to the Field Sampling Plan (FSP) developed for this investigation (Battelle, 2008b). Field activities are summarized briefly below.

Groundwater sampling was performed according to the procedures for Low-Flow (Low-Stress) Purging and Sampling based on EPA Region I Low Stress (flow) Purging and Sampling Groundwater Procedure for the Collection of Groundwater Samples from Monitoring Wells, Rev. 2, July 30, 1996 (EPA, 1996). A bladder pump (equipped with dedicated Teflon bladders) was used during both sampling events. Dedicated sample tubing was used to collect groundwater samples to minimize the risk of sample contamination and cross contamination between wells. Upon arrival for sample collection, the water level was measured with a cleaned water level tape and the well volume was calculated. The water level tape was cleaned between wells following decontamination procedures described in the FSP (Battelle, 2008b). The pump was then affixed to the dedicated tubing which was placed into the well. The water depth was measured again before purging the well to account for any water displacement from the pump. Groundwater samples were collected for PCBs (as Aroclor), metals, and VOC analysis once the well was purged and all diagnostic parameters (i.e., pH, DO, specific conductivity, turbidity, temperature, and ORP) achieved a steady state. The flow rate was verified using a graduated cylinder and timepiece and then recorded on the field log sheets.

Quality control (QC) samples were also collected to assess data quality in terms of precision and potential contamination. Field-based QC samples included one field duplicate sample and one equipment blank per sampling event. Additional groundwater was also collected for the preparation of laboratory-based QC samples (i.e., matrix spike and matrix spike duplicate).

Field measurements were recorded on detailed field logs sheets provided in Appendix A. The integrity of the groundwater samples was maintained by using cleaned, dedicated sampling tubing for each well, by not introducing contaminants into the samples during collection (e.g., wells were sampled from lowest contamination to highest contamination to reduce potential cross-contamination issues; the stainless steel bladder pump was cleaned in between wells), by collecting the samples in clean bottles provided by the analytical laboratories, by keeping the samples cold on ice during transport to the analytical laboratories, and by analyzing the samples within the required holding time.

In-situ Water Quality Summary

Water quality parameters were measured during the initial pumping of groundwater from the wells before the actual groundwater sample collection. *In-situ* measurements were made using an YSI® (Yellow Springs Instruments) multi-meter sonde and a flow-thru cell. The flow-thru cell was disconnected from the discharge line during the actual sample collection. The YSI® sonde was calibrated and used according to the manufacturer's specifications. Calibration records are documented on the field logs (Appendix A). Once the diagnostic parameters had stabilized, sample collection was initiated. *In-situ* measurements are summarized in Table 1.

Chemistry Water Quality Summary

Groundwater samples were analyzed for PCBs (as Aroclor), metals, and VOCs. PCB Aroclor analysis was performed by TestAmerica in Burlington, Vermont; metals analysis was performed by Battelle Marine Science Laboratory in Sequim, Washington; and VOC analysis was performed by Alpha Analytical in Mansfield, Massachusetts. Sample results are summarized in Table 2, and are compared to the Massachusetts Contingency Plan (MCP), Method 1 category GW-3 criteria for groundwater that has a potential to discharge to a surface water body (MADEP, 2008). Complete test results are provided in Appendix B.

Consistent with results from previous monitoring years (ENSR, 2006 and Battelle, 2008a), PCB and metals concentrations in all the groundwater samples collected during the May and November 2008 events were below the MCP GW-3 criteria (Table 2). Individual PCB Aroclors were undetected in all the groundwater samples except Aroclor 1242 at MW-4A (0.043 μg/L) during the May sampling event and Aroclor 1254 at MW-5 (0.032 μg/L) during the November sampling event (Appendix B). The target metals cadmium, chromium, copper, and lead were detected in all of the groundwater samples, albeit at low concentrations often comparable to low-level equipment blank contamination (see Quality Control section). Groundwater sampled at MW-7A, located along the southern boundary of the CDF, contained the highest concentrations of cadmium and copper (Table 2). The highest lead concentrations were measured in groundwater in well MW-1 (Table 2), located along the western boundary of the CDF. Chromium concentrations within each sampling event were relatively uniform across most locations; the lowest concentrations were measured at wells MW-5 and MW-6 during the spring event and at well MW-6 during the fall event.

With the exception of acetone, target VOCs were undetected in all the groundwater samples collected during the May and November 2008 events (Appendix B). While measured concentrations of acetone were comparable to low-level background contamination (see Quality Control section), sample concentrations were at least three orders of magnitude lower than the MCP GW-3 criteria (Table 2).

Quality Control

Analytical data received third party validation and the data were qualified according to Region 1 Data Validation guidelines. Qualifiers reported with the data represent the final qualifier assigned by the data validator. Results from the field QC samples were also evaluated to assess data quality in terms of precision (field replicate) and potential contamination (equipment blank) that may contribute to contaminant concentrations measured in the field samples. Results from the field replicate samples are summarized in Table 3 and results for the equipment blanks are presented with the sample data in Table 2.

Overall, PCB, metals, and VOCs results were comparable between the original and the replicate samples (Table 3), indicating that the sample collection methods were reproducible and that representative groundwater samples were collected.

Low-level contamination was measured in the equipment blanks: PCB Aroclor 1242 was detected at 0.095 μg/L in the fall 2008 blank; target metals were detected in equipment blanks during both sampling events; and acetone and methylene chloride were detected in the spring 2008 blank (Table 2). Potential impacts to data quality are:

- PCBs – The low-level PCB contamination does not appear to impact data quality because Aroclor 1242 was undetected in the associated field samples.
- Metals – Sample concentrations measured at levels less than five times the equipment blank values have been qualified by the data validator. While low-level contamination may have contributed to sample concentrations, all metals concentrations in all of the groundwater samples were well below the MCP GW-3 criteria (Table 2).
- VOCs – Sample concentrations of acetone measured at levels less than ten times the equipment blank value have been qualified by the data validator. While the low-level acetone contamination may have contributed to sample concentrations, acetone concentrations in all of the groundwater samples were at least three orders of magnitude below the MCP GW-3 criteria. The low-level methylene chloride contamination does not appear to impact data quality because methylene chloride was undetected in the associated field samples.

Summary

Semi-annual monitoring was performed in 2008 at the Sawyer Street CDF as part of the ongoing groundwater monitoring program. Groundwater levels, water quality parameters, organic contaminants, and metals were monitored in all six wells at the facility. Analysis of groundwater samples indicates that although low-level detections of PCB Aroclor, metals, and VOCs were observed, concentrations were all well below MCP GW-3 criteria. Overall, the groundwater data collected during the 2008 semi-annual monitoring suggest that the integrity of the CDF is currently maintained.

Literature Cited

Battelle, 2008a. Technical Memorandum: Sawyer Street 2007 Semi-annual Groundwater Monitoring Results -New Bedford, Massachusetts. Prepared by Battelle. May 2008.

Battelle, 2008b. Groundwater Monitoring Final Field Sampling Plan-New Bedford, Massachusetts. Prepared by Battelle. May 2008.

ENSR, 2006. Final Sawyer Street Groundwater Report: New Bedford Harbor Superfund Site - New Bedford, Massachusetts. Prepared by ENSR Corporation. December 2006.

EPA, 1996.EPA Region I Low Stress (flow) Purging and Sampling Groundwater Procedure for the Collection of Groundwater Samples from Monitoring Wells, Rev. 2, July 30, 1996.

Massachusetts Department of Environmental Protection (MADEP), 2008. MCP Method 1 Groundwater Standards. 310 CMR 40.0974(2). http://www.mass.gov/dep/cleanup/laws/0974_2.htm

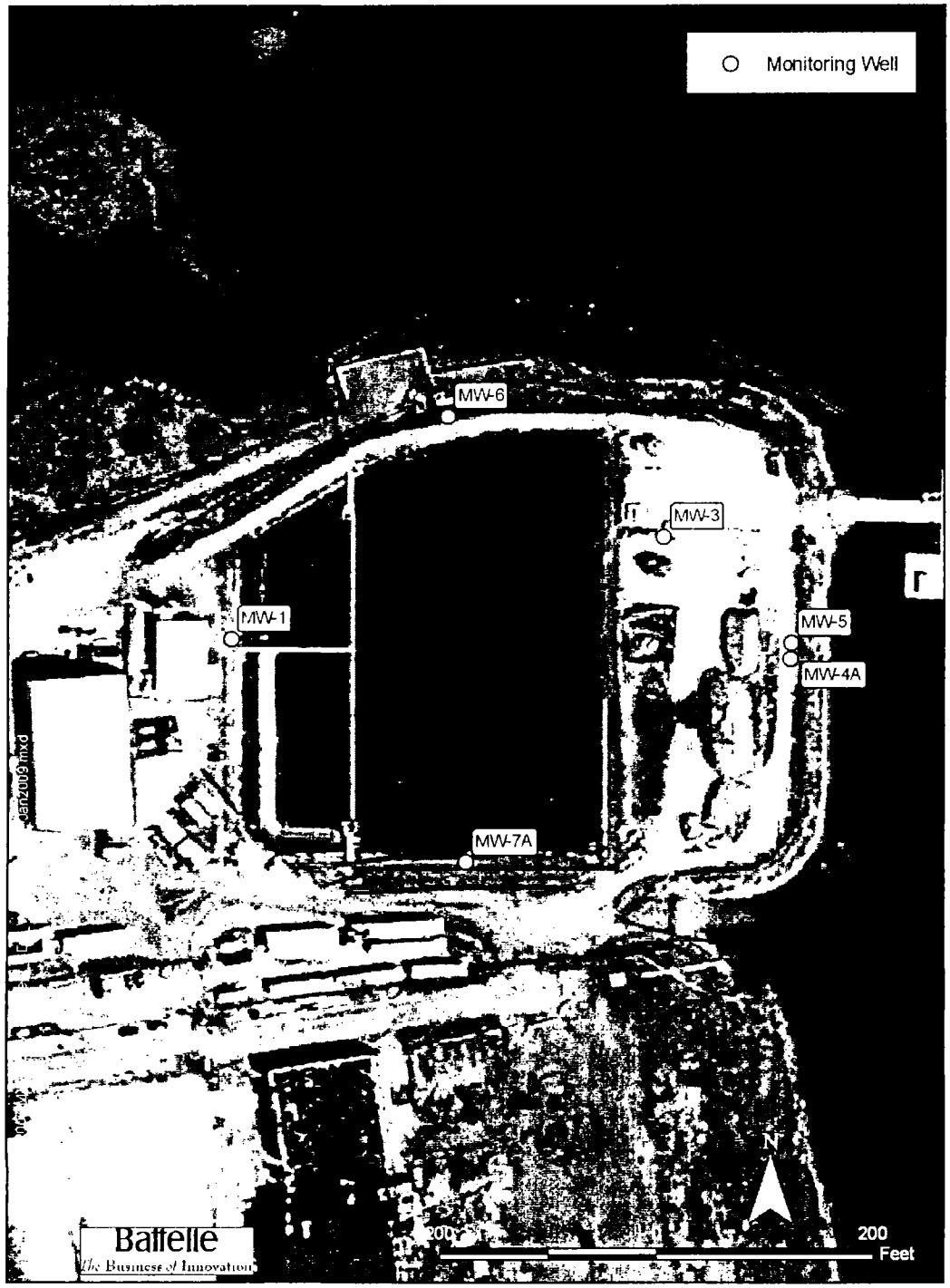


Figure 1: Sawyer Street CDF Monitoring Well Locations

Table 1: Summary of *In-situ* Groundwater Data Collected Immediately Prior to Sampling

Event	Well ID	Sample Date/ Time	Depth to Water (ft)	pH	Specific Cond. (µS/cm)	Temp-erature (°C)	DO (mg/L)	Turbidity (NTU)	ORP (mV)	Purge Volume (L)	Flow Rate (mL/ min)	Color/ Odor	Draw-down[a] (ft)
May 2008	MW-7A	5/19/2008 12:23	10.89	6.63	860	11.56	0.93	12	242.7	8.586	102	clear	-0.38
	MW-6	5/19/2008 15:18	13.78	7.19	604	12.69	0.3	5.7	4.5	7.705	75	clear/no odor	-0.59
	MW-1	5/19/2008 17:33	17.03	6.91	932	12.26	0.84	7.1	5.8	3.62	45		-2.48
	MW-5	5/20/2008 10:05	10.09	7.45	3263	11.32	0.19	4.1	-51.4	2.95	74	clear/no odor	-1.79
	MW-4A	5/20/2008 12:08	11.5	6.81	5074	13.01	0	4.8	-275.5	3.525	65	clear/sulfide	-2.29
	MW-3	5/20/2008 14:22	15.52	7.02	3872	12.12	0.48	5.3	-77	4.4	75	yellow color	-1.82
November 2008	MW-7A	11/6/2008 8:28	11.11	6.66	877	15.29	0.9	0.1	204.8	2.35	55	clear	-0.15
	MW-6	11/6/2008 10:03	13.78	7.3	520	14.93	0.5	1.5	111	5.69	60		-0.86
	MW-1	11/6/2008 12:14	16.76	6.8	911	15.05	0.77	0.5	3.8	3.64	35	clear	-1.91
	MW-5	11/6/2008 13:01	9.61	7.85	1878	14.71	1.85	2.2	-154.7	2.6	60	sulfur odor	-1.61
	MW-4A	11/7/2008 8:55	12	7.06	4370	14.52	0.52	2.7	-352.2	4.51	65		-2.12
	MW-3	11/7/2008 9:16	15.82	7.41	4401	14.24	0.28	9.8	-212.7	3.01	55	light orange & no odor	-1.39

[a] Drawdown is the distance in feet the water level changed during the sampling process.

Battelle
The Business of Innovation

Table 2: PCB, Metal and VOC Groundwater Results, May and November 2008 Sampling Events

Well ID	Sample Date	Result (µg/L)					
		Total PCB[a]	Cadmium	Chromium	Copper	Lead	Acetone
MW-1	5/19/2008	— U[b]	0.249	5.35	0.984 U[c]	0.739	2.79 EB
	11/6/2008	— U[b]	0.435	1.78 U[c]	1.46 U[c]	0.894 U[c]	10.3
MW-3	5/20/2008	— UJ[b]	0.124	6.36	1.95	0.085 U[c]	8.4 EB
	11/7/2008	— U[b]	0.03	5.63	0.855 U[c]	0.063 U[c]	5.36
MW-4A	5/20/2008	0.043 J	0.028 U[c]	6.57	1.46	0.071 U[c]	3.05 EB
	11/7/2008	— UD[b]	0.027	5.62	2.27	0.175 U[c]	5.32
MW-5	5/20/2008	— U[b]	0.046 U[c]	1.89 U[c]	1.12 U[c]	0.061 U[c]	16 EB
	11/6/2008	0.032 J	0.052	4.04	2.10	0.274 U[c]	5 U
MW-6	5/19/2008	— U[b]	0.044 U[c]	2.45 U[c]	0.453 U[c]	0.057 U[c]	1.26 EB
	11/6/2008	— UJ[b]	0.052	0.346 U[c]	0.666 U[c]	0.183 U[c]	23.3
MW-7A	5/19/2008	— U[b]	0.711	5.28	4.99	0.071 U[c]	5 U
	11/6/2008	— U[b]	0.648	1.01 U[c]	4.99	0.023 U[c]	5 U
MCP GW-3 Criteria[d]		**10**	**4**	**300**	**NA**	**10**	**50000**
Equipment Blank	5/20/2008	— UJ[b]	0.011 J	0.843	0.269	0.077	7.19
	11/5/2008	0.095	0.005 U	0.608	0.354	0.078	5

[a] Total PCB calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254 and 1260; a value of zero (0) used in summation for non-detects. For example, total PCB was calculated as follows for sample MW-4A collected on 05/20/2008:

Parameter	Result (µg/L)	Final Qual	Result (µg/L)	Comment
Aroclor 1016	0.047	U	0	zero substituted for non-detect
Aroclor 1221	0.047	U	0	
Aroclor 1232	0.047	U	0	
Aroclor 1242	0.043	J	0.043	J
Aroclor 1248	0.047	U	0	zero substituted for non-detect
Aroclor 1254	0.047	U	0	
Aroclor 1260	0.047	U	0	
			0.043 J	**Total PCB**

[b] PCB Aroclors undetected in the study samples at concentrations above the laboratory reporting limit (see Appendix B).
[c] Chemical detected at concentration <5X equipment blank values.
[d] MCP: Massachusetts Contingency Plan, Method 1 MCP GW-3 standard from 310 CMR 40.0974(2).

Key:
EB: Chemical not detected at concentration above 10X equipment blank values.
U: Chemical not detected at concentration above the laboratory reporting limit.
J: Estimated value.
NA: Not applicable.

Table 3: Field Replicate Results, May and November 2008 Sampling Events

Sampling Event/Well	Parameter	Result (µg/L)		RPD
		Sample	Replicate	
May 2008/ Well MW-5	Total PCB[a]	— U[b]	— U[b]	NA
	Cadmium	0.046 U[c]	0.043 U[c]	7%
	Chromium	1.89 U[c]	1.98 U[c]	5%
	Copper	1.12 U[c]	1.05 U[c]	6%
	Lead	0.061 U[c]	0.056 U[c]	9%
	Acetone	16 EB	16 EB	0%
November 2008/ Well MW-3	Cadmium	0.03	0.031	3%
	Chromium	5.63	5.92	5%
	Copper	0.855 U[c]	0.944 U[c]	10%
	Lead	0.063 U[c]	0.069 U[c]	9%
November 2008/Aerovox Well MW-6A[d]	Aroclor 1254	2.30 D	1.90 J	19%
	Tetrachloroethene	5.27	5.07	4%
	Cis-1,2-dichloroethene	14.3	14.4	1%
	Trichloroethene	113	113	0%

[a] Total PCB calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254 and 1260; a value of zero (0) used in summation for non-detects.
[b] PCB Aroclors undetected in the study samples at concentrations above the laboratory reporting limit (see Appendix B).
[c] Chemical detected at concentration <5X equipment blank values.
[d] Groundwater monitoring at the Sawyer Street CDF and Aerovox site was performed in November 2008 as a single event. As a result, a shared field replicate was collected, for common test parameters (PCB and VOC), to satisfy the field QC requirements.

Key:
EB: Chemical not detected at concentration above 10X equipment blank values.
U: Chemical not detected at concentration above the laboratory reporting limit.
J: Estimated value.
D: Concentration from analysis of the sample at a secondary dilution.
NA: Not applicable
RPD: relative percent difference.

Technical Memorandum

Date: June 20, 2008

To: Robert Leitch, USACE North Atlantic Division New England District

From: Deirdre Dahlen, Battelle

Subject: Sawyer Street 2007 Semi-annual Groundwater Monitoring Results

This Technical Memorandum presents a summary of the groundwater monitoring activities conducted at the Sawyer Street Confined Disposal Facility (CDF) in New Bedford, Massachusetts during the 2007 semi-annual monitoring period. The 2007 monitoring study is a continuation of a multi-year groundwater sampling program to sample six groundwater wells located at the perimeter of the CDF. Results from the monitoring study are used to assess potential trends in concentrations of polychlorinated biphenyls (PCBs as Aroclor) and selected metals (cadmium, chromium, copper, and lead) and to evaluate the integrity of the CDF. Groundwater well development and results from monitoring conducted since 2001 are presented in ENSR (2006). Results from the 2007 semi-annual monitoring study are discussed in this Technical Memorandum.

Field Activity Summary

Sampling was conducted in the early summer and fall of 2007, on June 28-29, 2007 and October 15-16, 2007. During both events, *in-situ* water quality measurements (temperature, specific conductivity, dissolved oxygen [DO], pH, Oxidative Redox Potential [ORP], turbidity), groundwater levels, and samples of groundwater were collected at six wells located at the perimeter of the CDF (Figure 1), identified as MW-1, MW-3, MW-4A, MW-5, MW-6, and MW-7A. All field measurements and groundwater collection were conducted according to the Field Sampling Plan (FSP) developed for this investigation (Battelle, 2006). Field activities are summarized briefly below.

Groundwater sampling was performed according to the procedures for Low-Flow (Low-Stress) Purging and Sampling based on EPA Region I Low Stress (flow) Purging and Sampling Groundwater Procedure for the Collection of Groundwater Samples from Monitoring Wells, Rev. 2, July 30, 1996 (EPA, 1996). A Geotech GeoPump II Peristaltic Pump was used during the June 2007 sampling event and a bladder pump (equipped with dedicated Teflon bladders) was used during the October 2007 event. Dedicated sampling tubing was used to collect groundwater samples during both events to minimize the risk of sample contamination and cross contamination between wells. Upon arrival for sample collection, the water level was measured with a cleaned water level tape and the well volume was calculated. The water level tape was cleaned between wells following decontamination procedures described in the FSP (Battelle, 2006). The pump (peristaltic or bladder) was then affixed to the dedicated tubing which was placed into the well. The well depth was measured again before purging the well to account for any water displacement from the pump. Groundwater samples for PCB Aroclor and metals analysis were collected once the well was purged and all diagnostic parameters (i.e., pH, DO, specific conductivity, turbidity, temperature, and ORP) achieved a steady state. The flow rate was verified using a graduated cylinder and timepiece and then recorded on the field log sheets.

In addition to the field samples, field and laboratory quality control (QC) samples were collected to meet measurement quality objectives defined in the FSP. During each sampling event, one field duplicate sample and one equipment blank were collected; one matrix spike/matrix spike duplicate (MS/MSD) were also collected to provide 'extra' water for the preparation of laboratory-based QC samples.

Field measurements were recorded on detailed field logs sheets that are provided as an attachment to this Technical Memorandum (Appendix A). The integrity of the groundwater samples was maintained by using cleaned, dedicated sampling tubing for each well, by not introducing contaminants into the samples during collection, by collecting the samples in clean bottles provided by the analytical laboratories, by keeping the samples cold on ice during transport to the analytical laboratories, and by analyzing the samples within the required holding time.

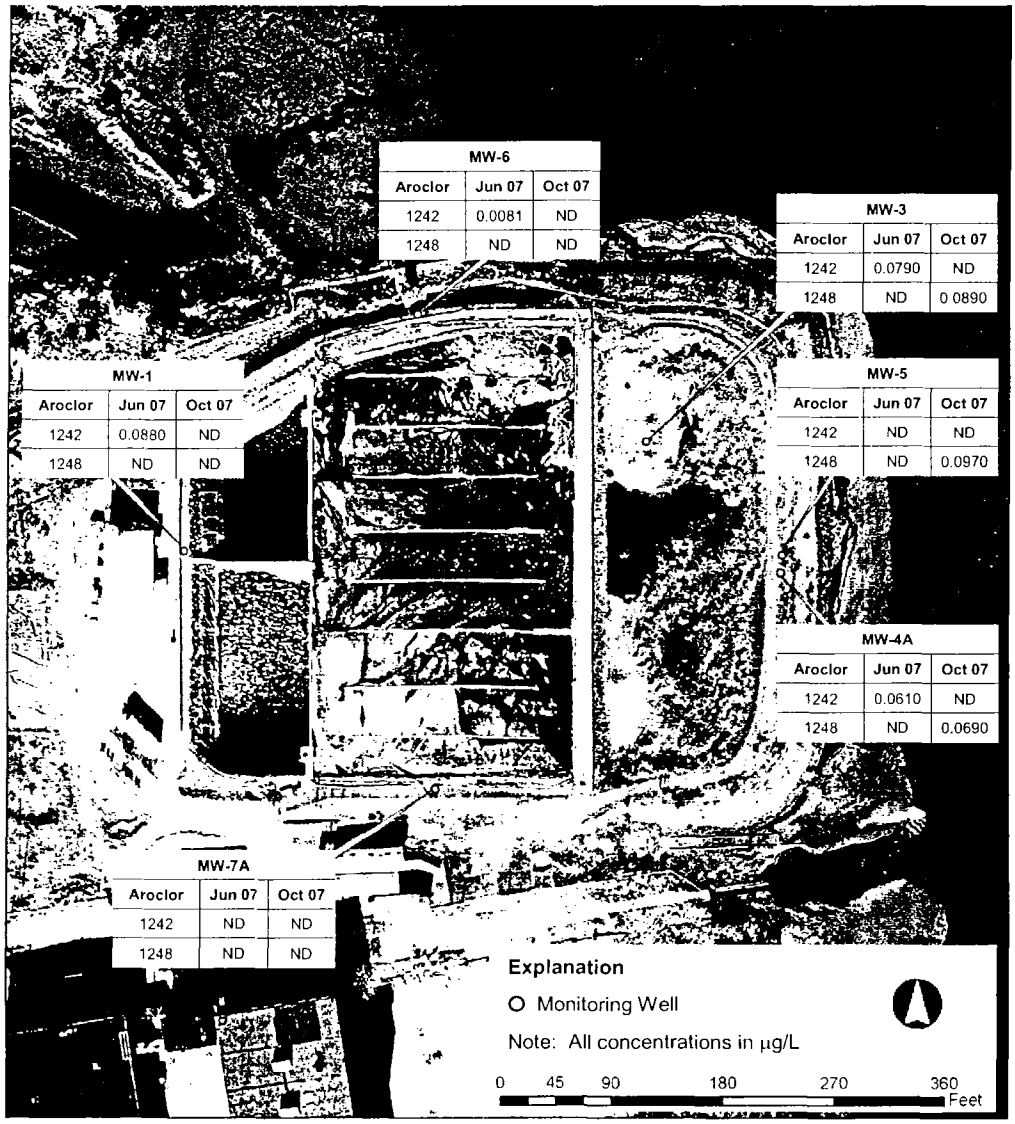


Figure 1: Sawyer Street CDF Monitoring Well Locations and PCB Aroclor 1242 and 1248 Concentrations in Groundwater

In-situ Water Quality Summary

Water quality parameters were measured during the initial pumping of groundwater from the wells before the actual groundwater sample collection. *In-situ* measurements were made using an YSI® multi-meter sonde and a flow-thru cell. The flow-thru cell was disconnected from the discharge line during the actual sample collection. The YSI® sonde was calibrated and used according to all manufacturer's specifications. Calibration records are documented on the field logs (Appendix A). Turbidity was measured using a LaMotte, 2020E turbidity meter. Once the diagnostic parameters had stabilized, sample collection was initiated. These data are summarized in Table 1.

Chemistry Water Quality Summary

The groundwater samples collected from the June and October 2007 sampling events were analyzed for PCB Aroclors and selected metals, including cadmium, chromium, copper, and lead. PCB Aroclor analysis was performed by Battelle, located in Duxbury, Massachusetts and metals analysis was performed by Battelle Marine Science Laboratory, located in Sequim, Washington. Sample results are summarized in Table 2 (PCB Aroclor) and Table 3 (metals), and are compared to the Massachusetts Contingency Plan (MCP), Method 1 category GW-3 criteria for groundwater that has a potential to discharge to a surface water body (http://www.mass.gov/dep/cleanup/laws/0974_2.htm).

Concentrations of PCB Aroclors were generally low or undetected in the groundwater samples. Aroclor 1242 was detected in 4 of the 6 wells (MW-1, MW-3, MW-4A, and MW-6) during the June 2007 event; Aroclor 1248 was detected in 3 of the 6 wells (MW-3, MW-4A, and MW-5) during the October 2007 event; and Aroclor 1260 was detected in 1 of the 6 wells (MW-7A) during the June 2007 event (Table 2). All PCB Aroclors were measured at levels below the MCP GW-3 criteria of 10 µg/L, which is consistent with earlier monitoring events conducted from 2004 to 2006 (ENSR, 2006). The June and October 2007 sampling results for Aroclor 1242 and 1248 are shown on Figure 1. Figure 1 shows that Aroclor 1242 detections are located in the western, northern, and eastern portions of the site, whereas Aroclor 1248 detections are observed in the eastern portion of the site only. The lone Aroclor 1260 detection was observed in MW-7A, which is located in the southern portion of the site where neither Aroclor 1242 nor Aroclor 1248 was detected.

Consistent with earlier monitoring events conducted since 2001 (ENSR, 2006), metals concentrations measured in the groundwater sampled in 2007 were below the MCP GW-3 criteria (Table 3). Cadmium was detected at low concentrations (0.018 to 0.718 µg/L) in groundwater collected at all 6 wells during the 2007 semi-annual monitoring, with the highest concentrations measured at well MW-7A. Chromium, copper, and lead were detected above the laboratory method detection limits in all the field samples. Due to the low-level background contamination (see Quality Control section), sample results for chromium, copper, and lead were "U" qualified during third party validation because the concentrations were below five times the concentrations in the equipment blanks.

Quality Control

Analytical data received third party validation and the data were qualified according to Region 1 Data Validation guidelines. Qualifiers reported on Tables 2 and 3 represent the final qualifier assigned by the data validator. Results from the field QC samples were also evaluated to assess data quality in terms of precision (field duplicate) and potential contamination (equipment blank) that may contribute to contaminant concentrations measured in the field samples, as follows.

Field Duplicates – PCB Aroclor and metals results were comparable between the original sample and the replicate sample collected at well MW-5 (June 2007 event) and at MW-4A (October 2007 event) (see Tables 2 and 3).

Equipment Blanks – PCB Aroclors were undetected in the equipment blanks, indicating that the sampling methods were free of PCB Aroclor contamination. Metals were detected in the equipment blanks (Table 3) at concentrations equal to or lower compared to earlier investigations (ENSR, 2006). Sample concentrations of cadmium were generally one order of magnitude higher compared to equipment blank concentrations, suggesting that the impact to data quality is minimal. Concentrations of chromium, copper, and lead in the groundwater samples were frequently less than five times the equipment blank concentrations, suggesting that sample concentrations for these metals may be biased high (sample values <5x equipment blank values are 'U' qualified on Table 3). While potential field contamination may have contributed to sample concentrations for chromium, copper, and lead, all metals concentrations in all of the groundwater samples are well below the MCP GW-3 criteria (Table 3).

Summary

Semi-annual monitoring was performed in 2007 at the Sawyer Street CDF as part of the ongoing groundwater monitoring program. Groundwater levels, water quality parameters, PCB Aroclor, and selected metals were monitored in all six wells at the facility. Analysis of groundwater samples indicates that although low-level detections of PCB Aroclor and metals were observed, concentrations are all below MCP GW-3 criteria. The groundwater data collected during the semi-annual monitoring suggest that the integrity of the CDF is currently maintained.

Literature Cited

Battelle, 2006. Groundwater Monitoring Final Field Sampling Plan-New Bedford, Massachusetts. Prepared by Battelle. June 2006.

ENSR, 2006. Final Sawyer Street Groundwater Report: New Bedford Harbor Superfund Site - New Bedford, Massachusetts. Prepared by ENSR Corporation. December 2006.

EPA, 1996.EPA Region I Low Stress (flow) Purging and Sampling Groundwater Procedure for the Collection of Groundwater Samples from Monitoring Wells, Rev. 2, July 30, 1996.

Massachusetts Department of Environmental Protection, 2008. MCP Method 1 Groundwater Standards. 310 CMR 40.0974(2). http://www.mass.gov/dep/cleanup/laws/0974_2.htm

Table 1: Summary of *In-situ* Groundwater Data Collected Immediately Prior to Sampling

Well ID	Date/ Time	Depth to Water (ft)	pH	Spec Cond. (µS/cm)	Temp (°C)	DO (mg/L)	Turbidity (NTU)	ORP (mV)	Purge Vol. (L)	Flow Rate (mL/ min)	Color/ Odor	Draw-down* (ft)
June 2007 Sampling Event												
MW-1	6/28/2007 17:55	17.7	7.19	848	18.17	2.12	5.6	-93.4	6.3	96	Clear	1.2
MW-3	6/28/2007 13:50	16.8	7.35	4322	15.58	0.18	7	-205.1	6.4	158	H2S Odor	1.7
MW-4A	6/28/2007 10:21	12.96	7.55	4518	17.39	0.39	1.8	-285.8	2.6	50	H2S Odor	2.11
MW-5	6/28/2007 12:48	13.0	7.93	3370	16.59	0.23	1.2	-229.2	4.9	109	H2S Odor	2.81
MW-6	6/28/2007 15:46	14.95	7.54	517	15.8	0.52	2.4	-96.3	8.5	148	H2S Odor	1.55
MW-7A	6/29/2007 10:18	11.55	6.67	777	14.12	1.46	0.35	183.1	5.3	113	Clear	0.2
October 2007 Sampling Event												
MW-1	10/16/2007 10:11	18.7	6.63	1023	16.66	0.67	1.22	-192.5	4.6	76	H2S	2.3
MW-3	10/16/2007 13:33	15.6	6.86	8016	16:46	0.35	9.87	-313.3	4.1	76	Rusty brown, slight H2S	0.9
MW-4A	10/15/2007 12:43	15.1	6.73	5985	16.57	0.18	3.9	-409.8	3.6	62	H2S	2.7
MW-5	10/15/2007 15:12	12.9	7.2	4236	16.08	0.16	6.6	-418.9	4.1	76	H2S	2.0
MW-6	10/16/2007 11:36	13.7	7.18	478	16.16	0.61	5.14	-270.5	3.7	89	Reddish particles	0.9
MW-7A	10/16/2007 15:01	11.5	6.48	850	16.6	0.44	0	26	2.4	74	Clear	0.2

* Drawdown is the distance in feet the water level changed during the sampling process.

Battelle
The Business of Innovation

Table 2: PCB Aroclor Results from June and October 2007 Sampling Events

Well ID	Date	Result (µg/L)													
		Aroclor 1016	Final Qual	Aroclor 1221	Final Qual	Aroclor 1232	Final Qual	Aroclor 1242	Final Qual	Aroclor 1248	Final Qual	Aroclor 1254	Final Qual	Aroclor 1260	Final Qual
MCP GW-3 Criteria		10		10		10		10		10		10		10	
MW-1	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0880		0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
	10/16/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
MW-3	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0790		0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
	10/16/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0890		0.0053	U[1]	0.0043	U[1]
MW-4A	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0610		0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
	10/15/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0690		0.0053	U[1]	0.0043	U[1]
MW-5	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
	10/15/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0970		0.0053	U[1]	0.0043	U[1]
MW-6	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0081		0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
	10/16/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
MW-7A	6/29/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0095	
	10/16/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
Field QC															
MW-4A	10/15/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0690		0.0053	U[1]	0.0043	U[1]
MW-4A REP	10/15/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0680		0.0053	U[1]	0.0043	U[1]
MW-5	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
MW-5 REP	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
Equipment Blank	6/28/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]
	10/18/2007	0.0061	U[1]	0.0033	U[1]	0.0071	U[1]	0.0066	U[1]	0.0071	U[1]	0.0053	U[1]	0.0043	U[1]

Notes:
MCP: Massachusetts Contingency Plan, Method 1 MCP GW-3 standard from 310 CMR 40.0974(2).
NA = not available
[1] 'U' qualifier indicates chemical not detected at concentration above the laboratory reporting limit.

Battelle
The Business of Innovation

Table 3: Metals Results from June and October 2007 Sampling Events

Well ID	Date	Result (µg/L)							
		Cadmium	Final Qual	Chromium	Final Qual	Copper	Final Qual	Lead	Final Qual
MCP GW-3 Criteria		4		300		NA		10	
MW-1	6/28/2007	0.18		2.668	U[2]	1.668	U[2]	1.028	
	10/16/2007	0.269		5.16	U[2]	2.66		1.11	
MW-3	6/28/2007	0.039		3.778	U[2]	3.467	U[2]	0.046	U[2]
	10/16/2007	0.19		8.79	U[2]	1.87		0.221	U[2]
MW-4A	6/28/2007	0.055		4.96		4.633		0.413	
	10/15/2007	0.021		9.96		0.622	U[2]	0.159	U[2]
MW-5	6/28/2007	0.042		1.201	U[2]	3.422	U[2]	0.052	
	10/15/2007	0.028		7.73	U[2]	0.653	U[2]	0.123	U[2]
MW-6	6/28/2007	0.079		2.505	U[2]	1.752	U[2]	0.292	
	10/16/2007	0.033		1.83	U[2]	0.707	U[2]	0.102	U[2]
MW-7A	6/29/2007	0.537		1.155	U[2]	3.996	U[2]	0.076	
	10/16/2007	0.718		3.64	U[2]	5.86		0.078	U[2]
Field QC									
MW-4A	10/15/2007	0.021		9.96		0.622	U[2]	0.159	U[2]
MW-4A REP	10/15/2007	0.018		6.4	UJ[2]	0.594	U[2]	0.061	U[2]
MW-5	6/28/2007	0.042		1.201	U[2]	3.422	U[2]	0.052	
MW-5 REP	6/28/2007	0.042		1.367	U[2]	2.164	U[2]	0.027	UJ[2]
Equipment Blank	6/28/2007	0.0032		0.93		0.857		0.01	
	10/16/2007	0.001	U[1]	1.79		0.293		0.0761	
Method Detection Limit		0.001		0.08		0.004		0.001	

MCP: Massachusetts Contingency Plan, Method 1 MCP GW-3 standard from 310 CMR 40.0974(2).
NA = not available
[1] 'U' qualifier indicates chemical not detected at concentration above the laboratory reporting limit
[2] 'U' qualifier indicates chemical not detected at concentration above 5x equipment blank values
J = estimated value