March 12, 2019 Reference No. 037894 (51)

Mr. Panjini Balarju
Site Manager
Washington Department of Ecology
Southwest Regional Office
300 Desmond Drive
Lacey, Washington 98503

Dear Mr. Balarju:

Re: Remedial Action Operation and Maintenance and Groundwater Monitoring Annual Report – 2018
Bonneville Power Administration Site
Consent Order No. 97206045

On behalf of Occidental Chemical Corporation, GHD is submitting the enclosed "Remedial Action Operation and Maintenance and Groundwater Monitoring Annual Report 2018". This report summarizes the operation and maintenance (O&M) activities and groundwater monitoring results for the period of December 2017 through November 2018 and presents an overview of the effectiveness of the Site remedy.

Based on the review of the Site remedy and Compliance Monitoring Program analytical data it is concluded that:

- The Remedial Action has been effective in addressing the concerns for protection of human health and the environment as laid forth in the Consent Decree.
- No further remedial action is required at the Site at this time.

Should you have any questions, require additional information, or wish to meet to discuss the performance of the Remedial Action, please do not hesitate to contact us.

Sincerely,

GHD

Richard A. Bieber LG, Site Manager

RB/bh/51

Encl. Remedial Action Operation and Maintenance and Groundwater Monitoring Annual Report – 2018

cc: R. Bakemeier (Bakemeier PC)
B. Sherer (BPA)
C. Babcock (GSHI)
I. Richardson (GHD)

GHD
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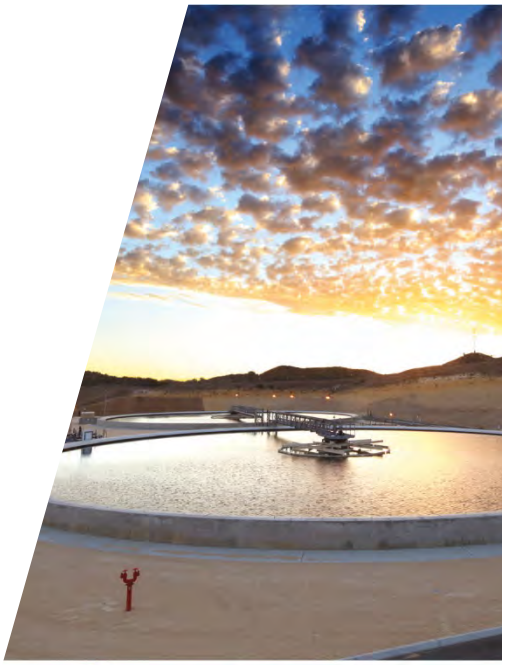

Remedial Action Operation and Maintenance and Groundwater Monitoring Annual Report – 2018

Bonneville Power Administration Site
Tacoma, Washington
Consent Order No. 97206045

Occidental Chemical

Executive Summary

In March 1997, Occidental Chemical Corporation (OCC) and the Bonneville Power Administration (BPA) entered into a Consent Decree with the Washington Department of Ecology (Ecology) to provide for the performance of a Remedial Action (RA) at the Site. The RA included excavation of impacted fill materials and soils and placement of these excavated materials in an on Site engineered landfill. The RA was considered complete on August 24, 1998.

The RA Operation and Maintenance (O&M) Program includes the performance of routine Site inspections, compliance monitoring of groundwater, and comprehensive annual reporting to evaluate the effectiveness of the RA in addressing the concerns of Ecology, stated in the Consent Decree as follows:

- Ongoing impact of groundwater in the Lower Sand unit by volatile organic compounds (VOCs) in buried sludge and soils
- Potential for direct human exposure to asbestos contained in the sludge
- Potential for direct human exposure to metal contained in grit and shot
- Potential surface and groundwater impacts from metals contained in the grit and shot

The O&M Program commenced with baseline groundwater monitoring in September 1998 following completion of the RA. This annual report has been prepared covering the period of December 2017 through December 2018.

The results of the O&M and Compliance Monitoring activities demonstrate that:

- The security and integrity of the landfill was maintained throughout this reporting period; therefore, there was no potential for direct human exposure to impacted materials.
- There were no systematic increases in the concentrations of monitoring parameters in groundwater during this reporting period; therefore, there is no ongoing impact of chemicals to groundwater in the Lower Sand unit.

The O&M activities and Compliance Monitoring performed during this reporting period demonstrate that the RA is effective in mitigating Ecology's concerns for human health exposure and groundwater impacts.

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1. Introduction

The Bonneville Power Administration (BPA) property (Site) is located at the corner of Taylor Way and Highway 509 in Tacoma, Washington. In the late 1960s and early 1970s, fill material from the Occidental Chemical Corporation (OCC) Tacoma facility was deposited at the Site. At about the same time, baghouse grit/shot material from an unidentified source was also placed at the Site.

In March 1997, OCC and BPA entered into a Consent Decree with the Washington Department of Ecology (Ecology) to provide for the performance of a Remedial Action (RA) at the Site. The RA included excavation of impacted fill materials and soils and placement of these excavated materials in an on-Site engineered landfill. The RA was considered complete on August 24, 1998.

An RA Operation and Maintenance (O&M) Plan was submitted to Ecology with the remedial design documents. The RA O&M Plan includes the performance of routine Site inspections, compliance monitoring of groundwater, and comprehensive annual reporting. The O&M Program commenced in September 1998.

This report presents the annual report for the period of December 2017 through December 2018. The report is organized as follows:

- Section 1 Introduction: The introduction presents a brief summary of the project history and the organization of the report
- Section 2 Operation and Maintenance Activities: The O&M activities performed during this reporting period are discussed in Section 2
- Section 3 Compliance Monitoring: The groundwater compliance monitoring activities performed during this reporting period are described in Section 3 and the resultant data are presented
- Section 4 Assessment of Site Conditions: An assessment of the Site conditions in terms of the effectiveness of the remedy is presented in Section 4
- Section 5 Conclusions and Recommendations: Section 5 presents the conclusions drawn from the Site assessment

The current project coordinators for the Site are:

Ecology:
Mr. Panjini Balarju
300 Desmond Drive
Lacey, Washington 98503

BPA:
Mr. Brett Sherer
Environmental Engineer
707 W. Main Street, Suite 500
Spokane, Washington 99201-0641

OCC:
Mr. Clint Babcock
Director Operations
Glenn Springs Holdings, Inc.
605 Alexander Avenue
Tacoma, WA 98421

The designated Site Custodian is:

GHD
3600 Port of Tacoma Road, Suite 302
Tacoma, WA 98424
Telephone: (253) 573-1218

The primary contact at GHD is Rick Bieber.

2. Operation and Maintenance Activities

O&M activities performed during this reporting period included Site inspections and compliance monitoring. The O&M activities were performed by GHD, on behalf of OCC in accordance with the requirements of the "Operation and Maintenance Plan" (May 1997) with the modifications approved by Ecology in letters dated August 3, 1998, September 16, 1998, March 18, 1999, and November 14, 2003. The approved modifications consist of:

- The use of monitoring well 9-30 instead of monitoring well 5-21 (August 3, 1998)
- The use of low-flow well purging and sampling techniques in the Compliance Monitoring Plan (CMP) (September 16, 1998)
- Revision of the analyte list for compliance monitoring (March 18, 1999, and November 14, 2003)
- Reduction in monitoring points from 7 to 2 (November 14, 2003)
- Reduction in the frequency of sampling from semi-annual to annual (November 14, 2003)

2.1 Site Inspections and Corrective Actions

Site inspections were performed on a quarterly basis during this reporting period. Observations were logged on inspection log sheets. The inspection log sheets for the 2017/2018 reporting period are contained in Appendix A.

Descriptions of the inspection observations are presented in the following subsections. No deficiencies requiring corrective action were observed during this reporting period.

2.1.1 Security

The security features include landfill perimeter fence, fence gates and locks, and signs. Each feature was examined during each Site inspection. No damage to security features was noted and the

integrity of the security features was maintained. The security features and their conditions during this reporting period are described below.

Perimeter Fence
No damage to the perimeter fence was identified during the quarterly inspections conducted for this reporting period.

Gates and Locks
No damage to perimeter fence gates or locks was identified during the quarterly inspections conducted for this reporting period.

Signs
All signs were in place and legible.

2.1.2 Site

The Site features include final and vegetative covers, drainage swales, and monitoring wells. Each of these features was examined during each Site inspection. The integrity of the Site features was maintained. The condition of the Site features during this reporting period is described below.

Final and Vegetative Covers
No surface cracking or failure of the landfill cap was observed during this reporting period. Issues identified during the quarterly inspections included deep rooted vegetation and stressed vegetation due to area drought. The deep rooted growth was hand pulled during maintenance activities in May 2018. Mowing of the entire mound was conducted following the hand removal of weeds. The cut vegetation was raked and removed. No burrows were observed during recent inspections and during the mowing of the cap, GHD will continue to monitor for the presence of burrowing animals during quarterly inspections.

Drainage Swales
No erosion or excessive buildup of sediment was identified in the drainage swales during the quarterly inspections conducted for this reporting period. Limited vegetation has begun to encroach on the drainage swales. In May 2018 contractors applied an Ecology approved herbicide to knock back the vegetation from the rockery in the swales and the vegetation has been significantly reduced.

Monitoring Wells
The inspection of the monitoring wells was conducted in November 6, 2018 and included the verification of the presence and condition of well caps and locks, integrity of protective casings, and inspection for settlement or displacement of the wells. No deficiencies were noted during the monitoring well inspections for this reporting period.

2.2 Routine Maintenance

The O&M Plan requires that the landfill cap vegetative cover be fertilized and maintained as necessary. In May 2018 crews hand removed the deep rooted vegetation and sprayed the encroaching vegetation in the rockery in the swales. Mowing of the mound was completed following hand weeding. Overall the landfill cap is in good condition and no repairs outside of the routine maintenance activities are required at this time.

3. Compliance Monitoring

The CMP is included as Appendix B of the O&M Plan. The groundwater CMP commenced in September 1998 at the completion of the RA. The CMP states that groundwater monitoring will be conducted semi-annually for 5 years following which a review will be conducted. The first 5-year review period ended in September 2003. A review of the groundwater monitoring program was presented in the "Remedial Action Operation and Maintenance and Groundwater Monitoring Annual Report – 2004." Based on the review, a modified groundwater monitoring program was approved by Ecology (see letter from G. Barrett (Ecology) to C. Barron (CRA) dated November 14, 2003).

The second 5-year review period ended in September 2008. A review of the groundwater monitoring program was presented in the "Remedial Action Operation and Maintenance and Groundwater Monitoring Annual Report – 2008." There were no approved modifications to the CMP following the second 5-year review period; however, potentiometric contour lines have been added to the site plan, as recommended by Ecology (see letter from G. Barrett (Ecology) to J. Cornetta (CRA) dated February 4, 2008). A third 5-year review was completed by Ecology in 2014, results were presented in a March 2015 report. No amendments to the CMP were made following this review.

Compliance monitoring currently consists of:

- Annual hydraulic monitoring of all site monitoring wells
- Annual groundwater sample collection and analyses of two wells, 1-20 and 7-26

The monitoring wells included in the Site monitoring program are listed in Table 3.1 and shown on Figure 3.1.

3.1 Hydraulic Monitoring

Site-wide hydraulic monitoring is performed in conjunction with each groundwater sampling event. A tabulation of the groundwater elevations measured since the commencement of the CMP is presented in Table 3.2. Groundwater elevations, potentiometric contour lines and groundwater flow direction are presented on Figure 3.1.

3.2 Water Quality Monitoring

Groundwater samples were collected in accordance with the low-flow monitoring well purging and sample collection procedures approved by Ecology on September 16, 1998. A sample collection summary log is contained in Appendix B.

Groundwater samples collected during this reporting period were analyzed for the parameters listed in Table 3.3. Cleanup levels for the monitoring parameters listed in Table 3.3 are the Model Toxic Control Act (MTCA) Method B groundwater levels, or the analytical method's Practical Quantitation Limit (PQL) where the Method B levels are lower than the PQL.

The groundwater analytical data generated during this reporting period and cleanup levels are presented in Table 3.4. The results are consistent with the historic data. The data validation for this reporting period is contained in Appendix C of this report. A complete groundwater analytical

database is presented in Appendix D. All investigative samples were analyzed within the recommended holding time.

4. Assessment of Site Conditions

One of the purposes of the annual review of the O&M activities and monitoring data is to assess the current Site conditions in terms of the effectiveness of the RA.

Based upon the findings of the site investigations performed prior to the RA, Ecology stated the following concerns regarding fill materials present at the Site:

- Ongoing impact to groundwater in the Lower Sand unit by volatile organic compounds (VOCs) in buried sludge and soils
- Potential for direct human exposure to asbestos contained in the sludge
- Potential for direct human exposure to metals contained in grit and shot
- Potential surface and groundwater impacts from metals contained in the grit and shot

These concerns were presented in Exhibit B, "Cleanup Action Plan," of the Consent Decree filed March 3, 1997.

The RA addressed each of these concerns through the removal of impacted sludge, grit, and shot and containment of these materials in the on-Site engineered landfill. Confirmatory analyses were performed on samples of in situ soils to confirm that concentrations of the Site compounds which exceeded the cleanup standards specified in Table 2 of Exhibit B of the Consent Decree did not remain following the completion of the RA.

The following subsections present evaluations of the current Site condition relative to these concerns. The evaluations are based upon the O&M activities performed during this reporting period and on the Compliance Monitoring data.

4.1 Direct Contact with Impacted Materials

The security and integrity of the landfill was maintained throughout this reporting period; therefore, there was no potential for direct human exposure to asbestos contained in sludge or metals contained in grit or shot.

4.2 Groundwater and Surface Water Impact

The sludge and soils containing concentrations of the Site compounds at concentrations exceeding the cleanup standards are isolated within the landfill and the integrity of the landfill was maintained throughout this reporting period. Therefore, the sludge or soils no longer represent a continuing source of VOCs or metals to groundwater or surface water.

The groundwater points of compliance are Lower Sand Unit monitoring wells located adjacent to the containment facility (MW-2) and at the downgradient boundaries of the Site (1-20, 2-27, 6-26, and 7-26). The locations of the points of compliance are shown on Figure 3.1. In the first 5-year review of the groundwater monitoring program conducted in November 2003, it was demonstrated that

compliance with cleanup standards was achieved and maintained at all monitoring points except 1-20 and 7-26. Therefore, routine monitoring of the remaining compliance points is no longer required.

The 2018 groundwater sampling event was conducted on November 6, 2018. There were detections of cis-1,2-DCE for both monitoring wells 1-20 and 7-26. These detections are consistent with the historic data and the general decreasing trend of both contaminates continues.

No exceedance of the cleanup standards for vinyl chloride or cis-1,2-DCE were detected in the samples collected from either monitoring wells. The concentrations of vinyl chloride and cis-1,2-DCE are consistent with historical data.

The analytical data for cis-1,2-DCE and vinyl chloride in monitoring wells 1-20 and 7-26 have been graphed as shown on Figures 4.1 and 4.2. To assist in the evaluation of chemical presence at these locations, linear trend lines have been added to the graphs. The graphs show overall downward trends in the cis-1,2-DCE concentrations in these wells since the baseline monitoring event was conducted in September 1998. The graphs also show a downward trend in vinyl chloride concentrations in well 1-20 and stable concentrations in well 7-26.

The analytical data collected during this reporting period, therefore, demonstrate that there is no ongoing impact of chemicals to groundwater in the Lower Sand unit by Site sludge or grit/shot. It is expected that, over time, the natural attenuation process will restore the Lower Sand groundwater to a quality that meets or exceeds the cleanup standards.

5. Conclusions and Recommendations

The O&M activities and Compliance Monitoring performed during this reporting period demonstrate that the RA remains effective in mitigating the concerns for human health exposure and groundwater impact that are stated in the Cleanup Action Plan. There is no further remedial action required at the Site at this time.

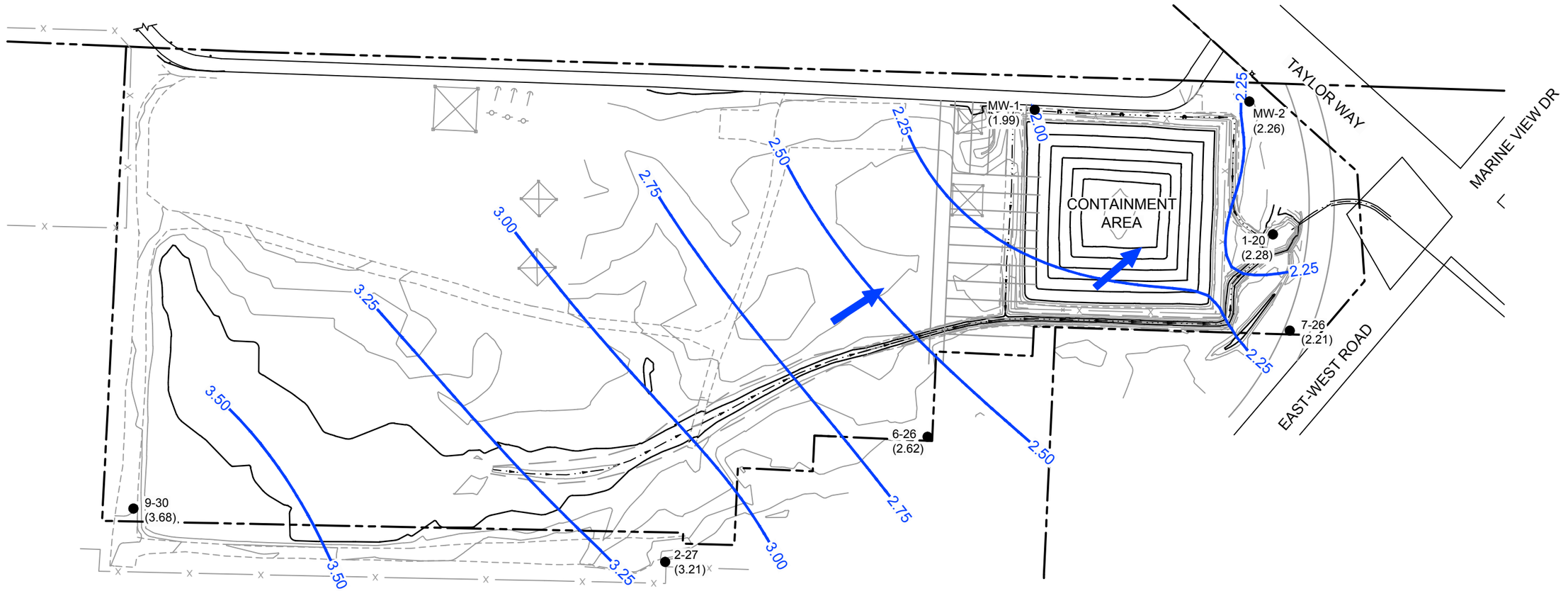
All of Which is Respectfully Submitted,

GHD

Rick Bieber, LG

Matthew Davis, LG

Figures



LEGEND

- PROPERTY LINE
- 18 — FINAL CONTOUR LINE AND ELEVATION
- DITCH LINE
- 9-30 — MONITORING WELL
- (7.53) — GROUNDWATER ELEVATION (NGVD)
- 6.00 — GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

N

0 60 150ft

figure 3.1

SITE PLAN AND GROUNDWATER CONTOUR MAP - NOVEMBER 2018
COMPLIANCE MONITORING PROGRAM
BONNEVILLE POWER ADMINISTRATION SITE
Tacoma, Washington

P:\drawings\37000s\37894\37894-REPORTS\37894-31(048)\37894-31(048)GN\37894-31(051)GN-WA002.DWG Plot Date: FEB 06, 2019

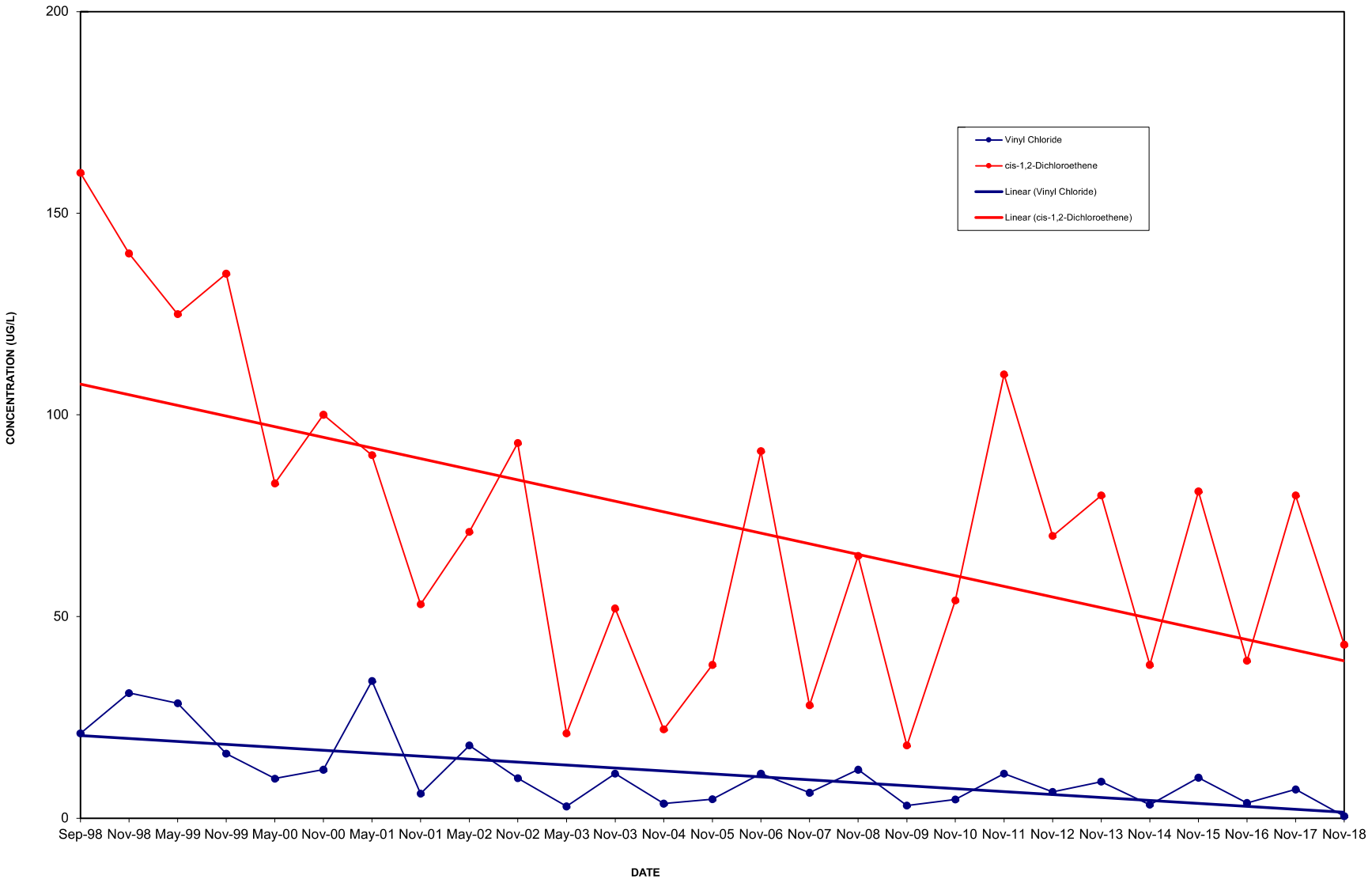


figure 4.1

CONCENTRATION VS. TIME - 1-20
COMPLIANCE MONITORING PROGRAM
BONNEVILLE POWER ADMINISTRATION
Tacoma, Washington

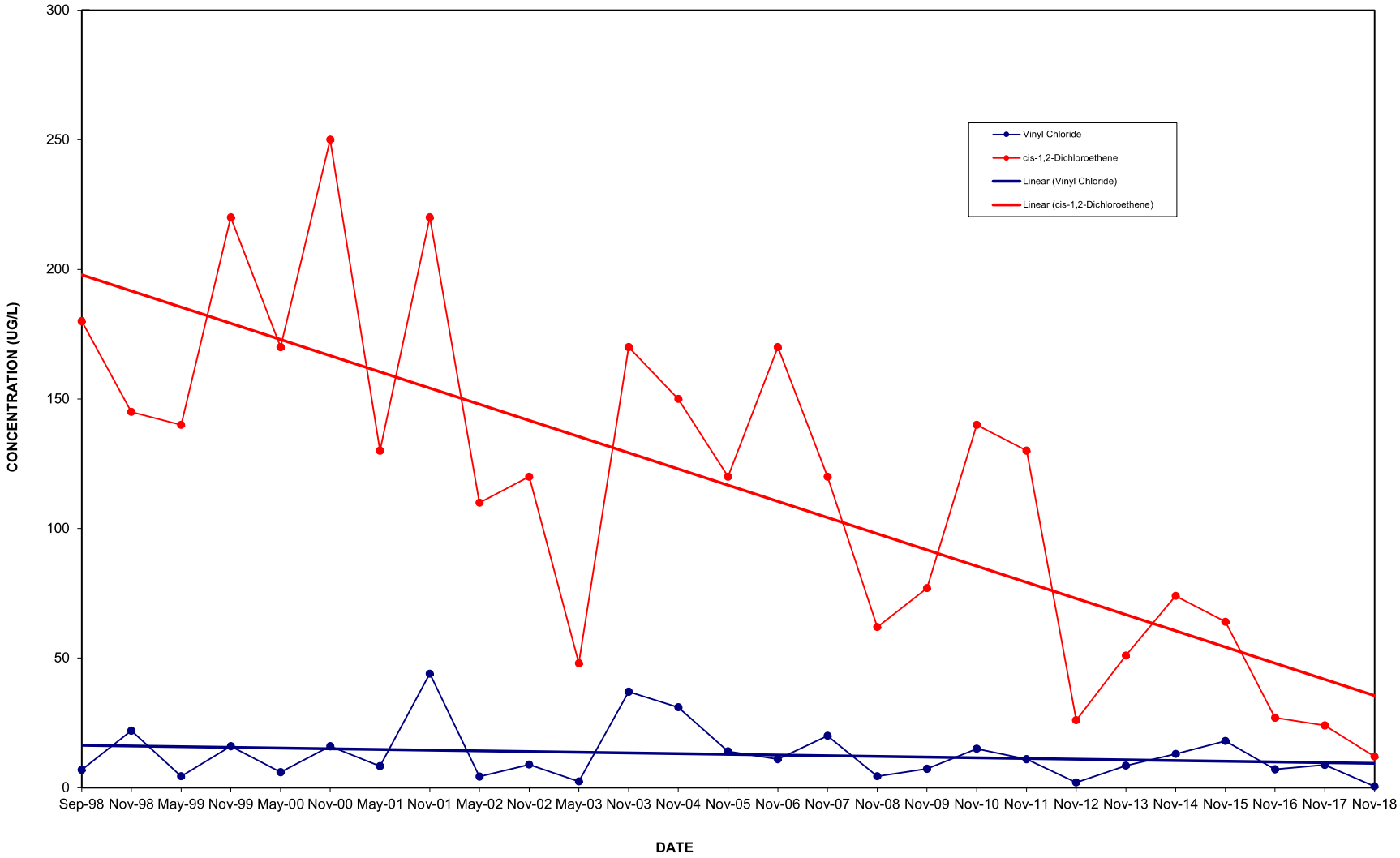


figure 4.2

CONCENTRATION VS. TIME - 7-26
COMPLIANCE MONITORING PROGRAM
BONNEVILLE POWER ADMINISTRATION
Tacoma, Washington

Tables

Table 3.1

Compliance Monitoring Points
Bonneville Power Administration Site
Taylor Way
Tacoma, Washington

Well No.	Hydraulic Monitoring	Water Quality Monitoring
1-20	X	X
2-27	X	
6-26	X	
7-26	X	X
9-30	X	
MW-1	X	
MW-2	X	

Table 3.2

Summary of Groundwater Elevations
Bonneville Power Administration Site
Taylor Way
Tacoma, Washington

Well No.	Top of Casing*	Sept. 98	Nov. 98	May 99	Nov. 99	May 00	Nov. 00	May 01	Nov. 01	May 02
1-20	8.40	1.58	2.00	2.94	2.24	3.42	3.10	3.15	2.24	3.70
2-27	14.92	3.08	3.14	5.13	3.48	5.44	4.34	5.00	3.58	6.07
6-26	13.27	2.25	2.38	4.09	2.77	4.55	3.57	4.06	2.87	4.87
7-26	12.73	1.44	1.85	2.91	2.14	3.55	2.94	3.02	2.14	3.54
9-30	14.65	3.69	3.76	5.74	4.22	5.99	4.96	5.66	4.28	6.43
MW-1	13.97	2.22	2.42	4.03	1.87	4.48	4.06	4.11	NM	4.88
MW-2	12.32	1.72	2.12	3.03	2.42	3.92	3.23	3.28	2.25	3.85

Well No.	Top of Casing*	Nov. 02	May. 03	Nov. 03	Nov. 04	Nov. 05	Nov. 06	Nov. 07	Nov. 08	Nov. 09
1-20	8.40	2.01	3.58	3.04	3.01	3.66	1.04	2.71	4.29	-0.36
2-27	14.92	2.96	5.76	5.02	4.81	5.34	3.18	4.16	6.36	6.30
6-26	13.27	2.41	4.66	4.04	3.86	4.59	2.49	3.45	5.73	5.39
7-26	12.73	1.90	3.46	2.86	2.92	3.58	1.91	2.73	4.15	3.20
9-30	14.65	3.49	6.28	5.68	5.52	5.82	3.82	4.74	6.27	6.14
MW-1	13.97	3.85	4.73	4.02	3.94	4.57	NM	3.11	5.56	5.42
MW-2	12.32	NM	3.79	2.92	3.15	3.8	2.00	2.90	4.47	4.39

Well No.	Top of Casing*	Nov. 10	Nov. 11	Nov. 12	Nov. 13	Nov. 14	Nov. 15	Nov. 16	Nov. 17	Nov. 18
1-20	8.40	4.39	2.71	4.78	3.80	4.10	4.55	4.93	4.09	2.28
2-27	14.92	6.60	3.93	6.93	5.94	5.96	6.79	7.53	5.85	3.21
6-26	13.27	5.76	3.27	6.09	4.99	5.2	5.96	6.80	5.30	2.62
7-26	12.73	4.38	2.62	4.72	3.79	4.04	5.47	4.01	4.47	2.21
9-30	14.65	6.68	4.43	7.01	6.21	6.25	6.70	7.26	6.54	3.68
MW-1	13.97	5.59	3.17	5.92	4.92	5.12	5.71	6.51	4.30	1.99
MW-2	12.32	4.45	2.74	4.90	3.88	4.14	4.66	5.15	4.25	2.26

Notes:

* Elevation surveyed January 2010. Vertical Datum: NGVD 29. Water level elevations updated based on 2010 survey.
NM Not measured

Table 3.3

Groundwater Compliance Monitoring Analytical Parameters
Bonneville Power Administration Site
Taylor Way
Tacoma, Washington

Parameter [1]	***Cleanup Level*** [2] ***(µg/L)***
cis-1,2-Dichloroethene	70
Dichloromethane (methylene chloride)	5
Tetrachloroethene	5
Trichloroethene	5
Vinyl chloride	10*

Notes:

(1) Analytical parameter list modified in January 2004.

(2) Model Toxic Control Act (MTCA Method B Surface Water Standard, Cleanup Levels and Risk Calculations (CLARC), Version 3.1, updated November 2001.

* Practical Quantitation Limit (PQL), "Washington State Department of Ecology Toxics Cleanup Program, Guidance on Sampling and Data Analysis Methods," January 1995.

Table 3.4

Analytical Results Summary
Bonneville Power Administration Site
Taylor Way
Tacoma, Washington

	Sample Location:		**1-20**	**7-26**	**7-26**
	Sample ID:		**GW-110618-NT-1-20**	**GW-110618-NT-7-26**	**GW-110618-NT-FD1**
	Sample Date:		**11/6/2018**	**11/6/2018**	**11/6/2018 (Duplicate)**
Parameter	**Units**	**Cleanup Level[(1)]**			
Volatile Organic Compounds					
cis-1,2-Dichloroethene	µg/L	70	43	12	12
Methylene chloride	µg/L	5	2.5 U	2.5 U	2.5 U
Tetrachloroethene	µg/L	5	2.5 U	2.5 U	2.5 U
Trichloroethene	µg/L	5	2.5 U	0.21J	2.5 U
Vinyl chloride	µg/L	10*	0.5 U	0.5 U	0.5 U

Notes:

(1) Standard, Cleanup Levels and Risk Calculations (CLARC), Version 3.1, updated November 2001.

J Estimated.

U Non-detect at associated value.

* Practical quantitation limit.

Concentration exceeds the cleanup standard.

Appendices

Appendix A
Site Inspection Sheets

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SITE

Specific Item		*No*	*Yes (If yes give details below)*
Erosion or Settlement of Low Permeability Cap		✓	
Surface Cracking or Failure of Cap Along Slopes		✓	
Emergence/Presence of Deep Rooted Vegetation (i.e. trees, brush, etc.)		✓	
Vegetation Burnout		✓	
Excessive Growth of Vegetation	Cap	✓	
	Drainage Swale		
Presence of Burrowing Mammals		✓	
Well Protective Casings and Appurtenances in Acceptable Condition			Y
Erosion of Drainage Swale/Ditch		✓	

Comments: If no problems with cap noted - state "No Problems Noted."
If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary.
No problems noted

Rick Bieber
(Inspector's Name - Please Print)

(Inspector's Signature and Date of Inspection) 1/11/18

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SECURITY

Specific Item		*No*	*Yes (If yes give details below)*
Perimeter Fence (i.e. damage or excessive deterioration)		✓	
Gates and Locks (missing damaged or inoperable)		✓	
Signs (damaged, missing or no longer readable)		✓	
Comments: If no problems with perimeter fence, gates or locks noted - state "No Problems Noted." If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary. No Problems noted			

Rick Bird

(Inspector's Name - Please Print)

1/11/18

(Inspector's Signature and Date of Inspection)

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SITE

Specific Item		*No*	*Yes (If yes give details below)*
Erosion or Settlement of Low Permeability Cap		✓	
Surface Cracking or Failure of Cap Along Slopes		✓	
Emergence/Presence of Deep Rooted Vegetation (i.e. trees, brush, etc.)		✓	
Vegetation Burnout		✓	
Excessive Growth of Vegetation	Cap	✓	
	Drainage Swale		
Presence of Burrowing Mammals		✓	
Well Protective Casings and Appurtenances in Acceptable Condition			Yes
Erosion of Drainage Swale/Ditch		✓	

Comments: If no problems with cap noted - state "No Problems Noted."
If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary.
NO Problems noted

Rick Bebee
(Inspector's Name - Please Print)

5/15/18
(Inspector's Signature and Date of Inspection)

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SECURITY

Specific Item		*No*	*Yes (If yes give details below)*
Perimeter Fence (i.e. damage or excessive deterioration)		✓	
Gates and Locks (missing damaged or inoperable)		✓	
Signs (damaged, missing or no longer readable)		✓	
Comments: If no problems with perimeter fence, gates or locks noted - state "No Problems Noted." If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary. NO problems noted			

Rick Bitzer
(Inspector's Name - Please Print)

5/13/10
(Inspector's Signature and Date of Inspection)

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SITE

Specific Item		*No*	*Yes (If yes give details below)*
Erosion or Settlement of Low Permeability Cap		✓	
Surface Cracking or Failure of Cap Along Slopes		✓	
Emergence/Presence of Deep Rooted Vegetation (i.e. trees, brush, etc.)		✓	
Vegetation Burnout		✓	
Excessive Growth of Vegetation	Cap Drainage Swale	✓	
Presence of Burrowing Mammals		✓	
Well Protective Casings and Appurtenances in Acceptable Condition			✓ Yes
Erosion of Drainage Swale/Ditch		✓	
Comments: If no problems with cap noted - state "No Problems Noted." If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary. No problems noted			

Rick Breber
(Inspector's Name - Please Print)

8/9/18
(Inspector's Signature and Date of Inspection)

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SECURITY

Specific Item		*No*	*Yes (If yes give details below)*
Perimeter Fence (i.e. damage or excessive deterioration)		✓	
Gates and Locks (missing damaged or inoperable)		✓	
Signs (damaged, missing or no longer readable)		✓	
Comments: If no problems with perimeter fence, gates or locks noted - state "No Problems Noted." If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary. NO problems noted			

Rick Bixler
(Inspector's Name - Please Print)

8/9/18
(Inspector's Signature and Date of Inspection)

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SITE

Specific Item		*No*	*Yes (If yes give details below)*
Erosion or Settlement of Low Permeability Cap		✓	
Surface Cracking or Failure of Cap Along Slopes		✓	
Emergence/Presence of Deep Rooted Vegetation (i.e. trees, brush, etc.)		✓	
Vegetation Burnout		✓	
Excessive Growth of Vegetation	Cap Drainage Swale	✓	
Presence of Burrowing Mammals		✓	
Well Protective Casings and Appurtenances in Acceptable Condition			Yes
Erosion of Drainage Swale/Ditch		✓	

Comments: If no problems with cap noted - state "No Problems Noted."
If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary.

No problems noted

Rick Breber
(Inspector's Name - Please Print)

11/06/18
(Inspector's Signature and Date of Inspection)

INSPECTION LOG SHEET
BONNEVILLE POWER ADMINISTRATION/OXYCHEM SITE
TACOMA, WASHINGTON

SECURITY

Specific Item		*No*	*Yes (If yes give details below)*
Perimeter Fence (i.e. damage or excessive deterioration)		✓	
Gates and Locks (missing damaged or inoperable)		✓	
Signs (damaged, missing or no longer readable)		✓	
Comments: If no problems with perimeter fence, gates or locks noted - state "No Problems Noted." If problems noted summarize problems below and corrective actions taken, use additional sheets if necessary. No problems noted			

Rick Bieber
(Inspector's Name - Please Print)

11/6/18
(Inspector's Signature and Date of Inspection)

Appendix B
Groundwater Sample Collection Summary Logs

APPENDIX B

SAMPLE COLLECTION DATA SHEET - GROUNDWATER SAMPLING PROGRAM
OCCIDENTAL CHEMICAL CORPORATION
BPA SITE
TACOMA, WASHINGTON

SAMPLE COLLECTION DATA SHEET - GROUNDWATER SAMPLING PROGRAM

PROJECT NAME: BPA — PROJECT NO.: 37894 (1 of 1)

SAMPLING CREW MEMBERS: Nate Tandeki — SUPERVISOR: R. Bieber

DATE OF SAMPLE COLLECTION: 11/6/2018

[Note: For 2" dia. well, 1 ft. = 0.14 gal (imp) or 0.16 gal (us)]

Sample I.D. Number	Well Number	Measuring Point Elev. (NGVD)	Water Depth (ft. btoc)	Water Elevation (NGVD)	Volume Flow (ml/min)	Volume Purged (gal US)	Field pH	Field Temp. (C)	Field Cond. (mS/cm)	Time	Sample Description & Analysis
GW-110618-NT-1-20(1)	1-20	8.40	6.12	2.28	--	6	6.6	13.3	0.755	13:10	Clear
GW-110618-NT-7-26(2)	7-26	12.73	10.52	2.21	--	3.75	6.67	12.28	0.573	14:24	Clear

Additional Comments: SAMPLE SET: 3 x 40ml glass w/ HCl preserve for VOC

Copies to:

(1) MS / MSD taken
(2) field duplicate taken

GHD

Appendix C
Analytical Data Verification and Assessment

Memorandum

December 5, 2018

To:	Rick Bieber	Ref. No.:	037894
From:	Sheri Finn/adh/25	Tel:	716-205-1977

Subject: **Analytical Results and Reduced Validation**
Tacoma BPA Annual Groundwater Monitoring
Glenn Springs Holdings, Inc.
Tacoma, Washington
November 2018

1. Introduction

This document details a reduced validation of analytical results for groundwater samples collected in support of the Tacoma BPA Annual Groundwater Monitoring Program at the Tacoma, Washington site during November 2018. Samples were submitted to APPL Labs located in Clovis, California. A sample collection and analysis summary is presented in Table 1. The validated analytical results are summarized in Table 2. A summary of the analytical methodology is presented in Table 3. A copy of the chain of custody can be found in Attachment A.

Standard GHD report deliverables were submitted by the laboratory. The final results and supporting quality assurance/quality control (QA/QC) data were assessed. Evaluation of the data was based on information obtained from the chain of custody form, finished report forms, method blank data, recovery data from surrogate spikes/laboratory control samples (LCS)/matrix spikes (MS), and field QA/QC samples.

The QA/QC criteria by which these data have been assessed are outlined in the analytical method referenced in Table 3 and applicable guidance from the document entitled "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review", United States Environmental Protection Agency (USEPA) 540-R-2016-002, September 2016, subsequently referred to as the "Guidelines" in this Memorandum.

2. Sample Holding Time and Preservation

The sample holding time criterion for the analyses is summarized in Table 3. The sample chain of custody document and analytical report were used to determine sample holding times. All samples were analyzed within the required holding time.

All samples were properly preserved, delivered on ice, and stored by the laboratory at the required temperature (0-6°C).

3. Laboratory Method Blank Analyses

Method blanks are prepared from a purified matrix and analyzed with investigative samples to determine the existence and magnitude of sample contamination introduced during the analytical procedures.

For this study, laboratory method blanks were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

All method blank results were non-detect, indicating that laboratory contamination was not a factor for this investigation.

4. Surrogate Spike Recoveries

In accordance with the method employed, all samples, blanks, and QC samples analyzed for organics are spiked with surrogate compounds prior to sample analysis. Surrogate recoveries provide a means to evaluate the effects of laboratory performance on individual sample matrices.

All samples submitted for volatile organic compound (VOC) determinations were spiked with the appropriate number of surrogate compounds prior to sample analysis.

Surrogate recoveries were assessed against laboratory control limits. All surrogate recoveries were acceptable.

5. Laboratory Control Sample Analyses

LCS are prepared and analyzed as samples to assess the analytical efficiencies of the method employed, independent of sample matrix effects.

For this study, LCS were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

The LCS contained all compounds of interest. LCS recoveries were within the laboratory control limits, demonstrating acceptable analytical accuracy.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

To evaluate the effects of sample matrices on the preparation process, measurement procedures, and accuracy of a particular analysis, samples are spiked with known concentrations of the analytes of concern and analyzed as MS/MSD samples.

MS/MSD analysis was performed as specified in Table 1.

The MS/MSD sample was spiked with all compounds of interest. Most percent recoveries and all relative percent difference (RPD) values were within the laboratory control limits, demonstrating acceptable

analytical accuracy and precision. High MS/MSD recoveries were reported for two compounds, the associated sample results were non-detect, and no qualification of data was necessary.

7. Field QA/QC Samples

The field QA/QC consisted of one field duplicate sample set.

To assess the analytical and sampling protocol precision, a field duplicate sample set was collected and submitted "blind" to the laboratory, as specified in Table 1. The RPDs associated with the duplicate sample must be less than 50 percent for water samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the reporting limit (RL), the evaluation criterion is one times the RL value.

All field duplicate results were within acceptable agreement, demonstrating acceptable sampling and analytical precision.

8. Analyte Reporting

The laboratory evaluated detected results down to the laboratory's method detection limit (MDL) for each analyte. Positive analyte detections less than the RL but greater than the MDL were reported as estimated (J) in Table 2. Non-detect results were presented as non-detect at the RL in Table 2.

9. Conclusion

Based on the assessment detailed in the foregoing, the data summarized in Table 2 are acceptable without qualification.

Table 1

Sample Collection and Analysis Summary
Tacoma BPA Annual Groundwater Monitoring
Glenn Springs Holdings, Inc.
Tacoma, Washington
November 2018

Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Collection Time (hr:min)	Analysis: Volatiles	Comments
GW-110618-NT-1-20	MW1-20	Water	11/06/2018	13:15	X	Matrix Spike/Matrix Spike Duplicate
GW-110618-NT-7-26	MW7-26	Water	11/06/2018	14:30	X	
GW-110618-FD1	MW7-26	Water	11/06/2018	-	X	Field Duplicate of GW-110618-NT-7-26

Notes:

- - Not applicable

Table 2

Analytical Results Summary
Tacoma BPA Annual Groundwater Monitoring
Glenn Springs Holdings, Inc.
Tacoma, Washington
November 2018

Location ID:		**MW1-20**	**MW7-26**	**MW7-26**
Sample Name:		**GW-110618-NT-1-20**	**GW-110618-NT-7-26**	**GW-110618-FD1**
Sample Date:		**11/06/2018**	**11/06/2018**	**11/06/2018 Duplicate**
Parameters	**Unit**			
Volatile Organic Compounds				
cis-1,2-Dichloroethene	µg/L	43	12	12
Methylene chloride	µg/L	2.5 U	2.5 U	2.5 U
Tetrachloroethene	µg/L	2.5 U	2.5 U	2.5 U
Trichloroethene	µg/L	2.5 U	0.24 J	0.22 J
Vinyl chloride	µg/L	0.5 U	0.5 U	0.5 U

Notes:

J -Estimated concentration
U -Not detected at the associated reporting limit

Table 3

Analytical Method
Tacoma BPA Annual Groundwater Monitoring
Glenn Springs Holdings, Inc.
Tacoma, Washington
November 2018

Parameter	Method	Matrix	Holding Time Collection to to Analysis (Days)
Volatile Organic Compounds (VOCs)	SW-846 8260B	Water	14

Notes:

SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, 1986, with subsequent revisions

Attachment A
Chain of Custody Document

87365

BPA

APPL, Inc.
908 N Temperance Ave
Clovis, CA 93611

Phone: (559) 275-2175
Fax: (559) 275-4422

CHAIN OF CUSTODY RECORD

C.O.C. 51094

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name: GHD	Phone: 253-988-7619	Company Name: GHD	Phone:
Address: 732 Broadway Tacoma WA 98421	Fax: N.A.	Address: See SSOW: 223-402-003-3100	Fax:
Attn: Rick.bieber@ghd.com		Attn: GSHI	

Project Name/Number	Sampler (Print)			
037894	N. Tandecki			
Purchase Order Number	Sampler (Signature)			
223-402-003-3100	[signature]			

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix: Aq	Matrix: Sed.	Matrix: Soil	Matrix	See SSOW (8260 / 8270)										MS/MSD	Date Shipped: / Carrier: / Waybill No.: / Comments:
GW-110618-NT-7-26	7-26	11-06-18	1430	PST	3	X				X											
GW-110618-NT-FD1	FD1	11-06-18		PST	3	X				X											
GW-110618-NT-1-20	1-20	11-06-18	1315	PST	12	X				X										X	

Shuttle Temperature: 3.5, 4.0

Turnaround Requested: Check one (see SSOW) ☐ Standard 2-3 wk ☐ One week ☐ 24/48 Hrs. ☒ Other

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30-day retention)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
N. Tandecki	11/08/18	1500					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:
					11-9-18	635	[signature]

White: Return to client with report   Yellow: Laboratory Copy   Pink: Sampler

See reverse side for Container Preservative and Sampling Information

Appendix D
Analytical Database

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20
Sample ID:		W-7412-092398-MW1-20-DG	MW1-20-1198-TR	MW1-20-0599-TR	MWD1-0599-TR	MW1-20-1199-TR	MWD1-1199-TR	MW1-20-0500-TR	MW1-20-1100-TR	FD1-1100-TR	MW1-20-0501-TR	FD1-0501-TR
Sample Date:		9/23/1998	11/5/1998	5/12/1999	5/12/1999	11/8/1999	11/8/1999	5/9/2000	11/9/2000	11/9/2000	5/21/2001	5/21/2001
					Duplicate		*Duplicate*			*Duplicate*		*Duplicate*
Parameter	***Units***											
Volatiles												
cis-1,2-Dichloroethene	ug/L	160 J	140 J	130	120	130	140	83	100	100	90	89
Methylene chloride	ug/L	5 J	5	5	5	1.0 U	1.0 U	2.3 U	4.0 U	10 U	2.5 U	2.5 U
Tetrachloroethene	ug/L	5 J	5	5	5	1.0 U	1.0 U	1.0 U	4.0 U	10 U	2.5 U	2.5 U
Trichloroethene	ug/L	9 J	8.0	4.1 J	4.4 J	3.4	3.6	2.2	1.2 J	10 U	1.7 J	1.7 J
Vinyl chloride	ug/L	21 J	31	25	32	16	16	9.8	12	12	33	34
Semi-Volatiles												
bis(2-Ethylhexyl)phthalate	ug/L	3.5 J	3.5	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	1.3 J	1.3	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	0.75	0.75	-	-	-	-	-	-	-	-	-
Metals												
Arsenic	ug/L	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	1.5	5.2	4.8	4.2	4.2 U	4.2 U	4.2 U	3.0 UJ	3.0 UJ	1.0 U	1.0 U
Lead	ug/L	-	-	-	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	5	5 J	5	5	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	3.0 UJ	3.0 UJ

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20	1-20
Sample ID:		MW1-20-1101-TR	FD1-1101-TR	MW1-20-0502-TR	FD1-0502-TR	MW1-20-1102-DC	FD1-1102-DC	I-20-0503	FD1-0503	1-20-1103	1-20-1104	1-20-1105-NR-001	1-20-1105-NR-002
Sample Date:		11/9/2001	11/9/2001 *Duplicate*	5/1/2002	5/1/2002 *Duplicate*	11/14/2002	11/14/2002 *Duplicate*	5/8/2003	5/8/2003 *Duplicate*	11/11/2003	11/11/2004	11/18/2005	11/18/2005 *Duplicate*
Parameter	***Units***												
Volatiles													
cis-1,2-Dichloroethene	ug/L	51	55	72	71	94	91	22 UJ	19	52	22 J	38 J	160 J
Methylene chloride	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ
Tetrachloroethene	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ
Trichloroethene	ug/L	1.3 J	1.3 J	2.5 U	2.5 U	2.0 J	1.9 J	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ
Vinyl chloride	ug/L	5.8	6.4	18	18	10	9.8	3.1	2.7	11	3.6	4.7 J	14 J
Semi-Volatiles													
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-
Metals													
Arsenic	ug/L	1.0 U	1.0 U	-	-	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	-	1.0 U	1.0 U	1.0 U	1.0 U	0.4	0.7	0.7	-	-	-
Lead	ug/L	3.0 U	3.0 U	-	-	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	-	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	-	-	-

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		**1-20**	**1-20**	**1-20**	**1-20**	**1-20**	**1-20**	**1-20**	**1-20**
Sample ID:		**1-20-1106-ILM-001**	**1-20-1107-ILM-001**	**GW-111408-TG-BPA-1-20-01**	**GW-110609-TG-1-20**	**GW-111610-JS-1-20**	**GW-111610-JS-1-20**	**GW-111711-AK-1-20**	**GW-112912-MD-1-20**
Sample Date:		**11/3/2006**	**11/2/2007**	**11/14/2008**	**11/6/2009**	**11/16/2010**	**11/16/2010** ***Duplicate***	**11/17/2011**	**11/29/2012**
Parameter	***Units***								
Volatiles									
cis-1,2-Dichloroethene	ug/L	91	28 J	65	18	54	50	110	70
Methylene chloride	ug/L	2.5 U	2.5 U	2.5 U	2.5U	2.5 U	2.5 U	2.5 U	2.0 U
Tetrachloroethene	ug/L	2.5 U	2.5 U	2.5 U	2.5U	2.5 U	2.5 U	2.5 U	0.50 U
Trichloroethene	ug/L	0.43 J	2.5 U	0.26 J	0.17J	2.5 U	2.5 U	2.5 U	0.10 J
Vinyl chloride	ug/L	11	6.3	12	3.1	4.6	4.2	11	6.5
Semi-Volatiles									
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-	-
Metals									
Arsenic	ug/L	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	-	-	-	-	-	-	-
Lead	ug/L	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	-	-	-	-	-	-	-

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		**1-20**	**1-20**	**1-20**	**1-20**	**1-20**	**1-20**	**1-20**
Sample ID:		**GW-112613-BP-1-20**	**GW-111814-BP-1-20**	**GW-113015-BP-1-20**	**GW-111716-NT-1-20**	**GW-201117-NT-1-20**	**GW-201117-NT-FD1**	**GW-110618-NT-1-20**
Sample Date:		**11/26/2013**	**11/18/2014**	**11/30/2015**	**11/17/16**	**11/20/17**	**11/20/17**	**11/06/2018**
							Duplicate	
Parameter	***Units***							
Volatiles								
cis-1,2-Dichloroethene	ug/L	80	38	81	39 J	80	75	43
Methylene chloride	ug/L	2.0 U	2.0 U	2.0 U	2.5 U	2.5 U	2.5 U	2.5 U
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	2.5 U	2.5 U	2.5 U	2.5 U
Trichloroethene	ug/L	0.50 U	0.50 U	0.50 U	2.5 U	2.5 U	2.5 U	2.5 U
Vinyl chloride	ug/L	9.0	3.3	10	3.7	7.1	5.5	0.5 U
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-
Metals								
Arsenic	ug/L	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	-	-	-	-	-	-
Lead	ug/L	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	-	-	-	-	-	-

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		7-26	7-26	7-26	7-26	7-26	7-26	7-26	7-26	7-26	7-26	7-26
Sample ID:		W-7412-092398-MW7-26-DG	MW7-26-1198-TR	MWD1-1198-TR	MW7-26-0599-TR	MW7-26-1199-TR	MW7-26-0500-TR	MW7-26-1100-TR	MW7-26-0501-TR	MW7-26-1101-TR	MW7-26-0502-TR	MW7-26-1102-DC
Sample Date:		9/23/1998	11/4/1998	11/4/1998 *Duplicate*	5/12/1999	11/8/1999	5/10/2000	11/9/2000	5/21/2001	11/8/2001	5/1/2002	11/14/2002
Parameter	***Units***											
Volatiles												
cis-1,2-Dichloroethene	ug/L	180	140	150	140	220 D	170 D	250	130	220	110	120
Methylene chloride	ug/L	5.3	5	5	5	1.0 U	5.3 D	8.0 U	2.5 U	2.5 U	2.5 U	2.5 UJ
Tetrachloroethene	ug/L	5	5	5	5	1.0 U	1.3 U	8.0 U	2.5 U	2.5 U	2.5 U	2.5 UJ
Trichloroethene	ug/L	10	9.2	9.4	5.5	4	1.8	8.0 U	1.4 J	2.5 U	2.5 U	2.0 J
Vinyl chloride	ug/L	6.9	22	22	4.4	16	6.0	16	8.3	44	4.3	8.9
Semi-Volatiles												
bis(2-Ethylhexyl)phthalate	ug/L	3.5	3.5	3.5	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	1.3	1.3	1.3	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	0.75	0.75	0.75	-	-	-	-	-	-	-	-
Metals												
Arsenic	ug/L	-	-	-	-	-	-	-	-	7.2	-	-
Arsenic (Dissolved)	ug/L	5.4	7.8	6.4	7.5 J	5.5 B	4.2	3.8 J	7.8	-	4	6.4
Lead	ug/L	-	-	-	-	-	-	-	-	3.0 U	-	-
Lead (Dissolved)	ug/L	5	5	5	5	2.7 U	2.7 U	2.7 U	3.0 UJ	-	3.0 U	3.0 U

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**
Sample ID:		**7-26-0503**	**7-26-1103**	**FD1-1103**	**7-26-1104**	**FD1-1104**	**7-26-1105-NR**	**7-26-1106-ILM-002**	**7-26-1106-ILM-003**	**7-26-1107-ILM**	**FDUP-1107-ILM**	**GW-111408-TG-BPA-7-26-04**
Sample Date:		**5/8/2003**	**11/10/2003**	**11/10/2003** *Duplicate*	**11/11/2004**	**11/11/2004** *Duplicate*	**11/18/2005**	**11/3/2006**	**11/3/2006** *Duplicate*	**11/2/2007**	**11/2/2007** *Duplicate*	**11/14/2008**
Parameter	***Units***											
Volatiles												
cis-1,2-Dichloroethene	ug/L	48	170	220	150	150	120	170 J	170	110	100	62
Methylene chloride	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Tetrachloroethene	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.24 J	2.5 U	2.5 U	2.5 U
Trichloroethene	ug/L	2.5 U	1.4 J	1.5 J	1.3 J	1.3 J	2.5 U	0.78 J	0.85 J	2.5 U	2.5 U	0.34 J
Vinyl chloride	ug/L	2.4	37	37	31	31	14	11	11	16	20	4.4
Semi-Volatiles												
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-	-	-	-	-
Metals												
Arsenic	ug/L	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	7.1	7.6	8.1	-	-	-	-	-	-	-	-
Lead	ug/L	-	-	-	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	3.0 U	3.0 U	3.0 U	-	-	-	-	-	-	-	-

Table D.1

Groundwater Analytical Database
Bonneville Administration Site
Taylor Way
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Sample Location:		**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**
Sample ID:		**GW-111408-TG-BPA-FD-05**	**GW-110609-TG-7-26**	**GW-110609-TG-FD1**	**GW-111610-JS-7-26**	**GW-111711-AK-7-26**	**GW-111711-AK-D1**	**GW-112912-MD-7-26**
Sample Date:		**11/14/2008**	**11/6/2009**	**11/6/2009**	**11/16/2010**	**11/17/2011**	**11/17/2011**	**11/29/2012**
		Duplicate		***Duplicate***	***Duplicate***		***Duplicate***	
Parameter	***Units***							
Volatiles								
cis-1,2-Dichloroethene	ug/L	94	77	91	140	130	130	26
Methylene chloride	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.0 U
Tetrachloroethene	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.50 U
Trichloroethene	ug/L	0.44 J	0.40J	0.39J	0.30 J	0.30 J	0.31 J	0.21 J
Vinyl chloride	ug/L	7.5	7.3	9.7	15 J	11	9.9	2.0 J
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-
Metals								
Arsenic	ug/L	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	-	-	-	-	-	-
Lead	ug/L	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	-	-	-	-	-	-

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Groundwater Analytical Database
Bonneville Administration Site
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Sample Location:		**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**7-26**
Sample ID:		**GW-112912-MD-FD1**	**GW-112613-BP-7-26**	**GW-112613-BP-FD-1**	**GW-111814-BP-7-26**	**GW-111814-BP-FD-1**	**GW-120115-BP-7-26**	**GW-120115-BP-FD-1**
Sample Date:		**11/29/2012**	**11/26/2013**	**11/26/2013**	**11/18/2014**	**11/18/2014**	**12/1/2015**	**12/1/2015**
Parameter	***Units***	***(Duplicate)***		***(Duplicate)***		***(Duplicate)***		
Volatiles								
cis-1,2-Dichloroethene	ug/L	40	51 J	100 J	74	73	64	61
Methylene chloride	ug/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene	ug/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	ug/L	0.22 J	0.22 J	0.26 J	0.23 J	0.20 J	0.20 J	0.20 J
Vinyl chloride	ug/L	3.7 J	8.5 J	23 J	13	13	18	17
Semi-Volatiles								
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-
Metals								
Arsenic	ug/L	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	-	-	-	-	-	-
Lead	ug/L	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	-	-	-	-	-	-

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Sample Location:		**7-26**	**7-26**	**7-26**	**7-26**	**7-26**	**MW1**	**MW1**	**MW1**
Sample ID:		**GW-111716-NT-7-26**	**GW-111716-NT-FD-1**	**GW-201117-NT-7-26**	**GW-110618-NT-7-26**	**GW-110618-NT-FD1**	**W-7412-092298-MW1-DG**	**MW1-1198-TR**	**MW1-0599-TR**
Sample Date:		**11/17/2016**	**11/17/2016**	**11/20/2017**	**11/6/2018**	**11/6/2018**	**9/22/1998**	**11/4/1998**	**5/11/1999**
			Duplicate						
Parameter	***Units***								
Volatiles									
cis-1,2-Dichloroethene	ug/L	27	38	24J	12	12	5	5 J	10
Methylene chloride	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5	5 J	5
Tetrachloroethene	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5	5 J	5
Trichloroethene	ug/L	0.23 J	2.5 U	0.21J	0.22 J	0.22 J	2.4 J	5 J	5
Vinyl chloride	ug/L	7.1	11	8.8	0.5 U	0.5 U	0.18 J	0.18 J	26
Semi-Volatiles									
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	4.4	3.5	-
Hexachlorobenzene	ug/L	-	-	-	-	-	1.3	1.3	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	0.75	0.75	-
Metals									
Arsenic	ug/L	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	-	-	-	-	3.2	4.5	4.4
Lead	ug/L	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	-	-	-	-	5	5 J	5

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Sample Location:		**MW1**	**MW1**	**MW1**	**MW1**	**MW1**	**MW1**	**MW1**	**MW1**	**MW1**	**MW1**
Sample ID:		**MW1-1199-TR**	**MW1-0500-TR**	**MWD1-0500-TR**	**MW1-1100-TR**	**MW1-0501-TR**	**MW1-1101-DC**	**MW1-0502-TR**	**MW-1-1102-DC**	**MW-1-0503**	**MW1-1103**
Sample Date:		**11/8/1999**	**5/9/2000**	**5/9/2000** *Duplicate*	**11/9/2000**	**5/21/2001**	**11/8/2001**	**5/1/2002**	**11/14/2002**	**5/8/2003**	**11/11/2003**
Parameter	***Units***										
Volatiles											
cis-1,2-Dichloroethene	ug/L	12	59	88	5.7	41	9.2	17	8.6	15	6.2
Methylene chloride	ug/L	1.0U	1.0U	2.7 U	4.0 U	2.5U	2.5U	2.5U	2.5 UJ	2.5U	2.5U
Tetrachloroethene	ug/L	1.0U	1.0U	1.0U	4.0 U	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
Trichloroethene	ug/L	1.0U	1.0U	2.6	4.0 U	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
Vinyl chloride	ug/L	13	15	11	2.3	16	0.5U	3.7	1.1	1.4	0.42 J
Semi-Volatiles											
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-	-	-	-	-
Metals											
Arsenic	ug/L	-	-	-	-	-	1.0U	-	-	-	-
Arsenic (Dissolved)	ug/L	4.2 U	4.2 U	4.2 U	3.0UJ	1.0U	-	1.0U	1.0U	1.0U	0.05 U
Lead	ug/L	-	-	-	-	-	3.0 U	-	-	-	-
Lead (Dissolved)	ug/L	2.7U	2.7U	2.7U	2.7U	3.0UJ	-	3.0U	3.0U	3.0U	3.0U

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Groundwater Analytical Database
Bonneville Administration Site
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Sample Location:		**MW2**	**MW2**	**MW2**	**MW2**	**MW2**	**MW2**	**MW2**	**MW2**	**MW2**	**MW2**	**MW2**
Sample ID:		**W-7412-092298-MW2-DG**	**MW2-1198-TR**	**MW2-0599-TR**	**MW2-1199-TR**	**MW2-0500-TR**	**MW2-1100-TR**	**MW2-0501-TR**	**MW2-1101-TR**	**MW2-0502-TR**	**MW-2-1102-DC**	**MW-2-0503**
Sample Date:		**9/22/1998**	**11/5/1998**	**5/11/1999**	**11/8/1999**	**5/10/2000**	**11/9/2000**	**5/21/2001**	**11/9/2001**	**5/1/2002**	**11/14/2002**	**5/8/2003**
Parameter	***Units***											
Volatiles												
cis-1,2-Dichloroethene	ug/L	100 J	72 J	35	27	18	16	15	10	11	16	16
Methylene chloride	ug/L	5	5.3	5	1.0U	1.0U	8.0 U	2.5U	2.5U	2.5U	2.5UJ	2.5U
Tetrachloroethene	ug/L	5	5	5	1.0U	1.0U	8.0 U	2.5U	2.5U	2.5U	2.5U	2.5U
Trichloroethene	ug/L	5 J	5	5	1.0U	1.0U	8.0 U	2.5U	2.5U	2.5U	2.5U	2.5U
Vinyl chloride	ug/L	22 J	23	4.4	2.0	3.0	4.0	8.9	5.0	6.1	5.6	6.1
Semi-Volatiles												
bis(2-Ethylhexyl)phthalate	ug/L	3.5	3.5	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	ug/L	1.3	1.3	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	0.75	0.75	-	-	-	-	-	-	-	-	-
Metals												
Arsenic	ug/L	-	-	-	-	-	-	-	1.0U	-	-	-
Arsenic (Dissolved)	ug/L	5.3	6.0	7.9	4.2 U	4.2 U	3.0UJ	1.0U	-	1.0U	1.0U	1.0U
Lead	ug/L	-	-	-	-	-	-	-	3.0U	-	-	-
Lead (Dissolved)	ug/L	5	5 J	5	2.7U	2.7U	2.7U	3.0UJ	-	3.0U	3.0U	3.0U

Table D.1

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Sample Location:		**MW2**	**MW2-27**	**MW2-27**	**MW2-27**	**MW2-27**	**MW2-27**	**MW2-27**	**MW2-27**	**MW2-27**	**MW2-27**
Sample ID:		**MW2-1103**	**W-7412-092398-MW2-27-DG**	**W-7412-092398-MW100-DG**	**MW2-27-1198-TR**	**MW2-27-0599-TR**	**MW2-27-1199-TR**	**MW2-27-0500-TR**	**MW2-27-1100-TR**	**MW2-27-0501-TR**	**MW2-27-1101-TR**
Sample Date:		**11/11/2003**	**9/23/1998**	**9/23/1998** *Duplicate*	**11/4/1998**	**5/12/1999**	**11/8/1999**	**5/10/2000**	**11/9/2000**	**5/21/2001**	**11/8/2001**
Parameter	***Units***										
Volatiles											
cis-1,2-Dichloroethene	ug/L	23	5	5	5	5	0.28 J	1.2	10 U	2.5U	2.5U
Methylene chloride	ug/L	2.5U	10	38	5.1	5	1.0U	1.0U	10 U	2.5U	2.5U
Tetrachloroethene	ug/L	2.5U	5	5	5	5	1.0U	1.0U	10 U	2.5U	2.5U
Trichloroethene	ug/L	2.5U	5 J	5 J	5	5	1.0U	1.0U	10 U	2.5U	2.5U
Vinyl chloride	ug/L	5.0	0.18 J	0.18 J	0.18	0.49	0.5U	0.60	5.0 U	0.84	0.5U
Semi-Volatiles											
bis(2-Ethylhexyl)phthalate	ug/L	-	5.3	4.4	3.5	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	1.3	1.3	1.3	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	0.75	0.75	0.75	-	-	-	-	-	-
Metals											
Arsenic	ug/L	-	-	-	-	-	-	-	-	-	1.0U
Arsenic (Dissolved)	ug/L	0.1	4.8	5.2	5.9	4.5	4.2 U	4.2 U	3.0UJ	1.0U	-
Lead	ug/L	-	-	-	-	-	-	-	-	-	3.0 U
Lead (Dissolved)	ug/L	3.0U	5	5	5	5	2.7U	2.7U	2.7U	3.0UJ	-

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Sample Location:		MW2-27	MW2-27	MW2-27	MW2-27	6-26	6-26	6-26	6-26	6-26	6-26	6-26
Sample ID:		MW2-27-0502-TR	MW2-27-1102-DC	MW2-27-0503	2-27-1103	W-7412-092398-MW6-26-DG	MW6-26-1198-TR	MW6-26-0599-TR	MW6-26-1199-TR	MW6-26-0500-TR	MW6-26-1100-TR	MW6-26-0501-TR
Sample Date:		5/1/2002	11/14/2002	5/8/2003	11/10/2003	9/23/1998	11/4/1998	5/12/1999	11/8/1999	5/10/2000	11/9/2000	5/21/2001
Parameter	***Units***											
Volatiles												
cis-1,2-Dichloroethene	ug/L	1.0 J	2.5U	2.5 U	2.5 U	4.0 J	5.1	4.1 J	3.6	2.8	10 U	2.1 J
Methylene chloride	ug/L	2.5U	2.5UJ	2.5 U	2.5 U	5	5	5	1.0U	1.0U	10 U	2.5U
Tetrachloroethene	ug/L	2.5U	2.5U	2.5 U	2.5 U	5	5	5	1.0U	1.0U	10 U	2.5U
Trichloroethene	ug/L	2.5U	2.5U	2.5 U	2.5 U	5 J	5	5	1.0U	0.34 J	10 U	2.5U
Vinyl chloride	ug/L	0.80	0.5U	0.77	0.5 U	1.7 J	3.5	3.2	2.5	3.0	5.0 U	2.0
Semi-Volatiles												
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	3.5 J	3.5	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	1.3 J	1.3	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	0.75 J	0.75	-	-	-	-	-
Metals												
Arsenic	ug/L	-	-	-	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	1.2	1.0U	0.2	0.7	5.4	4.2	6.8 J	4.2U	4.2U	3.0UJ	1.0 U
Lead	ug/L	-	-	-	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	3.0U	3.0U	3.0 U	3.0 U	5	5	5	2.7U	2.7U	2.7U	3.0UJ

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Bonneville Administration Site
Taylor Way
Tacoma, Washington

Sample Location:		6-26	6-26	6-26	6-26	6-26	MW9	MW9	MW9	MW9	MW9-30	MW9-30
Sample ID:		MW6-26-1101-TR	MW6-26-0502-TR	MW6-26-1102-DC	6-26-0503	6-26-1103	W-7412-092398-MW9-DG	MW9-1198-TR	MW9-0599-TR	MW9-30-1199-TR	MW9-30-0500-TR	MW9-30-1100-TR
Sample Date:		11/8/2001	5/1/2002	11/14/2002	5/8/2003	11/10/2003	9/23/1998	11/4/1998	5/11/1999	11/8/1999	5/9/2000	11/9/2000
Parameter	***Units***											
Volatiles												
cis-1,2-Dichloroethene	ug/L	2.5U	1.6 J	1.2 J	1.4 J	2.5U	5	5	5	2.7U	1.6 U	10 U
Methylene chloride	ug/L	2.5U	2.5U	2.5UJ	2.5U	2.5U	36	6.9	5	3.2U	1.6 U	10 U
Tetrachloroethene	ug/L	2.5U	2.5U	2.5U	2.5U	2.5U	5	5	5	3.2U	1.6 U	10 U
Trichloroethene	ug/L	2.5U	2.5U	2.5U	2.5U	2.5U	J 5	5	5	3.2U	1.6 U	10 U
Vinyl chloride	ug/L	1.4	2.3	1.0	2.0	1.1	J 0.18	0.18	0.49	3.2U	1.6 U	5.0 U
Semi-Volatiles												
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	J 3.5	3.5	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	J 1.3	1.3	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	J 0.75	0.75	-	-	-	-
Metals												
Arsenic	ug/L	0.47766 J	-	-	-	-	-	-	-	-	-	-
Arsenic (Dissolved)	ug/L	-	1.0U	1.0 U	1.0 U	0.3	5.3	17J	5 J	8.4U	8.4 U	3.0UJ
Lead	ug/L	3.0U	-	-	-	-	-	-	-	-	-	-
Lead (Dissolved)	ug/L	-	3.0U	3.0U	3.0 U	3.0 U	5	5	5	2.7U	2.7 U	2.7 U

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Tacoma, Washington

Sample Location:		**MW9-30**	**MW9-30**	**MW9-30**	**MW9-30**	**MW9-30**	**MW9-30**
Sample ID:		**MW9-30-0501-TR**	**MW9-30-1101-TR**	**MW9-30-0502-TR**	**MW9-30-1102-DC**	**MW9-30-0503**	**9-30-1103**
Sample Date:		**5/21/2001**	**11/8/2001**	**5/1/2002**	**11/14/2002**	**5/8/2003**	**11/10/2003**
Parameter	***Units***						
Volatiles							
cis-1,2-Dichloroethene	ug/L	2.5UJ	2.5U	2.5U	2.5U	2.5U	2.5U
Methylene chloride	ug/L	2.5UJ	2.5U	2.5U	2.5U	2.5U	2.5U
Tetrachloroethene	ug/L	2.5UJ	2.5UI	2.5U	2.5U	2.5U	2.5U
Trichloroethene	ug/L	2.5UJ	2.5U	2.5U	2.5U	2.5U	2.5U
Vinyl chloride	ug/L	0.5UJ	0.5U	0.5U	0.5U	0.5U	0.5U
Semi-Volatiles							
bis(2-Ethylhexyl)phthalate	ug/L	-	-	-	-	-	-
Hexachlorobenzene	ug/L	-	-	-	-	-	-
Hexachlorobutadiene	ug/L	-	-	-	-	-	-
Metals							
Arsenic	ug/L	-	1.0U	-	-	-	-
Arsenic (Dissolved)	ug/L	1.0J	-	1.0U	1.0U	1.0U	0.1
Lead	ug/L	-	3.0U	-	-	-	-
Lead (Dissolved)	ug/L	3.0UJ	-	3.0U	3.0U	15.0U	3.0U

about GHD

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