



Spring 2016 Groundwater and Surface Water  
Monitoring

## PACCAR Renton Site

Renton, Washington

**Prepared for**  
PACCAR

**October 18, 2016**  
**1639-69**





**HARTCROWSER**

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**Data Validation Summary and  
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# PACCAR Renton Site

## Renton, Washington

This report provides the Spring 2016 groundwater and surface water monitoring results for the PACCAR Renton National Priorities List (NPL) Site. This monitoring report contains the elements described in the Confirmational Monitoring and Inspection Plan (CMIP; DOF 1997) and the Periodic Review (Ecology 2014) and presents the results of the groundwater, surface water, and structural fill cover monitoring conducted at the site in March 2016.

This report is divided into three sections:

- **Section 1.** Groundwater Monitoring
- **Section 2.** Surface Water Monitoring
- **Section 3.** PACCAR Structural Fill Cover Monitoring Field Inspection and Observation Form

The information in these sections is supplemented by tables and figures presented at the end of the respective sections. In addition, Appendix A presents the chemical data quality review and laboratory reports for groundwater, Appendix B presents that information for surface water, and Appendix C presents groundwater quality summary charts.

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## SECTION 1

### Groundwater Monitoring



# SECTION 1

## GROUNDWATER MONITORING

### Introduction

This section presents the results of the groundwater monitoring event conducted in March 2016. Specifically, it includes a tabulation of water level and groundwater quality data, groundwater flow maps, and an assessment of results relative to cleanup levels (CULs) for developing sampling and analysis recommendations consistent with the CMIP and Periodic Review (Ecology 2014).

### Groundwater Monitoring

Groundwater monitoring was completed on March 10, 2016, in accordance with the planned elements described by the Periodic Review (Ecology 2014). The groundwater elevation and chemical test results obtained from this event are compiled in this section.

The CMIP provides compound-specific CULs and hot spot action levels (HSALs) for comparison with the site data. The CULs represent the groundwater remediation goals at the site, while HSALs for groundwater are based on drinking water standards. Planned actions described in this report are based on an interpretation of the updated data relative to the decision-making processes outlined in the CMIP.

Data presented in this report are organized as follows:

- **Monitoring Summary.** An overview of the data collected from each monitoring well is given in Table 1-1. This table lists the wells sampled and identifies the chemicals analyzed in each well.
- **Groundwater Elevation.** Groundwater elevation measurements are compiled in Table 1-2 and contoured on Figures 1-1 and 1-2 for the Upper Sand and Lower Sand units, respectively. Groundwater elevation for MW-2S was considered suspect since it was almost two feet lower than surrounding well elevations; therefore, this elevation was not used in developing groundwater contours. We will monitor this well in future sampling events to confirm the lower water table was an anomaly.
- **Chemical Result Summary.** A summary of groundwater analytical results is provided in Table 1-3. All groundwater samples were analyzed for arsenic and vinyl chloride (Table 1-1). Field parameter measurements including turbidity, temperature, pH, dissolved oxygen, redox potential, and conductivity are also included in Table 1-3.
- **Purge Water Sampling.** Groundwater collected during well purging (before sampling) was analyzed for arsenic, chromium, lead, diesel- and heavy-oil-range hydrocarbons, and volatile organic compounds (VOCs). These data are necessary for future disposal documentation and are presented in Table A-2.

- **Chemical Data Compilation.** Appendix A includes a data validation summary for the groundwater quality results and a compilation of the March 2016 groundwater data (Table A-1) and purge water data (Table A-2) along with the laboratory reports.
- **Groundwater Quality Summary Charts.** Appendix C includes groundwater quality summary charts for each well sampled as part of the March 2016 sampling program. The charts summarize the historical sampling results for these wells.

### ***Future Monitoring***

The Periodic Review establishes the groundwater sampling program (Table 1-4) for the site, which consists of:

- Sample groundwater in March 2017, 2018 and 2019 for arsenic in wells LW-6D, LW-9D, CW-1S, CW-1D, LW-9S, and MW-3I. Groundwater elevations and field parameters will also be measured in these wells.
- Sample groundwater in March 2017, 2018, and 2019 for vinyl chloride in wells CW-1S and LW-9D.
- Sample groundwater in March 2019 in wells SC-1S and SC-2S for arsenic, lead, and chromium. Groundwater elevations and field parameters will also be measured.
- Groundwater elevations will be measured in the PACCAR monitoring well network in March 2019.

### ***Electronic Groundwater Quality Data***

An electronic copy of the complete groundwater quality database is submitted on CD-ROM with this report for reference and further evaluation, if warranted. The CD contains a Microsoft Access data file in addition to a program that can be used as a viewer to create monitoring summary reports for any well or analyte. Instructions for viewing the data and generating the monitoring summary reports follow.

Instructions for Printing “Monitoring Summary Report” from PACCAR Database.

1. Open ACCESS 2000

2. Select File

Open database

CD Drive:\PACCAR Apr-16.mdb

3. The message, “The database ‘PACCAR Apr-16’ is read-only” will appear. Click the OK button.

4. The Reports Menu will appear.

5. Double click on “Monitoring Summary”

6. The Enter Parameter Value box will appear with the prompt, “Enter Well”

Type in the well name (such as LW-09D).

7. Another Parameter Value box will appear with the prompt, “Enter CAS or Analyte Code”

Type in analyte name (such as Vinyl Chloride).

8. The report will be displayed on screen.

9. To print, select the print icon.

If the error message “The expression On No Data you entered as the event property setting produced the following error” appears, you may have entered a well location or analyte name that doesn’t exist in the database. Click OK, select “Well Water Level Analyte Summary” and re-enter the well name and analyte name as indicated above.

## References

Dalton, Olmstead & Fluglevand. 1997. Confirmational Monitoring and Inspections Plans, Former PACCAR Defense Systems Site, Renton, Washington. November 1997.

Washington State Department of Ecology. 2014. Periodic Review. PACCAR, Facility Site ID#: 2065, ISIS Cleanup Site ID# 788. July 2014.



**Table 1-1 – Groundwater Monitoring Program in March 2016**

Well	VOC <sup>a</sup>	Arsenic
<b>Confirmation Lower Sand/Delta Deposits</b>		
CW-1D	<sup>b</sup>	X
LW-6D	<sup>b</sup>	X
LW-9D	X	X
<b>Confirmation Upper Sand/Aquitard Wells</b>		
CW-1S	X	X
LW-9S	<sup>b</sup>	X
MW-3I	<sup>b</sup>	X
<b>Stabilized Cell Wells</b>		
SC-1S		
SC-2S		
<b>Information Wells</b>		
<b>Quality Control Samples</b>		
	X	X
<b>Purge Water Samples</b>		
	X	X

<sup>a</sup> VOC is vinyl chloride.

Water elevations measured at approximately 33 wells.

All wells with samples submitted for laboratory analysis have the following parameters measured:

temperature, pH, conductivity, turbidity, dissolved oxygen, and redox potential.

Purge water samples analyzed for VOCs, arsenic, lead, total chromium, and TPH.

<sup>b</sup> Samples analyzed for vinyl chloride in March 2016 only.

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**Table 1-2 – Groundwater Elevation Data, March 2016**

<b>Well</b>	<b>Depth to Water in Feet</b>	<b>Reference Elevation in Feet</b>	<b>Water Elevation in Feet</b>
CW-1D	3.18	26.18	23.00
CW-1S	2.70	26.14	23.44
CW-3D	6.17	32.22	26.05
CW-3S	4.78	32.04	27.26
DM-2D	6.11	28.40	22.29
DM-5D	7.77	40.13	32.36
LW-14S	18.94	(a)	NC
LW-1D	2.54	25.98	23.44
LW-1S	1.51	25.84	24.33
LW-2D	4.69	28.78	24.09
LW-2S	3.88	28.98	25.10
LW-4S	6.59	39.87	33.28
LW-6D	6.09	30.58	24.49
LW-6S	5.50	29.70	24.20
LW-7S	4.78	33.74	28.96
LW-9D	7.56	31.95	24.39
LW-9S	7.77	32.12	24.35
MW-1S(N)	3.53	26.56	23.03
MW-2D(R)	6.20	29.43	23.23
MW-2S(W)	5.81	28.85	23.04 (b)
MW-3I(N)	6.96	34.39	27.43
MW-3S(S)	6.92	34.39	27.47
OSP-10D	10.74	40.74	30.00
OSP-1D	10.81	41.51	30.70
OSP-1S	5.61	41.44	35.83
OW-4D	19.05	(a)	NC
OW-4S	18.21	(a)	NC
R-10D	10.67	38.24	27.57
R-10S	9.28	39.17	29.89
SC-1S	4.54	37.78	33.24
SC-2S	13.05	40.52	27.47
U-1D	6.59	30.82	24.23
U-1S	4.64	30.44	25.80

NL = Not located.

NM = Not measured.

NC = Not calculated.

(a) Monitoring well stickup was modified during construction and needs to be resurveyed.

(b) Groundwater elevation for MW-2S was considered suspect since it was almost two feet lower than surrounding well elevations; therefore, this elevation was not used in developing groundwater contours. The well will be monitored in future sampling events to confirm the lower water table was an anomaly.



Table 1-3 - Summary of Groundwater Analytical Data

Well	Date	Arsenic in µg/L	Lead in µg/L	Chromium in µg/L	Benzene in µg/L	Vinyl Chloride in µg/L	Total cPAHs <sup>a</sup> in µg/L	PCP in µg/L	Diesel in mg/L	Heavy Oil in mg/L	Ferrous Iron <sup>b</sup> in mg/L	Temp. in °C	pH	Diss. Oxygen in mg/L	Cond. in µmhos /cm	Redox Potential in mV	Turbidity in NTU	TSS in mg/L
CUL:		5	5	80	5	0.4	0.1	0.73	1	1	NE	NE	NE	NE	NE	NE	NE	NE
HSAL:		50	50	100	5	2	NE	1.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Confirmation Lower Sand/Delta Deposits																		
CW-01D	3/24/98	4.1	-	-	0.5 U	0.13 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/20/98	2 U	-	-	0.5 U	0.12 J	-	-	0.24 U	0.48 U	-	-	-	-	-	-	-	-
	3/4/99	3.2 +	-	-	0.5 U	0.039 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/19/99	6.3	1 U	10 U	0.5 U	0.2	-	-	0.24 U	0.71 U	-	14	6.8	-	580	-	-	-
	5/18/00	6	-	-	0.2 U	0.4	-	-	0.25 U	0.5 U	-	14	6.8	-	560	-	-	-
	3/19/01	5.8	-	-	0.2 U	0.2	-	-	0.25 U	0.5 U	-	-	-	-	-	-	-	-
	3/25/02	7.9	-	-	0.2 U	0.6	-	-	0.25 U	0.5 U	-	12	7.1	-	780	-	0.08	-
	10/16/02	-	-	-	-	-	-	-	-	-	-	15.8	6.7	-	760	-	0.18	-
	4/2/03	6.7	1 U	1 U	0.2 U	0.2	0.15 U	-	0.25 U	0.5 U	4	13.2	6.8	1.18	442	-	28	-
	3/31/04	8.2	-	-	0.2 U	0.3	-	-	-	-	55.5	13.4	6.2	0.01	496	-34	12	74.5
	4/13/05	6.1	-	-	-	-	-	-	-	-	46.4	14.4	6.5	0.1	283	18	0	31.5
	3/28/06	5.1	-	-	-	-	-	-	-	-	52.5	13.9	6.2	0.26	448	25	0	51.9
	3/27/07	6.2	-	-	-	-	-	-	-	-	45.2	13.3	5.2	0.11	417	62	0	31.6
	4/1/10	5.6	-	-	-	-	-	-	-	-	52	13.1	7.1	0.26	-	-100	293	54.4
	3/29/11	5.7	-	-	-	-	-	-	-	-	43.8	12.8	6.4	<0.01	270	-	10	48.2
	3/22/12	5.5	-	-	-	-	-	-	-	-	46.4	12.9	6.1	0	727	-165	16.3	40
	11/15/12	-	-	-	-	0.14	-	-	-	-	48.4	13.9	6.3	1.15	332	-132	21	85.4
	3/12/13	5.4	0.3	1 U	0.02 U	0.1	0.2 U	0.25 U	0.1 U	0.2 U	55	13.1	9.9	<0.01	423	-13	24.9	80
	4/2/14	5.8	-	-	-	0.1	-	-	-	-	49.8	12.91	6.3	<0.01	410	-80	76.2	76.2
	4/15/15	5.4	-	-	-	-	-	-	-	-	-	13.99	6.2	0	433	-88	13.9	-
	3/10/16	0.4	-	-	-	0.02 U	-	-	-	-	-	13.61	6.6	0.01	797	-8	1.4	-
LW-06D	3/26/98	11	-	-	0.5 U	0.13 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/22/98	12	-	-	0.5 U	0.08 J	-	-	0.24 U	0.47 U	-	-	-	-	-	-	-	-
	3/5/99	3.1	-	-	0.5 U	0.039 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/19/99	10	1 U	10 U	0.5 U	0.099 J	-	-	0.24 U	0.71 U	-	14.1	6.4	-	530	-	-	-
	5/23/00	9	-	-	0.2 U	0.2 U	-	-	0.25 U	0.5 U	-	13	7.2	-	690	-	-	-
	3/16/01	10.8	-	-	0.2 U	0.2 U	-	-	0.25 U	0.5 U	-	14	7.1	-	900	-	0.14	-
	3/21/02	8.8	-	-	0.2 U	0.2 U	-	-	0.25 U	0.5 U	-	13	7.1	-	860	-	0.08	-
	4/3/03	3.3	1 U	1	0.2 U	0.2 U	0.15 U	-	0.25 U	0.5 U	4	11.4	6.9	1.25	454	-	18	-
	3/31/04	14.2	-	-	-	-	-	-	-	-	56.0	13.0	6.1	0.02	524	-2	27	93.0
	4/12/05	10.2	-	-	-	-	-	-	-	-	59.5	13.2	6.3	0.08	548	-15	0	38.9
	3/31/06	11.2	-	-	-	-	-	-	-	-	62.5	13.7	6.2	0.16	459	-10	0	20.3
	3/29/07	11.1	-	-	-	-	-	-	-	-	58.0	14.0	5.8	0.11	554	107	0	40.8
	3/26/08	9.8	-	-	-	-	-	-	-	-	49.6	11.1	6.7	0.52	436	-35	0	-
	3/26/09	10.4	-	-	-	-	-	-	-	-	63	13.36	5.6	2.64	764	-118	32	55
	4/2/10	10.4	-	-	-	-	-	-	-	-	62	12.5	7.1	0	445	-83	160	58.4
	3/31/11	9.7	-	-	-	-	-	-	-	-	63	13	6.1	0.05	382	-61	10	70
	3/23/12	9.1	-	-	-	-	-	-	-	-	61.5	13.3	6.0	0	724	-160	6.2	54.2
	3/13/13	9.1	0.1 U	1 U	0.025	0.14	0.2 U	-	0.1 U	0.2 U	65	13.18	8.6	<0.01	508	57	9.9	67.8
	4/2/14	7.8	-	-	-	-	-	-	-	-	56.5	14.01	6.3	0.01	527	-102	115.5	34.6
	4/15/15	7.8	-	-	-	-	-	-	-	-	-	14.05	6.2	0	529	-189	25.4	-
	3/10/16	8.0	-	-	-	0.24	-	-	-	-	-	13.72	6.2	0	533.9	-11	10.9	-

Table 1-3 - Summary of Groundwater Analytical Data

Well	Date	Arsenic in µg/L	Lead in µg/L	Chromium in µg/L	Benzene in µg/L	Vinyl Chloride in µg/L	Total cPAHs <sup>a</sup> in µg/L	PCP in µg/L	Diesel in mg/L	Heavy Oil in mg/L	Ferrous Iron <sup>b</sup> in mg/L	Temp. in °C	pH	Diss. Oxygen in mg/L	Cond. in µmhos /cm	Redox Potential in mV	Turbidity in NTU	TSS in mg/L
CUL:		5	5	80	5	0.4	0.1	0.73	1	1	NE	NE	NE	NE	NE	NE	NE	NE
HSAL:		50	50	100	5	2	NE	1.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
LW-09D	3/26/98	9.5	-	-	0.5 U	0.97 J	-	0.82 U	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/21/98	7.6	-	-	0.5 U	0.7 J	-	0.8 U	0.24 U	0.47 U	-	-	-	-	-	-	-	-
	3/7/99	7.9	-	-	0.5 U	0.86	-	0.9 U	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/19/99	3.3	1 U	10 U	0.5 U	0.4 J	-	-	0.32	0.71 U	-	14.6	7.4	-	450	-	-	-
	5/24/00	9	-	-	0.2 U	0.3	-	-	0.25 U	0.5 U	-	14	6.7	-	740	-	-	-
	10/12/00	-	-	-	0.2 U	0.9	-	-	-	-	-	14	7.2	-	640	-	-	-
	3/15/01	9.4	-	-	0.2 U	0.9	-	-	0.25 U	0.5 U	-	14	6.8	-	590	-	0.14	-
	10/31/01	-	-	-	0.2 U	0.5	-	-	-	-	-	14	6.8	-	560	-	0.14	-
	3/20/02	11.4	-	-	0.2 U	1.6	-	-	0.25 U	0.5 U	-	13	8.0	-	910	-	0.11	-
	10/16/02	-	-	-	0.2 U	0.9	-	-	-	-	5.8	14.1	6.9	1.1	510	-	0.14	-
	4/4/03	0.9	1 U	1 U	0.2 U	0.2 U	0.15 U	0.25 U	0.25 U	0.5 U	3.4	12.6	7.3	0.71	389	-	12	-
	10/7/03	-	-	-	0.2 U	0.7	-	-	-	-	-	13	7.3	-	680	-	0.18	-
	3/31/04	12.2	-	-	0.2 U	1.1	-	-	-	-	54.5	12.2	6.2	0.22	523	-22	13	77.5
	10/20/04	-	-	-	0.2 U	1.0	-	-	-	-	52	12.6	6.2	0	528	-28	0	41.5
	4/12/05	8	-	-	0.2 U	1.3 J	-	-	-	-	54	12.5	6.4	0.05	540	-24	1	37.5
	11/3/05	-	-	-	0.2 U	0.8	-	-	-	-	52	12	6.7	0.32	517	-42	7	33.4
	3/31/06	7.7	-	-	0.2 U	0.8	-	-	-	-	53.5	12.6	6.3	0.12	433	-20	0	18.2
	3/27/07	8.5	-	-	0.2 U	0.9	-	-	-	-	-	12.2	6.0	0.19	541	54	0	-
	3/26/08	8.3	-	-	-	1.2	-	-	-	-	46.7	11.7	6.8	0.48	427	-15	0	-
	3/26/09	8.4	-	-	-	1.2	-	-	-	-	55.5	12.24	5.7	2.56	729	-129	48	36.4
	10/27/09	8	-	-	-	0.71	-	-	-	-	52.7	12.44	9.3	3.33	617	-146	20	51.1
	4/2/10	8.4	-	-	-	0.5	-	-	-	-	55	11.5	7.2	0	428	-90	242	41.2
	3/29/11	8.5	-	-	-	0.5	-	-	-	-	51.5	12	6.4	0.11	441	-	10	54.8
	3/23/12	7.5	-	-	-	0.32	-	-	-	-	51	11.9	6.0	0	666	-155	2.9	40
	3/15/13	8	0.1 U	0.7	0.02 U	0.41	0.2 U	0.25 U	0.1 U	0.2 U	54	12.31	7.2	0.02	491	235	59.8	62.2
	4/2/14	8.2	-	-	-	0.41	-	-	-	-	63	12.16	6.3	0.01	499.8	-65	27.6	27.7
	4/15/15	7.7	-	-	-	0.7	-	-	-	-	-	12.41	6.2	0.07	481	-192	164.8	-
	3/10/16	9.0	-	-	-	0.44 J	-	-	-	-	-	12.42	6.2	0	478	-50	6	-

Table 1-3 - Summary of Groundwater Analytical Data

Well	Date	Arsenic in µg/L	Lead in µg/L	Chromium in µg/L	Benzene in µg/L	Vinyl Chloride in µg/L	Total cPAHs <sup>a</sup> in µg/L	PCP in µg/L	Diesel in mg/L	Heavy Oil in mg/L	Ferrous Iron <sup>b</sup> in mg/L	Temp. in °C	pH	Diss. Oxygen in mg/L	Cond. in µmhos /cm	Redox Potential in mV	Turbidity in NTU	TSS in mg/L
CUL:		5	5	80	5	0.4	0.1	0.73	1	1	NE	NE	NE	NE	NE	NE	NE	NE
HSAL:		50	50	100	5	2	NE	1.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
<b>Confirmation Upper Sand/Aquitard Wells</b>																		
CW-01S	3/24/98	8.7	-	-	0.5 U	0.38 J	-	-	0.3	0.71 U	-	-	-	-	-	-	-	-
	10/20/98	6.6	-	-	0.62	0.86 J	-	-	0.24 U	0.47 U	-	-	-	-	-	-	-	-
	3/4/99	4.9	-	-	0.5 U	0.53	-	-	0.24 U	0.72 U	-	-	-	-	-	-	-	-
	10/19/99	7.1	1 U	10 U	0.53	0.63 J	-	-	0.24 U	0.71 U	-	14.9	6.6	-	550	-	-	-
	5/18/00	9	-	-	0.6	0.9	-	-	0.25 U	0.5 U	-	15	7.0	-	810	-	-	-
	3/19/01	8.7	-	-	0.7	1.3	-	-	0.25 U	0.5 U	-	-	-	-	-	-	-	-
	3/25/02	11.5	-	-	0.7	2.4	-	-	0.27	0.5 U	-	12	7.1	-	820	-	0.06	-
	10/16/02	-	-	-	-	-	-	-	-	-	-	16.1	6.6	-	580	-	0.14	-
	4/2/03	8.7	1 U	1	0.4	0.9	0.26 U	-	0.25 U	0.5 U	4	13.9	6.8	1.51	408	-	29	-
	10/7/03	-	-	-	0.2 U	0.6	-	-	-	-	-	14	6.9	-	770	-	0.09	-
	3/31/04	12.0	-	-	0.2	0.9	-	-	-	-	48.2	13.5	6.2	0.06	484	-7	30	72.5
	4/13/05	8.7	-	-	0.2 U	0.9	-	-	-	-	48.4	14.8	6.4	0.1	480	5	2	34.4
	3/28/06	8.1	-	-	0.2 U	0.9	-	-	-	-	46.6	14.2	6.5	0.2	524	9	0	33.5
	3/27/07	8.2	-	-	0.2 U	0.7	-	-	-	-	46.2	13.1	5.8	0.02	398	72	0	32.8
	3/27/08	8.1	-	-	-	0.63	-	-	-	-	37.6	12.3	6.6	0.67	379	-7	0	-
	3/24/09	8	-	-	-	0.54	-	-	-	-	0.999	12.83	5.8	2.2	665	-135	10	40.7
	4/1/10	8.1	-	-	0.2 U	0.4	-	-	-	-	49.7	13.1	7.0	0	-	-94	333	69.6
	3/29/11	8.1	-	-	-	0.64	-	-	-	-	50.5	13.2	6.4	<0.01	440	-	10	48.7
	3/22/12	4.7	-	-	-	0.3	-	-	-	-	22.6	13.3	6.0	0	441	-113	4.6	13.7
	3/12/13	7	0.2	1 U	0.023	0.62	0.2 U	-	0.16	0.2 U	52.5	13.01	9.9	0.01	464.3	3	1.2	48.3
	4/2/14	1.8	-	-	-	0.11	-	-	-	-	5.95	12.99	6.1	0.08	95.65	36	18	7
	4/15/15	3.6	-	-	-	0.46	-	-	-	-	-	14.4	5.9	0.08	237.5	-117	42.4	-
	3/10/16	0.4	-	-	-	0.02 U	-	-	-	-	-	13.13	6.6	6.4	163	71	18.1	-
LW-09S	3/26/98	21	-	-	0.5 U	0.13 U	-	-	0.32	0.71 U	-	-	-	-	-	-	-	-
	10/21/98	17	-	-	0.5 U	0.31 J	-	-	0.36	0.47 U	-	-	-	-	-	-	-	-
	3/7/99	10 S	-	-	0.5 U	0.039 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/19/99	18	1 U	10 U	0.5 U	0.22 J	-	-	0.56	0.71 U	-	13.6	6.7	-	810	-	-	-
	5/24/00	14	-	-	0.2 U	0.2 U	-	-	0.25 U	0.5 U	-	13	7.2	-	860	-	-	-
	3/15/01	19.2	-	-	0.2 U	0.2 U	-	-	0.25	0.5 U	-	14	6.3	-	720	-	0.11	-
	3/20/02	19.9	-	-	0.2 U	0.2 U	-	-	0.38	0.5 U	-	13	7.4	-	660	-	0.08	-
	10/16/02	-	-	-	-	-	-	-	-	-	-	14.1	7.0	-	600	-	0.1	-
	4/4/03	13.4	1 U	2	0.2 U	0.2 U	0.15 U	-	0.4	0.5 U	3.8	11.5	7.5	1.12	268	-	16	-
	3/30/04	17.7	-	-	-	-	-	-	-	-	61.5	11.1	5.9	0.39	420	-12	49	89.0
	4/12/05	11.6	-	-	-	-	-	-	-	-	48.8	11.4	6.6	0.07	418	-37	10	48.4
	3/30/06	8.5	-	-	-	-	-	-	-	-	36.2	11.9	6.5	0.3	299	-15	0	43.6
	3/28/07	14.8	-	-	-	-	-	-	-	-	61	10.7	6.6	0.03	367	92	46	68.2
	3/25/08	12.8	-	-	-	-	-	-	-	-	39	10	6.4	1.08	343	-140	62	-
	3/26/09	13.3	-	-	-	-	-	-	-	-	57.5	11.86	6.0	2.4	612	-127	81	46.7
	4/2/10	18.3	-	-	-	-	-	-	-	-	65	10.4	7.6	0	361	-124	77	56.4
	3/31/11	17.3	-	-	-	-	-	-	-	-	61	10.6	6.4	<0.01	322	-152	10	76 J
	3/23/12	14.1	-	-	-	-	-	-	-	-	54	10.5	6.2	0	570	-190	9.2	68.1
	3/15/13	13.6	0.1 U	1.8	0.02 U	0.039	0.2 U	-	0.2	0.25	50	11.46	7.5	0.03	360.1	201	42	79.3
	4/2/14	14.6	-	-	-	-	-	-	-	-	61	11.03	6.7	0.07	417	-118	33.1	76.5
	4/15/15	19.2	-	-	-	-	-	-	-	-	-	11.72	6.5	0.01	410.5	-95	47.3	-
	3/10/16	14.8	-	-	-	0.027 J	-	-	-	-	-	11.59	6.4	0	421.6	-74	27.6	-

Table 1-3 - Summary of Groundwater Analytical Data

Well	Date	Arsenic in µg/L	Lead in µg/L	Chromium in µg/L	Benzene in µg/L	Vinyl Chloride in µg/L	Total cPAHs <sup>a</sup> in µg/L	PCP in µg/L	Diesel in mg/L	Heavy Oil in mg/L	Ferrous Iron <sup>b</sup> in mg/L	Temp. in °C	pH	Diss. Oxygen in mg/L	Cond. in µmhos /cm	Redox Potential in mV	Turbidity in NTU	TSS in mg/L
CUL:		5	5	80	5	0.4	0.1	0.73	1	1	NE	NE	NE	NE	NE	NE	NE	NE
HSAL:		50	50	100	5	2	NE	1.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
MW-03I	3/27/98	17	-	-	0.5 U	0.13 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/22/98	15	-	-	0.5 U	0.15 J	-	-	0.24 U	0.47 U	-	-	-	-	-	-	-	-
	3/5/99	10	-	-	0.5 U	0.039 U	-	-	0.24 U	0.71 U	-	-	-	-	-	-	-	-
	10/20/99	19	1 U	10 U	0.5 U	0.14 J	-	-	0.34	0.71 U	-	15.7	7.3	-	430	-	-	-
	5/23/00	14	-	-	0.2 U	0.2	-	-	0.25 U	0.5 U	-	13	7.1	-	620	-	-	-
	3/16/01	18	-	-	0.2 U	0.3	-	-	0.25 U	0.5 U	-	14	7.1	-	810	-	0.19	-
	3/25/02	19.4	-	-	0.2 U	0.5	-	-	0.28	0.5 U	-	13	7.4	-	940	-	0.13	-
	10/16/02	-	-	-	-	-	-	-	-	-	-	15.4	6.9	-	410	-	0.08	-
	4/1/03	37.4	1 U	1	0.2 U	0.2 U	0.15 U	-	0.29	0.5 U	5.5	13.2	6.9	0.86	268	-	35	-
	3/30/04	18.2	-	-	0.2 U	0.2 J	-	-	-	-	49.9	13	6.0	0.35	382	-33	19	79.5
	10/20/04	19.4	-	-	-	-	-	-	-	-	50.5	15.4	6.4	0.01	404	-26	1	43.5
	4/12/05	14.9	-	-	-	-	-	-	-	-	50.5	12.8	6.5	0.16	386	-41	0	35.2
	11/2/05	17.5	-	-	-	-	-	-	-	-	49.3	15	6.9	0.36	449	-40	7	30
	3/30/06	12.8	-	-	-	-	-	-	-	-	51.5	13.8	6.3	0.14	316	-11	0	51.4
	3/28/07	12.9	1 U	1 U	0.2 U	0.2 U	0.1 U	0.25 U	0.25 U	0.5 U	46	12.6	5.7	0.1	339	103	0	47.7
	3/25/08	18.6	-	-	-	-	-	-	-	-	37	11.1	6.9	0.8	320	-31	0	-
	3/26/09	13	-	-	-	-	-	-	-	-	48	11.94	5.8	2.11	504	-119	12	27.2
	4/2/10	13.8	-	-	-	-	-	-	-	-	50	11.5	7.4	0.15	320	-92	33	60.5
	3/31/11	14.9	-	-	-	-	-	-	-	-	51	12.2	6.2	0.08	265	-	10	98.8
	3/23/12	14.7	-	-	-	-	-	-	-	-	54.5	12	6.0	0	547	-148	3	45.1
	11/15/12	-	-	-	-	0.029	-	-	-	-	46.2 J	12.9	6.3	2.29	284	-105	2.6	54
	3/14/13	10.9	0.1 U	0.5	0.02 U	0.066	0.2 U	-	0.1 U	0.2 U	52.0	12.35	8.4	<0.01	343	77	7.1	58
	4/2/14	13.2	-	-	-	-	-	-	-	-	56.0	12.53	6.5	0.02	407.5	-100	3.9	33.4
	4/15/15	13.5	-	-	-	-	-	-	-	-	-	12.6	6.4	0.1	388.6	-85	5.6	-
	3/10/16	16.9	-	-	-	0.077 J	-	-	-	-	-	11.72	6.4	0	385.3	-36	9.2	-
Stabilized Cell Wells																		
SC-01S	3/25/98	4.4	2.2	10 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10/21/98	3.4	1.4	5 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/7/99	4.7	1 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10/19/99	5.8	1 U	10 U	-	-	-	-	-	-	-	17.2	8.2	-	190	-	-	-
	5/24/00	5	1 U	0.5 U	-	-	-	-	-	-	-	13	7.0	-	740	-	-	-
	3/15/01	5.2	1 U	0.5 U	-	-	-	-	-	-	-	13	6.8	-	620	-	0.13	-
	3/20/02	5.8	1 U	0.5 U	-	-	-	-	-	-	-	12	7.2	-	860	-	0.15	-
	10/16/02	-	-	-	-	-	-	-	-	-	-	15.1	7.1	-	610	-	0.11	-
	4/4/03	4.9	1 U	0.5 U	-	-	-	-	-	-	0.6	13.8	8.1	2.6	107	-	26	-
	4/1/04	5.4	-	-	-	-	-	-	-	-	0.043	12.4	8.2	0.19	119	162	13	4.9
	4/12/05	5.1	-	-	-	-	-	-	-	-	0.04 U	12.7	8.0	0.15	123	-42	1	1.9
	3/29/06	4.7	-	-	-	-	-	-	-	-	0.04 U	12.8	7.7	0.32	97	-49	0	1.8
	3/29/07	4.6	-	-	-	-	-	-	-	-	0.04 U	12.9	7.1	0.2	118	93	0	2.9
	3/13/13	4.6	0.1 U	1 U	-	-	-	-	-	-	0.046	11.72	8.7	0.09	105.7	70	9.3	3.3

**Table 1-3 - Summary of Groundwater Analytical Data**

Well	Date	Arsenic in µg/L	Lead in µg/L	Chromium in µg/L	Benzene in µg/L	Vinyl Chloride in µg/L	Total cPAHs <sup>a</sup> in µg/L	PCP in µg/L	Diesel in mg/L	Heavy Oil in mg/L	Ferrous Iron <sup>b</sup> in mg/L	Temp. in °C	pH	Diss. Oxygen in mg/L	Cond. in µmhos /cm	Redox Potential in mV	Turbidity in NTU	TSS in mg/L
CUL:		5	5	80	5	0.4	0.1	0.73	1	1	NE	NE	NE	NE	NE	NE	NE	NE
HSAL:		50	50	100	5	2	NE	1.0	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
SC-02S	3/26/98	4.5	1 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10/21/98	4	1 U	5 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/7/99	2.6	1 U	10 U	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10/19/99	4.7	1 U	10 U	-	-	-	-	-	-	-	16.5	-	-	-	-	-	-
	5/24/00	4	1 U	2 U	-	-	-	-	-	-	-	14	7.1	-	610	-	-	-
	3/15/01	4.1	1 U	2	-	-	-	-	-	-	-	13	6.3	-	810	-	0.17	-
	3/20/02	5.7	1 U	3.9	-	-	-	-	-	-	-	12	6.7	-	790	-	0.13	-
	10/16/02	-	-	-	-	-	-	-	-	-	-	13.4	6.5	-	560	-	0.09	-
	4/4/03	3.2	1 U	2	-	-	-	-	-	-	4.2	13	7.3	1.04	340	-	21	-
	4/1/04	4.9	-	-	-	-	-	-	-	-	36.5	12.7	6.2	0.03	386	66	18	23.2
	3/13/13	3.3	0.1 U	2	-	-	-	-	-	-	34.8	12.85	8.6	0.05	361	115	22.5	1.4

<sup>a</sup> cPAHs are benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene (WAC 173-340-200). Total cPAH values presented are based on toxicity equivalency quotient (TEQ) calculation.

<sup>b</sup> Ferrous iron collected in October 2002 and April 2003 were field measurements using HACH kit. Other samples were analyzed in the laboratory using EPA Method SM 3500.

**Notes:**

- = Sample not analyzed for specific analyte.

NE = Not established.

J = Estimated value.

U = Not selected at the detection limit noted.

See pages A-3 and A-4 for explanation of data qualifiers.

**Table 1-4 – Groundwater Monitoring Program for Spring 2017, 2018, and 2019**

		2017		2018		2019	
	Well	VOC <sup>a</sup>	Arsenic	VOC <sup>a</sup>	Arsenic	VOC <sup>a</sup>	Arsenic
<b>Confirmation Lower Sand/Delta Deposits</b>							
	CW-1D		X		X		X
	LW-6D		X		X		X
	LW-9D	X	X	X	X	X	X
<b>Confirmation Upper Sand/Aquitard Wells</b>							
	CW-1S	X	X	X	X	X	X
	LW-9S		X		X		X
	MW-3I		X		X		X
<b>Stabilized Cell Wells</b>							
	SC-1S						X <sup>b</sup>
	SC-2S						X <sup>b</sup>
<b>Quality Control Samples</b>							
		X	X	X	X	X	X
<b>Purge Water Samples</b>							
		X	X	X	X	X	X

<sup>a</sup> VOC is vinyl chloride.

<sup>b</sup> Samples will also be analyzed for lead and total chromium

Water elevations will be measured at approximately 33 wells.

All wells with samples submitted for laboratory analysis will have the following parameters measured:

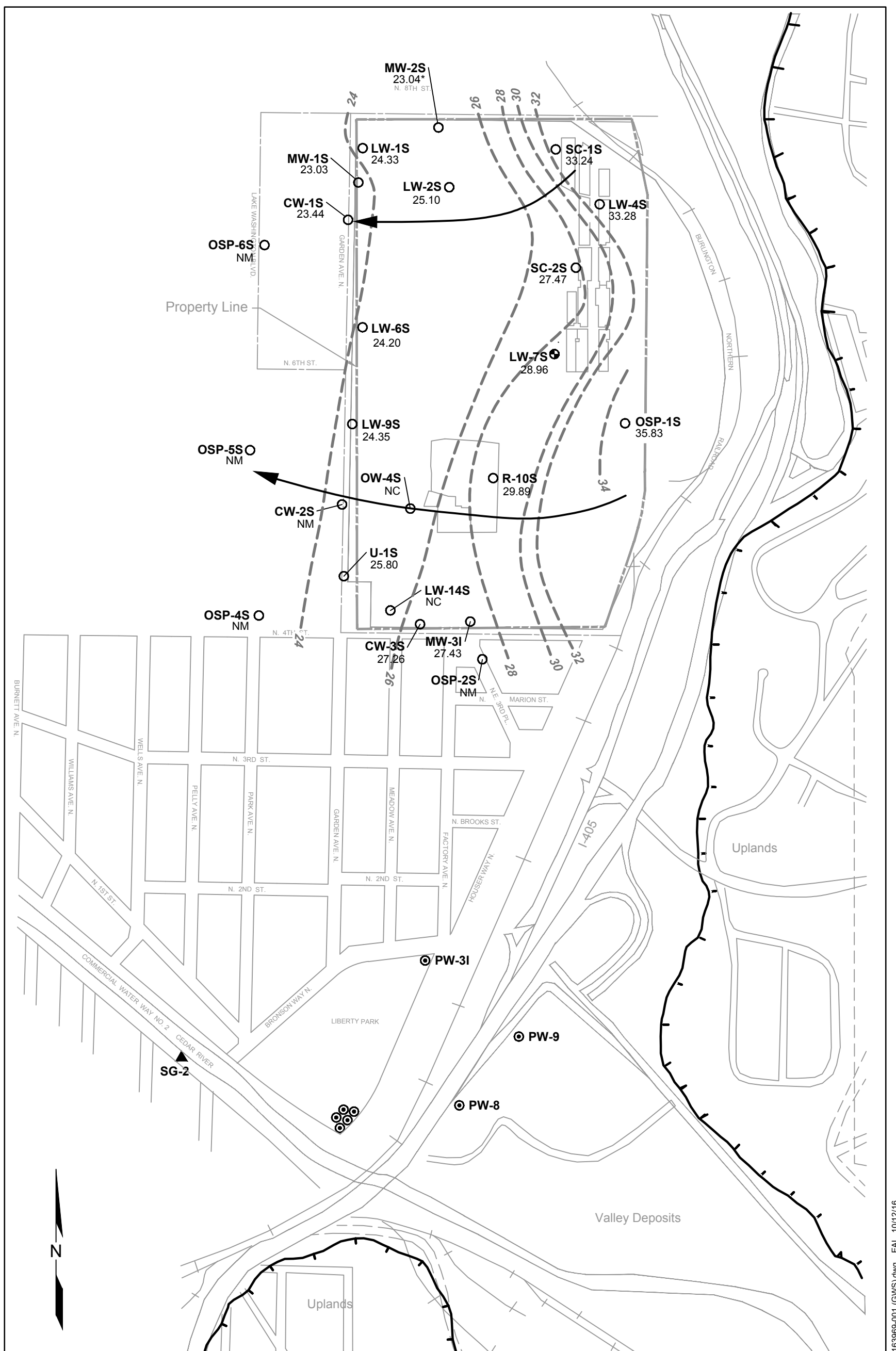
temperature, pH, conductivity, turbidity, dissolved oxygen, and redox potential.

Purge water samples will be analyzed for VOCs, arsenic, lead, total chromium, and TPH.

Hart Crowser

## Groundwater Elevation Contour Map



### Shallow Wells - March 2016







Note: Base map prepared from drawing provided by Dodds Engineering titled "Monitoring Wells PACCAR Renton Site", dated April 10, 1998.

A horizontal number line with arrows at both ends. It has three major tick marks labeled 0, 500, and 1000. A single tick mark is located exactly halfway between 500 and 1000, representing the value 750.

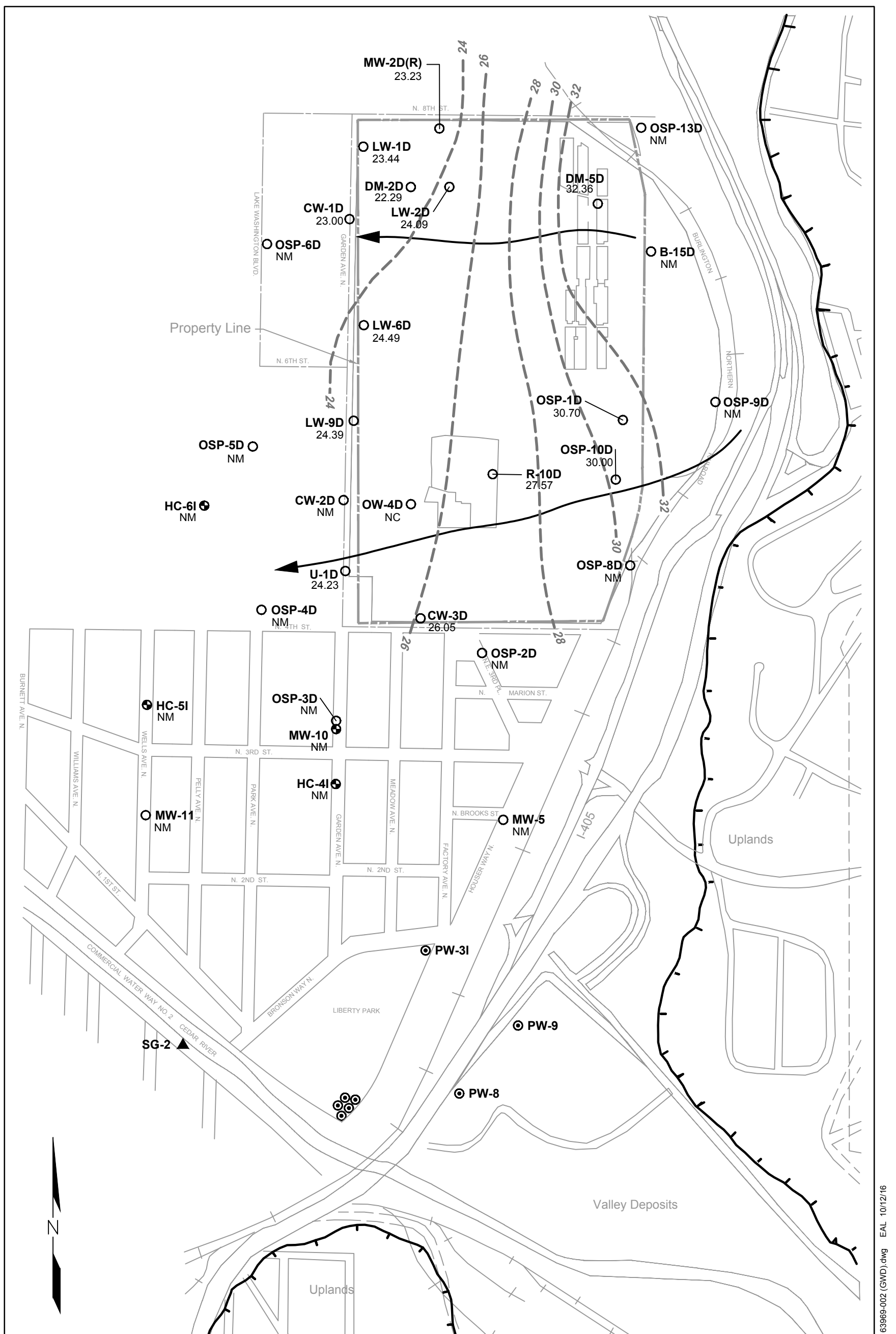
Scale in Feet

 Groundwater Flow Direction  
 Upland Boundary

	<u>Exploration Location and Number</u>
<b>LW-7S</b> 	Monitoring Well
<b>OW-4S</b> 	Piezometer
<b>PW-8</b> 	City of Renton Production Well
<b>SG-2</b> 	River Staff Gage

\*Groundwater elevation for MW-2S was not used in developing contours. See report for details

## Groundwater Elevation Contour Map Lower Sand Unit - March 2016



Note: Base map prepared from drawing provided by Dodds Engineering titled "Monitoring Wells PACCAR Renton Site," dated April 10, 1998.

0 500 1000  
Scale in Feet

Exploration Location and Number

**MW-10**  Monitoring Well

OW-4DO Piezometer

PW-8 © City of Renton Production Well

**SG-2▲** River Staff Gage

— — 24 Groundwater Elevation Contour in Feet

24.23 Groundwater Elevation in Feet

NM      Not Measured

NC      Not Calculated

 Groundwater Flow Direction

Upland Boundary



## SECTION 2

### Surface Water Monitoring



## SECTION 2

### SURFACE WATER MONITORING

This section presents the results of the surface water monitoring event conducted in accordance with the CMIP and the Periodic Review. Samples were collected from five storm sewer manholes on March 10, 2016. Chemical test results are compiled in Table 2-1, and the sampling locations are shown with the generalized storm sewer configuration on Figure 2-1. The laboratory report is provided in Appendix B, along with a data quality review.

The Periodic Review specifies annual surface water monitoring. Surface water monitoring will be conducted in March 2016 for metals (total copper, lead and zinc, and hexavalent chromium) at the five locations identified in the CMIP to assess whether any long-term changes are occurring.

The following notes apply to this monitoring event:

- **Off-Site Conditions.** Monitoring point SW-MH was used to evaluate the quality of stormwater generated off site and upstream of the PACCAR site. As summarized in Table 2-1, metal concentrations detected in the sample from SW-MH are higher or similar to those detected in the sample from SW-3, which is the PACCAR property discharge point located downstream of SW-MH (Figure 2-1).
- **Cleanup Level Compliance at SW-5.** The CMIP specifies that water quality from SW-5 will be compared with CULs for compliance purposes. The detected copper (0.0114 mg/L), and lead (0.0052 mg/L) concentrations in the sample from SW-5 did exceed the CULs. It should be noted that copper and lead CULs are also exceeded in the upstream SW-MH sample.



**Table 2-1 – Analytical Results for Surface Water Samples, March 2016**

Sample ID		SW-3	SW-5	SW-6	SW-DP	SW-MD	SW-MH
Sample Date	CUL <sup>a</sup>	3/10/16	3/10/16	3/10/16	3/10/16	3/10/16	3/10/16
<b>Total Metals in mg/L</b>							
Copper	0.007	0.001	0.0114	0.0077	0.0011	0.0395	0.0401
Hexavalent chromium	0.011	0.01 UJ	0.01 UJ	0.01 UJ	0.01 U	0.01 U	0.01 U
Lead	0.001	0.0003	0.0052	0.0012	0.0001 U	0.0041	0.004
Zinc	0.047	0.125	0.024	0.01	0.081	0.164	0.169

<sup>a</sup> Cleanup levels from CMIP (DOF 1997).

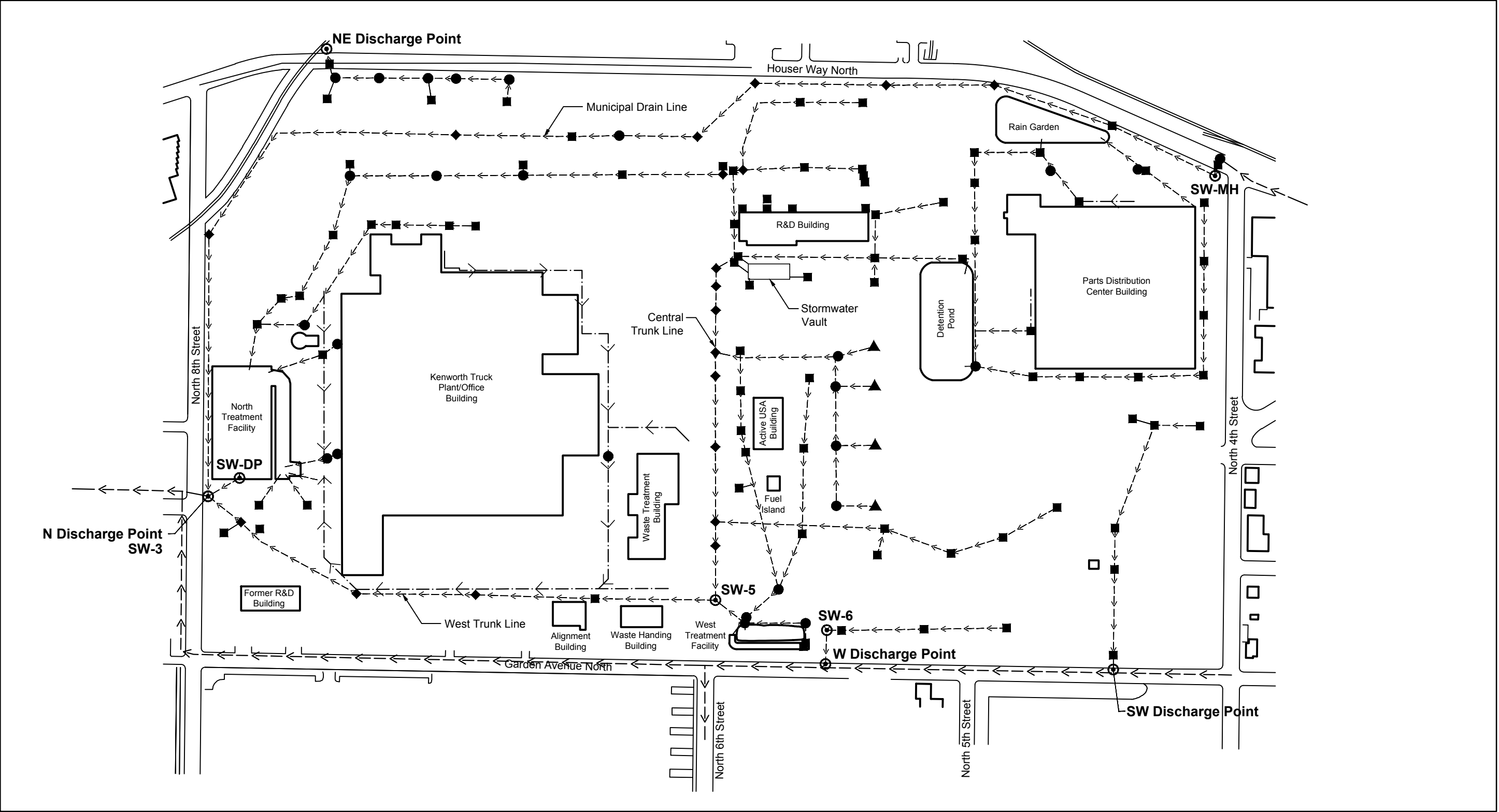
**Notes:**

See page B-3 for definition of data qualifiers.

SW-MD is a duplicate sample of SW-MH.



Surface Water Sampling Location Plan



EAL 10/12/16 163969-005.dwg

SECTION 3  
PACCAR Structural Fill Cover Monitoring  
Field Inspection and Observation Form





## SECTION 3

### PACCAR STRUCTURAL FILL COVER MONITORING FIELD INSPECTION AND OBSERVATION FORM

The structural fill and pavement covers are monitored annually to document their condition and note areas where repair or maintenance is necessary. An engineer or technician conducted a site walk to observe and document the following:

- Conditions of paved area (settlement, ruts, cracks, other) and
- Disturbance in areas of planted cover (erosion, excavation, vegetation, other).

#### Field Inspection Observations

Date of Field Inspection: March 10, 2016  
Weather Conditions: Cloudy, Temperature = 51 °F  
Inspection Personnel: Brigitte Brown  
Staff Engineer

#### ***North End of Site***

Areas appear to be in good condition, with no obvious signs of settlement or cracking in asphalt cover.

#### ***South End of Site***

The area is currently under construction. A new building and soil stockpiles are present. We will evaluate the conditions at the site once construction is completed and site grades have stabilized.

#### Recommended Actions and Follow-Up

##### ***Areas Needing Repair***

Review site conditions in the Spring 2017.

##### ***Documentation of Repair Completion***

None.



APPENDIX A  
Data Validation Summary and  
Laboratory Report  
Groundwater Samples



# APPENDIX A

## DATA VALIDATION SUMMARY AND LABORATORY REPORT GROUNDWATER SAMPLES

### Summary of Data Validation Effort

This appendix provides the quality assurance (QA) review of eight groundwater samples, one purge water sample, and one field duplicate collected in accordance with the PACCAR CMIP (DOF 1997) and Periodic Review (Ecology 2014) for the March 2016 sampling event. The samples were submitted to Analytical Resources, Inc., (ARI) in Tukwila, Washington, for chemical analysis. The laboratory reported results as ARI Job No. AXK7. The samples were analyzed for one or more of the following:

- Diesel and heavy oil by Ecology Method NWTPH-Dx;
- Total metals (arsenic, chromium, and lead) by EPA Method 200.8; and
- Vinyl chloride by EPA Method 8260C-SIM; and volatile organic compounds (VOCs) by EPA Method 8260C.

The laboratory performed ongoing quality assurance/quality control (QA/QC) reviews of laboratory procedures. Hart Crowser performed the data review, using laboratory quality control results summary sheets, to check that the data met data quality objectives for the project. The following criteria were evaluated in the standard data quality review process:

- Holding times;
- Method blanks;
- Surrogate recoveries;
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) recoveries and relative percent differences (RPDs);
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries and RPDs;
- Laboratory and field duplicate RPDs;
- Calibration criteria (if reported); and
- Reporting limits (RL).

### Overall Data Quality

The overall data quality objectives (DQOs) as set forth in the quality assurance project plan (QAPP) were met, and the data for this site are acceptable for use as qualified. The completeness for the associated data is 100 percent. Detailed discussions are presented in the following pages.

### ***Quality Assurance Objectives***

**Precision.** Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average values. Precision is generally evaluated using LCS/LCSD, MS/MSD, lab duplicate results,

and field duplicate results. The LCS/LCSD, MS/MSD, and lab duplicate results provide information on laboratory (only) precision, while field duplicates provide information on field and laboratory precision combined.

Analytical precision is generally measured through LCS/LCSD and MS/MSD samples for organic analysis, and through laboratory duplicate samples for metals and other inorganic analysis. Analytical precision is quantitatively expressed as the RPD between the LCS/LCSD, MS/MSD, or laboratory duplicates. Analytical precision measurements were carried out on project groundwater samples at a minimum frequency of one in 20 samples. The analytical precision for all analytes was acceptable.

**Accuracy.** Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results was assessed by analyzing standard reference materials or by "spiking" samples with known standards (surrogates, LCS, and/or MS) and measuring the percent recovery.

Accuracy measurements for all fractions were carried out in accordance with method requirements for organic and inorganic analyses and at a minimum frequency of one in 20 samples. The analytical accuracy for analytes was acceptable with the following exception:

- **Vinyl chloride by EPA Method 8260C-SIM.** The recovery for the LCS slightly exceeded the control limit, while the recovery for the LCSD fell within the control limit. The associated samples were not qualified.

**Completeness.** Completeness is defined as the percentage of measurements made that are judged to be valid measurements. The completeness of the data is the ratio of acceptable data points to the total number of data points (expressed as a percent). The target completeness goal for this work was 100 percent. The completeness of the data for this project was 100 percent.

**Comparability.** Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Because standard techniques were used for both sample collection and laboratory analysis, the data collected from the same sampling locations and depths should be comparable to both internal data and other data generated.

## No Major Problems Encountered

No major problems were encountered.

## Minor Problems Encountered

**Receiving Samples.** The following issues were encountered:

- The trip blank was not listed on the chain of custody. The trip blank was analyzed for vinyl chloride by EPA Method 8260C-SIM.
- The cooler temperature upon receipt at the laboratory was 12°C, above the 2° to 6°C method recommended limits. The laboratory noted that insufficient ice was used to cool the samples.

Samples that were collected more than four hours before receipt at the laboratory were subsequently evaluated:

- **Samples LW-9D, LW-9S, and MW-31.** The samples were analyzed for total arsenic by EPA Method 200.8 and vinyl chloride by EPA Method 8260C-SIM. The total arsenic results would not be affected by the temperature exceedance, and results were not qualified. The vinyl chloride results would potentially be affected by the temperature exceedance, and were qualified as estimated (J).

**Vinyl Chloride.** Samples LW-9D, LW-9S, and MW-31 were qualified as estimated (J) due to the temperature exceedance.

**Total Arsenic.** No problems were encountered.

**Volatile Organic Analysis.** The recovery of 1,2,3-Trichlorobenzene in the associated Calibration Verification Check failed low. The result for that analyte in the associated sample (KW Tank) was qualified as estimated (J).

**Diesel and Heavy Oil.** No problems were encountered.

## Data Qualifier Definitions

The following data qualifiers are used in the text and tables according to a quality assurance review of the laboratory procedures and results:

- U** Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ** Indicates the compound or analyte was analyzed for and not detected. Because of quality control deficiencies identified during data validation, the value reported may not accurately reflect the sample quantitation limit.
- J** Indicates the compound or analyte was analyzed for and detected. The associated value is estimated, but the data are usable for decision making processes.



**Table A-1 – Compilation of Chemical Analytical Data for Groundwater Samples**

Sample ID Sampling Date	Cleanup Level	CW-1D 3/10/2016	CW-100D 3/10/2016	CW-1S 3/10/2016	LW-6D 3/10/2016	LW-9D 3/10/2016	LW-9S 3/10/2016	MW-3I 3/10/2016
<b>Metals in mg/L</b>								
Arsenic	0.005 <sup>a</sup>	0.0004	0.0006	0.0004	0.008	0.009	0.0148	0.0169
<b>Volatiles in µg/L</b>								
Vinyl chloride	0.4 <sup>b</sup>	0.02 U	0.021	0.02 U	0.24	0.44 J	0.027 J	0.077 J

Sample ID Sampling Date	Cleanup Level	Trip Blank 3/10/2016
<b>Metals in mg/L</b>		
Arsenic	0.005 <sup>a</sup>	
<b>Volatiles in µg/L</b>		
Vinyl chloride	0.4 <sup>b</sup>	0.02 U

**Notes:**

<sup>a</sup> HSAL for arsenic is 0.05 mg/L.

<sup>b</sup> HSAL for vinyl chloride is 2 µg/L.

Blank indicates sample not analyzed for specific analyte.

See page A-4 for explanation of data qualifiers.

CW-100D is a duplicate sample from CW-1D

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**Table A-2 – Analytical Results for Purge Water**

Sample ID	KW Tank
Sampling Date	3/10/2016
<b>Metals in mg/L</b>	
Arsenic	0.0083
Chromium	0.0008
Lead	0.0005
<b>TPH in mg/L</b>	
Diesel Range Organics	0.11
Lube Oil	0.20 U
<b>Volatiles in µg/L</b>	
1,1,1,2-Tetrachloroethane	0.20 U
1,1,1-Trichloroethane	0.20 U
1,1,2,2-Tetrachloroethane	0.20 U
1,1,2-Trichloroethane	0.20 U
1,1-Dichloroethane	0.20 U
1,1-Dichloroethene	0.20 U
1,1-Dichloropropene	0.20 U
1,2,3-Trichlorobenzene	0.50 U
1,2,3-Trichloropropane	0.50 U
1,2,4-Trichlorobenzene	0.50 U
1,2,4-Trimethylbenzene	0.20 U
1,2-Dibromo-3-chloropropane	0.50 U
1,2-Dibromoethane	0.20 U
1,2-Dichlorobenzene	0.20 U
1,2-Dichloroethane	0.20 U
1,2-Dichloropropane	0.20 U
1,3,5-Trimethylbenzene	0.20 U
1,3-Dichlorobenzene	0.20 U
1,3-Dichloropropane	0.20 U
1,4-Dichlorobenzene	0.20 U
2,2-Dichloropropane	0.20 U
2-Butanone	5.0 U
2-Chloroethylvinylether	1.0 U
2-Chlorotoluene	0.20 U
2-Hexanone	5.0 U
4-Chlorotoluene	0.20 U
4-Isopropyltoluene	0.20 U
4-Methyl-2-pentanone	5.0 U
Acetone	5.0 U
Acrolein	5.0 U
Acrylonitrile	1.0 U
Benzene	0.20 U
Bromobenzene	0.20 U
Bromochloromethane	0.20 U
Bromodichloromethane	0.20 U
Bromoethane	0.20 U
Bromoform	0.20 U
Bromomethane	1.0 U
Carbon Disulfide	0.20 U
Carbon Tetrachloride	0.20 U
CFC-113	0.20 U

Sample ID	KW Tank
Sampling Date	3/10/2016
<b>Volatiles in µg/L</b>	
Chlorobenzene	0.20 U
Chloroethane	0.20 U
Chloroform	0.20 U
Chloromethane	0.50 U
cis-1,2-Dichloroethene	0.20 U
cis-1,3-Dichloropropene	0.20 U
Dibromochloromethane	0.20 U
Dibromomethane	0.20 U
Ethylbenzene	0.20 U
Hexachlorobutadiene	0.50 U
Iodomethane	1.0 U
Isopropylbenzene	0.20 U
m, p-Xylene	0.40 U
Methylene Chloride	1.0 U
Naphthalene	0.50 U
n-Butylbenzene	0.20 U
n-Propylbenzene	0.20 U
O-Xylene	0.20 U
sec-Butylbenzene	0.20 U
Styrene	0.20 U
tert-Butylbenzene	0.20 U
Tetrachloroethene	0.20 U
Toluene	0.20 U
trans-1,2-Dichloroethene	0.20 U
trans-1,3-Dichloropropene	0.20 U
trans-1,4-Dichloro-2-butene	1.0 U
Trichloroethene	0.20 U
Trichlorofluoromethane	0.20 U
Vinyl Acetate	0.20 U
Vinyl Chloride	0.20 U

See page A-4 for explanation of data qualifiers.

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LABORATORY REPORT  
Analytical Resources, Incorporated





**Analytical Resources, Incorporated**  
Analytical Chemists and Consultants

March 24, 2016

Roy Jensen  
Hart Crowser, Inc.  
1700 Westlake Avenue North Suite 200  
Seattle, WA 98109-3056

**RE: Client Project: Paccar, 1639-69**  
**ARI Job No: AXK7**

Dear Mr. Jensen:

Please find enclosed the original chain-of-custody (COC) record and the final results for the sample from the project referenced above. Analytical Resources, Inc. (ARI) accepted eight water samples, and trip blanks in good condition on March 10, 2016. There were no discrepancies between the COC and the sample containers' labels.

The samples were analyzed for VOCs, SIM VOCs, Total Metals and NWTPH-Dx, as requested on the COC.

The SIM VOCs LCS is out of control high for Vinyl Chloride. LCSD is in control.

The VOCs CCAL is out of control low for 1,2,3-Trichlorobenzene, the sample was non-detect, no further actions taken.

No other analytical complications were noted for these analyses.

A copy of this report and the supporting data will remain on file with ARI. Please feel free to contact me at your convenience if you have any questions.

Sincerely,

ANALYTICAL RESOURCES, INC.

Amanda Volgardsen  
-for-

Kelly Bottem  
Client Services Manager  
kellyb@arilabs.com  
206-695-6211

HART CROWSER CONTACT: Roy Jensen

(roy.jensen@hartcrowser.com)

SAMPLED BY: BLJ

As (Metal)  
VC (826)  
VOC (826)  
As, Pb, Cr  
NWTPS

NO. OF C

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	As (Metal)	VC (826)	VOC (826)	As, Pb, Cr	NWTPS	NO. OF C
	CW-15	Groundwater	3/10/16	1415	Water	X	X				4
	<del>CW-100D</del>			1415		X	X				4
	CW-1D			1345		X	X				4
	LW-6D			1302		X	X				4
	LW-9S			0940		X	X				4
	LW-9D			0800		X	X				4
	MW-31			1048		X	X				4
	KW Tank			1430				X	X	X	6

RELINQUISHED BY	DATE	RECEIVED BY	DATE
<i>B. Brown</i>	3/10/16	<i>R. Dunn</i>	3/10/16
SIGNATURE	TIME	SIGNATURE	TIME
B. Brown	1552	R. Dunn	1552
PRINT NAME		PRINT NAME	
Hart Crowser		ART	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

COOLER NO.: STORAGE LOCATION:

TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION

CUSTODY SEALS:

☐ YES ☐ NO ☐ N/A

GOOD CONDITION

☐ YES ☐ NO

TEMPERATURE

SHIPMENT METHOD: ☐ HAND ☐ COURIER ☐ OVERNIGHT

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

See Lab Work Order No. \_\_\_\_\_

for Other Contract Requirements

TURNAROUND TIME:

☐ 24 HOURS ☐ 1 WEEK

☒ 48 HOURS ☒ STANDARD

☐ 72 HOURS OTHER \_\_\_\_\_



# Cooler Receipt Form

ARI Client: HART CROWDER

Project Name: PACCAR

COC No(s): \_\_\_\_\_ (NA)

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: \_\_\_\_\_

Assigned ARI Job No: AXK7

Tracking No: \_\_\_\_\_ NA

## Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: 12:00 1552 12.0

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005276

Cooler Accepted by: [Signature] Date: 03/10/16 Time: 1552

**Complete custody forms and attach all shipping documents**

## Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: \_\_\_\_\_

Was sufficient ice used (if appropriate)? NA YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI... NA 3/2/16

Was Sample Split by ARI: NA YES Date/Time: \_\_\_\_\_ Equipment: \_\_\_\_\_ Split by: \_\_\_\_\_

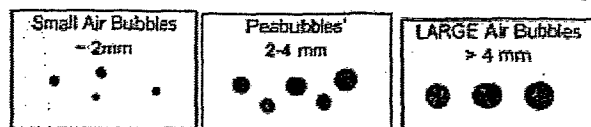
Samples Logged by: AV Date: 3/11/16 Time: 1025

**\*\* Notify Project Manager of discrepancies or concerns \*\***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

## Additional Notes, Discrepancies, & Resolutions:

By: \_\_\_\_\_ Date: \_\_\_\_\_



Small → "sm" (< 2 mm)  
Peabubbles → "pb" (2 to < 4 mm)  
Large → "lg" (4 to < 6 mm)  
Headspace → "hs" (> 6 mm)

**PRESERVATION VERIFICATION 03/11/16**

Page 1 of 1



ARI Job No: **AXK7**

PC: Kelly

VTSR: 03/10/16

Inquiry Number: NONE

Analysis Requested: 03/11/16

Contact: Jensen, Roy

Client: Hart Crowser, Inc.

Logged by: AV

Sample Set Used: Yes-481

Validatable Package: No

Deliverables:

Project #: 1639-69

Project: Paccar

Sample Site:

SDG No:

Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
16-4044 <b>AXK7A</b>	CW-1S						TOT															
16-4045 <b>AXK7B</b>	CW-100D						TOT															
16-4046 <b>AXK7C</b>	CW-1D						TOT															
16-4047 <b>AXK7D</b>	LW-6D						TOT															
16-4048 <b>AXK7E</b>	LW-9S						TOT															
16-4049 <b>AXK7F</b>	LW-9D						TOT															
16-4050 <b>AXK7G</b>	MW-31						TOT															
16-4051 <b>AXK7H</b>	KW TANK						TOT															

*P=Pass*

AXK7: 00001

Checked By *AV* Date *3/11/16*



# Sample ID Cross Reference Report



ARI Job No: AXK7  
Client: Hart Crowser, Inc.  
Project Event: 1639-69  
Project Name: Paccar

Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1. CW-1S	AXK7A	16-4044	Water	03/10/16 14:15	03/10/16 15:52
2. CW-100D	AXK7B	16-4045	Water	03/10/16 14:15	03/10/16 15:52
3. CW-1D	AXK7C	16-4046	Water	03/10/16 13:45	03/10/16 15:52
4. LW-6D	AXK7D	16-4047	Water	03/10/16 13:02	03/10/16 15:52
5. LW-9S	AXK7E	16-4048	Water	03/10/16 09:40	03/10/16 15:52
6. LW-9D	AXK7F	16-4049	Water	03/10/16 08:00	03/10/16 15:52
7. MW-31	AXK7G	16-4050	Water	03/10/16 10:48	03/10/16 15:52
8. KW TANK	AXK7H	16-4051	Water	03/10/16 14:30	03/10/16 15:52
9. TRIP BLANKS	AXK7I	16-4053	Water	03/10/16	03/10/16 15:52



## Data Reporting Qualifiers

Effective 12/31/13

### Inorganic Data

- U Indicates that the target analyte was not detected at the reported concentration
- \* Duplicate RPD is not within established control limits
- B Reported value is less than the CRDL but  $\geq$  the Reporting Limit
- N Matrix Spike recovery not within established control limits
- NA Not Applicable, analyte not spiked
- H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- L Analyte concentration is  $\leq 5$  times the Reporting Limit and the replicate control limit defaults to  $\pm 1$  RL instead of the normal 20% RPD

### Organic Data

- U Indicates that the target analyte was not detected at the reported concentration
- \* Flagged value is not within established control limits
- B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
- J Estimated concentration when the value is less than ARI's established reporting limits
- D The spiked compound was not detected due to sample extract dilution
- E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.



- Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).
- S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
- NA The flagged analyte was not analyzed for
- NR Spiked compound recovery is not reported due to chromatographic interference
- NS The flagged analyte was not spiked into the sample
- M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
- Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
- EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**
- C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
- P The analyte was detected on both chromatographic columns but the quantified values differ by  $\geq 40\%$  RPD with no obvious chromatographic interference
- X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**
- Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**



## **Geotechnical Data**

- A** The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
- F** Samples were frozen prior to particle size determination
- SM** Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
- SS** Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
- W** Weight of sample in some pipette aliquots was below the level required for accurate weighting

## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: CW-1S  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7A

LIMS ID: 16-4044

Matrix: Water

Data Release Authorized: *MW*

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Date Analyzed: 03/16/16 13:18

Sample Amount: 10.0 mL

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	< 0.020	U

Reported in µg/L (ppb)

Volatile Surrogate Recovery

d4-1,2-Dichloroethane	116%
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## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: CW-100D  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7B

LIMS ID: 16-4045

Matrix: Water

Data Release Authorized: *mmw*

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Date Analyzed: 03/16/16 13:43

Sample Amount: 10.0 mL

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	0.021	

Reported in µg/L (ppb)

Volatile Surrogate Recovery

d4-1,2-Dichloroethane	117%
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## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: CW-1D  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7C

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4046

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: *MW*

Date Sampled: 03/10/16

Reported: 03/23/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Sample Amount: 10.0 mL

Date Analyzed: 03/16/16 14:07

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	< 0.020	U

Reported in µg/L (ppb)

Volatile Surrogate Recovery

d4-1,2-Dichloroethane	121%
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## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: LW-6D  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7D

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4047

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: *mm*

Date Sampled: 03/10/16

Reported: 03/23/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Sample Amount: 10.0 mL

Date Analyzed: 03/16/16 14:32

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	0.24	

Reported in µg/L (ppb)

Volatile Surrogate Recovery

d4-1,2-Dichloroethane	122%
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**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: LW-9S  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7E

LIMS ID: 16-4048

Matrix: Water

Data Release Authorized: *mm*

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Date Analyzed: 03/16/16 14:56

Sample Amount: 10.0 mL

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	0.027	

Reported in µg/L (ppb)

**Volatile Surrogate Recovery**

d4-1,2-Dichloroethane	124%
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**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: LW-9D  
Page 1 of 1 **SAMPLE**

Lab Sample ID: AXK7F

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4049

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: *mmw*

Date Sampled: 03/10/16

Reported: 03/23/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Sample Amount: 10.0 mL

Date Analyzed: 03/16/16 15:20

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	0.44	

Reported in µg/L (ppb)

**Volatile Surrogate Recovery**

d4-1,2-Dichloroethane	124%
-----------------------	------

## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: MW-31  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7G

LIMS ID: 16-4050

Matrix: Water

Data Release Authorized: *mm*

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Date Analyzed: 03/16/16 15:45

Sample Amount: 10.0 mL

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	0.077	

Reported in µg/L (ppb)

## Volatile Surrogate Recovery

d4-1,2-Dichloroethane	125%
-----------------------	------

## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: TRIP BLANKS  
Page 1 of 1 SAMPLE

Lab Sample ID: AXK7I

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4053

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: *mm*

Date Sampled: 03/10/16

Reported: 03/23/16

Date Received: 03/10/16

Instrument/Analyst: NT15/LH

Sample Amount: 10.0 mL

Date Analyzed: 03/16/16 12:53

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	< 0.020	U

Reported in µg/L (ppb)

Volatile Surrogate Recovery

d4-1,2-Dichloroethane	116%
-----------------------	------

**SW8260-SIM SURROGATE RECOVERY SUMMARY**

Matrix: Water

QC Report No: AXK7-Hart Crowser, Inc.  
Project: Paccar  
1639-69

<u>Client ID</u>	<u>DCE</u>	<u>TOT OUT</u>
MB-031616	114%	0
LCS-031616	108%	0
LCSD-031616	107%	0
CW-1S	116%	0
CW-100D	117%	0
CW-1D	121%	0
LW-6D	122%	0
LW-9S	124%	0
LW-9D	124%	0
MW-31	125%	0
TRIP BLANKS	116%	0

	<b>LCS/MB LIMITS</b>	<b>QC LIMITS</b>
(DCE) = d4-1,2-Dichloroethane	(80-129)	(80-129)

Prep Method: SW5030  
Log Number Range: 16-4044 to 16-4053

**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS-Method SW8260C-SIM Sample ID: LCS-031616  
Page 1 of 1 LAB CONTROL SAMPLE

Lab Sample ID: LCS-031616

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4044

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: *mm*

Date Sampled: NA

Reported: 03/23/16

Date Received: NA

Instrument/Analyst LCS: NT15/LH

Sample Amount LCS: 10.0 mL

LCSD: NT15/LH

LCSD: 10.0 mL

Date Analyzed LCS: 03/16/16 11:09

Purge Volume LCS: 10.0 mL

LCSD: 03/16/16 11:34

LCSD: 10.0 mL

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Vinyl Chloride	2.43	2.00	122%	2.28	2.00	114%	6.4%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

**Volatile Surrogate Recovery**

	LCS	LCSD
d4-1,2-Dichloroethane	108%	107%

## ORGANICS ANALYSIS DATA SHEET

Volatiles by Purge &amp; Trap GC/MS-Method SW8260C-SIM Sample ID: MB-031616

Page 1 of 1

METHOD BLANK

Lab Sample ID: MB-031616

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4044

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: *mw*

Date Sampled: NA

Reported: 03/23/16

Date Received: NA

Instrument/Analyst: NT15/LH

Sample Amount: 10.0 mL

Date Analyzed: 03/16/16 11:58

Purge Volume: 10.0 mL

CAS Number	Analyte	RL	Result	Q
75-01-4	Vinyl Chloride	0.020	< 0.020	U

Reported in µg/L (ppb)

Volatile Surrogate Recovery

d4-1,2-Dichloroethane	114%
-----------------------	------

## ORGANICS ANALYSIS DATA SHEET

Volatiles by P&amp;T GC/MS-Method SW8260C

Page 1 of 2

Sample ID: KW TANK  
SAMPLE

Lab Sample ID: AXK7H

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized: *mm*

Reported: 03/21/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Instrument/Analyst: NT3/VTs

Date Analyzed: 03/16/16 17:38

Sample Amount: 10.0 mL

Purge Volume: 10.0 mL

CAS Number	Analyte	LOQ	Result	Q
74-87-3	Chloromethane	0.50	< 0.50	U
74-83-9	Bromomethane	1.0	< 1.0	U
75-01-4	Vinyl Chloride	0.20	< 0.20	U
75-00-3	Chloroethane	0.20	< 0.20	U
75-09-2	Methylene Chloride	1.0	< 1.0	U
67-64-1	Acetone	5.0	< 5.0	U
75-15-0	Carbon Disulfide	0.20	< 0.20	U
75-35-4	1,1-Dichloroethene	0.20	< 0.20	U
75-34-3	1,1-Dichloroethane	0.20	< 0.20	U
156-60-5	trans-1,2-Dichloroethene	0.20	< 0.20	U
156-59-2	cis-1,2-Dichloroethene	0.20	< 0.20	U
67-66-3	Chloroform	0.20	< 0.20	U
107-06-2	1,2-Dichloroethane	0.20	< 0.20	U
78-93-3	2-Butanone	5.0	< 5.0	U
71-55-6	1,1,1-Trichloroethane	0.20	< 0.20	U
56-23-5	Carbon Tetrachloride	0.20	< 0.20	U
108-05-4	Vinyl Acetate	0.20	< 0.20	U
75-27-4	Bromodichloromethane	0.20	< 0.20	U
78-87-5	1,2-Dichloropropane	0.20	< 0.20	U
10061-01-5	cis-1,3-Dichloropropene	0.20	< 0.20	U
79-01-6	Trichloroethene	0.20	< 0.20	U
124-48-1	Dibromochloromethane	0.20	< 0.20	U
79-00-5	1,1,2-Trichloroethane	0.20	< 0.20	U
71-43-2	Benzene	0.20	< 0.20	U
10061-02-6	trans-1,3-Dichloropropene	0.20	< 0.20	U
110-75-8	2-Chloroethylvinylether	1.0	< 1.0	U
75-25-2	Bromoform	0.20	< 0.20	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.0	< 5.0	U
591-78-6	2-Hexanone	5.0	< 5.0	U
127-18-4	Tetrachloroethene	0.20	< 0.20	U
79-34-5	1,1,2,2-Tetrachloroethane	0.20	< 0.20	U
108-88-3	Toluene	0.20	< 0.20	U
108-90-7	Chlorobenzene	0.20	< 0.20	U
100-41-4	Ethylbenzene	0.20	< 0.20	U
100-42-5	Styrene	0.20	< 0.20	U
75-69-4	Trichlorofluoromethane	0.20	< 0.20	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.20	< 0.20	U
179601-23-1	m,p-Xylene	0.40	< 0.40	U
95-47-6	o-Xylene	0.20	< 0.20	U
95-50-1	1,2-Dichlorobenzene	0.20	< 0.20	U
541-73-1	1,3-Dichlorobenzene	0.20	< 0.20	U
106-46-7	1,4-Dichlorobenzene	0.20	< 0.20	U



## ORGANICS ANALYSIS DATA SHEET

Volatiles by P&amp;T GC/MS-Method SW8260C

Page 2 of 2

Sample ID: KW TANK

SAMPLE

Lab Sample ID: AXK7H

LIMS ID: 16-4051

Matrix: Water

Date Analyzed: 03/16/16 17:38

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

CAS Number	Analyte	LOQ	Result	Q
107-02-8	Acrolein	5.0	< 5.0	U
74-88-4	Iodomethane	1.0	< 1.0	U
74-96-4	Bromoethane	0.20	< 0.20	U
107-13-1	Acrylonitrile	1.0	< 1.0	U
563-58-6	1,1-Dichloropropene	0.20	< 0.20	U
74-95-3	Dibromomethane	0.20	< 0.20	U
630-20-6	1,1,1,2-Tetrachloroethane	0.20	< 0.20	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	< 0.50	U
96-18-4	1,2,3-Trichloropropane	0.50	< 0.50	U
110-57-6	trans-1,4-Dichloro-2-butene	1.0	< 1.0	U
108-67-8	1,3,5-Trimethylbenzene	0.20	< 0.20	U
95-63-6	1,2,4-Trimethylbenzene	0.20	< 0.20	U
87-68-3	Hexachlorobutadiene	0.50	< 0.50	U
106-93-4	1,2-Dibromoethane	0.20	< 0.20	U
74-97-5	Bromochloromethane	0.20	< 0.20	U
594-20-7	2,2-Dichloropropane	0.20	< 0.20	U
142-28-9	1,3-Dichloropropane	0.20	< 0.20	U
98-82-8	Isopropylbenzene	0.20	< 0.20	U
103-65-1	n-Propylbenzene	0.20	< 0.20	U
108-86-1	Bromobenzene	0.20	< 0.20	U
95-49-8	2-Chlorotoluene	0.20	< 0.20	U
106-43-4	4-Chlorotoluene	0.20	< 0.20	U
98-06-6	tert-Butylbenzene	0.20	< 0.20	U
135-98-8	sec-Butylbenzene	0.20	< 0.20	U
99-87-6	4-Isopropyltoluene	0.20	< 0.20	U
104-51-8	n-Butylbenzene	0.20	< 0.20	U
120-82-1	1,2,4-Trichlorobenzene	0.50	< 0.50	U
91-20-3	Naphthalene	0.50	< 0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	< 0.50	U

Reported in µg/L (ppb)

## Volatile Surrogate Recovery

d4-1,2-Dichloroethane	93.2%
d8-Toluene	97.8%
Bromofluorobenzene	94.6%
d4-1,2-Dichlorobenzene	102%

2-Chloroethylvinylether is an acid labile compound and may not be recovered from an acid preserved sample.

EPA SW-846 indicates that vinyl chloride and styrene may degrade in the presence of acid preservative.

VOA SURROGATE RECOVERY SUMMARY



Matrix: Water

QC Report No: AXK7-Hart Crowser, Inc.  
Project: Paccar  
1639-69

ARI ID	Client ID	PV	DCE	TOL	BFB	DCB	TOT OUT
MB-031616A	Method Blank	10	94.8%	97.2%	97.6%	103%	0
LCS-031616A	Lab Control	10	91.0%	101%	103%	101%	0
LCSD-031616A	Lab Control Dup	10	91.6%	102%	102%	101%	0
AXK7H	KW TANK	10	93.2%	97.8%	94.6%	102%	0

SW8260C

LCS/MB LIMITS

QC LIMITS

(DCE) = d4-1,2-Dichloroethane	(80-129)	(80-129)
(TOL) = d8-Toluene	(80-120)	(80-120)
(BFB) = Bromofluorobenzene	(80-120)	(80-120)
(DCB) = d4-1,2-Dichlorobenzene	(80-120)	(80-120)

Prep Method: SW5030B  
Log Number Range: 16-4051 to 16-4051

AXK7:00022

## ORGANICS ANALYSIS DATA SHEET

Volatiles by P&amp;T GC/MS-Method SW8260C

Page 1 of 2

Sample ID: LCS-031616A

LAB CONTROL SAMPLE

Lab Sample ID: LCS-031616A

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized: *MW*

Reported: 03/21/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: NA

Date Received: NA

Instrument/Analyst LCS: NT3/VTS

LCSD: NT3/VTS

Date Analyzed LCS: 03/16/16 08:43

LCSD: 03/16/16 09:09

Sample Amount LCS: 10.0 mL

LCSD: 10.0 mL

Purge Volume LCS: 10.0 mL

LCSD: 10.0 mL

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Chloromethane	8.31	10.0	83.1%	8.16	10.0	81.6%	1.8%
Bromomethane	10.6	10.0	106%	10.3	10.0	103%	2.9%
Vinyl Chloride	9.05	10.0	90.5%	8.77	10.0	87.7%	3.1%
Chloroethane	9.39	10.0	93.9%	9.14	10.0	91.4%	2.7%
Methylene Chloride	10.4	10.0	104%	10.2	10.0	102%	1.9%
Acetone	48.9	50.0	97.8%	49.8	50.0	99.6%	1.8%
Carbon Disulfide	10.5	10.0	105%	10.4	10.0	104%	1.0%
1,1-Dichloroethene	9.30	10.0	93.0%	9.21	10.0	92.1%	1.0%
1,1-Dichloroethane	10.0	10.0	100%	9.92	10.0	99.2%	0.8%
trans-1,2-Dichloroethene	11.0	10.0	110%	10.9	10.0	109%	0.9%
cis-1,2-Dichloroethene	10.8	10.0	108%	10.6	10.0	106%	1.9%
Chloroform	10.7	10.0	107%	10.7	10.0	107%	0.0%
1,2-Dichloroethane	9.35	10.0	93.5%	9.33	10.0	93.3%	0.2%
2-Butanone	50.1	50.0	100%	49.4	50.0	98.8%	1.4%
1,1,1-Trichloroethane	11.0	10.0	110%	10.6	10.0	106%	3.7%
Carbon Tetrachloride	10.8	10.0	108%	10.5	10.0	105%	2.8%
Vinyl Acetate	9.49	10.0	94.9%	9.55	10.0	95.5%	0.6%
Bromodichloromethane	10.7	10.0	107%	10.5	10.0	105%	1.9%
1,2-Dichloropropane	9.97	10.0	99.7%	9.85	10.0	98.5%	1.2%
cis-1,3-Dichloropropene	10.8	10.0	108%	10.8	10.0	108%	0.0%
Trichloroethene	10.8	10.0	108%	10.9	10.0	109%	0.9%
Dibromochloromethane	10.2	10.0	102%	9.90	10.0	99.0%	3.0%
1,1,2-Trichloroethane	10.5	10.0	105%	10.5	10.0	105%	0.0%
Benzene	10.8	10.0	108%	10.8	10.0	108%	0.0%
trans-1,3-Dichloropropene	10.6	10.0	106%	10.6	10.0	106%	0.0%
2-Chloroethylvinylether	9.74	10.0	97.4%	9.56	10.0	95.6%	1.9%
Bromoform	9.66	10.0	96.6%	9.40	10.0	94.0%	2.7%
4-Methyl-2-Pentanone (MIBK)	47.1	50.0	94.2%	46.9	50.0	93.8%	0.4%
2-Hexanone	45.8	50.0	91.6%	46.2	50.0	92.4%	0.9%
Tetrachloroethene	9.84	10.0	98.4%	9.52	10.0	95.2%	3.3%
1,1,2,2-Tetrachloroethane	9.36	10.0	93.6%	9.51	10.0	95.1%	1.6%
Toluene	10.5	10.0	105%	10.7	10.0	107%	1.9%
Chlorobenzene	9.96	10.0	99.6%	9.78	10.0	97.8%	1.8%
Ethylbenzene	10.1	10.0	101%	10.0	10.0	100%	1.0%
Styrene	10.5	10.0	105%	10.3	10.0	103%	1.9%
Trichlorofluoromethane	11.4	10.0	114%	11.2	10.0	112%	1.8%
1,1,2-Trichloro-1,2,2-trifluoroetha	10.5	10.0	105%	10.2	10.0	102%	2.9%
m,p-Xylene	20.0	20.0	100%	19.4	20.0	97.0%	3.0%

## ORGANICS ANALYSIS DATA SHEET

Volatiles by P&amp;T GC/MS-Method SW8260C

Page 2 of 2

Sample ID: LCS-031616A

LAB CONTROL SAMPLE

Lab Sample ID: LCS-031616A

QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4051

Project: Paccar

Matrix: Water

1639-69

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
o-Xylene	9.69	10.0	96.9%	9.64	10.0	96.4%	0.5%
1,2-Dichlorobenzene	9.33	10.0	93.3%	9.25	10.0	92.5%	0.9%
1,3-Dichlorobenzene	9.50	10.0	95.0%	9.26	10.0	92.6%	2.6%
1,4-Dichlorobenzene	9.37	10.0	93.7%	9.26	10.0	92.6%	1.2%
Acrolein	42.6	50.0	85.2%	39.8	50.0	79.6%	6.8%
Iodomethane	10.9	10.0	109%	10.4	10.0	104%	4.7%
Bromoethane	11.2	10.0	112%	10.4	10.0	104%	7.4%
Acrylonitrile	9.08	10.0	90.8%	9.27	10.0	92.7%	2.1%
1,1-Dichloropropene	10.6	10.0	106%	10.5	10.0	105%	0.9%
Dibromomethane	10.6	10.0	106%	10.2	10.0	102%	3.8%
1,1,1,2-Tetrachloroethane	10.2	10.0	102%	10.0	10.0	100%	2.0%
1,2-Dibromo-3-chloropropane	9.07	10.0	90.7%	9.13	10.0	91.3%	0.7%
1,2,3-Trichloropropane	9.28	10.0	92.8%	8.81	10.0	88.1%	5.2%
trans-1,4-Dichloro-2-butene	7.86	10.0	78.6%	8.10	10.0	81.0%	3.0%
1,3,5-Trimethylbenzene	9.83	10.0	98.3%	9.73	10.0	97.3%	1.0%
1,2,4-Trimethylbenzene	9.86	10.0	98.6%	9.49	10.0	94.9%	3.8%
Hexachlorobutadiene	8.06	10.0	80.6%	7.82	10.0	78.2%	3.0%
1,2-Dibromoethane	10.9	10.0	109%	10.9	10.0	109%	0.0%
Bromochloromethane	11.3	10.0	113%	10.7	10.0	107%	5.5%
2,2-Dichloropropane	10.8	10.0	108%	10.9	10.0	109%	0.9%
1,3-Dichloropropane	9.75	10.0	97.5%	9.71	10.0	97.1%	0.4%
Isopropylbenzene	9.69	10.0	96.9%	9.66	10.0	96.6%	0.3%
n-Propylbenzene	9.66	10.0	96.6%	9.40	10.0	94.0%	2.7%
Bromobenzene	9.42	10.0	94.2%	9.24	10.0	92.4%	1.9%
2-Chlorotoluene	9.35	10.0	93.5%	9.22	10.0	92.2%	1.4%
4-Chlorotoluene	9.66	10.0	96.6%	9.27	10.0	92.7%	4.1%
tert-Butylbenzene	9.58	10.0	95.8%	9.34	10.0	93.4%	2.5%
sec-Butylbenzene	9.73	10.0	97.3%	9.58	10.0	95.8%	1.6%
4-Isopropyltoluene	9.80	10.0	98.0%	9.43	10.0	94.3%	3.8%
n-Butylbenzene	9.49	10.0	94.9%	9.13	10.0	91.3%	3.9%
1,2,4-Trichlorobenzene	8.68	10.0	86.8%	8.74	10.0	87.4%	0.7%
Naphthalene	8.29	10.0	82.9%	8.11	10.0	81.1%	2.2%
1,2,3-Trichlorobenzene	8.04 Q	10.0	80.4%	8.16 Q	10.0	81.6%	1.5%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

## Volatile Surrogate Recovery

	LCS	LCSD
d4-1,2-Dichloroethane	91.0%	91.6%
d8-Toluene	101%	102%
Bromofluorobenzene	103%	102%
d4-1,2-Dichlorobenzene	101%	101%

## ORGANICS ANALYSIS DATA SHEET

Volatiles by P&amp;T GC/MS-Method SW8260C

Page 1 of 2

Sample ID: MB-031616A

METHOD BLANK

Lab Sample ID: MB-031616A

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized: *mmw*

Reported: 03/21/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: NA

Date Received: NA

Instrument/Analyst: NT3/VTS

Date Analyzed: 03/16/16 10:00

Sample Amount: 10.0 mL

Purge Volume: 10.0 mL

CAS Number	Analyte	LOQ	Result	Q
74-87-3	Chloromethane	0.50	< 0.50	U
74-83-9	Bromomethane	1.0	< 1.0	U
75-01-4	Vinyl Chloride	0.20	< 0.20	U
75-00-3	Chloroethane	0.20	< 0.20	U
75-09-2	Methylene Chloride	1.0	< 1.0	U
67-64-1	Acetone	5.0	< 5.0	U
75-15-0	Carbon Disulfide	0.20	< 0.20	U
75-35-4	1,1-Dichloroethene	0.20	< 0.20	U
75-34-3	1,1-Dichloroethane	0.20	< 0.20	U
156-60-5	trans-1,2-Dichloroethene	0.20	< 0.20	U
156-59-2	cis-1,2-Dichloroethene	0.20	< 0.20	U
67-66-3	Chloroform	0.20	< 0.20	U
107-06-2	1,2-Dichloroethane	0.20	< 0.20	U
78-93-3	2-Butanone	5.0	< 5.0	U
71-55-6	1,1,1-Trichloroethane	0.20	< 0.20	U
56-23-5	Carbon Tetrachloride	0.20	< 0.20	U
108-05-4	Vinyl Acetate	0.20	< 0.20	U
75-27-4	Bromodichloromethane	0.20	< 0.20	U
78-87-5	1,2-Dichloropropane	0.20	< 0.20	U
10061-01-5	cis-1,3-Dichloropropene	0.20	< 0.20	U
79-01-6	Trichloroethene	0.20	< 0.20	U
124-48-1	Dibromochloromethane	0.20	< 0.20	U
79-00-5	1,1,2-Trichloroethane	0.20	< 0.20	U
71-43-2	Benzene	0.20	< 0.20	U
10061-02-6	trans-1,3-Dichloropropene	0.20	< 0.20	U
110-75-8	2-Chloroethylvinylether	1.0	< 1.0	U
75-25-2	Bromoform	0.20	< 0.20	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.0	< 5.0	U
591-78-6	2-Hexanone	5.0	< 5.0	U
127-18-4	Tetrachloroethene	0.20	< 0.20	U
79-34-5	1,1,2,2-Tetrachloroethane	0.20	< 0.20	U
108-88-3	Toluene	0.20	< 0.20	U
108-90-7	Chlorobenzene	0.20	< 0.20	U
100-41-4	Ethylbenzene	0.20	< 0.20	U
100-42-5	Styrene	0.20	< 0.20	U
75-69-4	Trichlorofluoromethane	0.20	< 0.20	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.20	< 0.20	U
179601-23-1	m,p-Xylene	0.40	< 0.40	U
95-47-6	o-Xylene	0.20	< 0.20	U
95-50-1	1,2-Dichlorobenzene	0.20	< 0.20	U
541-73-1	1,3-Dichlorobenzene	0.20	< 0.20	U
106-46-7	1,4-Dichlorobenzene	0.20	< 0.20	U

Lab Sample ID: MB-031616A  
LIMS ID: 16-4051  
Matrix: Water  
Date Analyzed: 03/16/16 10:00

QC Report No: AXK7-Hart Crowser, Inc.  
Project: Paccar  
1639-69

CAS Number	Analyte	LOQ	Result	Q
107-02-8	Acrolein	5.0	< 5.0	U
74-88-4	Iodomethane	1.0	< 1.0	U
74-96-4	Bromoethane	0.20	< 0.20	U
107-13-1	Acrylonitrile	1.0	< 1.0	U
563-58-6	1,1-Dichloropropene	0.20	< 0.20	U
74-95-3	Dibromomethane	0.20	< 0.20	U
630-20-6	1,1,1,2-Tetrachloroethane	0.20	< 0.20	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	< 0.50	U
96-18-4	1,2,3-Trichloropropane	0.50	< 0.50	U
110-57-6	trans-1,4-Dichloro-2-butene	1.0	< 1.0	U
108-67-8	1,3,5-Trimethylbenzene	0.20	< 0.20	U
95-63-6	1,2,4-Trimethylbenzene	0.20	< 0.20	U
87-68-3	Hexachlorobutadiene	0.50	< 0.50	U
106-93-4	1,2-Dibromoethane	0.20	< 0.20	U
74-97-5	Bromochloromethane	0.20	< 0.20	U
594-20-7	2,2-Dichloropropane	0.20	< 0.20	U
142-28-9	1,3-Dichloropropane	0.20	< 0.20	U
98-82-8	Isopropylbenzene	0.20	< 0.20	U
103-65-1	n-Propylbenzene	0.20	< 0.20	U
108-86-1	Bromobenzene	0.20	< 0.20	U
95-49-8	2-Chlorotoluene	0.20	< 0.20	U
106-43-4	4-Chlorotoluene	0.20	< 0.20	U
98-06-6	tert-Butylbenzene	0.20	< 0.20	U
135-98-8	sec-Butylbenzene	0.20	< 0.20	U
99-87-6	4-Isopropyltoluene	0.20	< 0.20	U
104-51-8	n-Butylbenzene	0.20	< 0.20	U
120-82-1	1,2,4-Trichlorobenzene	0.50	< 0.50	U
91-20-3	Naphthalene	0.50	< 0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	< 0.50	U

Reported in µg/L (ppb)

**Volatile Surrogate Recovery**

d4-1,2-Dichloroethane	94.8%
d8-Toluene	97.2%
Bromofluorobenzene	97.6%
d4-1,2-Dichlorobenzene	103%

ORGANICS ANALYSIS DATA SHEET  
TOTAL DIESEL RANGE HYDROCARBONS  
NWTPHD by GC/FID  
Extraction Method: SW3510C  
Page 1 of 1

QC Report No: AXK7-Hart Crowser, Inc.  
Project: Paccar  
1639-69

Matrix: Water

Date Received: 03/10/16

Data Release Authorized: *CB*  
Reported: 03/18/16

ARI ID	Sample ID	Extraction Date	Analysis Date	EFV DF	Range/Surrogate	RL	Result
MB-031416	Method Blank	03/14/16	03/15/16	1.00	Diesel Range	0.10	< 0.10 U
16-4051	HC ID: ---		FID3B	1.0	Motor Oil Range o-Terphenyl	0.20	< 0.20 U 95.1%
AXK7H	KW TANK	03/14/16	03/15/16	1.00	<b>Diesel Range</b>	<b>0.10</b>	<b>0.11</b>
16-4051	HC ID: DRO		FID3B	1.0	Motor Oil Range o-Terphenyl	0.20	< 0.20 U 91.7%

Reported in mg/L (ppm)

EFV-Effective Final Volume in mL.

DL-Dilution of extract prior to analysis.

RL-Reporting limit.

Diesel range quantitation on total peaks in the range from C12 to C24.

Motor Oil range quantitation on total peaks in the range from C24 to C38.

HC ID: DRO/RRO indicates results of organics or additional hydrocarbons in ranges are not identifiable.

**TPHD SURROGATE RECOVERY SUMMARY**

Matrix: Water

QC Report No: AXK7-Hart Crowser, Inc.  
Project: Paccar  
1639-69

<u>Client ID</u>	<u>OTER</u>	<u>TOT OUT</u>
MB-031416	95.1%	0
LCS-031416	104%	0
LCSD-031416	108%	0
KW TANK	91.7%	0

	<b>LCS/MB LIMITS</b>	<b>QC LIMITS</b>
(OTER) = o-Terphenyl	(50-150)	(50-150)

Prep Method: SW3510C  
Log Number Range: 16-4051 to 16-4051



**ORGANICS ANALYSIS DATA SHEET**

NWTPHD by GC/FID

Page 1 of 1

Sample ID: LCS-031416

LCS/LCSD

Lab Sample ID: LCS-031416

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized:

Reported: 03/18/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: NA

Date Received: NA

Date Extracted LCS/LCSD: 03/14/16

Sample Amount LCS: 500 mL

LCSD: 500 mL

Date Analyzed LCS: 03/15/16 17:16

Final Extract Volume LCS: 1.0 mL

LCSD: 03/15/16 17:40

LCSD: 1.0 mL

Instrument/Analyst LCS: FID3B/ML

Dilution Factor LCS: 1.00

LCSD: FID3B/ML

LCSD: 1.00

Range	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Diesel	2.51	3.00	83.7%	2.45	3.00	81.7%	2.4%

**TPHD Surrogate Recovery**

	LCS	LCSD
o-Terphenyl	104%	108%

Results reported in mg/L

RPD calculated using sample concentrations per SW846.

## TOTAL DIESEL RANGE HYDROCARBONS-EXTRACTION REPORT

Matrix: Water

Date Received: 03/10/16

ARI Job: AXK7

Project: Paccar  
1639-69

ARI ID	Client ID	Samp Amt	Final Vol	Prep Date
16-4051-031416MB1	Method Blank	500 mL	1.00 mL	03/14/16
16-4051-031416LCS1	Lab Control	500 mL	1.00 mL	03/14/16
16-4051-031416LCSD1	Lab Control Dup	500 mL	1.00 mL	03/14/16
16-4051-AXK7H	KW TANK	500 mL	1.00 mL	03/14/16

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS


Page 1 of 1

Sample ID: CW-18  
SAMPLE

Lab Sample ID: AXK7A

LIMS ID: 16-4044

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	0.4	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

**INORGANICS ANALYSIS DATA SHEET**

**TOTAL METALS**

Page 1 of 1


Sample ID: CW-100D

**SAMPLE**

Lab Sample ID: AXK7B

LIMS ID: 16-4045

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	0.6	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: CW-1D

SAMPLE

Lab Sample ID: AXK7C

LIMS ID: 16-4046

Matrix: Water

Data Release Authorized:

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	0.4	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS


Page 1 of 1

Sample ID: LW-6D  
SAMPLE

Lab Sample ID: AXK7D

LIMS ID: 16-4047

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	8.0	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1


Sample ID: LW-9S

SAMPLE

Lab Sample ID: AXK7E

LIMS ID: 16-4048

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	14.8	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

**INORGANICS ANALYSIS DATA SHEET**

**TOTAL METALS**


Page 1 of 1

Sample ID: LW-9D  
SAMPLE

Lab Sample ID: AXK7F

LIMS ID: 16-4049

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	9.0	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation



## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: MW-31

SAMPLE

Lab Sample ID: AXK7G

LIMS ID: 16-4050

Matrix: Water

Data Release Authorized:

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	16.9	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS


Page 1 of 1

Sample ID: KW TANK  
SAMPLE

Lab Sample ID: AXK7H

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	8.3	
200.8	03/21/16	200.8	03/22/16	7440-47-3	Chromium	0.5	0.8	
200.8	03/21/16	200.8	03/22/16	7439-92-1	Lead	0.1	0.5	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation


## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: KW TANK

DUPLICATE

Lab Sample ID: AXK7H  
LIMS ID: 16-4051  
Matrix: Water  
Data Release Authorized:   
Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.  
Project: Paccar  
1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

## MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	200.8	8.3	8.6	3.6%	+/- 20%	
Chromium	200.8	0.8	1.0	22.2%	+/- 0.5	L
Lead	200.8	0.5	0.5	0.0%	+/- 0.1	L

Reported in µg/L

\*-Control Limit Not Met

L-RPD Invalid, Limit = Detection Limit

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: KW TANK

MATRIX SPIKE

Lab Sample ID: AXK7H

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized:

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

## MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	8.3	29.8	25.0	86.0%	
Chromium	200.8	0.8	22.6	25.0	87.2%	
Lead	200.8	0.5	21.8	25.0	85.2%	

Reported in µg/L

N-Control Limit Not Met

H-% Recovery Not Applicable, Sample Concentration Too High

NA-Not Applicable, Analyte Not Spiked

NR-Not Recovered

Percent Recovery Limits: 75-125%

**INORGANICS ANALYSIS DATA SHEET**

**TOTAL METALS**

**Sample ID: METHOD BLANK**

Page 1 of 1

Lab Sample ID: AXK7MB


QC Report No: AXK7-Hart Crowser, Inc.

LIMS ID: 16-4051

Project: Paccar

Matrix: Water

1639-69

Data Release Authorized: 

Date Sampled: NA

Reported: 03/23/16

Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/21/16	200.8	03/22/16	7440-38-2	Arsenic	0.2	0.2	U
200.8	03/21/16	200.8	03/22/16	7440-47-3	Chromium	0.5	0.5	U
200.8	03/21/16	200.8	03/22/16	7439-92-1	Lead	0.1	0.1	U

U-Analyte undetected at given LOQ

LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

TOTAL METALS


Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: AXK7LCS

LIMS ID: 16-4051

Matrix: Water

Data Release Authorized: 

Reported: 03/23/16

QC Report No: AXK7-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: NA

Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	24.3	25.0	97.2%	
Chromium	200.8	26.0	25.0	104%	
Lead	200.8	24.7	25.0	98.8%	

Reported in µg/L

N-Control limit not met

Control Limits: 80-120%

APPENDIX B  
Data Validation Summary and  
Laboratory Report  
Surface Water Samples





## APPENDIX B

### DATA VALIDATION SUMMARY AND LABORATORY REPORT SURFACE WATER SAMPLES

#### Summary of Data Validation Effort

This appendix provides the quality assurance (QA) review of five surface water samples and one field duplicate, collected in accordance with the PACCAR CMIP (DOF 1997) and Periodic Review (Ecology 2014) for the March 2016 sampling event. The samples were submitted to Analytical Resources, Inc., (ARI) in Tukwila, Washington, for chemical analysis. The laboratory reported results as ARI Job No. AXJ3. The samples were analyzed for the following:

- Total metals (copper, lead, and zinc) by EPA Method 200.8; and
- Hexavalent chromium by SM 3500-Cr B.

The laboratory performed ongoing quality assurance/quality control (QA/QC) reviews of laboratory procedures. Hart Crowser performed the data review using laboratory quality control results summary sheets to ensure the data met data quality objectives for the project. The following criteria were evaluated in the standard data quality review process:

- Holding times;
- Method blanks;
- Laboratory control sample (LCS) recoveries;
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent differences (RPDs);
- Standard reference material (SRM) recoveries;
- Laboratory and field duplicate RPDs; and
- Reporting limits (RL).

#### Overall Data Quality

The overall data quality objectives (DQOs) as set forth in the quality assurance project plan (QAPP) were met, and the data for this site are acceptable for use as qualified. The completeness for the associated data is 100 percent. Detailed discussions are presented in the following pages.

#### ***Quality Assurance Objectives***

**Precision.** Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average values. Precision is generally evaluated using LCS/LCSD, MS/MSD, lab duplicate, and field duplicate results. The LCS/LCSD, MS/MSD, and lab duplicate results provide information on laboratory (only) precision, while field duplicates provide information on field and laboratory precision combined.

Analytical precision is generally measured through LCS/LCSD and MS/MSD samples for organic analysis, and through lab duplicate samples for metals and other inorganic analysis. Analytical precision is quantitatively expressed as the RPD between the MS/MSD or duplicates. Analytical precision measurements were carried out on project surface water samples at a minimum frequency of one in 20 samples. The analytical precision for all analytes was acceptable or not applicable when the sample and duplicate results were less than five times the RL.

**Accuracy.** Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results was assessed by analyzing standard reference materials or by "spiking" samples with known standards (surrogates, LCS, SRM, and/or MS) and measuring the percent recovery.

Accuracy measurements for all fractions were carried out in accordance with method requirements for organic and inorganic analyses and at a minimum frequency of one in 20 samples. The analytical accuracy for all analytes was acceptable.

**Completeness.** Completeness is defined as the percentage of measurements made that are judged to be valid measurements. The completeness of the data is the ratio of acceptable data points to the total number of data points (expressed as a percent). The target completeness goal for this work was 100 percent. The completeness of the data for this project was 100 percent.

**Comparability.** Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Because standard techniques were used for both sample collection and laboratory analysis, the data collected from the same sampling locations and depths should be comparable to both internal and other data generated.

## No Major Problems Encountered

No major problems were encountered.

## Minor Problems Encountered

**Receiving Samples.** The following issues were encountered.

- The cooler temperature upon receipt at the laboratory was 12°C, above the 2° to 6°C method recommended limits. The laboratory noted that insufficient ice was used to cool the samples. Samples that were collected more than four hours before receipt at the laboratory were subsequently evaluated:
  - **Samples SW-3, SW-5, and SW-6.** The samples were analyzed for total copper, lead, and zinc by EPA Method 200.8 and hexavalent chromium by SM 3500-Cr B. The total metals results would not be affected by the temperature exceedance, and results were not qualified. The hexavalent chromium results would potentially be affected by the temperature exceedance, and were qualified as estimated (J).

**Hexavalent Chromium.** Samples SW-3, SW-5, and SW-6 were qualified as estimated (J) due to the temperature exceedance.

**Total Metals.** No problems were encountered.

## Data Qualifier Definitions

The following data qualifiers are used in the text and tables according to a quality assurance review of the laboratory procedures and results:

- U** Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution by the laboratory.
- UJ** Indicates the compound or analyte was analyzed for and not detected. Because of quality control deficiencies identified during data validation, the value reported may not accurately reflect the sample quantitation limit.



LABORATORY REPORT  
Analytical Resources, Incorporated





**Analytical Resources, Incorporated**  
Analytical Chemists and Consultants

March 22, 2016

Roy Jensen  
Hart Crowser, Inc.  
1700 Westlake Avenue North Suite 200  
Seattle, WA 98109-3056

**RE: Client Project: Paccar, 1639-69**  
**ARI Job No: AXJ3**

Dear Mr. Jensen:


Please find enclosed the original chain-of-custody (COC) record and the final results for the sample from the project referenced above. Analytical Resources, Inc. (ARI) accepted six water samples in good condition on March 10, 2016. There were no discrepancies between the COC and the sample containers' labels.

The samples were analyzed for total metals, and hexavalent chromium, as requested on the COC.

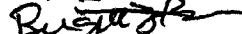




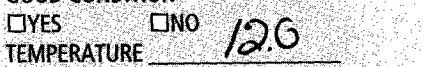
No analytical complications were noted for the analyses.

A copy of this report and the supporting data will remain on file with ARI. Please feel free to contact me at your convenience if you have any questions.

Sincerely,  
ANALYTICAL RESOURCES, INC.

  
Amanda Volgardsen  
-for-  
Kelly Bottem  
Client Services Manager  
kellyb@arilabs.com  
206-695-6211

$$\frac{Cu}{CuI}$$

RELINQUISHED BY		DATE	RECEIVED BY	DATE	SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:	TOTAL NUMBER OF CONTAINERS	
 SIGNATURE Brigitte Brown PRINT NAME Herb Crouse COMPANY		3/10/16 TIME 1552	 SIGNATURE S. Smith PRINT NAME All COMPANY	3/10/16 TIME 1552		SAMPLE RECEIPT INFORMATION CUSTODY SEALS: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A GOOD CONDITION <input type="checkbox"/> YES <input type="checkbox"/> NO    12.6 TEMPERATURE SHIPMENT METHOD: <input type="checkbox"/> HAND <input type="checkbox"/> COURIER <input type="checkbox"/> OVERNIGHT	
RELINQUISHED BY		DATE	RECEIVED BY	DATE			
 SIGNATURE  SIGNATURE PRINT NAME COMPANY		TIME TIME	SIGNATURE SIGNATURE PRINT NAME COMPANY	TIME TIME	COOLER NO.: COOLER NO.: STORAGE LOCATION: STORAGE LOCATION:		
RELINQUISHED BY		DATE	RECEIVED BY	DATE			
RELINQUISHED BY		DATE	RECEIVED BY	DATE	See Lab Work Order No. _____ for Other Contract Requirements	TURNAROUND TIME: <input type="checkbox"/> 24 HOURS <input type="checkbox"/> 1 WEEK <input type="checkbox"/> 48 HOURS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> 72 HOURS <input type="checkbox"/> OTHER	

Gold to Sample Custodian





# Cooler Receipt Form

ARI Client: HART CROWDER

Project Name: PACCAR

COC No(s): \_\_\_\_\_ NA

Delivered by: Fed-Ex UPS Courier (Hand Delivered) Other: \_\_\_\_\_

Assigned ARI Job No: AXJ3

Tracking No: \_\_\_\_\_ NA

## Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: 12:15:52 12:0

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005276

Cooler Accepted by: [Signature] Date: 03/10/16 Time: 1552

**Complete custody forms and attach all shipping documents**

## Log-In Phase:

Was a temperature blank included in the cooler? \_\_\_\_\_

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: \_\_\_\_\_

Was sufficient ice used (if appropriate)? \_\_\_\_\_ NA YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI: NA

Was Sample Split by ARI: NA YES Date/Time: \_\_\_\_\_ Equipment: \_\_\_\_\_ Split by: \_\_\_\_\_

Samples Logged by: AV Date: 3/10/16 Time: 1613

**\*\* Notify Project Manager of discrepancies or concerns \*\***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

### Additional Notes, Discrepancies, & Resolutions:

COC dates + times filled out in pencil.

By: AV Date: 3/10/16



Small → "sm" (< 2 mm)  
Peabubbles → "pb" (2 to < 4 mm)  
Large → "lg" (4 to < 6 mm)  
Headspace → "hs" (> 6 mm)



# Cooler Temperature Compliance Form

[illegible]

Completed by: AN Date: 3/10/16 Time: 11:13

00070F

Cooler Temperature Compliance Form

Version 000

AXJ3 : 00004 3/3/09

## PRESERVATION VERIFICATION 03/10/16

Page 1 of 1



ARI Job No: AXJ3

PC: Kelly

VTSR: 03/10/16

Inquiry Number: NONE

Analysis Requested: 03/11/16

Contact: Jensen, Roy

Client: Hart Crowser, Inc.

Logged by: AV

Sample Set Used: Yes-481

Validatable Package: No

Deliverables:

Project #: 1639-69

Project: Paccar

Sample Site:

SDG No:

Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
16-4000 AXJ3A	SW-DP						TOP															
16-4001 AXJ3B	SW-3						TOP															
16-4002 AXJ3C	SW-5						TOP															
16-4003 AXJ3D	SW-6						TOP															
16-4004 AXJ3E	SW-MH						TOP															
16-4005 AXJ3F	SW-MD						TOP															

AXJ3:000005

N1

dindu

# Sample ID Cross Reference Report



ARI Job No: AXJ3  
Client: Hart Crowser, Inc.  
Project Event: 1639-69  
Project Name: Paccar

Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1. SW-DP	AXJ3A	16-4000	Water	03/10/16 12:20	03/10/16 15:52
2. SW-3	AXJ3B	16-4001	Water	03/10/16 07:00	03/10/16 15:52
3. SW-5	AXJ3C	16-4002	Water	03/10/16 07:15	03/10/16 15:52
4. SW-6	AXJ3D	16-4003	Water	03/10/16 11:30	03/10/16 15:52
5. SW-MH	AXJ3E	16-4004	Water	03/10/16 12:00	03/10/16 15:52
6. SW-MD	AXJ3F	16-4005	Water	03/10/16 12:30	03/10/16 15:52



## **Data Reporting Qualifiers**

**Effective 12/31/13**

### **Inorganic Data**

- U Indicates that the target analyte was not detected at the reported concentration
- \* Duplicate RPD is not within established control limits
- B Reported value is less than the CRDL but  $\geq$  the Reporting Limit
- N Matrix Spike recovery not within established control limits
- NA Not Applicable, analyte not spiked
- H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- L Analyte concentration is  $\leq 5$  times the Reporting Limit and the replicate control limit defaults to  $\pm 1$  RL instead of the normal 20% RPD

### **Organic Data**

- U Indicates that the target analyte was not detected at the reported concentration
- \* Flagged value is not within established control limits
- B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
- J Estimated concentration when the value is less than ARI's established reporting limits
- D The spiked compound was not detected due to sample extract dilution
- E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.



Analytical Resources,  
Incorporated  
Analytical Chemists and  
Consultants

- Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).
- S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
- NA The flagged analyte was not analyzed for
- NR Spiked compound recovery is not reported due to chromatographic interference
- NS The flagged analyte was not spiked into the sample
- M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
- Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
- EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**
- C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
- P The analyte was detected on both chromatographic columns but the quantified values differ by  $\geq 40\%$  RPD with no obvious chromatographic interference
- X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**
- Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**



## **Geotechnical Data**

- A** The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
- F** Samples were frozen prior to particle size determination
- SM** Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
- SS** Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
- W** Weight of sample in some pipette aliquots was below the level required for accurate weighting

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS


Page 1 of 1

Sample ID: SW-DP  
SAMPLE

Lab Sample ID: AXJ3A

LIMS ID: 16-4000

Matrix: Water

Data Release Authorized: 

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	1.1	
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	0.1	U
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	81	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation



**INORGANICS ANALYSIS DATA SHEET**

**TOTAL METALS**

Page 1 of 1

Sample ID: SW-3

**SAMPLE**

Lab Sample ID: AXJ3B

LIMS ID: 16-4001

Matrix: Water

Data Release Authorized: *[Signature]*

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	1.0	
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	0.3	
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	125	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

**INORGANICS ANALYSIS DATA SHEET**

**TOTAL METALS**


Page 1 of 1

Sample ID: SW-5  
SAMPLE

Lab Sample ID: AXJ3C

LIMS ID: 16-4002

Matrix: Water

Data Release Authorized: 

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	11.4	
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	5.2	
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	24	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

**INORGANICS ANALYSIS DATA SHEET**

**TOTAL METALS**

Page 1 of 1


**Sample ID: SW-6**

**SAMPLE**

Lab Sample ID: AXJ3D

LIMS ID: 16-4003

Matrix: Water

Data Release Authorized: 

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	7.7	
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	1.2	
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	10	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS


Page 1 of 1

Sample ID: SW-MH  
SAMPLE

Lab Sample ID: AXJ3E

LIMS ID: 16-4004

Matrix: Water

Data Release Authorized: 

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	40.1	
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	4.0	
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	169	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: SW-MD  
SAMPLE

Lab Sample ID: AXJ3F

LIMS ID: 16-4005

Matrix: Water

Data Release Authorized:

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: 03/10/16

Date Received: 03/10/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	39.5	
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	4.1	
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	164	

U-Analyte undetected at given LOQ  
LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: AXJ3MB

LIMS ID: 16-4005

Matrix: Water

Data Release Authorized: *EF*

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: NA

Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	03/15/16	200.8	03/17/16	7440-50-8	Copper	0.5	0.5	U
200.8	03/15/16	200.8	03/17/16	7439-92-1	Lead	0.1	0.1	U
200.8	03/15/16	200.8	03/17/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ

LOQ-Limit of Quantitation

## INORGANICS ANALYSIS DATA SHEET

## TOTAL METALS

Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: AXJ3LCS

LIMS ID: 16-4005

Matrix: Water

Data Release Authorized:

Reported: 03/18/16

QC Report No: AXJ3-Hart Crowser, Inc.

Project: Paccar

1639-69

Date Sampled: NA

Date Received: NA

## BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Copper	200.8	24.3	25.0	97.2%	
Lead	200.8	23.8	25.0	95.2%	
Zinc	200.8	73	80	91.2%	

Reported in µg/L

N-Control limit not met

Control Limits: 80-120%

**SAMPLE RESULTS-CONVENTIONALS**  
**AXJ3-Hart Crowser, Inc.**



Matrix: Water  
Data Release Authorized: ✓  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

Client ID: SW-DP  
ARI ID: 16-4000 AXJ3A

Analyte	Date Batch	Method	Units	RL	Sample
Hexavalent Chromium	03/10/16 031016#1	SM3500Cr-B	mg/L	0.010	< 0.010 U

RL Analytical reporting limit  
U Undetected at reported detection limit



**SAMPLE RESULTS-CONVENTIONALS**  
**AXJ3-Hart Crowser, Inc.**



Matrix: Water  
Data Release Authorized: *W*  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

Client ID: SW-3  
ARI ID: 16-4001 AXJ3B

Analyte	Date Batch	Method	Units	RL	Sample
Hexavalent Chromium	03/10/16 031016#1	SM3500Cr-B	mg/L	0.010	< 0.010 U

RL Analytical reporting limit  
U Undetected at reported detection limit

**SAMPLE RESULTS-CONVENTIONALS**  
**AXJ3-Hart Crowser, Inc.**



Matrix: Water  
Data Release Authorized: W  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

**Client ID: SW-5**  
**ARI ID: 16-4002 AXJ3C**

Analyte	Date Batch	Method	Units	RL	Sample
Hexavalent Chromium	03/10/16 031016#1	SM3500Cr-B	mg/L	0.010	< 0.010 U

RL Analytical reporting limit  
U Undetected at reported detection limit

**SAMPLE RESULTS-CONVENTIONALS**  
**AXJ3-Hart Crowser, Inc.**



Matrix: Water  
Data Release Authorized: *W*  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

**Client ID: SW-6**  
**ARI ID: 16-4003 AXJ3D**

<b>Analyte</b>	<b>Date Batch</b>	<b>Method</b>	<b>Units</b>	<b>RL</b>	<b>Sample</b>
Hexavalent Chromium	03/10/16 031016#1	SM3500Cr-B	mg/L	0.010	< 0.010 U

RL Analytical reporting limit  
U Undetected at reported detection limit

**SAMPLE RESULTS-CONVENTIONALS**  
**AXJ3-Hart Crowser, Inc.**



Matrix: Water  
Data Release Authorized:  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

Client ID: SW-MH  
ARI ID: 16-4004 AXJ3E

Analyte	Date Batch	Method	Units	RL	Sample
Hexavalent Chromium	03/10/16 031016#1	SM3500Cr-B	mg/L	0.010	< 0.010 U

RL Analytical reporting limit  
U Undetected at reported detection limit

**SAMPLE RESULTS-CONVENTIONALS**  
**AXJ3-Hart Crowser, Inc.**



Matrix: Water  
Data Release Authorized: W  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16


**Client ID: SW-MD**  
**ARI ID: 16-4005 AXJ3F**

Analyte	Date Batch	Method	Units	RL	Sample
Hexavalent Chromium	03/10/16 031016#1	SM3500Cr-B	mg/L	0.010	< 0.010 U

RL Analytical reporting limit  
U Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS  
AXJ3-Hart Crowser, Inc.



Matrix: Water  
Data Release Authorized:   
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: NA  
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Hexavalent Chromium	SM3500Cr-B	03/10/16	mg/L	< 0.010 U	

STANDARD REFERENCE RESULTS-CONVENTIONALS  
AXJ3-Hart Crowser, Inc.



Matrix: Water  
Data Release Authorized: W  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: NA  
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Hexavalent Chromium ERA #300614	SM3500Cr-B	03/10/16	mg/L	0.611	0.620	98.5%

REPLICATE RESULTS-CONVENTIONALS  
AXJ3-Hart Crowser, Inc.



Matrix: Water  
Data Release Authorized: W  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: AXJ3A    Client ID: SW-DP						
Hexavalent Chromium	SM3500Cr-B	03/10/16	mg/L	< 0.010	< 0.010	NA



MS/MSD RESULTS-CONVENTIONALS  
AXJ3-Hart Crowser, Inc.



Matrix: Water  
Data Release Authorized: W  
Reported: 03/15/16

Project: Paccar  
Event: 1639-69  
Date Sampled: 03/10/16  
Date Received: 03/10/16

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: AXJ3A Client ID: SW-DP							
Hexavalent Chromium	SM3500Cr-B	03/10/16	mg/L	< 0.010	0.059	0.062	95.2%



## APPENDIX C

### Groundwater Quality Summary Charts



CW-01D	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	+	+	+	↘	↘		↘		↘		↘		↘		↘		↘		↘						↘		↘		↘		↘		↘		↘		+	
Lead				+							+																	+										
Chromium				+							+																											
Benzene	+	+	+	+	+		+		+		+		+																									
VC	+	+	+	+	+		+		↘		+		+															+	+		+					+		
Total cPAHs											+																											
Diesel	+	+	+	+	+		+		+		+																											
Heavy Oil	+	+	+	+	+		+		+		+																											

Notes:

- X = Analytical constituents concentration is above the HSAL.
  - \ = Analytical constituents concentration is above the CUL but below the HSAL.
  - + = Analytical constituents concentration is below the CUL.
  - = Not sampled
- VC = Vinyl chloride  
HSAL = Hot spot action level  
CUL = cleanup levels

CW-01S	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	↘	↘	+	↘	↘		↘		↘		↘		↘		↘		↘		↘		↘		↘		↘		↘		↘		↘		+		+		+	
Lead				+							+																		+									
Chromium				+							+																											
Benzene	+	+	+	+	+		+		+		+	+	+		+		+		+					+				+										
VC	+	↘	↘	↘	↘		↘		X		↘	↘	↘		↘		↘		↘		↘		↘		+		↘		↘		+		+				+	
Total cPAHs											+																											
Diesel	+	+	+	+	+		+		+		+																	+										
Heavy Oil	+	+	+	+	+		+		+		+																											

Notes:

- X = Analytical constituents concentration is above the HSAL.
- \ = Analytical constituents concentration is above the CUL but below the HSAL.
- +
- = Analytical constituents concentration is below the CUL.
- = Not sampled
- VC = Vinyl chloride
- HSAL = Hot spot action level
- CUL = cleanup levels

LW-06D	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	\	\	+	\	\		\		\		+		\		\		\		\		\		\		\		\		\		\		\		\		\	
Lead				+							+																											
Chromium				+							+																											
Benzene	+	+	+	+	+		+		+		+																		+									
VC	+	+	+	+	+		+		+		+																		+							+		
Total cPAHs											+																											
Diesel	+	+	+	+	+		+		+		+																											
Heavy Oil	+	+	+	+	+		+		+		+																											

Notes:

- X = Analytical constituents concentration is above the HSAL.
  - \ = Analytical constituents concentration is above the CUL but below the HSAL.
  - + = Analytical constituents concentration is below the CUL.
  - = Not sampled
- VC = Vinyl chloride  
HSAL = Hot spot action level  
CUL = cleanup levels

LW-09D	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	\	\	\	+	\		\		\		+		\		\		\		\		\		\	\	\		\		\		\		\		\		\	
Lead				+							+																											
Chromium				+							+																	+										
Benzene	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+																			
VC	\	\	\	+	+	\	\	\	\	\	+	\	\	\	\	\	\		\		\		\	\	\		\		\		\		\		\		\	
Total cPAHs											+																											
Diesel	+	+	+	+	+		+		+		+																											
Heavy Oil	+	+	+	+	+		+		+		+																											

Notes:

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  - \ = Analytical constituents concentration is above the CUL but below the HSAL.
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  - = Not sampled
- VC = Vinyl chloride  
HSAL = Hot spot action level  
CUL = cleanup levels



LW-09S	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	
Arsenic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lead				+							+																												
Chromium				+							+																				+								
Benzene	+	+	+	+	+		+		+		+																												
VC	+	+	+	+	+		+		+		+																				+					+			
Total cPAHs											+																												
Diesel	+	+	+	+	+		+		+		+																				+								
Heavy Oil	+	+	+	+	+		+		+		+																				+								

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HSAL = Hot spot action level  
CUL = cleanup levels

MW-031	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	\	\	\	\	\		\		\		\	\	\	\	\		\		\		\		\		\		\		\		\		\		\		\	
Lead				+							+								+																			
Chromium				+							+								+									+										
Benzene	+	+	+	+	+		+		+		+		+						+																			
VC	+	+	+	+	+		+	\			+		+						+									+	+							+		
Total cPAHs											+								+																			
Diesel	+	+	+	+	+		+		+		+								+																			
Heavy Oil	+	+	+	+	+		+		+		+								+																			

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CUL = cleanup levels

SC-01S	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2015	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	+	+	+	↘	+		↘		↘		+		↘		↘		+		+										+									
Lead	+	+	+	+	+		+		+		+																											
Chromium	+	+	+	+	+		+		+		+																											
Benzene																																						
VC																																						
Total cPAHs																																						
Diesel																																						
Heavy Oil																																						

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HSAL = Hot spot action level  
CUL = cleanup levels

SC-02S	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016	
Analytical Constituents	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Arsenic	+	+	+	+	+		+		↗		+		+																+									
Lead	+	+	+	+	+		+		+		+																											
Chromium	+	+	+	+	+		+		+		+																		+									
Benzene																																						
VC																																						
Total cPAHs																																						
Diesel																																						
Heavy Oil																																						

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HSAL = Hot spot action level  
CUL = cleanup levels