

September 8, 2020

Project No. 923-1000-006.2020

Mr. Bill Kombol

Landsburg PLP Group
31407 Highway 169
PO Box 10
Black Diamond, WA 98010

LANDSBURG MINE SITE QUARTERLY GROUNDWATER MONITORING REPORT JUNE 2020 SAMPLING

Dear Bill,

Golder Associates Inc. (Golder) completed a quarterly interim groundwater monitoring event at the Landsburg Mine Site during June 2020. Groundwater samples were collected from monitoring wells LMW-2, LMW-4, LMW-10, LMW-12, and LMW-13R (Figure 1). Quarterly monitoring for all Site groundwater monitoring wells located on the north end of the Site has been conducted since May 2018 to provide additional data on the detection of 1,4-dioxane in LMW-2, LMW-4, and LMW-12.

Monitoring wells LMW-2, LMW-4, LMW-10, LMW-12 and LMW-13R are completed to monitor shallow, middle, and deeper zones within the north end of the Rogers Coal Mine subsidence trench. Figure 2 presents a cross-section along the strike at the coal seam that also depicts the location of the monitoring wells.

Groundwater sampling was conducted in accordance with the *Compliance Monitoring Plan, Landsburg Mine Site*¹, and included the following activities:

- Measurement of static water levels in each groundwater monitoring well.
- Well purging with dedicated sampling pumps installed in each monitoring well.
- Measurement of field parameters including: pH, specific conductance, temperature, dissolved oxygen, oxidation-reduction potential (ORP), and turbidity.
- Collection of representative samples in appropriate containers provided by the analytical laboratory.

¹ Washington State Department of Ecology. 2017. Exhibit D of the Consent Decree – Compliance Monitoring Plan Landsburg Mine Site MTCA Remediation Project, Ravensdale, Washington. Prepared by Golder Associates Inc. June 7.

- Analyses of groundwater samples for the following parameters:
 - Volatile Organic Compounds (VOCs) by United States Environmental Protection Agency (USEPA) USEPA Method 8260D
 - 1,4-Dioxane by USEPA SW-846 Method 8270E

Field sampling activities were documented on Sample Integrity Data Sheets (SIDS), provided in Appendix A. Table 1 presents depths to groundwater measured during the event and calculated static water level elevations. Following sample collection, all bottles were sealed, labeled, and placed in an iced cooler until delivery to the laboratory. Groundwater samples were transported under chain-of-custody procedures to Analytical Resources Incorporated (ARI), of Tukwila, Washington, for analyses.

The laboratory data packages underwent data validation. The data were found to be acceptable without significant qualifications, with the following exception: the analytical result for 2-chloroethyl vinyl ether reported for LMW-2-0620 and its duplicate LMW-2-0620-D were rejected due to matrix spike/matrix spike duplicate recoveries grossly out of quality control criteria. 2-chloroethyl vinyl ether was not detected during the June 2020 sampling round and has never been detected at the Site. Appendix B presents the laboratory analytical report and the data validation report with added data qualifiers noted.

Table 2 presents the field parameter measurements and laboratory analytical results for each groundwater sample. The only parameters detected in groundwater samples above the laboratory RLs during this sampling event were carbon disulfide, 1,1-dichloroethane, and 1,4-dioxane.

Carbon disulfide was detected in all 5 of the wells sampled. The maximum concentration reported across all samples was 0.29 micrograms per liter (µg/L) in LMW-2. All reported concentrations of carbon disulfide are considerably lower than the MTCA Method A groundwater cleanup level of 800 µg/L. Carbon disulfide has been detected at these low levels in Site groundwater in previous sampling events. The detection of carbon disulfide is attributed to being present in the coal bed material as a natural constituent.

1,1-Dichloroethane was detected in LMW-12 at a reported concentration of 0.3 µg/L. 1,1-Dichloroethane is routinely detected in LMW-12 at these trace reported concentrations. The MTCA Method B groundwater cleanup level is 7.68 µg/L.

1,4-Dioxane was detected in LMW-2 (1.8 µg/L), LMW-4 (1.8 µg/L), and LMW-12 (0.5 µg/L). The MTCA Method B groundwater cleanup level for 1,4-dioxane is 0.438 µg/L. 1,4-Dioxane concentrations reported during the June 2020 round are lower than the concentrations initially reported in November 2017 and are consistent with recent concentrations reported in these wells. The concentration of 1,4-dioxane reported in LMW-12 during the current sampling round is consistent with the low concentrations historically reported in this well, which range from 1.6 µg/L to not detected. 1,4-Dioxane has not been detected in any other Site monitoring wells. The 1,4-dioxane detection is being addressed by the Landsburg Mine Site Group in cooperation with Ecology.

If you have any questions or require any additional information, please contact Gary Zimmerman at (425) 883-0777.

Sincerely,

Golder Associates Inc.



Joseph Xi
Senior Project Engineer



Gary Zimmerman
Principal

JX/GZ/ks

Attachments: Table 1: Groundwater Elevation Data, Landsburg Mine Site, June 25, 2020
Table 2: June 2020 Groundwater Analytical Results Landsburg Mine Site
Figure 1: Groundwater Monitoring Locations
Figure 2: Cross-Section along Strike at Coal Seam, June 2020
Appendix A: Sample Integrity Data Sheets (SIDS)
Appendix B: Laboratory Analytical Reports Data Validation and Quality Assurance /
Quality Control Review Memorandum, June 2020 Laboratory Analytical Report

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Tables

Table 1: Groundwater Elevation Data, Landsburg Mine Site, June 25, 2020

	LMW-1	LMW-2	LMW-3	LMW-4 ¹	LMW-5	LMW-6	LMW-7 ¹	LMW-8	LMW-9	LMW-10	LMW-11	LMW-12	LMW-13R	LMW-14 ¹	LMW-15
Water Depths															
Date of data collection	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	3/10/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020
Time of data collection	9:49 AM	9:19 AM	11:04 AM	9:21 AM	11:17 AM	9:49 AM	10:45 AM	11:04 AM	11:10 AM	9:15 AM	10:19 AM	9:27 AM	9:29 AM	10:02 AM	10:23 AM
Measured to Top of PVC (ft btc)	138.98	7.13	12.68	8.67	14.28	24.65	211.73	4.46	99.94	0.24	157.82	8.75	9.25	160.93	152.02
Surveyed Elevation															
Top of PVC (ft asl)	765.36	617.79	656.75	619.27	658.27	632.33	771.51	646.97	743.99	618.98	802.19	625.35	625.86	805.12	796.46
Top of Monument (ft asl)	766.16	618.38	657.48	619.89	658.87	633.00	771.88	NC	NC	619.10	802.51	625.49	625.91	805.14	796.61
Ground Level (ft asl)	763.02	614.92	654.40	617.37	655.63	629.95	768.79	645.25	741.13	615.78	799.89	621.90	622.07	802.22	792.64
Corrected Water Elevation															
Using PVC elevation (ft asl)	626.38	610.66	644.07	610.60	643.99	607.68	559.78	642.51	644.05	618.74	644.37	616.60	616.61	644.19	644.44

Notes:
¹ Data corrected to accommodate well inclination from vertical
NA = Not applicable
NC = Data not collected
ft btc = feet below top of casing
ft asl = feet above sea level

Table 2: June 2020 Groundwater Analytical Results Landsburg Mine Site

ANALYTE	UNITS	LMW-2	LMW-2 Duplicate	LMW-4	LMW-10	LMW-12	LMW-13R	Field Blank	Trip Blank
		6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020	6/25/2020
Field Parameter									
Temperature	°C	11.3	-	11.0	12.3	11.4	11.2	-	-
pH	stnd	6.79	-	6.82	8.59	6.58	7.33	-	-
Conductivity	uS/cm	777	-	746	290	578	692	-	-
Dissolved Oxygen	mg/L	0.43	-	0.43	0.42	0.39	0.42	-	-
Oxidation-Reduction Potential	Rel mV	-124.8	-	-131.2	-213	-84.2	-121.8	-	-
Turbidity	NTU	0.33	-	0.20	0.73	1.1	0.76	-	-
Volatile Organic Compounds (VOCs)									
Acetone	ug/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acrolein	ug/L	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
Acrylonitrile	ug/L	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Benzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromobenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
methyl ethyl ketone	ug/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
n-Butylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Sec-Butylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
tert-butylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Carbon Disulfide	ug/L	0.25	0.29	0.25	0.15	0.21	0.16	0.1 U	0.1 U
Carbon Tetrachloride	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chlorobenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Chloroethyl vinyl ether	ug/L	0.5 R	0.5 R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
Chloroform	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloromethane	ug/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chlorotoluene	ug/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4-Chlorotoluene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dichlorodifluoromethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromo-3-Chloropropane	ug/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylene Dibromide	ug/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Dibromomethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichlorobenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,4-Dichlorobenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,4-Dichloro-2-butene	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.3	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cis-1,2-Dichloroethene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichloropropane	ug/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2,2-Dichloropropane	ug/L	0.1 UJ	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloropropene	ug/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Table 2: June 2020 Groundwater Analytical Results Landsburg Mine Site

ANALYTE	UNITS	LMW-2	LMW-2 Duplicate	LMW-4	LMW-10	LMW-12	LMW-13R	Field Blank	Trip Blank
Cis-1,3-Dichloropropene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,3-Dichloropropene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Hexanone	ug/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Iodomethane	ug/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cumene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
p-Isopropyltoluene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Methylene Chloride	ug/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methyl isobutyl ketone	ug/L	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Naphthalene	ug/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
n-Propylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Styrene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trichlorobenzene	ug/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1,2-Tetrachloroethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2,2-Tetrachloroethane	ug/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloroethane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichloroethene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
CFC-113	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichloropropane	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Vinyl Acetate	ug/L	0.2 UJ	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Vinyl Chloride	ug/L	0.23 UJ	0.23 UJ	0.23 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
m, p-Xylene	ug/L	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
o-Xylene	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Total Xylenes	ug/L	0.6 UJ	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Semi-Volatile Organic Compounds (SVOCs)									
1,4-Dioxane	ug/L	1.8	1.8	1.8	0.4 U	0.5	0.4 U	0.4 U	NS

Notes:

U - Analyte was not detected above the Reporting Limit (RL).

UJ - The analyte was analyzed for and was not detected. The RL is approx and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

J - Analyte was detected above the Method Detection Limit (MDL) but below the RL.

J+ - The result is an estimated quantity, but the result may be biased high.

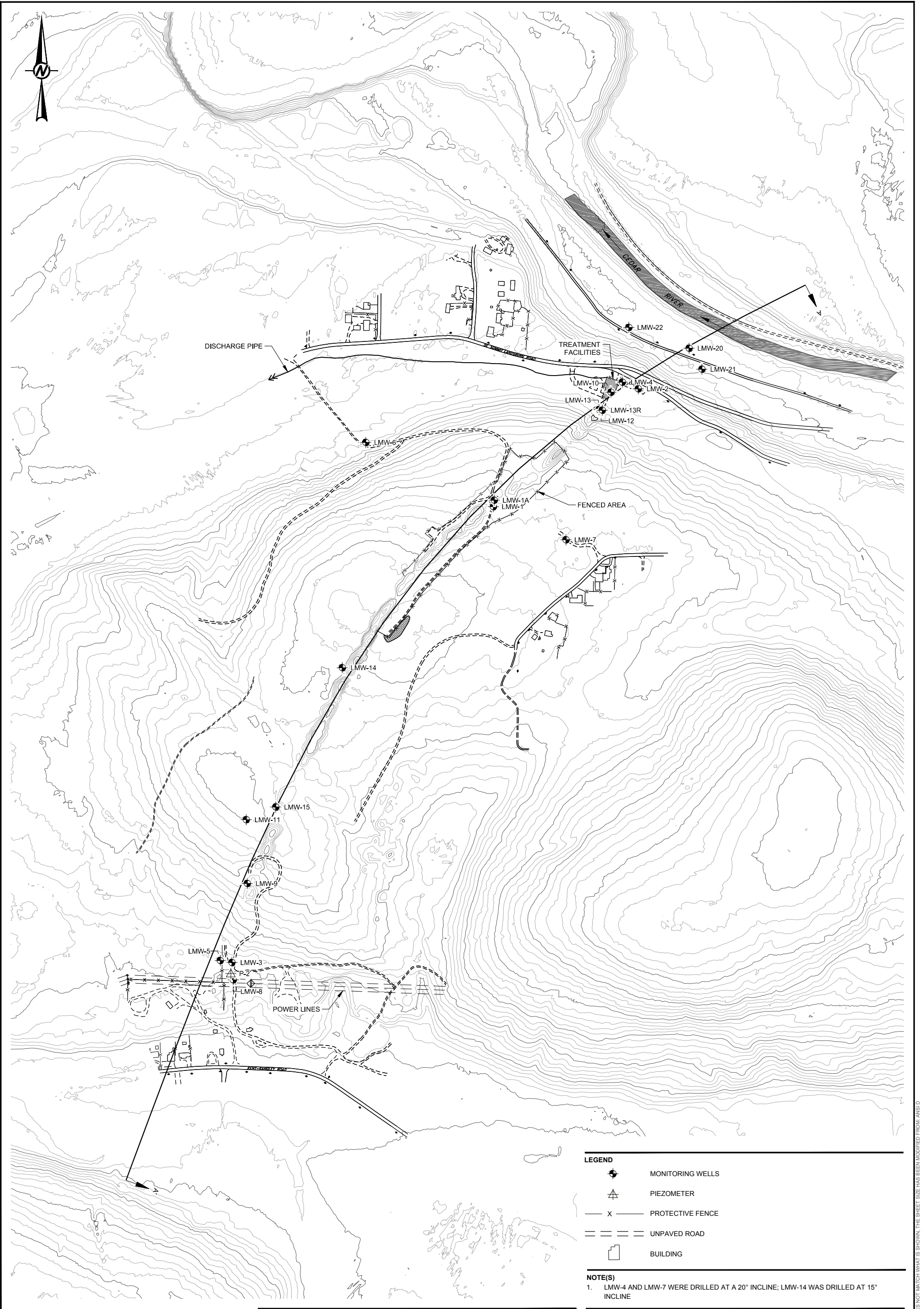
J- - The result is an estimated quantity, but the result may be biased low.

R - Analytical result is unusable because certain data quality criteria were not met.

Bold font indicates detections above the RL.

NS - Not Sampled

Figures



- LEGEND**
- MONITORING WELLS
 - PIEZOMETER
 - PROTECTIVE FENCE
 - UNPAVED ROAD
 - BUILDING

NOTE(S)

1. LMW-4 AND LMW-7 WERE DRILLED AT A 20° INCLINE; LMW-14 WAS DRILLED AT 15° INCLINE

CLIENT
LANDSBURG MINE SITE PLP GROUP

PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION

CONSULTANT

YYYY-MM-DD	2019-04-25
DESIGNED	XXX
PREPARED	XXX
REVIEWED	XXX
APPROVED	XXX

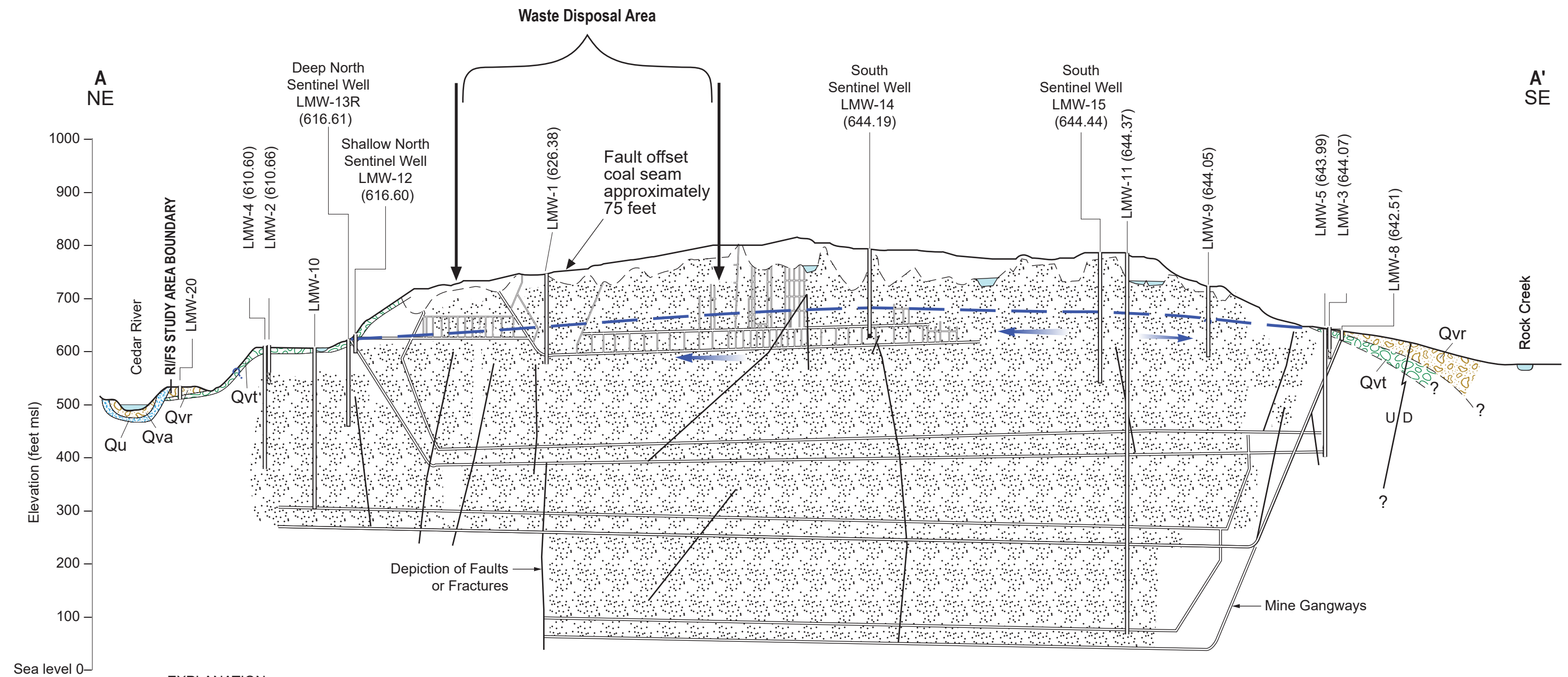


TITLE
SITE MAP

PROJECT NO.	PHASE	REV.	SHEET
9231000005	1200	A	1

0 300 600
1" = 300' FEET

G:\PalmerCokingCoal\LandsburgMine\VA99_PROJECTS\9231000002_Phil_Remediation\15A02_PRODUCTION\INDD\9231000_002_R154_003.indd



EXPLANATION

- Potentiometric surface
- Outline of trench bottom
- LMW-2 (609.99) Well ID (water level in ft. amsl)
- Qvt Till, compact mixture of gravel occasional boulders in clayey silty sand matrix
- Sandstone
- Surface water feature
- Anticipated collapsed zone within mine
- Qu Drift, till, fluvial sand and gravel, lacustrine sand, silt, clay and peat
- Qvr Recessional outwash, well sorted sand and pebble-cobble
- Qva Advanced outwash pebble-cobble gravel may include very fine sand
- Monitoring Interval

Groundwater Flow Direction

Sources for the Geology and Mine Information:
J.E. Luzier 1969; surficial geology
State of Washington, Water Well reports
Mine Superintendant's Records
Landsburg Well Logs

NOTE: Vertical to horizontal scale ratio is 2.5:1
Wells are project normal into the strike of the Cross-Section
A-A' Groundwater elevation obtained 6/25/2020

CLIENT			PROJECT		
LANDSBURG PLP GROUP			LANDSBURG MINE SITE		
CONSULTANT			TITLE		
			CROSS-SECTION ALONG STRIKE AT COAL SEAM JUNE 2020		
			CROSS-SECTION A-A'		
			PROJECT No. 923-1000-006		
			PHASE 2020		
			FIGURE 2		



APPENDIX A

**Sample Integrity Data Sheets
(SIDS)**

SAMPLE INTEGRITY DATA SHEET

Plant/Site Landsburg Mine Site Project No. 923-1000-006.2020
 Site Location Ravensdale, WA Sample ID LMW-2-0620 + LMW-2-0620-D
 Sampling Location Groundwater Monitoring well – end dedicated sampling tube

Technical Procedure Reference(s) Landsburg Mine Site Compliance Monitoring Plan (2017)
 Type of Sampler Dedicated Pump Grundfos

Date 6/25/20 Time 1300 (pri.) 1305 (dup)

Media Water Station LMW-2

Sample Type: grab time composite space composite

Sample Acquisition Measurements (depth, volume of static well water and purged water, etc.)

SWL: 7.13 @ 09/9 ft BTOC (monument at elev. X) (bottom at 38.1 ft bgs, 4-in casing)

Screened Interval: 27.9 – 38.1 ft bgs Monument: 2.94 ags

Sand Pack Interval: 24.8-38.1 ft bgs (8-in hole) (~7.8 gal/sand pack vol)

Packer Depth – NA (~22.3 gal/casing vol) (~30.1 gal/total well vol)

Sample Description Extra volume collected for MS/MSD

water odor (at start of purge), clear

Field Measurements on Sample (pH, conductivity, etc.)

SEE FIELD PARAMETERS SHEET

Aliquot Amount	Analyses	Container	Preservation/Amount
12-40 mL	VOA	VOA vial	HCl
8-500 mL	1,4-dioxane	500 mL amber bottles	None

Sampler (signature) [Signature] Date 6/25/20

Supervisor (signature) [Signature] Date 6/30/20

SAMPLE INTEGRITY DATA SHEET

Well ID LMW-2-0620 + LMW-2-0620-D

Date 6/25/20

Time Begin Purge 1225

Time Collect Sample 1300 / 1305

Time Water Level feet bmp	WL (ft) Time	Temp. °C	pH	Cond uS/cm	DO mg/L	ORP mV	Turbidity NTU
1230	7.20	11.6	6.78	785	0.70	-55.8	0.31
1235	6.79 7.19	11.3	6.79	779	0.55	-86.5	0.24
1240	7.20	11.3	6.79	776	0.50	-102.4	0.28
1245	7.21	11.3	6.79	777	0.47	-110.3	0.33
1250	7.21	11.3	6.79	773	0.45	-118.6	0.60
1255	7.21	11.3	6.79	777	0.43	-124.8	0.33

Comments:

Grundfos: ~80 Hz (Reel Flo 2)

Flow Rate: gpm
1.2 L/min

Sampler's Initials PH

SAMPLE INTEGRITY DATA SHEET

Plant/Site Landsburg Mine Site **Project No.** 923-1000-006.2020
Site Location Ravensdale, WA **Sample ID** LMW-4-0620
Sampling Location Groundwater Monitoring well – end dedicated sampling tube

Technical Procedure Reference(s) Landsburg Mine Site Compliance Monitoring Plan (2017)
Type of Sampler Dedicated Pump Grundfos

Date 6/25/20 **Time** 1430

Media Water **Station** LMW-4-

Sample Type: ☒ **grab** ☐ time composite ☐ space composite

Sample Acquisition Measurements (depth, volume of static well water and purged water, etc.)
SWL: 9.23 @ 0921 ft BTOC (monument at elev. X) (bottom at 209.7 ft bgs, 4-in. casing)

Screened Interval: 195-209.7 ft bgs Monument: 2.76 ags

Sand Pack Interval: 189-209.7 ft bgs (8-in hole) (~12.3 gal/sand pack vol)

Packer Depth – 187.3 ft bgs (~133.3 gal/casing vol) (~14.6 gal/packer casing volume)
(~26.9 gal/total well vol below packer)

** Depths corrected for 70° inclination

Sample Description clear, no odor

Field Measurements on Sample (pH, conductivity, etc.) _____

SEE FIELD PARAMETERS SHEET

Aliquot Amount	Analyses	Container	Preservation/Amount
3-40 mL	VOA	VOA vial	HCl
2-500 mL	1,4-dioxane	500 mL amber bottles	None

Sampler (signature)  **Date** 6-25-20

Supervisor (signature)  **Date** 6-30-20

Time Collect Sample 1430

[illegible]

Comments:

Grundfos: 80 Hz

Packer: 110 psi

Flow Rate: gpm

12/m.v

Sampler's Initials GH

SAMPLE INTEGRITY DATA SHEET

Plant/Site Landsburg Mine Site Project No. 923-1000-006.2020
 Site Location Ravensdale, WA Sample ID LMW-10-0620
 Sampling Location Groundwater Monitoring well – end dedicated sampling tube

Technical Procedure Reference(s) Landsburg Mine Site Compliance Monitoring Plan (2017)

Type of Sampler Dedicated QED Bladder

Date 6/25/20 Time 1520

Media Water Station LMW-10

Sample Type: ☒ grab time composite ☐ space composite

Sample Acquisition Measurements (depth, volume of static well water and purged water, etc.)

SWL: 0.24 @ 0915 ft BTOC (monument at elev. X) (bottom at 289 ft bgs, 4-in casing)

Screened Interval: 267-289 ft bgs PVC Stickup: 3.12 ags

Sand Pack Interval: 258-289 ft bgs (9-in hole) (~18.2 gal/sand pack vol)

Packer Depth –NA (~191 gal/casing vol) (~209 gal/total well vol)

Sample Description clear, w odor

Field Measurements on Sample (pH, conductivity, etc.)

SEE FIELD PARAMETERS SHEET

Aliquot Amount	Analyses	Container	Preservation/Amount
3-40 mL	VOA	VOA vial	HCl
2-500 mL	1,4-dioxane	500 mL amber bottles	None

Sampler (signature) [Signature] Date 6/25/20

Supervisor (signature) [Signature] Date 6-30-20

SAMPLE INTEGRITY DATA SHEET

Well ID LMW-10-0620

Date 6/25/20

Time Begin Purge 1453

Time Collect Sample 1520

[illegible]

Comments:

Tank: 110

Throttle: 40

CPM: 2

CID: ~~50~~ 51

Flow Rate: 350 mL/min

Sampler's Initials JD

SAMPLE INTEGRITY DATA SHEET

Plant/Site Landsburg Mine Site **Project No.** 923-1000-006.2020
Site Location Ravensdale, WA **Sample ID** LMW-12-0620
Sampling Location Groundwater Monitoring well – end dedicated sampling tube

Technical Procedure Reference(s) Landsburg Mine Site Compliance Monitoring Plan (2017)
Type of Sampler Dedicated QED Bladder

Date 6/25/20 **Time** 1625

Media Water **Station** LMW-12

Sample Type: ☒ **grab** ☐ time composite ☐ space composite

Sample Acquisition Measurements (depth, volume of static well water and purged water, etc.)

SWL: 8.75' @ 0927

Screened Interval: 15-25 ft

Sand Pack Interval: 11-25 ft

Packer Depth – NA

Sample Description clear, no odor

Field Measurements on Sample (pH, conductivity, etc.)

SEE FIELD PARAMETERS SHEET

Aliquot Amount	Analyses	Container	Preservation/Amount
3-40 mL	VOA	VOA vial	HCl
2-500 mL	1,4-dioxane	500 mL amber bottles	None

Sampler (signature) [Signature] **Date** 6/25/20

Supervisor (signature) [Signature] **Date** 6-30-20

SAMPLE INTEGRITY DATA SHEET

Well ID LMW-12-0620

Date 6/25/20

Time Begin Purge 1544

Time Collect Sample 1625

Water Level feet bmp	Time	Temp. °C	pH	Cond uS/cm	DO mg/L	ORP mV	Turbidity NTU
8.71	1550	11.8	6.63	517	0.54	-58.0	3.24
8.72	1555	11.6	6.59	510	0.49	-62.5	2.92
8.72	1600	11.4	6.53	505	0.44	-66.2	1.76
8.76	1605	11.4	6.52	509	0.42	-69.5	1.97
8.76	1610	11.4	6.56	550	0.41	-76.2	2.23
8.76	1615	11.4	6.59	573	0.40	-81.3	1.28
8.75	1620	11.4	6.58	578	0.39	-84.2	1.05
	1625	collect sample					

Comments:

Tank: 110

Throttle: 20

CPM: 2

CID: 47

Flow Rate: 500 mL/min

Sampler's Initials JH

SAMPLE INTEGRITY DATA SHEET

Plant/Site Landsburg Mine Site **Project No.** 923-1000-006.2020
Site Location Ravensdale, WA **Sample ID** LMW-13R-0620
Sampling Location Groundwater Monitoring well – end dedicated sampling tube

Technical Procedure Reference(s) Landsburg Mine Site Compliance Monitoring Plan (2017)
Type of Sampler Dedicated QED Bladder

Date 6/25/20 **Time** 1705
Media Water **Station** LMW-13R

Sample Type: ☒ **grab** ☐ **time composite** ☐ **space composite**

Sample Acquisition Measurements (depth, volume of static well water and purged water, etc.)

SWL: 9.25' @ 0927

Screened Interval: 115-140 ft

Sand Pack Interval: 110-150 ft

Packer Depth – NA

Sample Description Clear, no odor

Field Measurements on Sample (pH, conductivity, etc.) _____

SEE FIELD PARAMETERS SHEET

Aliquot Amount	Analyses	Container	Preservation/Amount
3-40 mL	VOA	VOA vial	HCl
2-500 mL	1,4-dioxane	500 mL amber bottles	None

Sampler (signature) [Signature] **Date** 6/25/20

Supervisor (signature) [Signature] **Date** 6-30-20

Well ID LMW-13R-0620

Date 6/25/20

Time Begin Purge 1635

Time Collect Sample 1705

[illegible]

Comments:

Tank: 110

Throttle: 35

CPM: 2

CID: 48

Flow Rate: 500 mL/min

WL:
9.58 @ 1640

Sampler's Initials TH

SAMPLE INTEGRITY DATA SHEET

Plant/Site Landsburg Mine Site Project No. 923-1000-006.2020

Site Location Ravensdale, WA Sample ID LMW-FB-0620

Sampling Location Direct pour/end of dedicated sampling tube

Technical Procedure Reference(s) Landsburg Mine Site Compliance Monitoring Plan (2017)

Type of Sampler Direct pour/ peristaltic pump with new tubing

Date 6/25/20 Time 1330

Media Water Station LMW- 2

Sample Type: ☒ grab time composite space composite

Sample Acquisition Measurements (depth, volume of static well water and purged water, etc.)

SWL: NA

Sample Description Lab provided DI and VOC free DI water, direct pour

Field Measurements on Sample (pH, conductivity, etc.)

No field measurements.

Aliquot Amount	Analyses	Container	Preservation/Amount
3-40 mL	VOA	VOA vial	HCl
2-500 mL	1,4-dioxane	500 mL amber bottles	None

Sampler (signature) [Signature] Date 6/25/20

Supervisor (signature) [Signature] Date 6-30-20

SAMPLE INTEGRITY DATA SHEET

Well ID LMW-FB-0620

Date 6/25/20

Time Begin Purge _____

Time Collect Sample 1330

[illegible]

Comments:

Lab-provided DI / VOC-free DI

Sampler's Initials TA

APPENDIX B

Laboratory Analytical Reports Data
Validation and Quality Assurance /
Quality Control Review
Memorandum,
June 2020 Laboratory Analytical
Report



Analytical Resources, Incorporated
Analytical Chemists and Consultants

21 July 2020

Gary Zimmerman
Golder Associates
18300 NE Union Hill Road Suite 200
Redmond, WA 98052-3333

RE: Landsburg

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
20F0458

Associated SDG ID(s)
N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20F0458		Turn-around Requested:		Page: 1 of 1																																																																																						
ARI Client Company: Golder		Phone: 425-863-0772		Date: 6/25/20	Ice Present? Yes																																																																																					
Client Contact: Gary Zimmerman / Joseph Xi		No. of Coolers: 2		Cooler Temps: 2.7, 1.8																																																																																						
Client Project Name: Landsburg		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="10">Analysis Requested</th> <th>Notes/Comments</th> </tr> <tr> <td rowspan="8" style="writing-mode: vertical-rl; transform: rotate(180deg);"> 1,4 Dioxane 82700 VOCs Client List </td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> <td rowspan="8" style="vertical-align: top;"> Analyze in accordance w/ MSA between Golder & ARI </td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>				Analysis Requested										Notes/Comments	1,4 Dioxane 82700 VOCs Client List										Analyze in accordance w/ MSA between Golder & ARI																																																															
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1,4 Dioxane 82700 VOCs Client List										Analyze in accordance w/ MSA between Golder & ARI																																																																																
Client Project #: 9231000006.2020		Samplers: T. Hostins/T. Daggett																																																																																								

Sample ID	Date	Time	Matrix	No. Containers	1,4 Dioxane 82700	VOCs Client List										
LMW-2-0620	6/25/20	1300	GW	15	X											MS/MSD
LMW-2-0620-D	↓	1305	GW	5												
LMW-FB-0620		1330	GW	5												
LMW-4-0620		1430	GW	5												
LMW-10-0620		1520	GW	5												
LMW-12-0620		1625	GW	5												
LMW-13R-0620		1705	GW	5												
Trip Blank-0620	-	-	DI	3												

Comments/Special Instructions - Ecology EIM EDD - Client specific RLs and analyte List	Relinquished by: (Signature) <i>Turner Daggett</i>	Received by: (Signature) <i>Kenny Dang</i>	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Turner Daggett	Printed Name: Kenny Dang	Printed Name:	Printed Name:
	Company: Golder	Company: ARI	Company:	Company:
	Date & Time: 6/26/2020 10:21	Date & Time: 6/26/2020 10:21	Date & Time:	Date & Time:



Analytical Resources, Incorporated
 Analytical Chemists and Consultants
 4611 South 134th Place, Suite 100
 Tukwila, WA 98168
 206-695-6200 206-695-6201 (fax)
 www.arilabs.com

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, notwithstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.



Golder Associates
18300 NE Union Hill Road Suite 200
Redmond WA, 98052-3333

Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
LMW-2-0620	20F0458-01	Water	25-Jun-2020 13:00	26-Jun-2020 10:21
LMW-2-0620-D	20F0458-02	Water	25-Jun-2020 13:05	26-Jun-2020 10:21
LMW-FB-0620	20F0458-03	Water	25-Jun-2020 13:30	26-Jun-2020 10:21
LMW-4-0620	20F0458-04	Water	25-Jun-2020 14:30	26-Jun-2020 10:21
LMW-10-0620	20F0458-05	Water	25-Jun-2020 15:20	26-Jun-2020 10:21
LMW-12-0620	20F0458-06	Water	25-Jun-2020 16:25	26-Jun-2020 10:21
LMW-13R-0620	20F0458-07	Water	25-Jun-2020 17:05	26-Jun-2020 10:21
Trip Blank-0620	20F0458-08	Water	25-Jun-2020 17:05	26-Jun-2020 10:21



Golder Associates
18300 NE Union Hill Road Suite 200
Redmond WA, 98052-3333

Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Work Order Case Narrative

Volatiles - EPA Method SW8260D

The sample(s) were analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements with the exception of all associated "Q" flagged analytes which are out of control high in the CCAL and chloroethane is out of control high. All associated samples that contain analyte have been flagged with a "Q" qualifier.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) contained Hexachloro-1,3-Butadiene. Samples that contain Hexachloro-1,3-Butadiene have been flagged with a "B" qualifier.

The LCS and LCSD percent recoveries were within control limits with the exception of analytes flagged on the associated forms.

The matrix spike/matrix spike duplicate recoveries and RPD were within limits with the exception of analytes flagged on the associated forms.

Due to a retention time shift during the analysis samples 20F0458-01, 02 and 04 were flagged with a "Y1" qualifier for Vinyl Chloride. All intact sample volume was consumed and the samples could not be re-analyzed uncompromised.

1,4-Dioxane- EPA Method SW8270E

The sample(s) were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The LCS percent recoveries were within control limits.

The matrix spike/matrix spike duplicate recoveries and RPD were within limits.



Golder Associates

18300 NE Union Hill Road Suite 200

Redmond WA, 98052-3333

Project: Landsburg

Project Number: Landsburg

Project Manager: Gary Zimmerman

Reported:

21-Jul-2020 13:23



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Golder

Project Name: Landsburg

COC No(s): _____ (NA)

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 20F0458

Tracking No: _____ (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the 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 10:21 1.8 2.7

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

Temp Gun ID#: D005206

Cooler Accepted by: KD Date: 6/26/20 Time: 10:21

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

How were bottles sealed in plastic bags? Individually Grouped Not

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 6/22/20

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: KD Date: 6/26/20 Time: 1642 Labels checked by: KD

**** 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: _____



Golder Associates
18300 NE Union Hill Road Suite 200
Redmond WA, 98052-3333

Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-2-0620
20F0458-01 (Water)

Volatile Organic Compounds

Method: EPA 8260D
Instrument: NT3 Analyst: PKC

Sampled: 06/25/2020 13:00

Analyzed: 07/09/2020 19:55

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap)
Preparation Batch: BIG0241 Sample Size: 10 mL
Prepared: 07/09/2020 Final Volume: 10 mL

Extract ID: 20F0458-01 J

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.23	ND	ug/L	Y1, U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	0.25	ug/L	
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



Golder Associates
18300 NE Union Hill Road Suite 200
Redmond WA, 98052-3333

Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-2-0620
20F0458-01 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:00

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 19:55

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 104 %



Golder Associates
18300 NE Union Hill Road Suite 200
Redmond WA, 98052-3333

Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-2-0620
20F0458-01 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:00

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 19:55

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	99.4	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	102	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	104	%	



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-2-0620
20F0458-01 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM	Sampled: 06/25/2020 13:00
Instrument: NT12 Analyst: JZ	Analyzed: 07/09/2020 21:55
Sample Preparation:	Extract ID: 20F0458-01 A 01
Preparation Method: EPA 3520C (Liq Liq)	
Preparation Batch: BIF0900	Sample Size: 500 mL
Prepared: 07/02/2020	Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	1.8	ug/L	
Surrogate: 1,4-Dioxane-d8			33.6-120 %	67.2	%	



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-2-0620-D
20F0458-02 (Water)

Volatile Organic Compounds

Method: EPA 8260D
Instrument: NT3 Analyst: PKC

Sampled: 06/25/2020 13:05

Analyzed: 07/09/2020 20:20

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap)
Preparation Batch: BIG0241 Sample Size: 10 mL
Prepared: 07/09/2020 Final Volume: 10 mL

Extract ID: 20F0458-02 E

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.23	ND	ug/L	Y1, U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	0.29	ug/L	
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Reported:
21-Jul-2020 13:23

LMW-2-0620-D
20F0458-02 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:05

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 20:20

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 97.9 %



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Reported:
21-Jul-2020 13:23

LMW-2-0620-D
20F0458-02 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:05

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 20:20

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	99.4	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	104	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	98.6	%	



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Reported:
21-Jul-2020 13:23

LMW-2-0620-D
20F0458-02 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM	Sampled: 06/25/2020 13:05
Instrument: NT12 Analyst: JZ	Analyzed: 07/09/2020 23:14
Sample Preparation:	Extract ID: 20F0458-02 A 01
Preparation Method: EPA 3520C (Liq Liq)	
Preparation Batch: BIF0900	Sample Size: 500 mL
Prepared: 07/02/2020	Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	1.8	ug/L	
Surrogate: 1,4-Dioxane-d8			33.6-120 %	66.5	%	



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Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-FB-0620
20F0458-03 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:30

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 12:50

Sample Preparation:

Preparation Method: EPA 5030C (Purge and Trap)

Extract ID: 20F0458-03 E

Preparation Batch: BIG0036

Sample Size: 10 mL

Prepared: 07/08/2020

Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.10	ND	ug/L	U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	ND	ug/L	U
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Project Number: Landsburg
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Reported:
21-Jul-2020 13:23

LMW-FB-0620
20F0458-03 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:30

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 12:50

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 103 %



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Reported:
21-Jul-2020 13:23

LMW-FB-0620
20F0458-03 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 13:30

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 12:50

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	95.3	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	89.8	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	102	%	



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Reported:
21-Jul-2020 13:23

LMW-FB-0620
20F0458-03 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM	Sampled: 06/25/2020 13:30
Instrument: NT12 Analyst: JZ	Analyzed: 07/09/2020 23:40
Sample Preparation:	Extract ID: 20F0458-03 A 01
Preparation Method: EPA 3520C (Liq Liq)	
Preparation Batch: BIF0900	Sample Size: 500 mL
Prepared: 07/02/2020	Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	ND	ug/L	U
Surrogate: 1,4-Dioxane-d8			33.6-120 %	65.6	%	



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Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-4-0620
20F0458-04 (Water)

Volatile Organic Compounds

Method: EPA 8260D
Instrument: NT3 Analyst: PKC

Sampled: 06/25/2020 14:30

Analyzed: 07/09/2020 20:46

Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap)
Preparation Batch: BIG0241 Sample Size: 10 mL
Prepared: 07/09/2020 Final Volume: 10 mL

Extract ID: 20F0458-04 D

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.23	ND	ug/L	Y1, U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	0.25	ug/L	
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-4-0620
20F0458-04 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 14:30

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 20:46

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 98.7 %



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Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-4-0620
20F0458-04 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 14:30

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 20:46

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	96.8	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	104	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	99.7	%	



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Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-4-0620
20F0458-04 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM	Sampled: 06/25/2020 14:30
Instrument: NT12 Analyst: JZ	Analyzed: 07/10/2020 00:06
Sample Preparation:	Preparation Method: EPA 3520C (Liq Liq)
	Preparation Batch: BIF0900
	Prepared: 07/02/2020
	Sample Size: 500 mL
	Final Volume: 1 mL
	Extract ID: 20F0458-04 A 01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	1.8	ug/L	
Surrogate: 1,4-Dioxane-d8			33.6-120 %	64.2	%	



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Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-10-0620
20F0458-05 (Water)

Volatile Organic Compounds

Method: EPA 8260D
Instrument: NT2 Analyst: LH
Sample Preparation: Preparation Method: EPA 5030C (Purge and Trap)
Preparation Batch: BIG0036 Sample Size: 10 mL
Prepared: 07/08/2020 Final Volume: 10 mL
Extract ID: 20F0458-05 D
Sampled: 06/25/2020 15:20
Analyzed: 07/08/2020 13:31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.10	ND	ug/L	U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	0.15	ug/L	
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Reported:
21-Jul-2020 13:23

LMW-10-0620
20F0458-05 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 15:20

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 13:31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 105 %



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Reported:
21-Jul-2020 13:23

LMW-10-0620
20F0458-05 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 15:20

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 13:31

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	95.6	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	90.0	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	102	%	



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Reported:
21-Jul-2020 13:23

LMW-10-0620
20F0458-05 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM	Sampled: 06/25/2020 15:20
Instrument: NT12 Analyst: JZ	Analyzed: 07/10/2020 00:32
Sample Preparation:	Preparation Method: EPA 3520C (Liq Liq)
	Preparation Batch: BIF0900
	Prepared: 07/02/2020
	Sample Size: 500 mL
	Final Volume: 1 mL
	Extract ID: 20F0458-05 A 01

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	ND	ug/L	U
Surrogate: 1,4-Dioxane-d8			33.6-120 %	64.6	%	



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Reported:
21-Jul-2020 13:23

LMW-12-0620
20F0458-06 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 16:25

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 21:12

Sample Preparation:

Preparation Method: EPA 5030C (Purge and Trap)

Extract ID: 20F0458-06 E

Preparation Batch: BIG0241

Sample Size: 10 mL

Prepared: 07/09/2020

Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.10	ND	ug/L	U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	0.21	ug/L	
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	0.30	ug/L	
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Project: Landsburg
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Reported:
21-Jul-2020 13:23

LMW-12-0620
20F0458-06 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 16:25

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 21:12

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 96.9 %



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Reported:
21-Jul-2020 13:23

LMW-12-0620
20F0458-06 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 16:25

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 21:12

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	99.1	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	97.3	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	98.3	%	



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Reported:
21-Jul-2020 13:23

LMW-12-0620
20F0458-06 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM	Sampled: 06/25/2020 16:25
Instrument: NT12 Analyst: JZ	Analyzed: 07/10/2020 00:58
Sample Preparation:	Extract ID: 20F0458-06 A 01
Preparation Method: EPA 3520C (Liq Liq)	
Preparation Batch: BIF0900	Sample Size: 500 mL
Prepared: 07/02/2020	Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	0.5	ug/L	
Surrogate: 1,4-Dioxane-d8			33.6-120 %	66.7	%	



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Reported:
21-Jul-2020 13:23

LMW-13R-0620

20F0458-07 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 17:05

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 21:38

Sample Preparation:

Preparation Method: EPA 5030C (Purge and Trap)

Extract ID: 20F0458-07 E

Preparation Batch: BIG0241

Sample Size: 10 mL

Prepared: 07/09/2020

Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.10	ND	ug/L	U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	0.16	ug/L	
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-13R-0620
20F0458-07 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 17:05

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 21:38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 99.8 %



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Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

LMW-13R-0620
20F0458-07 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 17:05

Instrument: NT3 Analyst: PKC

Analyzed: 07/09/2020 21:38

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	98.1	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	96.1	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	98.8	%	



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Reported:
21-Jul-2020 13:23

LMW-13R-0620

20F0458-07 (Water)

Semivolatile Organic Compounds - SIM

Method: EPA 8270E-SIM

Sampled: 06/25/2020 17:05

Instrument: NT12 Analyst: JZ

Analyzed: 07/10/2020 01:24

Sample Preparation:

Preparation Method: EPA 3520C (Liq Liq)

Extract ID: 20F0458-07 A 01

Preparation Batch: BIF0900

Sample Size: 500 mL

Prepared: 07/02/2020

Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
1,4-Dioxane	123-91-1	1	0.4	ND	ug/L	U
Surrogate: 1,4-Dioxane-d8			33.6-120 %	59.4	%	



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Trip Blank-0620
20F0458-08 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 17:05

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 10:25

Sample Preparation:

Preparation Method: EPA 5030C (Purge and Trap)

Extract ID: 20F0458-08 B

Preparation Batch: BIG0036

Sample Size: 10 mL

Prepared: 07/08/2020

Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.10	ND	ug/L	U
Bromomethane	74-83-9	1	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.50	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.20	ND	ug/L	U
Acetone	67-64-1	1	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.50	ND	ug/L	U
Methylene Chloride	75-09-2	1	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.10	ND	ug/L	U
trans-1,2-Dichloroethene	156-60-5	1	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.10	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.10	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.50	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	2.50	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.20	ND	ug/L	U



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Reported:
21-Jul-2020 13:23

Trip Blank-0620
20F0458-08 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 17:05

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 10:25

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.10	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.10	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.20	ND	ug/L	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.10	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.20	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.10	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.20	ND	ug/L	U
1,3-Dichlorobenzene	541-73-1	1	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.20	ND	ug/L	U
Naphthalene	91-20-3	1	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.20	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.20	ND	ug/L	U

Surrogate: 1,2-Dichloroethane-d4

80-129 % 99.1 %



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Reported:
21-Jul-2020 13:23

Trip Blank-0620
20F0458-08 (Water)

Volatile Organic Compounds

Method: EPA 8260D

Sampled: 06/25/2020 17:05

Instrument: NT2 Analyst: LH

Analyzed: 07/08/2020 10:25

Analyte	CAS Number	Recovery	Recovery	Units	Notes
		Limits			
Surrogate: Toluene-d8		80-120 %	95.1	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	93.3	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	101	%	



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIG0036-BLK1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 09:46								
Chloromethane	ND	0.50	ug/L							U
Vinyl Chloride	ND	0.10	ug/L							U
Bromomethane	ND	1.00	ug/L							U
Chloroethane	ND	0.20	ug/L							U
Trichlorofluoromethane	ND	0.20	ug/L							U
Acrolein	ND	2.50	ug/L							U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.20	ug/L							U
Acetone	ND	5.00	ug/L							U
1,1-Dichloroethene	ND	0.20	ug/L							U
Iodomethane	ND	0.50	ug/L							U
Methylene Chloride	ND	1.00	ug/L							U
Acrylonitrile	ND	1.00	ug/L							U
Carbon Disulfide	ND	0.10	ug/L							U
trans-1,2-Dichloroethene	ND	0.20	ug/L							U
Vinyl Acetate	ND	0.20	ug/L							U
1,1-Dichloroethane	ND	0.20	ug/L							U
2-Butanone	ND	5.00	ug/L							U
2,2-Dichloropropane	ND	0.10	ug/L							U
cis-1,2-Dichloroethene	ND	0.20	ug/L							U
Chloroform	ND	0.20	ug/L							U
Bromochloromethane	ND	0.20	ug/L							U
1,1,1-Trichloroethane	ND	0.20	ug/L							U
1,1-Dichloropropene	ND	0.10	ug/L							U
Carbon tetrachloride	ND	0.20	ug/L							U
1,2-Dichloroethane	ND	0.20	ug/L							U
Benzene	ND	0.20	ug/L							U
Trichloroethene	ND	0.20	ug/L							U
1,2-Dichloropropane	ND	0.20	ug/L							U
Bromodichloromethane	ND	0.20	ug/L							U
Dibromomethane	ND	0.20	ug/L							U
2-Chloroethyl vinyl ether	ND	0.50	ug/L							U
4-Methyl-2-Pentanone	ND	2.50	ug/L							U
cis-1,3-Dichloropropene	ND	0.20	ug/L							U
Toluene	ND	0.20	ug/L							U
trans-1,3-Dichloropropene	ND	0.20	ug/L							U



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Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIG0036-BLK1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 09:46								
2-Hexanone	ND	5.00	ug/L							U
1,1,2-Trichloroethane	ND	0.20	ug/L							U
1,3-Dichloropropane	ND	0.10	ug/L							U
Tetrachloroethene	ND	0.20	ug/L							U
Dibromochloromethane	ND	0.20	ug/L							U
1,2-Dibromoethane	ND	0.10	ug/L							U
Chlorobenzene	ND	0.20	ug/L							U
Ethylbenzene	ND	0.20	ug/L							U
1,1,1,2-Tetrachloroethane	ND	0.20	ug/L							U
m,p-Xylene	ND	0.40	ug/L							U
o-Xylene	ND	0.20	ug/L							U
Xylenes, total	ND	0.60	ug/L							U
Styrene	ND	0.20	ug/L							U
Bromoform	ND	0.20	ug/L							U
1,1,2,2-Tetrachloroethane	ND	0.10	ug/L							U
1,2,3-Trichloropropane	ND	0.20	ug/L							U
trans-1,4-Dichloro 2-Butene	ND	1.00	ug/L							U
n-Propylbenzene	ND	0.20	ug/L							U
Bromobenzene	ND	0.20	ug/L							U
Isopropyl Benzene	ND	0.20	ug/L							U
2-Chlorotoluene	ND	0.10	ug/L							U
4-Chlorotoluene	ND	0.20	ug/L							U
t-Butylbenzene	ND	0.20	ug/L							U
1,3,5-Trimethylbenzene	ND	0.20	ug/L							U
1,2,4-Trimethylbenzene	ND	0.20	ug/L							U
s-Butylbenzene	ND	0.20	ug/L							U
4-Isopropyl Toluene	ND	0.20	ug/L							U
1,3-Dichlorobenzene	ND	0.20	ug/L							U
1,4-Dichlorobenzene	ND	0.20	ug/L							U
n-Butylbenzene	ND	0.20	ug/L							U
1,2-Dichlorobenzene	ND	0.20	ug/L							U
1,2-Dibromo-3-chloropropane	ND	0.50	ug/L							U
1,2,4-Trichlorobenzene	ND	0.50	ug/L							U
Hexachloro-1,3-Butadiene	0.33	0.20	ug/L							
Naphthalene	ND	0.50	ug/L							U



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Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIG0036-BLK1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 09:46								
1,2,3-Trichlorobenzene	ND	0.20	ug/L							U
Dichlorodifluoromethane	ND	0.20	ug/L							U
Surrogate: 1,2-Dichloroethane-d4	4.60		ug/L	5.00		92.0	80-129			
Surrogate: Toluene-d8	4.82		ug/L	5.00		96.4	80-120			
Surrogate: 4-Bromofluorobenzene	4.86		ug/L	5.00		97.2	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	5.12		ug/L	5.00		102	80-120			
LCS (BIG0036-BS1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 08:24								
Chloromethane	8.99	0.50	ug/L	10.0		89.9	60-138			
Vinyl Chloride	8.51	0.10	ug/L	10.0		85.1	66-133			
Bromomethane	9.31	1.00	ug/L	10.0		93.1	72-131			
Chloroethane	7.65	0.20	ug/L	10.0		76.5	60-155			Q
Trichlorofluoromethane	8.87	0.20	ug/L	10.0		88.7	80-129			
Acrolein	47.1	2.50	ug/L	50.0		94.2	52-144			
1,1,2-Trichloro-1,2,2-Trifluoroethane	8.85	0.20	ug/L	10.0		88.5	76-129			
Acetone	43.3	5.00	ug/L	50.0		86.5	58-142			
1,1-Dichloroethene	8.93	0.20	ug/L	10.0		89.3	69-135			
Iodomethane	9.08	0.50	ug/L	10.0		90.8	56-147			
Methylene Chloride	9.05	1.00	ug/L	10.0		90.5	65-135			
Acrylonitrile	8.89	1.00	ug/L	10.0		88.9	64-134			
Carbon Disulfide	8.55	0.10	ug/L	10.0		85.5	78-125			
trans-1,2-Dichloroethene	9.14	0.20	ug/L	10.0		91.4	78-128			
Vinyl Acetate	10.5	0.20	ug/L	10.0		105	55-138			
1,1-Dichloroethane	9.72	0.20	ug/L	10.0		97.2	76-124			
2-Butanone	51.4	5.00	ug/L	50.0		103	61-140			
2,2-Dichloropropane	11.0	0.10	ug/L	10.0		110	78-125			
cis-1,2-Dichloroethene	10.1	0.20	ug/L	10.0		101	80-121			
Chloroform	9.79	0.20	ug/L	10.0		97.9	80-122			
Bromochloromethane	9.43	0.20	ug/L	10.0		94.3	80-121			
1,1,1-Trichloroethane	10.1	0.20	ug/L	10.0		101	79-123			
1,1-Dichloropropene	12.1	0.10	ug/L	10.0		121	80-120			*, Q
Carbon tetrachloride	11.2	0.20	ug/L	10.0		112	53-137			
1,2-Dichloroethane	9.81	0.20	ug/L	10.0		98.1	75-123			
Benzene	11.8	0.20	ug/L	10.0		118	80-120			
Trichloroethene	10.6	0.20	ug/L	10.0		106	80-120			



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIG0036-BS1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 08:24								
1,2-Dichloropropane	10.4	0.20	ug/L	10.0		104	80-120			
Bromodichloromethane	10.0	0.20	ug/L	10.0		100	80-121			
Dibromomethane	9.90	0.20	ug/L	10.0		99.0	80-120			
2-Chloroethyl vinyl ether	9.56	0.50	ug/L	10.0		95.6	74-127			
4-Methyl-2-Pentanone	50.7	2.50	ug/L	50.0		101	67-133			
cis-1,3-Dichloropropene	11.5	0.20	ug/L	10.0		115	80-124			
Toluene	10.8	0.20	ug/L	10.0		108	80-120			
trans-1,3-Dichloropropene	10.4	0.20	ug/L	10.0		104	71-127			
2-Hexanone	50.4	5.00	ug/L	50.0		101	69-133			
1,1,2-Trichloroethane	9.87	0.20	ug/L	10.0		98.7	80-121			
1,3-Dichloropropane	10.8	0.10	ug/L	10.0		108	80-120			
Tetrachloroethene	11.0	0.20	ug/L	10.0		110	80-120			
Dibromochloromethane	9.05	0.20	ug/L	10.0		90.5	65-135			
1,2-Dibromoethane	10.4	0.10	ug/L	10.0		104	80-121			
Chlorobenzene	10.8	0.20	ug/L	10.0		108	80-120			
Ethylbenzene	10.9	0.20	ug/L	10.0		109	80-120			
1,1,1,2-Tetrachloroethane	11.1	0.20	ug/L	10.0		111	80-120			
m,p-Xylene	24.1	0.40	ug/L	20.0		120	80-121			
o-Xylene	11.5	0.20	ug/L	10.0		115	80-121			
Xylenes, total	35.5	0.60	ug/L	30.0		118	76-127			
Styrene	11.1	0.20	ug/L	10.0		111	80-124			
Bromoform	8.48	0.20	ug/L	10.0		84.8	51-134			
1,1,2,2-Tetrachloroethane	10.1	0.10	ug/L	10.0		101	77-123			
1,2,3-Trichloropropane	10.4	0.20	ug/L	10.0		104	76-125			
trans-1,4-Dichloro 2-Butene	8.84	1.00	ug/L	10.0		88.4	55-129			
n-Propylbenzene	12.0	0.20	ug/L	10.0		120	78-130			
Bromobenzene	10.9	0.20	ug/L	10.0		109	80-120			
Isopropyl Benzene	10.1	0.20	ug/L	10.0		101	80-128			
2-Chlorotoluene	11.8	0.10	ug/L	10.0		118	78-122			
4-Chlorotoluene	12.4	0.20	ug/L	10.0		124	80-121			*, Q
t-Butylbenzene	11.2	0.20	ug/L	10.0		112	78-125			
1,3,5-Trimethylbenzene	12.6	0.20	ug/L	10.0		126	80-129			Q
1,2,4-Trimethylbenzene	11.9	0.20	ug/L	10.0		119	80-127			
s-Butylbenzene	11.9	0.20	ug/L	10.0		119	78-129			
4-Isopropyl Toluene	11.5	0.20	ug/L	10.0		115	79-130			



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIG0036-BS1)										
					Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 08:24					
1,3-Dichlorobenzene	11.3	0.20	ug/L	10.0		113	80-120			
1,4-Dichlorobenzene	10.5	0.20	ug/L	10.0		105	80-120			
n-Butylbenzene	11.3	0.20	ug/L	10.0		113	74-129			
1,2-Dichlorobenzene	10.8	0.20	ug/L	10.0		108	80-120			
1,2-Dibromo-3-chloropropane	9.69	0.50	ug/L	10.0		96.9	62-123			
1,2,4-Trichlorobenzene	10.7	0.50	ug/L	10.0		107	64-124			
Hexachloro-1,3-Butadiene	10.2	0.20	ug/L	10.0		102	58-123			B
Naphthalene	9.44	0.50	ug/L	10.0		94.4	50-134			
1,2,3-Trichlorobenzene	9.84	0.20	ug/L	10.0		98.4	49-133			
Dichlorodifluoromethane	9.02	0.20	ug/L	10.0		90.2	48-147			
Surrogate: 1,2-Dichloroethane-d4	4.23		ug/L	5.00		84.5	80-129			
Surrogate: Toluene-d8	4.97		ug/L	5.00		99.3	80-120			
Surrogate: 4-Bromofluorobenzene	5.32		ug/L	5.00		106	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	5.02		ug/L	5.00		100	80-120			
LCS Dup (BIG0036-BSD1)										
					Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 09:05					
Chloromethane	8.91	0.50	ug/L	10.0		89.1	60-138	0.97	30	
Vinyl Chloride	8.38	0.10	ug/L	10.0		83.8	66-133	1.54	30	
Bromomethane	9.30	1.00	ug/L	10.0		93.0	72-131	0.08	30	
Chloroethane	7.79	0.20	ug/L	10.0		77.9	60-155	1.81	30	Q
Trichlorofluoromethane	8.40	0.20	ug/L	10.0		84.0	80-129	5.46	30	
Acrolein	45.0	2.50	ug/L	50.0		89.9	52-144	4.65	30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	8.61	0.20	ug/L	10.0		86.1	76-129	2.78	30	
Acetone	41.6	5.00	ug/L	50.0		83.1	58-142	4.00	30	
1,1-Dichloroethene	8.83	0.20	ug/L	10.0		88.3	69-135	1.13	30	
Iodomethane	8.89	0.50	ug/L	10.0		88.9	56-147	2.09	30	
Methylene Chloride	8.85	1.00	ug/L	10.0		88.5	65-135	2.23	30	
Acrylonitrile	8.59	1.00	ug/L	10.0		85.9	64-134	3.44	30	
Carbon Disulfide	8.45	0.10	ug/L	10.0		84.5	78-125	1.22	30	
trans-1,2-Dichloroethene	8.66	0.20	ug/L	10.0		86.6	78-128	5.39	30	
Vinyl Acetate	10.1	0.20	ug/L	10.0		101	55-138	3.05	30	
1,1-Dichloroethane	9.29	0.20	ug/L	10.0		92.9	76-124	4.57	30	
2-Butanone	49.1	5.00	ug/L	50.0		98.3	61-140	4.58	30	
2,2-Dichloropropane	10.5	0.10	ug/L	10.0		105	78-125	4.95	30	
cis-1,2-Dichloroethene	9.63	0.20	ug/L	10.0		96.3	80-121	4.97	30	



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BIG0036-BSD1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 09:05								
Chloroform	9.26	0.20	ug/L	10.0		92.6	80-122	5.59	30	
Bromochloromethane	9.17	0.20	ug/L	10.0		91.7	80-121	2.74	30	
1,1,1-Trichloroethane	9.71	0.20	ug/L	10.0		97.1	79-123	3.48	30	
1,1-Dichloropropene	11.7	0.10	ug/L	10.0		117	80-120	3.52	30	Q
Carbon tetrachloride	10.6	0.20	ug/L	10.0		106	53-137	5.08	30	
1,2-Dichloroethane	9.43	0.20	ug/L	10.0		94.3	75-123	3.99	30	
Benzene	11.4	0.20	ug/L	10.0		114	80-120	3.86	30	
Trichloroethene	10.3	0.20	ug/L	10.0		103	80-120	2.49	30	
1,2-Dichloropropane	10.0	0.20	ug/L	10.0		100	80-120	3.74	30	
Bromodichloromethane	9.69	0.20	ug/L	10.0		96.9	80-121	3.61	30	
Dibromomethane	9.68	0.20	ug/L	10.0		96.8	80-120	2.18	30	
2-Chloroethyl vinyl ether	9.42	0.50	ug/L	10.0		94.2	74-127	1.50	30	
4-Methyl-2-Pentanone	50.8	2.50	ug/L	50.0		102	67-133	0.08	30	
cis-1,3-Dichloropropene	11.2	0.20	ug/L	10.0		112	80-124	2.93	30	
Toluene	10.4	0.20	ug/L	10.0		104	80-120	3.59	30	
trans-1,3-Dichloropropene	10.3	0.20	ug/L	10.0		103	71-127	1.54	30	
2-Hexanone	48.3	5.00	ug/L	50.0		96.6	69-133	4.17	30	
1,1,2-Trichloroethane	9.91	0.20	ug/L	10.0		99.1	80-121	0.39	30	
1,3-Dichloropropane	10.3	0.10	ug/L	10.0		103	80-120	5.07	30	
Tetrachloroethene	9.87	0.20	ug/L	10.0		98.7	80-120	11.30	30	
Dibromochloromethane	8.91	0.20	ug/L	10.0		89.1	65-135	1.50	30	
1,2-Dibromoethane	10.4	0.10	ug/L	10.0		104	80-121	0.43	30	
Chlorobenzene	10.3	0.20	ug/L	10.0		103	80-120	5.60	30	
Ethylbenzene	10.5	0.20	ug/L	10.0		105	80-120	4.25	30	
1,1,1,2-Tetrachloroethane	10.6	0.20	ug/L	10.0		106	80-120	3.89	30	
m,p-Xylene	23.3	0.40	ug/L	20.0		116	80-121	3.36	30	
o-Xylene	10.9	0.20	ug/L	10.0		109	80-121	4.85	30	
Xylenes, total	34.2	0.60	ug/L	30.0		114	76-127	3.84	30	
Styrene	10.5	0.20	ug/L	10.0		105	80-124	5.43	30	
Bromoform	8.14	0.20	ug/L	10.0		81.4	51-134	4.08	30	
1,1,2,2-Tetrachloroethane	9.86	0.10	ug/L	10.0		98.6	77-123	2.02	30	
1,2,3-Trichloropropane	10.0	0.20	ug/L	10.0		100	76-125	3.76	30	
trans-1,4-Dichloro 2-Butene	8.87	1.00	ug/L	10.0		88.7	55-129	0.36	30	
n-Propylbenzene	11.5	0.20	ug/L	10.0		115	78-130	4.12	30	
Bromobenzene	10.6	0.20	ug/L	10.0		106	80-120	2.93	30	



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0036 - EPA 5030C (Purge and Trap)

Instrument: NT2 Analyst: LH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BIG0036-BSD1)		Prepared: 08-Jul-2020 Analyzed: 08-Jul-2020 09:05								
Isopropyl Benzene	9.79	0.20	ug/L	10.0		97.9	80-128	3.05	30	
2-Chlorotoluene	11.8	0.10	ug/L	10.0		118	78-122	0.16	30	
4-Chlorotoluene	11.8	0.20	ug/L	10.0		118	80-121	5.10	30	Q
t-Butylbenzene	10.8	0.20	ug/L	10.0		108	78-125	3.67	30	
1,3,5-Trimethylbenzene	12.0	0.20	ug/L	10.0		120	80-129	4.79	30	Q
1,2,4-Trimethylbenzene	11.5	0.20	ug/L	10.0		115	80-127	3.12	30	
s-Butylbenzene	11.5	0.20	ug/L	10.0		115	78-129	3.75	30	
4-Isopropyl Toluene	11.1	0.20	ug/L	10.0		111	79-130	3.49	30	
1,3-Dichlorobenzene	10.8	0.20	ug/L	10.0		108	80-120	4.29	30	
1,4-Dichlorobenzene	10.1	0.20	ug/L	10.0		101	80-120	3.67	30	
n-Butylbenzene	10.9	0.20	ug/L	10.0		109	74-129	4.13	30	
1,2-Dichlorobenzene	10.3	0.20	ug/L	10.0		103	80-120	3.90	30	
1,2-Dibromo-3-chloropropane	9.64	0.50	ug/L	10.0		96.4	62-123	0.51	30	
1,2,4-Trichlorobenzene	10.5	0.50	ug/L	10.0		105	64-124	1.36	30	
Hexachloro-1,3-Butadiene	10.1	0.20	ug/L	10.0		101	58-123	1.04	30	B
Naphthalene	9.35	0.50	ug/L	10.0		93.5	50-134	0.95	30	
1,2,3-Trichlorobenzene	9.55	0.20	ug/L	10.0		95.5	49-133	2.99	30	
Dichlorodifluoromethane	8.99	0.20	ug/L	10.0		89.9	48-147	0.32	30	
Surrogate: 1,2-Dichloroethane-d4	4.17		ug/L	5.00		83.4	80-129			
Surrogate: Toluene-d8	5.02		ug/L	5.00		100	80-120			
Surrogate: 4-Bromofluorobenzene	5.26		ug/L	5.00		105	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	4.94		ug/L	5.00		98.9	80-120			



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Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIG0241-BLK1)		Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 18:11								
Chloromethane	ND	0.50	ug/L							U
Vinyl Chloride	ND	0.10	ug/L							U
Bromomethane	ND	1.00	ug/L							U
Chloroethane	ND	0.20	ug/L							U
Trichlorofluoromethane	ND	0.20	ug/L							U
Acrolein	ND	2.50	ug/L							U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.20	ug/L							U
Acetone	ND	5.00	ug/L							U
1,1-Dichloroethene	ND	0.20	ug/L							U
Iodomethane	ND	0.50	ug/L							U
Methylene Chloride	ND	1.00	ug/L							U
Acrylonitrile	ND	1.00	ug/L							U
Carbon Disulfide	ND	0.10	ug/L							U
trans-1,2-Dichloroethene	ND	0.20	ug/L							U
Vinyl Acetate	ND	0.20	ug/L							U
1,1-Dichloroethane	ND	0.20	ug/L							U
2-Butanone	ND	5.00	ug/L							U
2,2-Dichloropropane	ND	0.10	ug/L							U
cis-1,2-Dichloroethene	ND	0.20	ug/L							U
Chloroform	ND	0.20	ug/L							U
Bromochloromethane	ND	0.20	ug/L							U
1,1,1-Trichloroethane	ND	0.20	ug/L							U
1,1-Dichloropropene	ND	0.10	ug/L							U
Carbon tetrachloride	ND	0.20	ug/L							U
1,2-Dichloroethane	ND	0.20	ug/L							U
Benzene	ND	0.20	ug/L							U
Trichloroethene	ND	0.20	ug/L							U
1,2-Dichloropropane	ND	0.20	ug/L							U
Bromodichloromethane	ND	0.20	ug/L							U
Dibromomethane	ND	0.20	ug/L							U
2-Chloroethyl vinyl ether	ND	0.50	ug/L							U
4-Methyl-2-Pentanone	ND	2.50	ug/L							U
cis-1,3-Dichloropropene	ND	0.20	ug/L							U
Toluene	ND	0.20	ug/L							U
trans-1,3-Dichloropropene	ND	0.20	ug/L							U



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIG0241-BLK1)		Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 18:11								
2-Hexanone	ND	5.00	ug/L							U
1,1,2-Trichloroethane	ND	0.20	ug/L							U
1,3-Dichloropropane	ND	0.10	ug/L							U
Tetrachloroethene	ND	0.20	ug/L							U
Dibromochloromethane	ND	0.20	ug/L							U
1,2-Dibromoethane	ND	0.10	ug/L							U
Chlorobenzene	ND	0.20	ug/L							U
Ethylbenzene	ND	0.20	ug/L							U
1,1,1,2-Tetrachloroethane	ND	0.20	ug/L							U
m,p-Xylene	ND	0.40	ug/L							U
o-Xylene	ND	0.20	ug/L							U
Xylenes, total	ND	0.60	ug/L							U
Styrene	ND	0.20	ug/L							U
Bromoform	ND	0.20	ug/L							U
1,1,2,2-Tetrachloroethane	ND	0.10	ug/L							U
1,2,3-Trichloropropane	ND	0.20	ug/L							U
trans-1,4-Dichloro 2-Butene	ND	1.00	ug/L							U
n-Propylbenzene	ND	0.20	ug/L							U
Bromobenzene	ND	0.20	ug/L							U
Isopropyl Benzene	ND	0.20	ug/L							U
2-Chlorotoluene	ND	0.10	ug/L							U
4-Chlorotoluene	ND	0.20	ug/L							U
t-Butylbenzene	ND	0.20	ug/L							U
1,3,5-Trimethylbenzene	ND	0.20	ug/L							U
1,2,4-Trimethylbenzene	ND	0.20	ug/L							U
s-Butylbenzene	ND	0.20	ug/L							U
4-Isopropyl Toluene	ND	0.20	ug/L							U
1,3-Dichlorobenzene	ND	0.20	ug/L							U
1,4-Dichlorobenzene	ND	0.20	ug/L							U
n-Butylbenzene	ND	0.20	ug/L							U
1,2-Dichlorobenzene	ND	0.20	ug/L							U
1,2-Dibromo-3-chloropropane	ND	0.50	ug/L							U
1,2,4-Trichlorobenzene	ND	0.50	ug/L							U
Hexachloro-1,3-Butadiene	ND	0.20	ug/L							U
Naphthalene	ND	0.50	ug/L							U



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIG0241-BLK1)										
					Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 18:11					
1,2,3-Trichlorobenzene	ND	0.20	ug/L							U
Dichlorodifluoromethane	ND	0.20	ug/L							U
Surrogate: 1,2-Dichloroethane-d4	4.30		ug/L	5.00		86.0	80-129			
Surrogate: Toluene-d8	4.89		ug/L	5.00		97.8	80-120			
Surrogate: 4-Bromofluorobenzene	4.96		ug/L	5.00		99.3	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	5.04		ug/L	5.00		101	80-120			
LCS (BIG0241-BS1)										
					Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 16:27					
Chloromethane	3.57	0.50	ug/L	4.00		89.3	60-138			
Vinyl Chloride	3.82	0.10	ug/L	4.00		95.5	66-133			
Bromomethane	3.91	1.00	ug/L	4.00		97.8	72-131			
Chloroethane	3.49	0.20	ug/L	4.00		87.3	60-155			
Trichlorofluoromethane	3.78	0.20	ug/L	4.00		94.5	80-129			
Acrolein	27.9	2.50	ug/L	20.0		140	52-144			
1,1,2-Trichloro-1,2,2-Trifluoroethane	3.76	0.20	ug/L	4.00		94.0	76-129			
Acetone	24.0	5.00	ug/L	20.0		120	58-142			
1,1-Dichloroethene	3.57	0.20	ug/L	4.00		89.3	69-135			
Iodomethane	3.66	0.50	ug/L	4.00		91.6	56-147			
Methylene Chloride	3.60	1.00	ug/L	4.00		89.9	65-135			
Acrylonitrile	3.90	1.00	ug/L	4.00		97.6	64-134			
Carbon Disulfide	3.53	0.10	ug/L	4.00		88.4	78-125			
trans-1,2-Dichloroethene	3.61	0.20	ug/L	4.00		90.3	78-128			
Vinyl Acetate	3.72	0.20	ug/L	4.00		93.1	55-138			
1,1-Dichloroethane	3.65	0.20	ug/L	4.00		91.2	76-124			
2-Butanone	18.8	5.00	ug/L	20.0		93.9	61-140			
2,2-Dichloropropane	4.52	0.10	ug/L	4.00		113	78-125			
cis-1,2-Dichloroethene	3.58	0.20	ug/L	4.00		89.5	80-121			
Chloroform	3.47	0.20	ug/L	4.00		86.6	80-122			
Bromochloromethane	3.80	0.20	ug/L	4.00		95.1	80-121			
1,1,1-Trichloroethane	3.49	0.20	ug/L	4.00		87.2	79-123			
1,1-Dichloropropene	3.94	0.10	ug/L	4.00		98.6	80-120			
Carbon tetrachloride	3.51	0.20	ug/L	4.00		87.8	53-137			
1,2-Dichloroethane	3.77	0.20	ug/L	4.00		94.2	75-123			
Benzene	3.60	0.20	ug/L	4.00		90.1	80-120			
Trichloroethene	3.65	0.20	ug/L	4.00		91.1	80-120			



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIG0241-BS1)		Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 16:27								
1,2-Dichloropropane	3.67	0.20	ug/L	4.00		91.8	80-120			
Bromodichloromethane	3.58	0.20	ug/L	4.00		89.4	80-121			
Dibromomethane	3.68	0.20	ug/L	4.00		92.1	80-120			
2-Chloroethyl vinyl ether	3.69	0.50	ug/L	4.00		92.1	74-127			
4-Methyl-2-Pentanone	18.5	2.50	ug/L	20.0		92.4	67-133			
cis-1,3-Dichloropropene	3.67	0.20	ug/L	4.00		91.7	80-124			
Toluene	3.60	0.20	ug/L	4.00		90.1	80-120			
trans-1,3-Dichloropropene	3.45	0.20	ug/L	4.00		86.2	71-127			
2-Hexanone	20.1	5.00	ug/L	20.0		100	69-133			
1,1,2-Trichloroethane	3.74	0.20	ug/L	4.00		93.5	80-121			
1,3-Dichloropropane	3.75	0.10	ug/L	4.00		93.7	80-120			
Tetrachloroethene	3.77	0.20	ug/L	4.00		94.3	80-120			
Dibromochloromethane	3.55	0.20	ug/L	4.00		88.8	65-135			
1,2-Dibromoethane	3.82	0.10	ug/L	4.00		95.5	80-121			
Chlorobenzene	3.72	0.20	ug/L	4.00		93.0	80-120			
Ethylbenzene	3.65	0.20	ug/L	4.00		91.1	80-120			
1,1,1,2-Tetrachloroethane	3.77	0.20	ug/L	4.00		94.1	80-120			
m,p-Xylene	7.69	0.40	ug/L	8.00		96.1	80-121			
o-Xylene	3.64	0.20	ug/L	4.00		91.0	80-121			
Xylenes, total	11.3	0.60	ug/L	12.0		94.4	76-127			
Styrene	3.70	0.20	ug/L	4.00		92.6	80-124			
Bromoform	3.38	0.20	ug/L	4.00		84.6	51-134			
1,1,2,2-Tetrachloroethane	3.77	0.10	ug/L	4.00		94.3	77-123			
1,2,3-Trichloropropane	3.53	0.20	ug/L	4.00		88.3	76-125			
trans-1,4-Dichloro 2-Butene	3.63	1.00	ug/L	4.00		90.7	55-129			
n-Propylbenzene	3.65	0.20	ug/L	4.00		91.3	78-130			
Bromobenzene	3.56	0.20	ug/L	4.00		89.1	80-120			
Isopropyl Benzene	3.58	0.20	ug/L	4.00		89.6	80-128			
2-Chlorotoluene	3.52	0.10	ug/L	4.00		88.1	78-122			
4-Chlorotoluene	3.41	0.20	ug/L	4.00		85.3	80-121			
t-Butylbenzene	3.62	0.20	ug/L	4.00		90.4	78-125			
1,3,5-Trimethylbenzene	3.52	0.20	ug/L	4.00		88.0	80-129			
1,2,4-Trimethylbenzene	3.65	0.20	ug/L	4.00		91.1	80-127			
s-Butylbenzene	3.51	0.20	ug/L	4.00		87.6	78-129			
4-Isopropyl Toluene	3.62	0.20	ug/L	4.00		90.4	79-130			



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIG0241-BS1)										
					Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 16:27					
1,3-Dichlorobenzene	3.66	0.20	ug/L	4.00		91.4	80-120			
1,4-Dichlorobenzene	3.65	0.20	ug/L	4.00		91.3	80-120			
n-Butylbenzene	3.88	0.20	ug/L	4.00		97.1	74-129			
1,2-Dichlorobenzene	3.54	0.20	ug/L	4.00		88.5	80-120			
1,2-Dibromo-3-chloropropane	3.64	0.50	ug/L	4.00		91.0	62-123			
1,2,4-Trichlorobenzene	3.68	0.50	ug/L	4.00		92.0	64-124			
Hexachloro-1,3-Butadiene	3.99	0.20	ug/L	4.00		99.6	58-123			
Naphthalene	3.85	0.50	ug/L	4.00		96.3	50-134			
1,2,3-Trichlorobenzene	3.67	0.20	ug/L	4.00		91.8	49-133			
Dichlorodifluoromethane	4.10	0.20	ug/L	4.00		102	48-147			
Surrogate: 1,2-Dichloroethane-d4	4.92		ug/L	5.00		98.4	80-129			
Surrogate: Toluene-d8	4.82		ug/L	5.00		96.5	80-120			
Surrogate: 4-Bromofluorobenzene	5.13		ug/L	5.00		103	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	4.78		ug/L	5.00		95.5	80-120			
LCS Dup (BIG0241-BS1)										
					Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 16:53					
Chloromethane	4.12	0.50	ug/L	4.00		103	60-138	14.20	30	
Vinyl Chloride	4.27	0.10	ug/L	4.00		107	66-133	11.10	30	
Bromomethane	3.99	1.00	ug/L	4.00		99.8	72-131	1.97	30	
Chloroethane	3.91	0.20	ug/L	4.00		97.7	60-155	11.30	30	
Trichlorofluoromethane	3.76	0.20	ug/L	4.00		94.1	80-129	0.43	30	
Acrolein	31.7	2.50	ug/L	20.0		159	52-144	12.70	30	*
1,1,2-Trichloro-1,2,2-Trifluoroethane	4.08	0.20	ug/L	4.00		102	76-129	8.13	30	
Acetone	24.3	5.00	ug/L	20.0		122	58-142	1.21	30	
1,1-Dichloroethene	3.99	0.20	ug/L	4.00		99.7	69-135	11.00	30	
Iodomethane	4.06	0.50	ug/L	4.00		102	56-147	10.30	30	
Methylene Chloride	3.94	1.00	ug/L	4.00		98.4	65-135	8.96	30	
Acrylonitrile	3.71	1.00	ug/L	4.00		92.8	64-134	5.02	30	
Carbon Disulfide	3.85	0.10	ug/L	4.00		96.2	78-125	8.46	30	
trans-1,2-Dichloroethene	4.02	0.20	ug/L	4.00		100	78-128	10.60	30	
Vinyl Acetate	3.95	0.20	ug/L	4.00		98.9	55-138	5.99	30	
1,1-Dichloroethane	4.03	0.20	ug/L	4.00		101	76-124	10.10	30	
2-Butanone	20.4	5.00	ug/L	20.0		102	61-140	8.32	30	
2,2-Dichloropropane	5.12	0.10	ug/L	4.00		128	78-125	12.50	30	*
cis-1,2-Dichloroethene	4.17	0.20	ug/L	4.00		104	80-121	15.10	30	



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BIG0241-BSD1)		Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 16:53								
Chloroform	3.81	0.20	ug/L	4.00		95.2	80-122	9.40	30	
Bromochloromethane	4.18	0.20	ug/L	4.00		105	80-121	9.51	30	
1,1,1-Trichloroethane	3.99	0.20	ug/L	4.00		99.9	79-123	13.50	30	
1,1-Dichloropropene	4.23	0.10	ug/L	4.00		106	80-120	6.93	30	
Carbon tetrachloride	3.88	0.20	ug/L	4.00		97.0	53-137	9.95	30	
1,2-Dichloroethane	3.89	0.20	ug/L	4.00		97.3	75-123	3.23	30	
Benzene	3.80	0.20	ug/L	4.00		95.0	80-120	5.27	30	
Trichloroethene	3.75	0.20	ug/L	4.00		93.7	80-120	2.77	30	
1,2-Dichloropropane	3.90	0.20	ug/L	4.00		97.4	80-120	5.99	30	
Bromodichloromethane	3.94	0.20	ug/L	4.00		98.5	80-121	9.75	30	
Dibromomethane	3.91	0.20	ug/L	4.00		97.6	80-120	5.82	30	
2-Chloroethyl vinyl ether	3.92	0.50	ug/L	4.00		98.0	74-127	6.15	30	
4-Methyl-2-Pentanone	19.7	2.50	ug/L	20.0		98.3	67-133	6.17	30	
cis-1,3-Dichloropropene	3.87	0.20	ug/L	4.00		96.7	80-124	5.32	30	
Toluene	3.84	0.20	ug/L	4.00		95.9	80-120	6.27	30	
trans-1,3-Dichloropropene	3.68	0.20	ug/L	4.00		92.0	71-127	6.53	30	
2-Hexanone	20.4	5.00	ug/L	20.0		102	69-133	1.47	30	
1,1,2-Trichloroethane	3.78	0.20	ug/L	4.00		94.5	80-121	1.02	30	
1,3-Dichloropropane	3.87	0.10	ug/L	4.00		96.8	80-120	3.31	30	
Tetrachloroethene	3.90	0.20	ug/L	4.00		97.6	80-120	3.39	30	
Dibromochloromethane	4.02	0.20	ug/L	4.00		100	65-135	12.20	30	
1,2-Dibromoethane	3.77	0.10	ug/L	4.00		94.3	80-121	1.25	30	
Chlorobenzene	3.90	0.20	ug/L	4.00		97.5	80-120	4.69	30	
Ethylbenzene	3.91	0.20	ug/L	4.00		97.8	80-120	7.01	30	
1,1,1,2-Tetrachloroethane	3.73	0.20	ug/L	4.00		93.2	80-120	0.95	30	
m,p-Xylene	7.94	0.40	ug/L	8.00		99.2	80-121	3.18	30	
o-Xylene	3.75	0.20	ug/L	4.00		93.7	80-121	2.97	30	
Xylenes, total	11.7	0.60	ug/L	12.0		97.4	76-127	3.11	30	
Styrene	3.93	0.20	ug/L	4.00		98.3	80-124	5.95	30	
Bromoform	3.87	0.20	ug/L	4.00		96.8	51-134	13.50	30	
1,1,2,2-Tetrachloroethane	4.24	0.10	ug/L	4.00		106	77-123	11.80	30	
1,2,3-Trichloropropane	4.02	0.20	ug/L	4.00		101	76-125	13.00	30	
trans-1,4-Dichloro 2-Butene	3.93	1.00	ug/L	4.00		98.4	55-129	8.13	30	
n-Propylbenzene	4.10	0.20	ug/L	4.00		103	78-130	11.60	30	
Bromobenzene	3.69	0.20	ug/L	4.00		92.3	80-120	3.55	30	



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Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BIG0241-BSD1)										
					Prepared: 09-Jul-2020 Analyzed: 09-Jul-2020 16:53					
Isopropyl Benzene	3.99	0.20	ug/L	4.00		99.8	80-128	10.80	30	
2-Chlorotoluene	3.96	0.10	ug/L	4.00		98.9	78-122	11.60	30	
4-Chlorotoluene	3.85	0.20	ug/L	4.00		96.4	80-121	12.20	30	
t-Butylbenzene	3.95	0.20	ug/L	4.00		98.7	78-125	8.74	30	
1,3,5-Trimethylbenzene	4.04	0.20	ug/L	4.00		101	80-129	13.80	30	
1,2,4-Trimethylbenzene	4.12	0.20	ug/L	4.00		103	80-127	12.30	30	
s-Butylbenzene	3.91	0.20	ug/L	4.00		97.8	78-129	10.90	30	
4-Isopropyl Toluene	4.01	0.20	ug/L	4.00		100	79-130	10.40	30	
1,3-Dichlorobenzene	4.03	0.20	ug/L	4.00		101	80-120	9.72	30	
1,4-Dichlorobenzene	4.12	0.20	ug/L	4.00		103	80-120	12.10	30	
n-Butylbenzene	4.15	0.20	ug/L	4.00		104	74-129	6.71	30	
1,2-Dichlorobenzene	3.90	0.20	ug/L	4.00		97.6	80-120	9.77	30	
1,2-Dibromo-3-chloropropane	3.84	0.50	ug/L	4.00		96.1	62-123	5.37	30	
1,2,4-Trichlorobenzene	3.99	0.50	ug/L	4.00		99.8	64-124	8.12	30	
Hexachloro-1,3-Butadiene	4.21	0.20	ug/L	4.00		105	58-123	5.48	30	
Naphthalene	4.03	0.50	ug/L	4.00		101	50-134	4.43	30	
1,2,3-Trichlorobenzene	3.72	0.20	ug/L	4.00		93.0	49-133	1.36	30	
Dichlorodifluoromethane	4.80	0.20	ug/L	4.00		120	48-147	15.70	30	
Surrogate: 1,2-Dichloroethane-d4	4.91		ug/L	5.00		98.2	80-129			
Surrogate: Toluene-d8	4.97		ug/L	5.00		99.5	80-120			
Surrogate: 4-Bromofluorobenzene	4.89		ug/L	5.00		97.8	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	5.15		ug/L	5.00		103	80-120			
Matrix Spike (BIG0241-MS1)										
		Source: 20F0458-01		Prepared: 09-Jul-2020 Analyzed: 10-Jul-2020 14:30						
Chloromethane	10.3	0.50	ug/L	10.0	ND	103	60-138			
Vinyl Chloride	9.68	0.10	ug/L	10.0	ND	94.6	66-133			
Bromomethane	9.44	1.00	ug/L	10.0	ND	94.4	72-131			
Chloroethane	8.83	0.20	ug/L	10.0	ND	88.3	60-155			
Trichlorofluoromethane	10.6	0.20	ug/L	10.0	ND	106	80-129			
Acrolein	40.5	2.50	ug/L	50.0	ND	81.1	52-144			
1,1,2-Trichloro-1,2,2-Trifluoroethane	9.49	0.20	ug/L	10.0	ND	94.9	76-129			
Acetone	60.9	5.00	ug/L	50.0	ND	114	58-142			
1,1-Dichloroethene	9.74	0.20	ug/L	10.0	ND	97.4	69-135			
Iodomethane	9.71	0.50	ug/L	10.0	ND	97.1	56-147			
Methylene Chloride	9.13	1.00	ug/L	10.0	ND	91.3	65-135			



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Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BIG0241-MS1)		Source: 20F0458-01		Prepared: 09-Jul-2020 Analyzed: 10-Jul-2020 14:30						
Acrylonitrile	9.03	1.00	ug/L	10.0	ND	90.3	64-134			
Carbon Disulfide	9.42	0.10	ug/L	10.0	0.25	91.7	78-125			
trans-1,2-Dichloroethene	9.36	0.20	ug/L	10.0	ND	93.6	78-128			
Vinyl Acetate	5.19	0.20	ug/L	10.0	ND	51.9	55-138			*
1,1-Dichloroethane	9.54	0.20	ug/L	10.0	ND	95.4	76-124			
2-Butanone	59.1	5.00	ug/L	50.0	ND	118	61-140			
2,2-Dichloropropane	7.13	0.10	ug/L	10.0	ND	71.3	78-125			*
cis-1,2-Dichloroethene	9.83	0.20	ug/L	10.0	ND	98.3	80-121			
Chloroform	9.42	0.20	ug/L	10.0	ND	94.2	80-122			
Bromochloromethane	10.3	0.20	ug/L	10.0	ND	103	80-121			
1,1,1-Trichloroethane	10.0	0.20	ug/L	10.0	ND	100	79-123			
1,1-Dichloropropene	9.77	0.10	ug/L	10.0	ND	97.7	80-120			
Carbon tetrachloride	8.96	0.20	ug/L	10.0	ND	89.6	53-137			
1,2-Dichloroethane	9.57	0.20	ug/L	10.0	ND	95.7	75-123			
Benzene	9.33	0.20	ug/L	10.0	ND	93.3	80-120			
Trichloroethene	9.04	0.20	ug/L	10.0	ND	90.4	80-120			
1,2-Dichloropropane	9.30	0.20	ug/L	10.0	ND	93.0	80-120			
Bromodichloromethane	9.56	0.20	ug/L	10.0	ND	95.6	80-121			
Dibromomethane	9.54	0.20	ug/L	10.0	ND	95.4	80-120			
2-Chloroethyl vinyl ether	ND	0.50	ug/L	10.0	ND		74-127			*, U
4-Methyl-2-Pentanone	47.0	2.50	ug/L	50.0	ND	94.1	67-133			
cis-1,3-Dichloropropene	8.66	0.20	ug/L	10.0	ND	86.6	80-124			
Toluene	9.14	0.20	ug/L	10.0	ND	91.4	80-120			
trans-1,3-Dichloropropene	8.25	0.20	ug/L	10.0	ND	82.5	71-127			
2-Hexanone	51.7	5.00	ug/L	50.0	ND	103	69-133			
1,1,2-Trichloroethane	9.21	0.20	ug/L	10.0	ND	92.1	80-121			
1,3-Dichloropropane	9.47	0.10	ug/L	10.0	ND	94.7	80-120			
Tetrachloroethene	9.26	0.20	ug/L	10.0	ND	92.6	80-120			
Dibromochloromethane	9.19	0.20	ug/L	10.0	ND	91.9	65-135			
1,2-Dibromoethane	9.36	0.10	ug/L	10.0	ND	93.6	80-121			
Chlorobenzene	9.33	0.20	ug/L	10.0	ND	93.3	80-120			
Ethylbenzene	9.32	0.20	ug/L	10.0	ND	93.2	80-120			
1,1,1,2-Tetrachloroethane	9.76	0.20	ug/L	10.0	ND	97.6	80-120			
m,p-Xylene	19.6	0.40	ug/L	20.0	ND	97.8	80-121			
o-Xylene	9.49	0.20	ug/L	10.0	ND	94.9	80-121			



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Project: Landsburg
Project Number: Landsburg
Project Manager: Gary Zimmerman

Reported:
21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BIG0241-MS1)		Source: 20F0458-01		Prepared: 09-Jul-2020		Analyzed: 10-Jul-2020 14:30				
Xylenes, total	29.0	0.60	ug/L	30.0	ND	96.8	76-127			
Styrene	9.70	0.20	ug/L	10.0	ND	97.0	80-124			
Bromoform	9.34	0.20	ug/L	10.0	ND	93.4	51-134			
1,1,2,2-Tetrachloroethane	10.1	0.10	ug/L	10.0	ND	101	77-123			
1,2,3-Trichloropropane	9.14	0.20	ug/L	10.0	ND	91.4	76-125			
trans-1,4-Dichloro 2-Butene	8.57	1.00	ug/L	10.0	ND	85.7	55-129			
n-Propylbenzene	9.38	0.20	ug/L	10.0	ND	93.8	78-130			
Bromobenzene	9.24	0.20	ug/L	10.0	ND	92.4	80-120			
Isopropyl Benzene	9.39	0.20	ug/L	10.0	ND	93.9	80-128			
2-Chlorotoluene	9.15	0.10	ug/L	10.0	ND	91.5	78-122			
4-Chlorotoluene	8.81	0.20	ug/L	10.0	ND	88.1	80-121			
t-Butylbenzene	9.43	0.20	ug/L	10.0	ND	94.3	78-125			
1,3,5-Trimethylbenzene	9.39	0.20	ug/L	10.0	ND	93.9	80-129			
1,2,4-Trimethylbenzene	9.59	0.20	ug/L	10.0	ND	95.9	80-127			
s-Butylbenzene	9.05	0.20	ug/L	10.0	ND	90.5	78-129			
4-Isopropyl Toluene	9.18	0.20	ug/L	10.0	ND	91.8	79-130			
1,3-Dichlorobenzene	9.44	0.20	ug/L	10.0	ND	94.4	80-120			
1,4-Dichlorobenzene	9.13	0.20	ug/L	10.0	ND	90.9	80-120			
n-Butylbenzene	9.19	0.20	ug/L	10.0	ND	91.9	74-129			
1,2-Dichlorobenzene	9.61	0.20	ug/L	10.0	ND	96.1	80-120			
1,2-Dibromo-3-chloropropane	9.60	0.50	ug/L	10.0	ND	96.0	62-123			
1,2,4-Trichlorobenzene	8.83	0.50	ug/L	10.0	ND	88.3	64-124			
Hexachloro-1,3-Butadiene	8.74	0.20	ug/L	10.0	ND	87.4	58-123			
Naphthalene	9.67	0.50	ug/L	10.0	ND	96.7	50-134			
1,2,3-Trichlorobenzene	8.81	0.20	ug/L	10.0	ND	88.1	49-133			
Dichlorodifluoromethane	9.99	0.20	ug/L	10.0	ND	99.9	48-147			
Surrogate: 1,2-Dichloroethane-d4	5.08		ug/L	5.00	5.20	102	80-129			
Surrogate: Toluene-d8	4.93		ug/L	5.00	4.97	98.7	80-120			
Surrogate: 4-Bromofluorobenzene	5.00		ug/L	5.00	5.11	99.9	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	5.09		ug/L	5.00	5.20	102	80-120			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIG0241-MSD1)		Source: 20F0458-01		Prepared: 09-Jul-2020		Analyzed: 10-Jul-2020 14:55				
Chloromethane	10.9	0.50	ug/L	10.0	ND	109	60-138	5.33	30	
Vinyl Chloride	9.70	0.10	ug/L	10.0	ND	94.8	66-133	0.23	30	



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Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIG0241-MSD1)		Source: 20F0458-01		Prepared: 09-Jul-2020 Analyzed: 10-Jul-2020 14:55						
Bromomethane	9.70	1.00	ug/L	10.0	ND	97.0	72-131	2.78	30	
Chloroethane	9.41	0.20	ug/L	10.0	ND	94.1	60-155	6.35	30	
Trichlorofluoromethane	11.0	0.20	ug/L	10.0	ND	110	80-129	3.29	30	
Acrolein	42.4	2.50	ug/L	50.0	ND	84.7	52-144	4.45	30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	9.15	0.20	ug/L	10.0	ND	91.5	76-129	3.66	30	
Acetone	57.2	5.00	ug/L	50.0	ND	107	58-142	6.18	30	
1,1-Dichloroethene	10.0	0.20	ug/L	10.0	ND	100	69-135	3.04	30	
Iodomethane	10.0	0.50	ug/L	10.0	ND	100	56-147	3.36	30	
Methylene Chloride	9.53	1.00	ug/L	10.0	ND	95.3	65-135	4.31	30	
Acrylonitrile	9.67	1.00	ug/L	10.0	ND	96.7	64-134	6.85	30	
Carbon Disulfide	9.56	0.10	ug/L	10.0	0.25	93.1	78-125	1.43	30	
trans-1,2-Dichloroethene	9.38	0.20	ug/L	10.0	ND	93.8	78-128	0.18	30	
Vinyl Acetate	5.19	0.20	ug/L	10.0	ND	51.9	55-138	0.02	30	*
1,1-Dichloroethane	9.66	0.20	ug/L	10.0	ND	96.6	76-124	1.25	30	
2-Butanone	52.0	5.00	ug/L	50.0	ND	104	61-140	12.80	30	
2,2-Dichloropropane	7.03	0.10	ug/L	10.0	ND	70.3	78-125	1.48	30	*
cis-1,2-Dichloroethene	9.92	0.20	ug/L	10.0	ND	99.2	80-121	0.96	30	
Chloroform	9.53	0.20	ug/L	10.0	ND	95.3	80-122	1.15	30	
Bromochloromethane	10.0	0.20	ug/L	10.0	ND	100	80-121	2.67	30	
1,1,1-Trichloroethane	9.57	0.20	ug/L	10.0	ND	95.7	79-123	4.39	30	
1,1-Dichloropropene	10.8	0.10	ug/L	10.0	ND	108	80-120	10.30	30	
Carbon tetrachloride	9.66	0.20	ug/L	10.0	ND	96.6	53-137	7.53	30	
1,2-Dichloroethane	10.2	0.20	ug/L	10.0	ND	102	75-123	6.50	30	
Benzene	9.71	0.20	ug/L	10.0	ND	97.1	80-120	3.92	30	
Trichloroethene	9.58	0.20	ug/L	10.0	ND	95.8	80-120	5.80	30	
1,2-Dichloropropane	9.84	0.20	ug/L	10.0	ND	98.4	80-120	5.66	30	
Bromodichloromethane	10.3	0.20	ug/L	10.0	ND	103	80-121	7.23	30	
Dibromomethane	9.86	0.20	ug/L	10.0	ND	98.6	80-120	3.33	30	
2-Chloroethyl vinyl ether	ND	0.50	ug/L	10.0	ND		74-127			*, U
4-Methyl-2-Pentanone	51.4	2.50	ug/L	50.0	ND	103	67-133	8.92	30	
cis-1,3-Dichloropropene	9.23	0.20	ug/L	10.0	ND	92.3	80-124	6.34	30	
Toluene	9.47	0.20	ug/L	10.0	ND	94.7	80-120	3.54	30	
trans-1,3-Dichloropropene	8.89	0.20	ug/L	10.0	ND	88.9	71-127	7.42	30	
2-Hexanone	54.2	5.00	ug/L	50.0	ND	108	69-133	4.63	30	
1,1,2-Trichloroethane	10.2	0.20	ug/L	10.0	ND	102	80-121	10.10	30	



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Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIG0241-MSD1)		Source: 20F0458-01		Prepared: 09-Jul-2020 Analyzed: 10-Jul-2020 14:55						
1,3-Dichloropropane	9.82	0.10	ug/L	10.0	ND	98.2	80-120	3.63	30	
Tetrachloroethene	9.89	0.20	ug/L	10.0	ND	98.9	80-120	6.59	30	
Dibromochloromethane	9.97	0.20	ug/L	10.0	ND	99.7	65-135	8.10	30	
1,2-Dibromoethane	10.6	0.10	ug/L	10.0	ND	106	80-121	12.90	30	
Chlorobenzene	9.99	0.20	ug/L	10.0	ND	99.9	80-120	6.87	30	
Ethylbenzene	9.78	0.20	ug/L	10.0	ND	97.8	80-120	4.89	30	
1,1,1,2-Tetrachloroethane	9.69	0.20	ug/L	10.0	ND	96.9	80-120	0.68	30	
m,p-Xylene	20.2	0.40	ug/L	20.0	ND	101	80-121	3.43	30	
o-Xylene	9.92	0.20	ug/L	10.0	ND	99.2	80-121	4.44	30	
Xylenes, total	30.2	0.60	ug/L	30.0	ND	101	76-127	3.76	30	
Styrene	10.1	0.20	ug/L	10.0	ND	101	80-124	4.39	30	
Bromoform	10.5	0.20	ug/L	10.0	ND	105	51-134	12.00	30	
1,1,2,2-Tetrachloroethane	11.3	0.10	ug/L	10.0	ND	113	77-123	11.50	30	
1,2,3-Trichloropropane	9.83	0.20	ug/L	10.0	ND	98.3	76-125	7.26	30	
trans-1,4-Dichloro 2-Butene	9.06	1.00	ug/L	10.0	ND	90.6	55-129	5.57	30	
n-Propylbenzene	9.93	0.20	ug/L	10.0	ND	99.3	78-130	5.67	30	
Bromobenzene	9.86	0.20	ug/L	10.0	ND	98.6	80-120	6.52	30	
Isopropyl Benzene	9.86	0.20	ug/L	10.0	ND	98.6	80-128	4.89	30	
2-Chlorotoluene	9.98	0.10	ug/L	10.0	ND	99.8	78-122	8.68	30	
4-Chlorotoluene	9.72	0.20	ug/L	10.0	ND	97.2	80-121	9.78	30	
t-Butylbenzene	10.1	0.20	ug/L	10.0	ND	101	78-125	6.58	30	
1,3,5-Trimethylbenzene	9.82	0.20	ug/L	10.0	ND	98.2	80-129	4.49	30	
1,2,4-Trimethylbenzene	10.2	0.20	ug/L	10.0	ND	102	80-127	5.86	30	
s-Butylbenzene	9.72	0.20	ug/L	10.0	ND	97.2	78-129	7.17	30	
4-Isopropyl Toluene	9.75	0.20	ug/L	10.0	ND	97.5	79-130	5.98	30	
1,3-Dichlorobenzene	10.0	0.20	ug/L	10.0	ND	100	80-120	6.22	30	
1,4-Dichlorobenzene	9.62	0.20	ug/L	10.0	ND	95.8	80-120	5.29	30	
n-Butylbenzene	9.87	0.20	ug/L	10.0	ND	98.7	74-129	7.11	30	
1,2-Dichlorobenzene	10.0	0.20	ug/L	10.0	ND	100	80-120	4.04	30	
1,2-Dibromo-3-chloropropane	10.7	0.50	ug/L	10.0	ND	107	62-123	10.50	30	
1,2,4-Trichlorobenzene	9.77	0.50	ug/L	10.0	ND	97.7	64-124	10.10	30	
Hexachloro-1,3-Butadiene	8.58	0.20	ug/L	10.0	ND	85.8	58-123	1.88	30	
Naphthalene	10.7	0.50	ug/L	10.0	ND	107	50-134	9.83	30	
1,2,3-Trichlorobenzene	9.83	0.20	ug/L	10.0	ND	98.3	49-133	11.00	30	
Dichlorodifluoromethane	10.6	0.20	ug/L	10.0	ND	106	48-147	5.76	30	



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21-Jul-2020 13:23

Volatile Organic Compounds - Quality Control

Batch BIG0241 - EPA 5030C (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIG0241-MSD1)		Source: 20F0458-01		Prepared: 09-Jul-2020		Analyzed: 10-Jul-2020 14:55				
Surrogate: 1,2-Dichloroethane-d4	5.32		ug/L	5.00	5.20	106	80-129			
Surrogate: Toluene-d8	5.02		ug/L	5.00	4.97	100	80-120			
Surrogate: 4-Bromofluorobenzene	5.07		ug/L	5.00	5.11	101	80-120			
Surrogate: 1,2-Dichlorobenzene-d4	5.03		ug/L	5.00	5.20	101	80-120			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Project: Landsburg
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Semivolatile Organic Compounds - SIM - Quality Control

Batch BIF0900 - EPA 3520C (Liq Liq)

Instrument: NT12 Analyst: JZ

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIF0900-BLK1)		Prepared: 02-Jul-2020 Analyzed: 09-Jul-2020 20:37								
1,4-Dioxane	ND	0.4	ug/L							U
Surrogate: 1,4-Dioxane-d8	6.53		ug/L	10.0	65.3	33.6-120				
LCS (BIF0900-BS1)		Prepared: 02-Jul-2020 Analyzed: 09-Jul-2020 21:03								
1,4-Dioxane	6.0	0.4	ug/L	10.0	59.6	39.9-120				
Surrogate: 1,4-Dioxane-d8	6.42		ug/L	10.0	64.2	33.6-120				
LCS Dup (BIF0900-BSD1)		Prepared: 02-Jul-2020 Analyzed: 09-Jul-2020 21:29								
1,4-Dioxane	6.4	0.4	ug/L	10.0	64.1	39.9-120	7.40	30		
Surrogate: 1,4-Dioxane-d8	6.59		ug/L	10.0	65.9	33.6-120				
Matrix Spike (BIF0900-MS1)		Source: 20F0458-01		Prepared: 02-Jul-2020 Analyzed: 09-Jul-2020 22:22						
1,4-Dioxane	6.2	0.4	ug/L	10.0	1.8	44.3	35.1-120			
Surrogate: 1,4-Dioxane-d8	5.22		ug/L	10.0	6.72	52.2	33.6-120			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.										
Matrix Spike Dup (BIF0900-MSD1)		Source: 20F0458-01		Prepared: 02-Jul-2020 Analyzed: 09-Jul-2020 22:48						
1,4-Dioxane	7.7	0.4	ug/L	10.0	1.8	59.4	35.1-120	21.80	30	
Surrogate: 1,4-Dioxane-d8	6.32		ug/L	10.0	6.72	63.2	33.6-120			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.										



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Certified Analyses included in this Report

Analyte	Certifications
EPA 8260D in Water	
Chloromethane	DoD-ELAP,ADEC,NELAP,WADOE
Chloromethane	DoD-ELAP,ADEC,CALAP,WADOE
Vinyl Chloride	DoD-ELAP,ADEC,CALAP,WADOE
Vinyl Chloride	DoD-ELAP,ADEC,NELAP,WADOE
Bromomethane	DoD-ELAP,ADEC,NELAP,WADOE
Bromomethane	DoD-ELAP,ADEC,CALAP,WADOE
Chloroethane	DoD-ELAP,ADEC,CALAP,WADOE
Chloroethane	DoD-ELAP,ADEC,NELAP,WADOE
Trichlorofluoromethane	DoD-ELAP,ADEC,NELAP,WADOE
Trichlorofluoromethane	DoD-ELAP,ADEC,CALAP,WADOE
Acrolein	DoD-ELAP,NELAP,WADOE
Acrolein	DoD-ELAP,CALAP,WADOE
1,1,2-Trichloro-1,2,2-Trifluoroethane	DoD-ELAP,ADEC,CALAP,WADOE
1,1,2-Trichloro-1,2,2-Trifluoroethane	DoD-ELAP,ADEC,NELAP,WADOE
Acetone	DoD-ELAP,ADEC,NELAP,WADOE
Acetone	DoD-ELAP,ADEC,CALAP,WADOE
1,1-Dichloroethene	DoD-ELAP,ADEC,CALAP,WADOE
1,1-Dichloroethene	DoD-ELAP,ADEC,NELAP,WADOE
Iodomethane	DoD-ELAP,NELAP,WADOE
Iodomethane	DoD-ELAP,CALAP,WADOE
Methylene Chloride	DoD-ELAP,ADEC,NELAP,WADOE
Methylene Chloride	DoD-ELAP,ADEC,CALAP,WADOE
Acrylonitrile	DoD-ELAP,CALAP,WADOE
Acrylonitrile	DoD-ELAP,NELAP,WADOE
Carbon Disulfide	DoD-ELAP,NELAP,WADOE
Carbon Disulfide	DoD-ELAP,CALAP,WADOE
trans-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,WADOE
trans-1,2-Dichloroethene	DoD-ELAP,ADEC,CALAP,WADOE
Vinyl Acetate	DoD-ELAP,CALAP,WADOE
Vinyl Acetate	DoD-ELAP,NELAP,WADOE
1,1-Dichloroethane	DoD-ELAP,ADEC,NELAP,WADOE
1,1-Dichloroethane	DoD-ELAP,ADEC,CALAP,WADOE
2-Butanone	DoD-ELAP,NELAP,WADOE
2-Butanone	DoD-ELAP,CALAP,WADOE
2,2-Dichloropropane	DoD-ELAP,ADEC,CALAP,WADOE



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21-Jul-2020 13:23

2,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,WADOE
cis-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,WADOE
cis-1,2-Dichloroethene	DoD-ELAP,ADEC,CALAP,WADOE
Chloroform	DoD-ELAP,ADEC,CALAP,WADOE
Chloroform	DoD-ELAP,ADEC,NELAP,WADOE
Bromochloromethane	DoD-ELAP,ADEC,NELAP,WADOE
Bromochloromethane	DoD-ELAP,ADEC,CALAP,WADOE
1,1,1-Trichloroethane	DoD-ELAP,ADEC,CALAP,WADOE
1,1,1-Trichloroethane	DoD-ELAP,ADEC,NELAP,WADOE
1,1-Dichloropropene	DoD-ELAP,ADEC,CALAP,WADOE
1,1-Dichloropropene	DoD-ELAP,ADEC,NELAP,WADOE
Carbon tetrachloride	DoD-ELAP,ADEC,NELAP,WADOE
Carbon tetrachloride	DoD-ELAP,ADEC,CALAP,WADOE
1,2-Dichloroethane	DoD-ELAP,ADEC,CALAP,WADOE
1,2-Dichloroethane	DoD-ELAP,ADEC,NELAP,WADOE
Benzene	DoD-ELAP,ADEC,NELAP,WADOE
Benzene	DoD-ELAP,ADEC,CALAP,WADOE
Trichloroethene	DoD-ELAP,ADEC,CALAP,WADOE
Trichloroethene	DoD-ELAP,ADEC,NELAP,WADOE
1,2-Dichloropropane	DoD-ELAP,ADEC,CALAP,WADOE
1,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,WADOE
Bromodichloromethane	DoD-ELAP,ADEC,CALAP,WADOE
Bromodichloromethane	DoD-ELAP,ADEC,NELAP,WADOE
Dibromomethane	DoD-ELAP,ADEC,CALAP,WADOE
Dibromomethane	DoD-ELAP,ADEC,NELAP,WADOE
2-Chloroethyl vinyl ether	DoD-ELAP,ADEC,CALAP,WADOE
2-Chloroethyl vinyl ether	DoD-ELAP,ADEC,NELAP,WADOE
4-Methyl-2-Pentanone	DoD-ELAP,CALAP,WADOE
4-Methyl-2-Pentanone	DoD-ELAP,NELAP,WADOE
cis-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,WADOE
cis-1,3-Dichloropropene	DoD-ELAP,ADEC,CALAP,WADOE
Toluene	DoD-ELAP,ADEC,CALAP,WADOE
Toluene	DoD-ELAP,ADEC,NELAP,WADOE
trans-1,3-Dichloropropene	DoD-ELAP,ADEC,CALAP,WADOE
trans-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,WADOE
2-Hexanone	DoD-ELAP,NELAP,WADOE
2-Hexanone	DoD-ELAP,CALAP,WADOE
1,1,2-Trichloroethane	DoD-ELAP,ADEC,CALAP,WADOE
1,1,2-Trichloroethane	DoD-ELAP,ADEC,NELAP,WADOE



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Reported:
21-Jul-2020 13:23

1,3-Dichloropropane	DoD-ELAP,ADEC,NELAP,WADOE
1,3-Dichloropropane	DoD-ELAP,ADEC,CALAP,WADOE
Tetrachloroethene	DoD-ELAP,ADEC,CALAP,WADOE
Tetrachloroethene	DoD-ELAP,ADEC,NELAP,WADOE
Dibromochloromethane	DoD-ELAP,ADEC,NELAP,WADOE
Dibromochloromethane	DoD-ELAP,ADEC,CALAP,WADOE
1,2-Dibromoethane	DoD-ELAP,CALAP,WADOE
1,2-Dibromoethane	DoD-ELAP,NELAP,WADOE
Chlorobenzene	DoD-ELAP,ADEC,NELAP,WADOE
Chlorobenzene	DoD-ELAP,ADEC,CALAP,WADOE
Ethylbenzene	DoD-ELAP,ADEC,NELAP,WADOE
Ethylbenzene	DoD-ELAP,ADEC,CALAP,WADOE
1,1,1,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,WADOE
1,1,1,2-Tetrachloroethane	DoD-ELAP,ADEC,CALAP,WADOE
m,p-Xylene	DoD-ELAP,ADEC,NELAP,WADOE
m,p-Xylene	DoD-ELAP,ADEC,CALAP,WADOE
o-Xylene	DoD-ELAP,ADEC,NELAP,WADOE
o-Xylene	DoD-ELAP,ADEC,CALAP,WADOE
Styrene	DoD-ELAP,NELAP,WADOE
Styrene	DoD-ELAP,CALAP,WADOE
Bromoform	DoD-ELAP,CALAP,WADOE
Bromoform	DoD-ELAP,NELAP,WADOE
1,1,2,2-Tetrachloroethane	DoD-ELAP,ADEC,CALAP,WADOE
1,1,2,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,WADOE
1,2,3-Trichloropropane	DoD-ELAP,ADEC,NELAP,WADOE
1,2,3-Trichloropropane	DoD-ELAP,ADEC,CALAP,WADOE
trans-1,4-Dichloro 2-Butene	DoD-ELAP,ADEC,CALAP,WADOE
trans-1,4-Dichloro 2-Butene	DoD-ELAP,ADEC,NELAP,WADOE
n-Propylbenzene	DoD-ELAP,CALAP,WADOE
n-Propylbenzene	DoD-ELAP,NELAP,WADOE
Bromobenzene	DoD-ELAP,NELAP,WADOE
Bromobenzene	DoD-ELAP,CALAP,WADOE
Isopropyl Benzene	DoD-ELAP,NELAP,WADOE
Isopropyl Benzene	DoD-ELAP,CALAP,WADOE
2-Chlorotoluene	DoD-ELAP,ADEC,CALAP,WADOE
2-Chlorotoluene	DoD-ELAP,ADEC,NELAP,WADOE
4-Chlorotoluene	DoD-ELAP,ADEC,NELAP,WADOE
4-Chlorotoluene	DoD-ELAP,ADEC,CALAP,WADOE
t-Butylbenzene	DoD-ELAP,NELAP,WADOE



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Redmond WA, 98052-3333

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Project Number: Landsburg
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21-Jul-2020 13:23

t-Butylbenzene	DoD-ELAP,CALAP,WADOE
1,3,5-Trimethylbenzene	DoD-ELAP,CALAP,WADOE
1,3,5-Trimethylbenzene	DoD-ELAP,NELAP,WADOE
1,2,4-Trimethylbenzene	DoD-ELAP,CALAP,WADOE
1,2,4-Trimethylbenzene	DoD-ELAP,NELAP,WADOE
s-Butylbenzene	DoD-ELAP,CALAP,WADOE
s-Butylbenzene	DoD-ELAP,NELAP,WADOE
4-Isopropyl Toluene	DoD-ELAP,NELAP,WADOE
4-Isopropyl Toluene	DoD-ELAP,CALAP,WADOE
1,3-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,WADOE
1,3-Dichlorobenzene	DoD-ELAP,ADEC,CALAP,WADOE
1,4-Dichlorobenzene	DoD-ELAP,ADEC,CALAP,WADOE
1,4-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,WADOE
n-Butylbenzene	DoD-ELAP,CALAP,WADOE
n-Butylbenzene	DoD-ELAP,NELAP,WADOE
1,2-Dichlorobenzene	DoD-ELAP,ADEC,CALAP,WADOE
1,2-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,WADOE
1,2-Dibromo-3-chloropropane	DoD-ELAP,ADEC,CALAP,WADOE
1,2-Dibromo-3-chloropropane	DoD-ELAP,ADEC,NELAP,WADOE
1,2,4-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,WADOE
1,2,4-Trichlorobenzene	DoD-ELAP,ADEC,CALAP,WADOE
Hexachloro-1,3-Butadiene	DoD-ELAP,ADEC,NELAP,WADOE
Hexachloro-1,3-Butadiene	DoD-ELAP,ADEC,CALAP,WADOE
Naphthalene	DoD-ELAP,ADEC,NELAP,WADOE
Naphthalene	DoD-ELAP,ADEC,CALAP,WADOE
1,2,3-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,WADOE
1,2,3-Trichlorobenzene	DoD-ELAP,ADEC,CALAP,WADOE
Dichlorodifluoromethane	DoD-ELAP,ADEC,CALAP,WADOE
Dichlorodifluoromethane	DoD-ELAP,ADEC,NELAP,WADOE
Methyl tert-butyl Ether	DoD-ELAP,ADEC,CALAP,WADOE
Methyl tert-butyl Ether	DoD-ELAP,ADEC,NELAP,WADOE
n-Hexane	WADOE
n-Hexane	WADOE
2-Pentanone	WADOE
2-Pentanone	WADOE

EPA 8270E-SIM in Water

1,4-Dioxane	WADOE,DoD-ELAP
1,4-Dioxane	WADOE,NELAP,DoD-ELAP



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21-Jul-2020 13:23

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021
WADOE	WA Dept of Ecology	C558	06/30/2020
WA-DW	Ecology - Drinking Water	C558	06/30/2020



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21-Jul-2020 13:23

Notes and Definitions

*	Flagged value is not within established control limits.
B	This analyte was detected in the method blank.
D	The reported value is from a dilution
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
H	Hold time violation - Hold time was exceeded.
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)
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
Y1	Raised reporting limit due to interference
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.



TECHNICAL MEMORANDUM

DATE: August 17, 2020

Project No. 9231000006.2020

TO: Bill Kombol, Palmer Coking Coal Company

FROM: Joseph Xi (Golder Associates)

EMAIL jxi@golder.com

LANDSBURG MINE SITE JUNE 2020 DATA VALIDATION & QUALITY ASSURANCE / QUALITY CONTROL REVIEW

This Data Usability Summary Report (DUSR) presents the findings of the data quality assessment performed on the analyses of water samples collected on June 25, 2020 at the Landsburg Mine Site in Washington (Site) as part of the Landsburg Groundwater sampling project. Samples in the laboratory sample delivery group (SDG) as indicated in Table 1 were reviewed in this DUSR to identify quality issues which could affect the use of the sample data for decision making purposes.

Five water samples, one field duplicate sample, one field blank, and one trip blank were collected by Golder Associates, Inc. (Golder). Samples were analyzed by Analytical Resources Inc. of Tukwila, Washington for the following parameters:

- Volatile Organic Compounds (VOCs) following United States Environmental Protection Agency (USEPA) USEPA SW-846¹ Method 8260D, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS); and
- 1,4-Dioxane following USEPA SW-846 Method 8270E, Semivolatile Organic Compounds by GC/MS.

Quality assurance / quality control (QA/QC) reviews of laboratory data were performed in the laboratory in accordance with the laboratory quality assurance program plan (QAPP). The data validation QA/QC review focused primarily on laboratory results and quality control data to ensure that work plan data quality objectives were met for the project.

Data validation was conducted in accordance with the criteria outlined in the National Functional Guidelines for Organic Review (USEPA 2017²), modified to include method specific requirements of the laboratory, and laboratory standard operating procedures. Where there was a discrepancy between the QC criteria in the Guidelines and the QC criterion established in the analytic methodology, method-specific criteria, the QAPP, or professional judgment was used.

In general, chemical results for the samples collected at the Site were evaluated based on laboratory preservation, hold times, laboratory and field blank contamination, outlying precision or accuracy parameters,

¹ USEPA. 2015. Test methods for evaluating solid waste, physical/chemical methods (SW-846): 3rd edition, and subsequent updates, Environmental Protection Agency, National Center for Environmental Publications, Cincinnati, Ohio, accessed at URL <http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm>

² USEPA. 2017. USEPA Contract Laboratory Program, National Functional Guidelines for Organic Superfund Methods Data Review. OLEM 9355.0-136. EPA-540-R-2017—001/002, January. Available on the Web at: <https://www.epa.gov/clp/superfund-clp-national-functional-guidelines-data-review> (accessed June 26, 2019)

or based on professional judgment. The following definitions provide brief explanations of the qualifiers which may have been assigned to data during the data validation process.

Data Qualifier Definitions

- J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- J+ The result is an estimated quantity, but the result may be biased high.
- U The analyte was analyzed for but was not detected.
- R The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

The validation level for the data is Tier 2A, and included the following:

- Data package completeness assessment
- Verification of required deliverables
- Evaluation of holding times
- Laboratory narrative evaluation
- Evaluation and qualification of QC elements for surrogates, matrix spike samples, laboratory control samples, blanks (method, equipment, and trip blank) laboratory duplicate samples and field duplicate samples
- Evaluation of detection limits

Raw data and calibration elements, including GC instrument tuning and performance check, initial and continuing calibration, internal standard performance, and analyte identification, were not provided by the lab. Data review and validation was performed by an experienced QA personnel independent of the analytical laboratory and not directly involved in the project. Data qualifiers that were applied by the laboratory have been removed from the data summary report sheets, when applicable, and superseded by data validation qualifiers.

Overall, the data review showed that data are acceptable for use, except for 2-chloroethyl vinyl ether for LMW-2-0620 and its duplicate LMW-2-0620-D. The MS/MSD recoveries for 2-chloroethyl vinyl ether for these samples were grossly below QC criteria and therefore rejected. 2-chloroethyl vinyl ether was not detected during the June 2020 sampling round and has never been detected at the Site. Other minor data qualifiers related to sample preservation, MS/MSD recoveries below QC criteria, and matrix interference were also reported. Qualifier Summary Table (Table 2) is included with the qualifiers applied. For details about the data validation, refer to the data validation checklist in Attachment A. The following bulleted items highlight comments and/or qualifications to specific parameters:

- QAPP stipulated matrix spike analysis was not performed along with the VOCs. No action is taken since adequate accuracy and precision data are provided.
- A data completeness of 99.6% was achieved, which exceeds the QAPP stipulated completeness goal of 90%.

Attachments

Attachment A: Tables

Table 1 – Sample Collection and Analysis Summary

Table 2 – Qualifier Summary Table

Attachment B: Level 2A Data Validation Checklist

ATTACHMENT A

Tables

Table 1: Sample Collection and Analysis Summary Landsburg Mine Water Sampling Investigation - June 2020

SDG	Field Identification	Collection Date	Lab Identification	Matrix	QC Samples	Analyses/Parameters	
						VOCs (8260C)	1,4-Dioxane (8270D SIM)
20F0485	LMW-2-0620	06/25/2020	20F0458-01	GW	MS/MSD	x	x
20F0485	LMW-2-0620-D	06/25/2020	20F0458-02	GW	FD (LMW-2-0620)	x	x
20F0485	LMW-FB-0620	06/25/2020	20F0458-03	GW	FB	x	x
20F0485	LMW-4-0620	06/25/2020	20F0458-04	GW	--	x	x
20F0485	LMW-10-0620	06/25/2020	20F0458-05	GW	--	x	x
20F0485	LMW-12-0620	06/25/2020	20F0458-06	GW	--	x	x
20F0485	LMW-13R-0620	06/25/2020	20F0458-07	GW	--	x	x
20F0485	Trip Blank-0620	06/25/2020	20F0458-08	WQ	TB	x	--

Notes:

All analyses performed by Analytical Resources, Incorporated (ARI), Tukwila WA.

Abbreviations:

FB - Field Blank

FD - Field Duplicate

QC - Quality Control

SDG - Sample Delivery Group

GW - Groundwater

TB - Trip Blank

WQ - Water Quality

MS/MSD - Matrix Spike/Matrix Spike Duplicate

SIM - Selected Ion Monitoring

VOCs - Volatile Organic Compounds

Table 2: Qualifier Summary Table Landsburg Mine Water Sampling Investigation - June 2020

SDG	Sample Name	Constituent	New Result	New MDL	New RL	Qualifier	Reason
20F0485	All Samples	Acrolein	--	--	--	UJ	Sample Preservation
20F0485	All Samples	Acrylonitrile	--	--	--	UJ	Sample Preservation
20F0485	All Samples except LMW-2-0620 and LMW-2-0620-D	2-Chloroethyl vinyl ether	--	--	--	UJ	Sample Preservation
20F0485	LMW-2-0620	Vinyl Acetate	--	--	--	UJ	MS/MSD Recoveries Below QC Criteria
20F0485	LMW-2-0620-D	Vinyl Acetate	--	--	--	UJ	MS/MSD Recoveries Below QC Criteria
20F0485	LMW-2-0620	2,2-Dichloropropane	--	--	--	UJ	MS/MSD Recoveries Below QC Criteria
20F0485	LMW-2-0620-D	2,2-Dichloropropane	--	--	--	UJ	MS/MSD Recoveries Below QC Criteria
20F0485	LMW-2-0620	2-Chloroethyl vinyl ether	--	--	--	R	Sample Preservation; MS/MSD Recoveries Grossly Below QC Criteria
20F0485	LMW-2-0620-D	2-Chloroethyl vinyl ether	--	--	--	R	Sample Preservation; MS/MSD Recoveries Grossly Below QC Criteria
20F0485	LMW-2-0620	Vinyl Chloride	--	--	--	UJ	Matrix Interference Reported
20F0485	LMW-2-0620-D	Vinyl Chloride	--	--	--	UJ	Matrix Interference Reported
20F0485	LMW-4-0620	Vinyl Chloride	--	--	--	UJ	Matrix Interference Reported
20F0485	All Samples	All Results	--	--	--	--	Laboratory applied U-qualifiers or J-qualifiers are retained unless other qualifications are indicated in this table. All other laboratory qualifiers are removed.

Abbreviations

QC - Quality Control

SDG - Sample Delivery Group

RL - Reporting Limit

MDL - Method Detection Limit

Qualifier Definitions

R - Rejected Result

UJ - Non-Detect Result; RL is Estimated

ATTACHMENT B

Level 2A Data Validation Checklist

QA LEVEL 2A - DATA VERIFICATION/DATA VALIDATION CHECKLIST

Project Name: Landsburg Groundwater

Project Number/Phase/Task: 9231000006 p2020

Reviewing Company: Golder Associates

Project Manager: Gary Zimmerman

Data Evaluator: Stacy Mason

Data Evaluation Date: July 30, 2020

Checked by: Michael Shadle

Review Date: July 31, 2020

Laboratory: Analytical Resources, Inc., Tukwila, WA

Lab SDG #: 20F0458

Matrix: ☒ Aqueous ☐ Soil ☐ Sediment ☐ Waste ☐ Air ☐ Other:

Analytical Methods: See Table 1.

Sample Information: See Table 1.

Work Plan or QAPP: Compliance Monitoring Plan and QAPP for Landsburg Mine Site (Exhibit D, to the Consent Decree, 2017).

Data Validation Guidance: National Functional Guidelines for Organic Superfund Methods Data Review, EPA-540-R-2017-002, January 2017.

COC and Sample Receipt	YES	NO	NA	COMMENT
a) COC complete and correct?	☒	☐		
b) COC documents release of custody (signed and dated)?	☒	☐		
c) Field QC types provided (note types)?	☒	☐	☐	FD, MS/MSD, and TB; See Table 1
d) Did the cooler contents match the COC?	☒	☐		
e) Were samples received in good condition?	☒	☐		
f) Were cooler temperatures within control limits?	☒	☐		

Data Package Information	YES	NO	NA	COMMENT
a) Laboratory name and location documented?	☒	☐		
b) All samples on COC reported in data package?	☒	☐		
c) Requested analytical methods used?	☒	☐		
d) Requested sample preparation methods used?	☒	☐	☐	
e) Requested analyte list reported?	☒	☐		
f) Requested units reported?	☒	☐	☐	
g) Did the laboratory define the qualifiers used?	☒	☐		
h) Data package contains all information necessary to complete the data quality review?	☒	☐		All Information for a 2A Scope

Analytical Assessment	YES	NO	NA	COMMENT
a) Solid samples reported on a dry-weight basis?	☐	☐	☒	
b) Were solid samples percent moisture criteria acceptable?	☐	☐	☒	
c) Were sample dilutions noted?	☐	☒		
d) Were detected concentrations less than the QL qualified by the laboratory?	☒	☐		No Results Less than QL
e) Were detected concentrations above the calibration range reported by the laboratory?	☐	☒		
f) Did the laboratory satisfy the requested sensitivity requirements?	☒	☐		

Laboratory Case Narrative	YES	NO	NA	COMMENT
a) Do the laboratory narrative or laboratory qualifiers indicate deficiencies?	☒	☐	☐	
b) Were all deficiencies noted in the laboratory qualifiers or narrative?	☒	☐	☐	
Sample Preservation and Holding Time	YES	NO	NA	COMMENT
a) Were samples properly preserved?	☐	☒		See Note 1
b) Were holding times met for sample preparation?	☒	☐	☐	
c) Were holding times met for sample analysis?	☒	☐		
Blanks	YES	NO	NA	COMMENTS
a) Were blanks analyzed at the appropriate frequency?	☐	☐		
b) Were any analytes detected in the associated preparation/method blank?	☒	☐		See Note 2
c) Were any analytes detected in the associated trip blanks?	☐	☒	☐	
d) Were any analytes detected in the associated field or equipment/rinsate blanks?	☐	☐	☒	
e) Were any analytes detected in the associated storage blanks?	☐	☐	☒	
Surrogates or Deuterated Monitoring Compounds	YES	NO	NA	COMMENTS
a) Were the correct surrogate compounds added to each sample?	☒	☐	☐	
b) Were surrogate recoveries within control limits?	☒	☐	☐	
c) If not, were samples analyzed at dilution factors of 20x or greater?	☐	☐	☒	
LCS/LCSD	YES	NO	NA	COMMENTS
a) Were LCS/LCSD reported at the appropriate frequency?	☒	☐		
b) Were proper analytes included in the LCS/LCSD?	☒	☐		
c) Were LCS/LCSD recoveries within control limits?	☐	☒		See Note 3
d) Were RPD values within control limits (if LCSD was analyzed)?	☒	☐	☐	
MS/MSDs	YES	NO	NA	COMMENTS
a) Were project-specific MS (and MSD) reported?	☒	☐		LMW-2-0620
b) Were proper analytes reported in the MS/MSD?	☒	☐	☐	
c) Were project-specific MS/MSD recoveries within control limits?	☐	☒	☐	See Note 4
d) If not, were sample concentrations greater than 4x the spiking concentration?	☐	☒	☐	
e) Was the RPD or absolute difference within control limits (if project-specific MSD analyzed)?	☒	☐	☐	

MS/MSDs	YES	NO	NA	COMMENTS
f) Were project-specific post-digestion spikes analyzed?	☐	☐	☒	
g) Were project-specific post-digestion spike recoveries within control limits?	☐	☐	☒	

Duplicates	YES	NO	NA	COMMENTS
a) Were project-specific laboratory duplicates reported?	☐	☒	☐	
b) Was laboratory duplicate RPD or absolute difference criteria acceptable?	☐	☐	☒	
c) Were field duplicates reported?	☒	☐	☐	LMW-2-0620 / LMW-2-0620-D
d) Was field duplicate RPD or absolute difference criteria acceptable?	☒	☐	☐	

ICP Serial Dilution (SD)	YES	NO	NA	COMMENTS
a) Was project-specific ICP SD data provided?	☐	☐	☒	
b) Were project-specific ICP SD within acceptable criteria?	☐	☐	☒	

Overall Evaluation	YES	NO	NA	COMMENTS
a) Were there any other technical problems not previously addressed?	☒	☐		See Note 5
b) Were data acceptable and usable, except where noted?	☒	☐		

Comments/Notes:

- All VOCs were preserved in accordance with the method requirements to <2 pH with HCL, and the laboratory analyzed analytes 2-chloroethyl vinyl ether, acrolein and acrylonitrile from the preserved VOA vials. Due to the acid-labile nature of analytes 2-chloroethyl vinyl ether, acrolein and acrylonitrile, it is recommended those analytes are collected in and analyzed from unpreserved vials. Based on professional judgment, when samples were outside of method and preservation requirements but all associated LCS/LCSDs were within or above QC criteria, the associated non-detect results for these three analytes were qualified as estimated (UJ) due to possible acid degradation.
- Target analytes were detected in a method blank associated with primary or field duplicate samples. Blank contamination was compared to sample results based on equivalent concentrations. Following the Organic Guidelines, when the blank contamination was above the RL, associated non-detect results did not require qualification.

Blank ID	Method	Analyte	Result	Qualifier	RL	Units
BIG0036-BLK1	SW8260C	Hexachlorobutadiene	0.33		0.2	ug/L

- LCS/LCSD recoveries and RPDs were outside of acceptance criteria for associated primary and field duplicate samples, as shown in the table below. The VOC Guidelines do not indicate actions required for LCS recoveries outside of QC criteria. Using professional judgment, when only one QC indicator (LCS, LCSD, or RPD) was outside QC criteria, associated sample results did not require qualification.

LCS/LCSD ID	Method	Analyte	LCS / LCSD Recovery (%)	RPD (%)	% Recovery / RPD Criteria
BIG0036-BS1 BIG0036-BSD1	SW8260C	1,1-Dichloropropene	121 / 117	3.52	80-120 / 30

LCS/LCSD ID	Method	Analyte	LCS / LCSD Recovery (%)	RPD (%)	% Recovery / RPD Criteria
BIG0036-BS1 BIG0036-BSD1	SW8260C	4-Chlorotoluene	124 / 118	5.10	80-121 / 30
BIG0241-BS1 BIG0241-BSD1	SW8260C	Acrolein	140 / 159	12.70	52-144 / 30
BIG0241-BS1 BIG0241-BSD1	SW8260C	2,2-Dichloropropane	113 / 128	12.50	78-125 / 30

4. Matrix Spike recoveries were outside of acceptance criteria for select analytes, as summarized in the table below for project specific samples. Following Guidelines and using professional judgment, when there was more than one QC indicator (MS, MSD, or RPD) below QC criteria, associated non-detect sample results were qualified as estimated (UJ). Using professional judgment, when the sample used for the MS/MSD was also used for the field duplicate, both the primary sample LMW-2-0620 and field duplicate LMW-2-0620-D were qualified for any MS/MSD deficiencies.

The MS/MSD results for 2-chloroethyl vinyl ether were non-detect and the lab did not calculate the recoveries or RPD. Samples were collected in preserved VOA vials and the recovery was most likely lost due to the acid-labile nature of 2-chloroethyl vinyl ether. Following Guidelines and using professional judgment, when the MS/MSD results were ND and the calculated percent recovery of the associated MS/MSD were below 10%, the associated non-detect results were rejected (R).

Primary Sample Name	Parameter	Analyte	MS/MSD % Recovery	RPD	% Recovery / RPD Criteria
LMW-2-0620	SW8260C	Vinyl Acetate	51.9 / 51.9	0.02	55-138 / 30
LMW-2-0620	SW8260C	2,2-Dichloropropane	71.3 / 70.3	1.48	78-125 / 30
LMW-2-0620	SW8260C	2-Chloroethyl vinyl ether	0 / 0	0	74-127 / 30

5. The laboratory case narrative noted that certain CCVs were outside of control criteria for select analytes in the VOC analysis and marked with the "Q" qualifier. Review of calibration data is outside of the scope of a Level II validation, and the calibration results were not included in the data package. Using professional judgment, as the associated LCS met QC criteria, no rejections were required.

The laboratory assigned the "Y1" qualifier to the Vinyl Chloride results for samples LMW-2-0620, LMW-2-0620-D, and LMW-4-0620 to indicate that the RL was elevated due to matrix interference. Using professional judgment, the associated non-detect results were qualified as estimated (UJ).

Data qualification: See Table 2.

Definitions:

%D:	Percent Difference / Drift	QAPP:	Quality Assurance Project Plan
%R:	Percent Recovery	QC:	Quality Control
CCB:	Continuing Calibration Blank	QL:	Quantitation Limit
CCV:	Continuing Calibration Verification	RB:	Rinsate Blank
COC:	Chain of Custody	RDL:	Reported Detection Limit
CRQL:	Contract Required Quantitation Limit	RL:	Reporting Limit
DMC:	Deuterated Monitoring Compound	RPD:	Relative Percent Deviation
DRO:	Diesel Range Organics	RRF:	Relative Response Factor
EB:	Equipment Blank	RSD:	Relative Standard Deviation
FB:	Field Blank	SD:	Serial Dilution
GRO:	Gasoline Range Organics	SDG:	Sample Delivery Group
HT:	Holding Time	SPLP:	Synthetic Precipitate Leachate Procedure
ICB:	Initial Calibration Blank	SVOC:	Semivolatile Organic Compound
ICV:	Initial Calibration Verification	TAL:	Target Analyte List
IS:	Internal Standard	TAT:	Turn Around Time
LCS:	Laboratory Control Sample	TB:	Trip Blank
LCSD:	Laboratory Control Sample Duplicate	TCL:	Target Compound List
MB:	Method Blank	TCLP:	Toxicity Characteristic Leachate Procedure
MDL:	Method Detection Limit	TDS:	Total Dissolved Solids
MS:	Matrix Spike	TOC:	Total Organic Carbon
MSD:	Matrix Spike Duplicate	TPH:	Total Petroleum Hydrocarbons
PCB:	Polychlorinated Biphenyl	TSS:	Total Suspended Solids
PQL:	Practical Quantitation Limit	VOC:	Volatile Organic Compound
		ZHE:	Zero Headspace Extraction