REPORT

Second Semiannual Groundwater Monitoring Report (Form 1216)

Lovington 66, Facility #1489, February 2018 Monitoring Event

Submitted to:

Tim Noger
Remedial Action Program
New Mexico Environment Department-Petroleum Storage Tank Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, New Mexico 87505

Submitted by:

Golder
5200 Pasadena Avenue, N.E. Suite C Albuquerque, New Mexico, USA 87113

+1 505 821-3043

17926-3

March 28, 2018

Distribution List

Mr. Tim Noger, NMED-PSTB

Mr. Robert Murrell, Jack Walstad Oil Company

File - Golder Associates, Inc.

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COVER PAGE
Form 1216
Groundwater Monitoring Report Event

Site:	Lovington 66
Responsible Party:	Jack Walstad Oil Company Inc.
Responsible Party Mailing Address:	2317 Tuttington Circle Oklahoma City, Oklahoma 73170
Facility ID:	1489
Release ID:	1182
Site Address:	424 South Main Street Lovington, New Mexico
Author/Consulting Company:	Golder Associates Inc.
Date of Report:	March 28, 2018
Date of Confirmation of Release:	December 5, 1991

STATEMENT OF FAMILIARITY

We, the undersigned, are personally familiar with the information submitted in this report and the attached documents and attest that it is complete and true to the best of our knowledge.

Golder Associates Inc.

Emily Clark, CPSS
Project Manager

Todd Stein
Senior Hydrogeologist

EMC/TS/js

1.0 INTRODUCTION

On behalf of Jack Walstad Oil Company (Walstad), Golder Associates Inc. (Golder) completed the second semiannual groundwater monitoring event and third quarter Non-Aqueous Phase Liquid (NAPL) recovery at the former Lovington 66 site (Facility #1489, Release ID #1182). The monitoring event was performed in accordance with the *Work Plan for Groundwater Monitoring and NAPL Bailing/Disposal, Lovington 66 (LUST ID #1182), Lovington, New Mexico* (WPID #17926) prepared by Golder to satisfy the requirements in the New Mexico Administrative Code, Title 20, Chapter 5, Section 12 and the New Mexico Environment Department Petroleum Storage Tank Bureau (NMED-PSTB) Guidelines for Corrective Action (GCA). The work plan was submitted to the NMED-PSTB on June 27, 2017 and approved by NMED-PSTB on August 8, 2017. This report (Deliverable ID 17926-3) is the third deliverable under WPID #17926.

The Lovington 66 (Site) is a former gasoline service station located at 424 South Main Street, Lovington, New Mexico (Figure 1). This site is bounded by Highway 83/Avenue D on the south, and Main Street on the east. Avenue C is north of the site; west of the site is commercial property. Southeast of the site is the Allsup's #109 convenience store and self-service gasoline station (Allsup's), which is also a NMED-PSTB corrective action site. Immediately south of the site, is an Exxon self-service gasoline station. The original Lovington 66 building has been demolished, and a McDonald's restaurant now occupies the property. The former Lovington 66 was located on the southern portion of the property that now is the parking lot for McDonald's. The Site dissolved phase plume has migrated southeast across the intersection of Main and Avenue D and is commingled with the Allsup's site dissolved phase plume.

Significant thickness of non-aqueous phase liquid (NAPL) fuels has been detected at the site in monitoring wells W-1, W-2 and W-3, as well as in Allsup's monitoring well MW-3, located approximately 200 feet downgradient and southeast across the intersection of NM 83 (Avenue D) and Main Street. In 2015, Golder further characterized the NAPL accumulation and performed pilot testing. The pilot testing results indicated that multiple remedial strategies could be implemented at the site including: NAPL recovery, water level suppression with enhanced NAPL recovery, multiphase extraction, or secondary enhanced bioremediation using oxygen injection once NAPL has been recovered. To date a remedial strategy has not been selected. At the request of the NMED-PSTB, Golder has continued NAPL recovery and disposal, and groundwater monitoring events at the site to maximize contaminant reduction during the time required to plan, install, and operate capital remediation equipment at the site.

There are twenty-seven wells in the monitoring network for the Site, including the three Allsup's monitoring wells. However, only nineteen monitoring wells are routinely monitored. Several wells are no longer accessible, destroyed according to previous file records, or were plugged and abandoned. Table 1 lists the available details of the monitoring wells. Wells W-4, W-6 and W-17 have been destroyed since 2006. Well W-10 has a broken well vault and is in the middle of Main Street. Thus, it is generally unsafe to measure fluid levels at this well without a formal traffic control plan. Allsup's site wells MW-1 and MW-2 are also inaccessible. Allsup's well MW-2 was covered in 2014 when the parking lot was repaved. Allsup's well MW-1 well vault is cemented shut.

Table 1: Monitoring Well Network Details

Monitoring Well	Northing[1]	Easting[1]	Casing Elevation	Notes
Allsup's # 109				
MW1	708392.73	843467.49	3909.74	No access - well vault cemented shut
MW2	708398.53	843584.18	3910.05	Well Destroyed -- covered by new cement (parking lot)
MW3	708484.61	843518.13	3910.14	
Walstad 66				
V1	708614.74	843348.54	3910.67	Well Plugged & Abandoned
MPE1	Unknown	Unknown	Unknown	Not Surveyed
W1	708649.18	843347.81	3911.33	
W2	708625.02	843381.13	3910.19	
W3	708597.9	843348.6	3910.29	
W4	Unknown	Unknown	99.62	Well Destroyed
W5	708759.72	843252.39	3911.71	
W6	Unknown	Unknown	99.48	Well Destroyed
W7	708910.73	843120.516	3910.88	
W8	708389.76	843640.62	3909.92	
W9	708267.18	843790.26	3908.72	
W10	708254.54	843452.92	3908.89	No access to well, well vault broken
W11	708600.95	843650.96	3909.96	
W12	708435.38	843045.85	3910.59	
W13	708915.13	843525.37	3910.36	
W14	708504.99	843463.76	3909.73	
W15	708195.85	843053.51	3909.71	
W15	708221.991	843030.65	3909.4	
W16	708153.28	843364.45	3908.67	
W17	Unknown	Unknown	96.94	Well Destroyed
W18	708697.213	843818.977	3909.38	
W19	708148.942	843934.177	3908.36	
W20	707780.845	844187.25	3907.45	
W21	707988.787	843841.613	3908.49	

Notes: [1] Casing elevations for some wells have changed over time. Final casing elevation listed.
[2] "Well Destroyed" is a legacy file note. There are no records to indicate if the wells were plugged and abandoned.

LEGEND

- W-11 — LOCATION OF GROUNDWATER MONITORING WELL IN THE WALSTAD 66 SITE NETWORK
- MW-3 — LOCATION OF GROUNDWATER MONITORING WELL IN THE ALLSUPS SITE NETWORK

0 60 120
1" = 120' FEET

CLIENT
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
SANTA FE, NEW MEXICO

PROJECT
WALSTAD 66
424 SOUTH MAIN
LOVINGTON, NEW MEXICO

TITLE
SITE MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2018-03-26
DESIGNED	KK
PREPARED	JLS
REVIEWED	EMC
APPROVED	TS

PROJECT NO.	PHASE	REV.	FIGURE
1782919	3	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

2.0 ACTIVITIES PERFORMED DURING THIS EVENT

Golder gauged water levels, bailed NAPL where present, and collected groundwater samples during this monitoring event.

2.1 Description of Remediation System

The Site does not have a remediation system. Previous corrective action and monitoring activities on the Site include:

- July 1991 – AEI Tank, Inc. (AEI) conducted a site assessment that included seven soil borings advanced within the underground storage tank (UST) backfill or UST perimeter, and five borings in or near product pipe trenches. Hydrocarbon contamination was observed.
- November 1991 – AEI removed five USTs that contained diesel, unleaded fuels, and used oil, as well as the associated product piping and fuel dispensers. Hydrocarbon contamination was observed in the location of the dispensers and the location of the diesel tank. It was determined that a release likely occurred from overfilling the USTs and from the dispensers and product lines (a large section of product piping had been replaced).
- November and December 1991 – AEI excavated approximately 600 cubic yards of contaminated soil from product line trenches, dispenser islands, and tank excavations.
- December 1991 – AEI attempted to delineate the vertical extent of contamination by installing one soil boring. The location of this soil boring was never documented. During the drilling of the boring auger refusal was encountered at 40 feet below ground surface (bgs).
- February 1992 – AEI installed one groundwater monitoring well. Groundwater sample results indicated that groundwater contamination was present above New Mexico Water Quality Control Commission (NMWQCC) standards.
- March 1992 – AEI installed two additional monitor wells to determine the extent of dissolved phase hydrocarbon contamination. Both wells had dissolved phase hydrocarbon concentrations well above NMWQCC standards.
- June 1992 – Billings & Associates, Inc. (BAI) completed an Interim Hydrogeologic Investigation Report. During this investigation six soil borings (B-4 through B-9) were advanced at the site to a depth of 40 feet bgs. Heated headspace measurements above action levels were present in all borings except B-8. NAPL was present in the three monitor wells installed by AEI. Three additional monitor wells W-4, W-5, and W-6 were installed. The three new wells exceeded NMWQCC standards.
- September 1993 – BAI completed a 2nd Interim Hydrogeologic Investigation Report. During this investigation, free product recovery efforts were made using BAI's Product Recovery Filter system. In addition, BAI installed six new monitor wells (W-7 through W-12) and vertical extent well V-1.
- June 1993 – BAI submitted the 3rd Interim Hydrogeologic Investigation Report. Five wells (W 13 through W-17) were installed to delineate the dissolved phase plume. NAPL was present in vertical extent well V-1, which BAI attributed to leaking well casing.
- August 2006 – Golder sampled the Lovington 66 wells as part of an investigation conducted at the Allsup's site located downgradient from the Lovington 66 site.

- November 2007 – Golder completed a Continued Secondary Investigation to delineate the downgradient extent of contamination. Golder installed three downgradient wells (W-19, W-20, and W-21) and completed a NAPL bail down test on wells W-2 and W-3.
- June and July 2015 – Golder installed and completed pilot testing of a multiphase extraction well (MPE 1). Golder also completed multiphase vacuum extraction pilot testing and NAPL bail-down recovery testing on Walstad wells W-1, W-2 and W-3.
- September 2017 – Golder rehabilitated monitoring well W-7 to remove root build up in the well.
- Golder performed periodic groundwater monitoring between August 2006 and the present.

2.2 Monitoring Activities Performed

Monitoring activities performed as part of the third deliverable under WPID #17926 included the second semi-annual groundwater monitoring event and the third quarterly NAPL recovery event. Golder subcontracted CMB Environmental & Geological Services, Inc. (CMB) to perform all field monitoring activities at the Site. CMB completed field activities on February 20, March 1, and March 2, 2018.

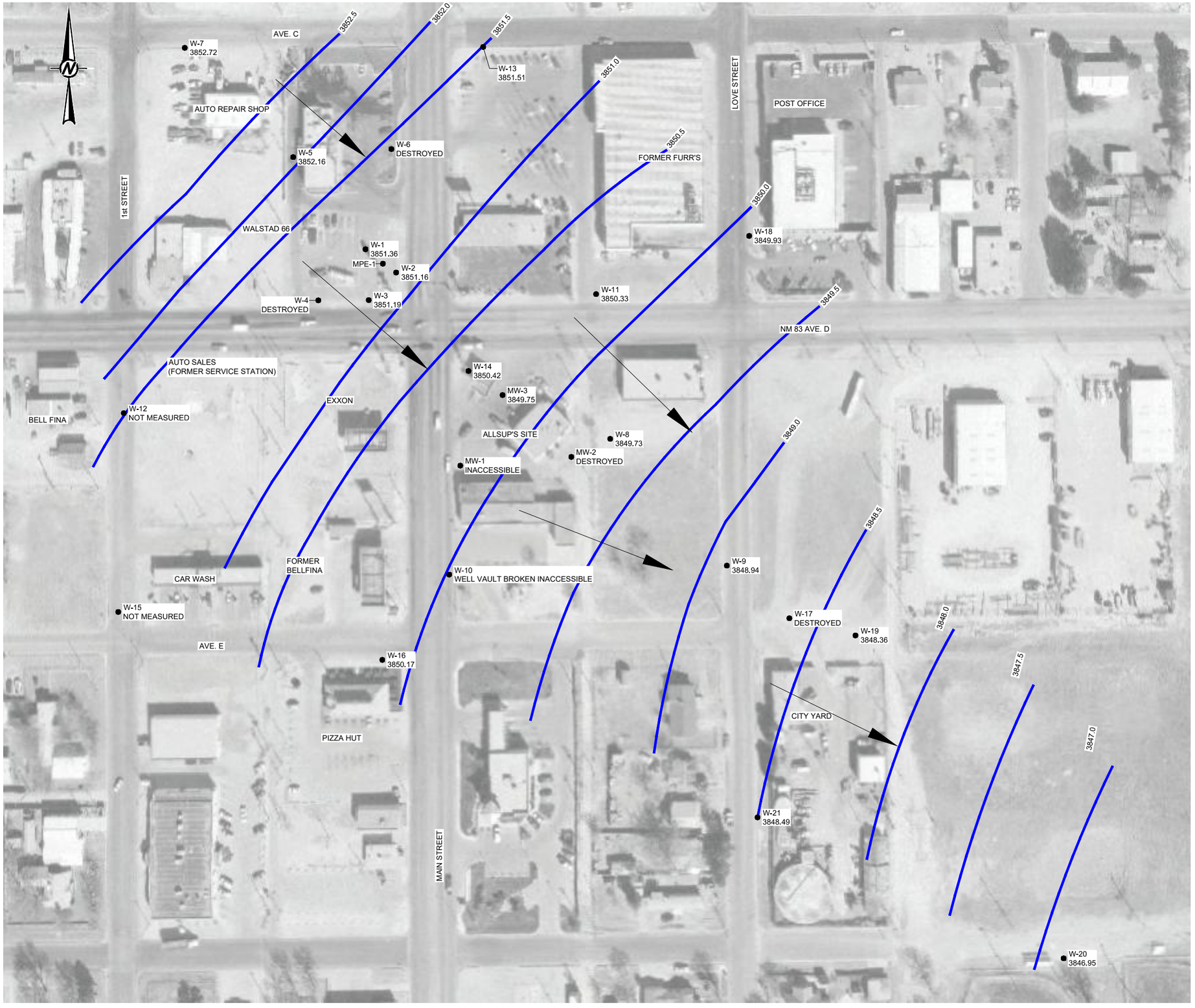
2.2.1 Groundwater Gauging

CMB measured groundwater levels with an interface probe in all accessible monitoring wells except W-12 and W-15. Groundwater measurements and elevations are summarized in Table 2. The potentiometric surface map for the monitoring well data is shown in Figure 2. Well gauging data from MW-3 was not used to develop the groundwater contours. Hydrographs for selected monitoring wells and cumulative water level data for the period of record are presented in APPENDIX A. On average, groundwater elevations increased about 0.33 feet since the last monitoring event in September 2017.

Table 2: February-March 2018 Groundwater Gauging Data

Monitoring Well	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Notes
Allsup's					
MW-3	59.75	2.55	62.30	3849.75	
Walstad 66					
MPE1	57.70	6.35	64.05	-	No Survey Data
W-1	58.46	6.04	64.50	3851.36	
W-2	57.43	6.39	63.82	3851.16	
W-3	57.55	6.20	63.75	3851.19	
W-5	-	-	59.55	3852.16	
W-7	-	-	58.16	3852.72	
W-8	-	-	60.19	3849.73	
W-9	-	-	59.78	3848.94	
W-11	-	-	59.63	3850.33	
W-12	-	-	-	-	Not Measured
W-13	-	-	58.85	3851.51	
W-14	57.93	5.52	63.45	3850.42	
W-15	-	-	-	-	Not Measured
W-16	-	-	58.5	3850.17	
W-18	-	-	59.45	3849.93	
W-19	-	-	60.00	3848.36	
W-20	-	-	60.50	3846.95	
W-21	-	-	60.00	3848.49	

Notes: NM = Not Measured



LEGEND

- W-11 — LOCATION OF GROUNDWATER MONITORING WELL IN THE WALSTAD 66 SITE NETWORK
- MW-3 — LOCATION OF GROUNDWATER MONITORING WELL IN THE ALLSUPS SITE NETWORK
- DIRECTION OF GROUNDWATER GRADIENT
- PROJECTED GROUNDWATER ELEVATION CONTOUR FEET ABOVE MEAN SEA LEVEL

NOTES:

1. MW-3 NOT USED TO DRAW CONTOURS

0 60 120
1" = 120' FEET

CLIENT
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
SANTA FE, NEW MEXICO

PROJECT
WALSTAD 66
424 SOUTH MAIN
LOVINGTON, NEW MEXICO

TITLE
POTENTIOMETRIC SURFACE MAP - FEBRUARY-MARCH 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2017-08-27
DESIGNED	KK
PREPARED	JLS
REVIEWED	EMC
APPROVED	TS

PROJECT NO.	PHASE	REV.	FIGURE
1782919	3	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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2.2.2 NAPL Thickness and Recovery

CMB gauged wells MPE-1, W-1, W-2 and W-3 on February 20, 2018 pursuant to the third quarterly NAPL bailing event. CMB gauged the wells, bailed and then re-gauged. NAPL was present in all four of the Lovington 66 monitor wells (MPE-1, W-1, W-2, and W-3). During the semi-annual groundwater monitoring event on March 1 and 2, 2018, CMB found NAPL present in MW-14 and Allsup's well MW-3, both approximately 150 feet to 200 feet downgradient to the southeast. In all, NAPL was observed in six wells during this monitoring period and thicknesses ranged from 2.55 to 6.39 feet (Table 2). The current estimated NAPL plume distribution is shown on Figure 3.

APPENDIX B contains a cumulative summary of the NAPL thicknesses and recovered quantities from the Lovington 66 monitor wells since 2008. Allsup's well MW-3 and well MW-14 were not bailed as they are not part of the approved work plan NAPL bailing schedule. Approximately 486 gallons of NAPL have been recovered since 2008.

Approximately 25.6 gallons of NAPL and 22.4 gallons of contaminated groundwater were recovered from the wells during the February 20, 2018 bailing event. The NAPL and highly contaminated groundwater were transported to the Gandy Marley disposal facility in Roswell; a copy of the documentation of disposal is included in APPENDIX C.

LEGEND

W-11	LOCATION OF GROUNDWATER MONITORING WELL IN THE WALSTAD 66 SITE NETWORK
MW-3	LOCATION OF GROUNDWATER MONITORING WELL IN THE ALLSUPS SITE NETWORK
	NAPL PLUME
(FP=6.04)	FREE PRODUCT (THICKNESS IN FEET)

VOC CONCENTRATIONS AT WELL 1/2/2017

Benzene	BTEX	MTBE
EDB	EDC	Total Napthalene

ALL CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

BOLD FONT INDICATED THAT CONCENTRATION EXCEEDS NMWQCC STANDARD

0 60 120
1" = 120' FEET

CLIENT
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
SANTA FE, NEW MEXICO

PROJECT
WALSTAD 66
424 SOUTH MAIN
LOVINGTON, NEW MEXICO

TITLE
DISTRIBUTION OF ORGANIC CONTAMINANTS IN GROUNDWATER - FEBRUARY-MARCH 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2018-03-26
DESIGNED	KK
PREPARED	JLS
REVIEWED	EMC
APPROVED	TS

PROJECT NO.	PHASE	REV.	FIGURE
1782919	3	0	3

2.2.3 Groundwater Sampling and Results

CMB collected groundwater samples from eight of the nineteen active monitor wells on March 1 and 2, 2018. This is a deviation from the approved Workplan which specified sampling nine wells. MW-14 could not be sampled due to the presence of NAPL. CMB sampled each well using new disposable polyethylene bailers. Wells were sampled from the lowest reported contamination areas to the highest reported contamination areas, based on previous results, to the extent possible. All reusable equipment (e.g., monitoring probes) was cleaned between wells with an Alconox™ solution and deionized water to avoid cross-contamination. Purge water was discharged on an impervious surface in accordance with Section 1.7.2 of the GCA.

CMB measured field parameters during purging and prior to sampling. Each well was purged until at least three casing volumes of water had been removed. Specific conductance, dissolved oxygen (DO), pH, Oxidation-Reduction Potential (ORP) and temperature were recorded on monitoring well sampling field forms. Copies of the field purge parameter data are included in APPENDIX C. ORP measurements were two to ten times more negative than the previous two sampling events. Golder believes these data are anomalous, thus we did not create a Figure of the ORP distribution. CMB confirmed the meter was calibrated and/or checked against standards in accordance with manufacturer's specifications prior to use, but there is potential that the ORP probe went bad during the event.

Groundwater samples from monitor wells were collected directly into the laboratory supplied 40 milliliter (mL) glass vials from the disposable bailers. Samples collected for volatile organic compound analysis (U.S. Environmental Protection Agency [EPA] Method 8260) were preserved with mercuric chloride, collected such that no headspace was present in the 40-mL vials, stored in coolers filled with ice, and shipped under chain-of-custody to Hall Environmental Analysis Laboratory (Hall) in Albuquerque, New Mexico. The analytical laboratory reports and associated chain-of-custody forms are provided in APPENDIX D.

Analytical results for the groundwater samples collected on March 1 and 2, 2018 are listed in Table 3. Graphs of concentration trends in selected wells and cumulative analytical results for the period of record are shown in APPENDIX E.

Notable findings from this event are summarized as follows:

- Dissolved phase hydrocarbon concentrations were at or above NMWQCC standards in four of the eight monitor wells sampled.
- Well W-14 was not sampled due to the presence of NAPL. Well W-14 is presumed to exceed regulated limits for gasoline derived groundwater contaminants.
- Benzene concentrations exceeded the NMWQCC standard of 10 micrograms per liter (µg/L) in samples collected from W-8 (12,000 µg/L) and W-9 (4,100 µg/L). Note, the W-5 benzene concentration was just below the regulatory limit at 9.9 µg/L.
- Toluene concentrations exceeded the NMWQCC standard of 750 micrograms per liter (µg/L) in the sample collected from W 8 (5,200 µg/L).
- Ethylbenzene concentrations exceeded the NMWQCC standard of 750 micrograms per liter (µg/L) in the sample collected from W-8 (2,200 µg/L).
- Xylenes concentration exceeded the NMWQCC standard of 620 micrograms per liter (µg/L) in the sample collected from W 8 (4,900 µg/L).

- Methyl tert-butyl ether (MTBE) concentrations exceeded the NMWQCC standard of 100 micrograms per liter (µg/L) in samples collected from W-8 (12,000 µg/L) and W-9 (660 µg/L).
- Ethylene dichloride (EDC) concentrations exceeded the 10 µg/L NMWQCC standard in samples collected from W-8 (230 µg/L), W-9 (600 µg/L), W-11 (40 µg/L), and W 19 (71 µg/L).
- Total naphthalene concentrations (total of reported naphthalene, 1 methylnaphthalene, and 2-methylnaphthalene concentrations) exceeded the NMWQCC standard of 30 µg/L standard in samples collected from W-8 (480 µg/L) and W-9 (120 µg/L).
- The detection limit for ethylene dibromide (EDB) concentrations exceeded NMWQCC standard (0.1 µg/L) for all wells and no samples exceeded the detection limit for any of the wells tested.

Table 3: March 1 and 2, 2018 VOC Concentrations in Micrograms per Liter (µg/L)

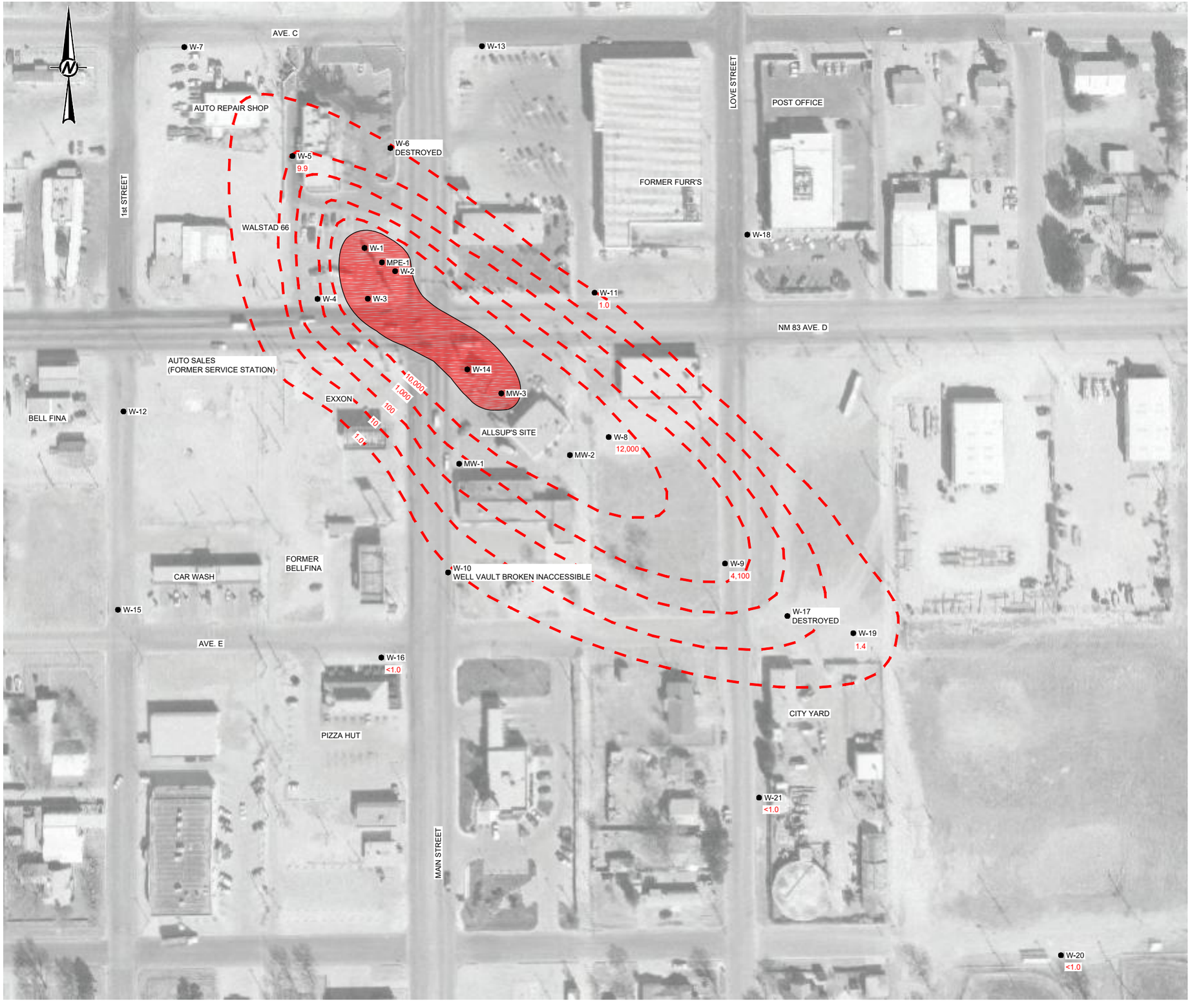
Monitoring Well	Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDB	EDC	Total Naphthalenes
NMWQCC Standard	**10**	**750**	**750**	**620**	**100**	**0.1**	**10**	**30**
W-5	9.9	<1.0	2.3	2.7	1.5	<1.0	<1.0	<4.0
W-8	**12,000**	**5,200**	**2,200**	**4,900**	**12,000**	<100	**230**	**480**
W-9	**4,100**	<20	35	38	**660**	<20	**600**	**120**
W-11	1.0	<1.0	1.1	1.8	80	<1.0	**40**	<4.0
W-14	NA	NA	NA	NA	NA	NA	NA	NA
W-16	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
W-19	1.4	<1.0	<1.0	<1.5	<1.0	<1.0	**71**	<4.0
W-20	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
W-21	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0

Notes: **Bold** indicates exceedance of standard; MTBE = methyl tert-butyl ether; EDB = ethylene dibromide; EDC = ethylene dichloride; NA = Not Analyzed

The current distributions of dissolved phase benzene, MTBE, and EDC in groundwater are shown on Figure 4, Figure 5, and Figure 6.

2.3 Statement Verifying Containment of Release

The Lovington 66 dissolved phase plume has migrated southeast across the intersection of Avenue D and Main Street to Avenue E southeast of the site (Figure 4,Figure 5, and Figure 6). The NAPL plume appears to have migrated beneath the intersection of Avenue D and Main Street with NAPL noted in Allsup's network well MW-3, and as of this monitoring period, well W-14 (Figure 3). The downgradient extent of the dissolved phase plume appears to be upgradient of wells W-20 and W-21. Cumulative NAPL data, as well as dissolved VOC data from downgradient wells W-9 and W-19 indicate that the dissolved phase plume is mobile to the southeast.



LEGEND

- W-11 — LOCATION OF GROUNDWATER MONITORING WELL SHOWING DESIGNATION AND DISSOLVED BENZENE
- 32,000 — CONCENTRATION (µg/L) IN GROUNDWATER SAMPLE COLLECTED 1/2/2017
- 10 — ISOPLETH ON PROJECTED EQUAL DISSOLVED BENZENE CONCENTRATION (µg/L)
- NAPL PLUME

0 60 120
1" = 120' FEET

CLIENT
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
SANTA FE, NEW MEXICO

PROJECT
WALSTAD 66
424 SOUTH MAIN
LOVINGTON, NEW MEXICO

TITLE
DISTRIBUTION OF DISSOLVED BENZENE IN GROUNDWATER - FEBRUARY-MARCH 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2018-03-26
DESIGNED	KK
PREPARED	JLS
REVIEWED	EMC
APPROVED	TS

PROJECT NO.	PHASE	REV.	FIGURE
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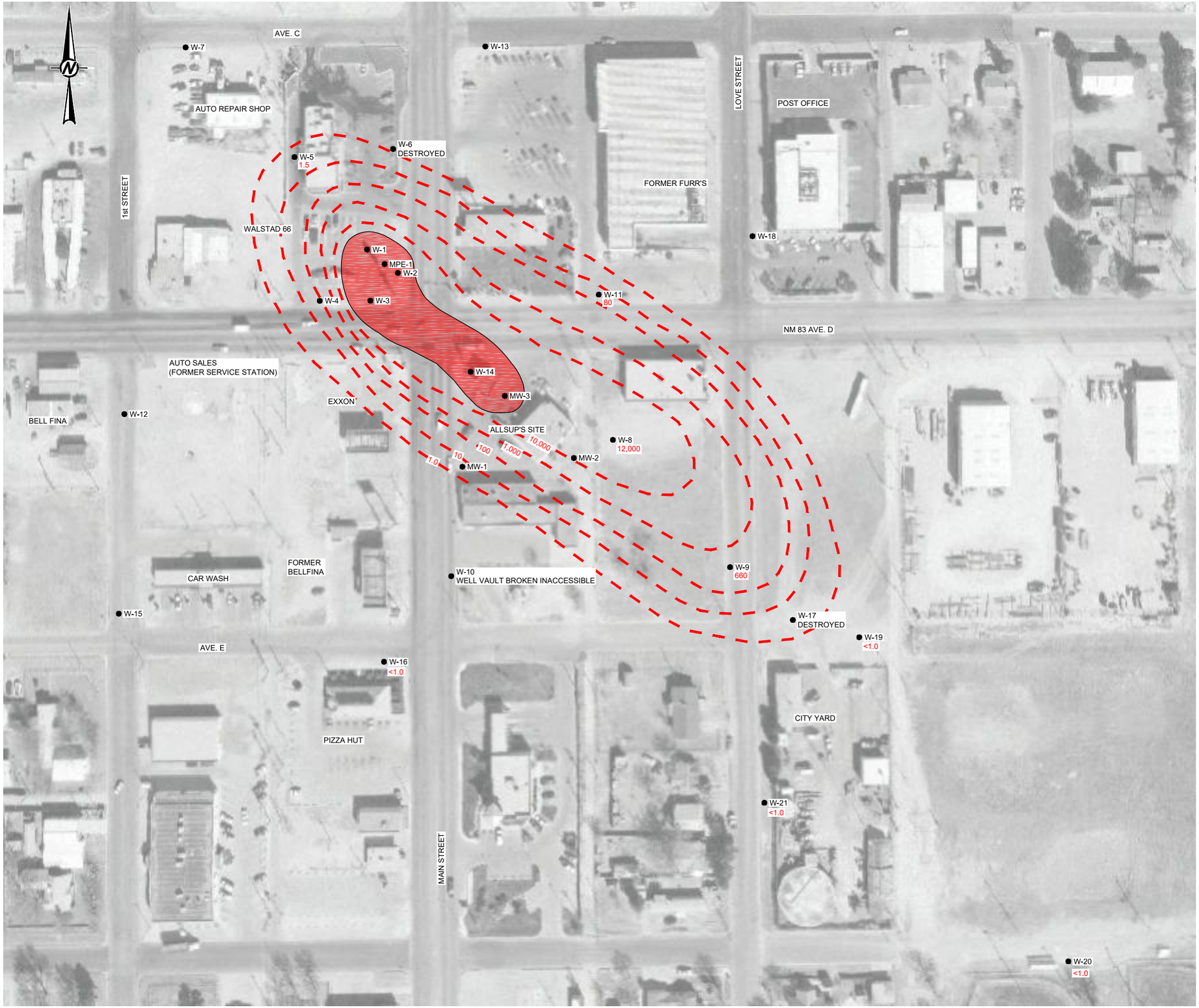

LEGEND

- W-11 — LOCATION OF GROUNDWATER MONITORING WELL SHOWING DESIGNATION AND DISSOLVED MTBE
- 32,000 — CONCENTRATION (µg/L) IN GROUNDWATER SAMPLE COLLECTED 1/2/2017
- 10 — ISOPLETH ON PROJECTED EQUAL DISSOLVED mtbe CONCENTRATION (µg/L)
- NAPL PLUME

0 60 120
1" = 120' FEET

CLIENT
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
SANTA FE, NEW MEXICO

PROJECT
WALSTAD 66
424 SOUTH MAIN
LOVINGTON, NEW MEXICO

TITLE
DISTRIBUTION OF DISSOLVED MTBE IN GROUNDWATER - FEBRUARY-MARCH 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2018-03-26
DESIGNED	KK
PREPARED	JLS
REVIEWED	EMC
APPROVED	TS

PROJECT NO.	PHASE	REV.	FIGURE
1782919	3	0	5

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LEGEND

- W-11 — LOCATION OF GROUNDWATER MONITORING WELL SHOWING DESIGNATION AND DISSOLVED EDC
- 32,000 — CONCENTRATION (µg/L) IN GROUNDWATER SAMPLE COLLECTED 1/2/2017
- 10 — ISOPLETH ON PROJECTED EQUAL DISSOLVED EDC CONCENTRATION (µg/L)
- NAPL PLUME

0 60 120
1" = 120' FEET

CLIENT
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
SANTA FE, NEW MEXICO

PROJECT
WALSTAD 66
424 SOUTH MAIN
LOVINGTON, NEW MEXICO

TITLE
DISTRIBUTION OF DISSOLVED EDC IN GROUNDWATER - FEBRUARY-MARCH 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2018-03-26
DESIGNED	KK
PREPARED	JLS
REVIEWED	EMC
APPROVED	TS

PROJECT NO.	PHASE	REV.	FIGURE
1782919	3	0	6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Path: \\tucson\cadd\NMED\walstad66\as\199_projects\1782919_gwmon\0001_BiAnnual_Mon\02_PRODUCTION\DWG\ | File Name: 1782919_0001_FIG_006.dwg | Last Edited By: jlsanchez Date: 2018-03-26 Time:2:28:54 PM | Printed By: JeDiaz Date: 2018-03-28 Time:10:52:07 AM

3.0 SUMMARY AND CONCLUSIONS

This section summarizes the results of the February-March 2018 groundwater monitoring event and includes a brief discussion of water level and contaminant concentration trends at the Site. Additionally, recommendations for future site activities are provided.

3.1 Discussion of General Trends

The groundwater gauging results from February-March 2018 indicate that there is a general southeasterly groundwater flow at the Site. The groundwater flow directions observed in February-March 2018 are consistent with the flow directions observed during the previous monitoring event in September 2017. The hydraulic gradient is quite flat, approximately 0.005 foot per foot (Figure 2).

Depth to shallow groundwater at the site is approximately 58 to 65 feet bgs. The hydrographs in APPENDIX A show a general decline in groundwater levels at the Site of about 6 feet since 2007. The water levels within the individual monitoring wells generally increased by about 0.33 feet between September 2017 and February-March 2018.

The estimated distribution of NAPL is shown on Figure 3. NAPL was present in Lovington wells W-1, W-2, W-3, MPE-1, and W-14. NAPL was also detected in Allsup's site well MW-3. NAPL has historically been detected in W-1, W-2, and W-3 (APPENDIX A), but NAPL observations south of the site were first recorded in mid-2016 and 2017 (MW-3 and MW-14) indicating more recent migration. NAPL thickness measurements in February-March 2018 decreased slightly from the September 2017 monitoring event, except for Allsup's well MW-3. The NAPL thickness in Allsup's well MW-3 increased about 2 feet since the previous event. The Allsup's site is monitored by NMED-PSTB as a separate facility.

The distribution of dissolved phase organic contaminants determined from analytical data from samples collected on March 1 and 2, 2018 are shown in Figure 3. The distribution of benzene in the groundwater observed in March 2018 is shown on Figure 4. The dissolved phase benzene concentration in well W 8 (12,000 µg/L) was approximately 3 orders of magnitude greater than the NMWQCC standard of 10 µg/L. The shape and magnitude of the dissolved benzene plume is generally unchanged since the previous monitoring event in September 2017 and is consistent with historical concentrations.

The distribution of MTBE in groundwater observed in March 2018 is shown on Figure 5. The greatest MTBE concentration is downgradient from the NAPL plume near well W-8. EDC concentrations from the March 2018 monitoring event are shown on Figure 6. EDC concentrations are also greatest downgradient from the NAPL plume near well W-8. The dissolved phase EDC plume extends past downgradient well W-19 (71 µg/L). The overall shapes of the mapped groundwater analyte plumes do not show significant regression or further excursion of dissolved fuel contaminants than those mapped during the previous sampling event in September 2017. The results from the current monitoring event are consistent with the period of record measurements (APPENDIX E).

Historical trends in the concentrations of dissolved phase organic contaminants within the individual monitoring wells are shown in the plots included in APPENDIX E. A significant spike in the concentration of benzene was detected in samples collected from side-gradient well W-16 between August 2006 and January 2009. A similarly-timed spike in MTBE concentration was noted in samples collected from side-gradient well W-11. These spikes may be associated with mobilization of adsorbed contaminants occurring during the period when groundwater levels rose and peaked during approximately the same time frame. MTBE concentrations have declined in MW-8 and have risen in MW-9 and MW-11 since the January 2014 monitoring.

3.2 Recommendations

Based on the results of the second semiannual groundwater monitoring event and third quarter NAPL recovery event under WPID 17926, we conclude that the geometry of the dissolved phase fuel contaminant plume at the site has not changed significantly since the site was placed into regulatory enforcement in 1991. Separate phase fuel, however, appears to be mobile downgradient and to the southeast with NAPL observations in monitoring wells MW-3 and W-14. The estimated NAPL plume is now projected slightly larger to the south to include W-14 and MW-3.

The results of MPE pilot testing performed at the site in 2015 indicate that hydraulic conductance of sediments in the adsorbed fuel plume is limited. Vapor flow rates were found to be modest; however, NAPL recovery rates were noted to be significant. During the combined 16.6 hours of MPE operations performed during pilot testing, a total of 141 gallons of NAPL were recovered from the three tested wells, and the equivalent of an additional 89 gallons of fuel was recovered as vapor. Therefore, we recommend that NAPL recovery and/or MPE be implemented at the site.

Until active remediation is implemented, we recommend that semi-annual groundwater monitoring continue and that more frequent and aggressive NAPL recovery be performed using total fluids recovery from existing site wells and produced fluid be disposed at a permitted facility.

Signature Page

Golder Associates Inc.

Emily Clark, CPSS
Project Manager

Todd Stein
Senior Hydrogeologist

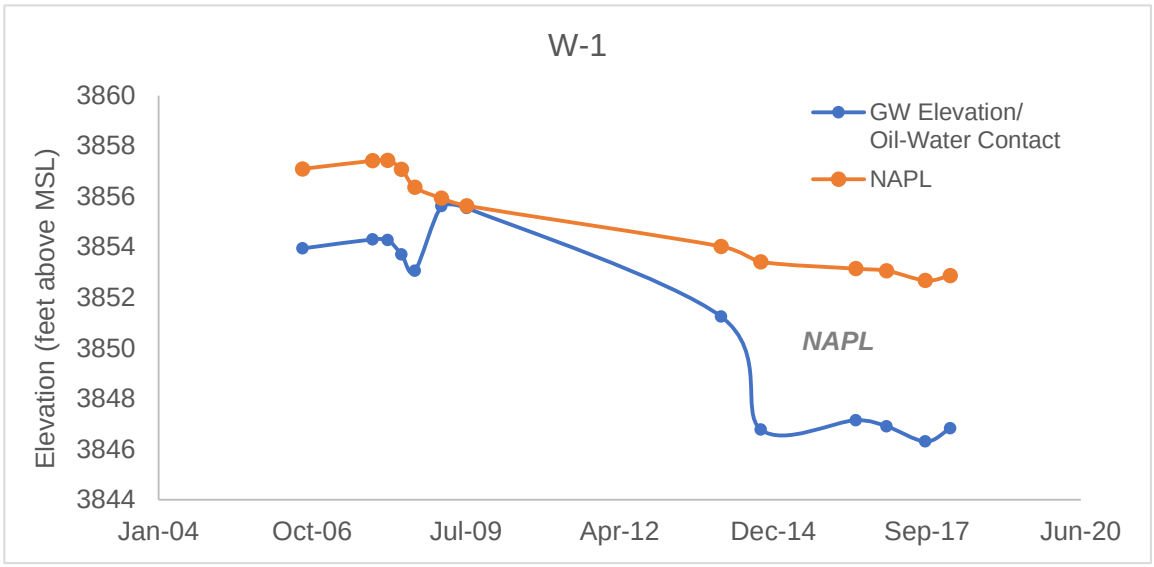
EMC/TS/js

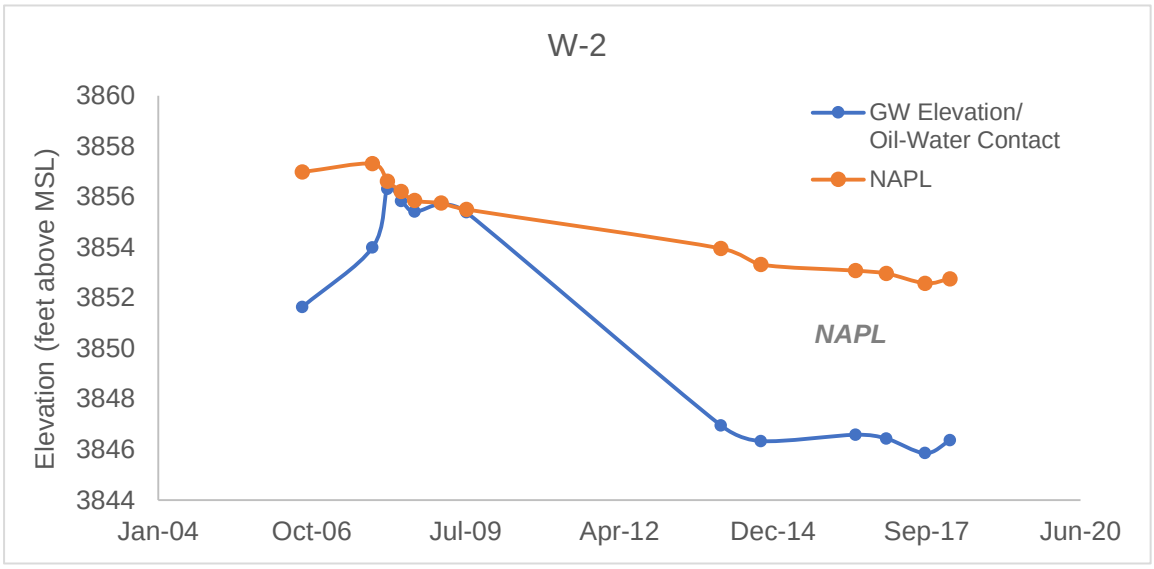
https://golderassociates.sharepoint.com/sites/17549g/deliverables/17926-3/1782919-003-r-rev0-20180328.docx

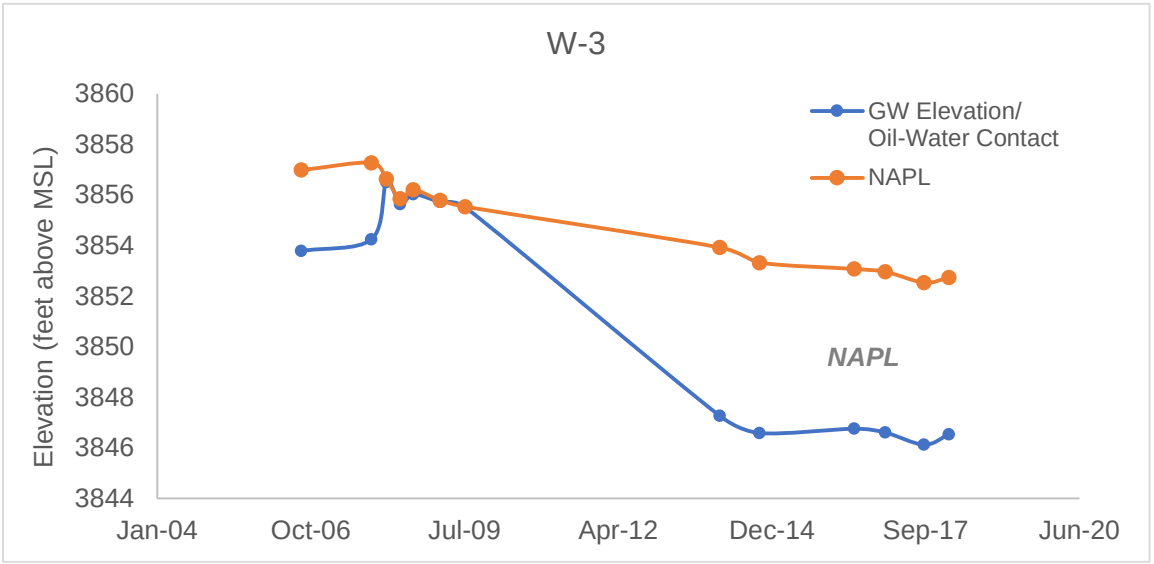
APPENDIX A

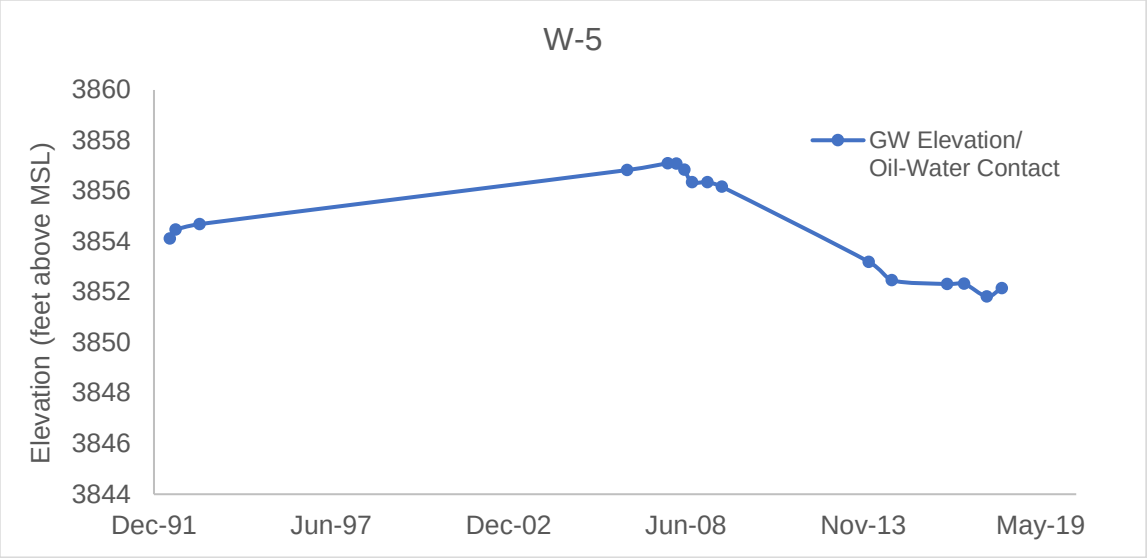
Monitoring Well Hydrographs and Cumulative Water Level Data

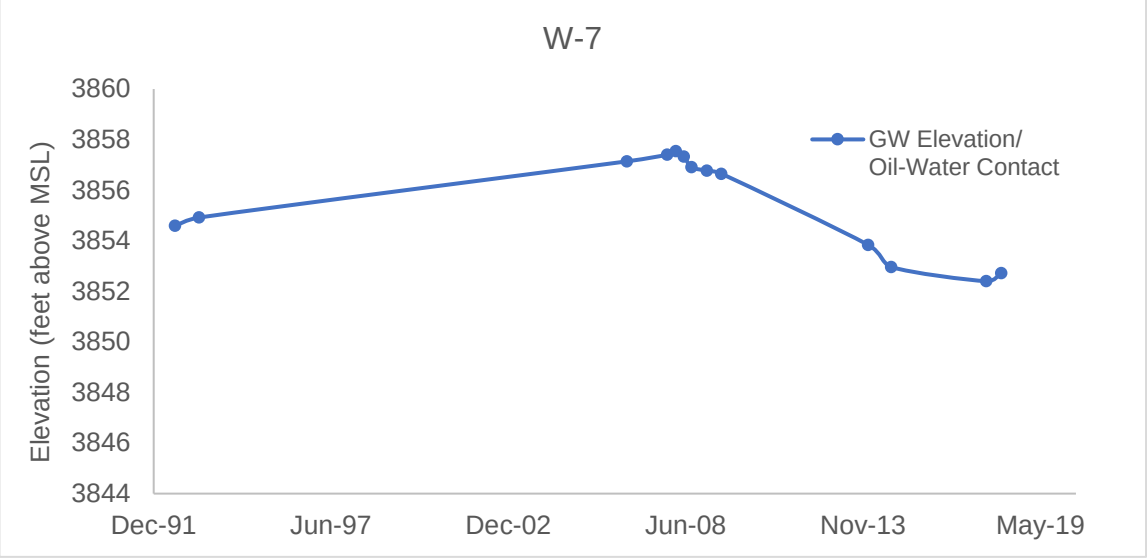
Appendix A
Monitoring Well Hydrographs
Lovington 66








W-5
Elevation (feet above MSL)
3860
3858
3856
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact


W-7
Elevation (feet above MSL)
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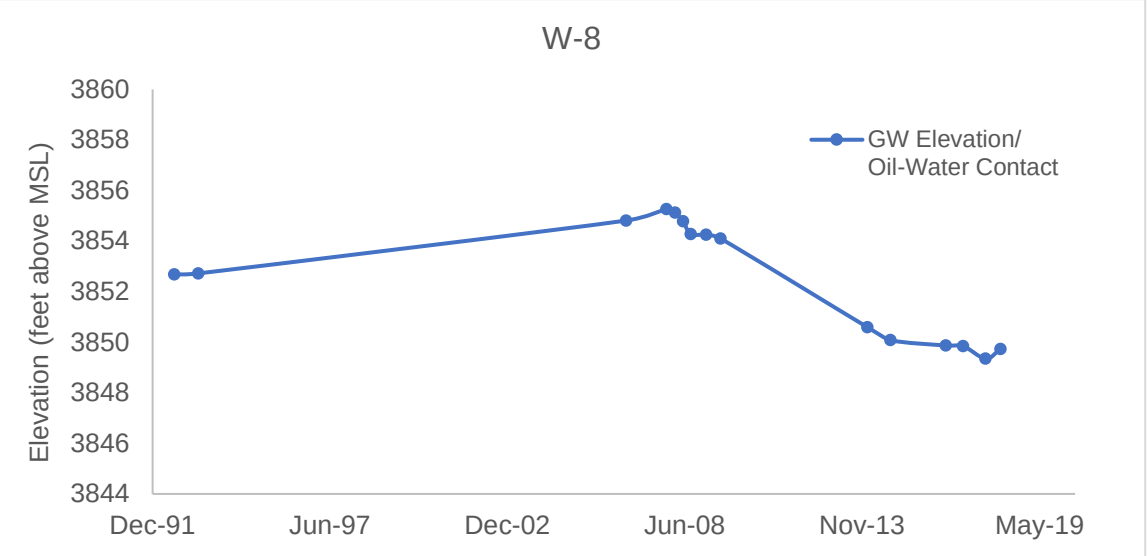
3858
3856
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact


W-8
Elevation (feet above MSL)
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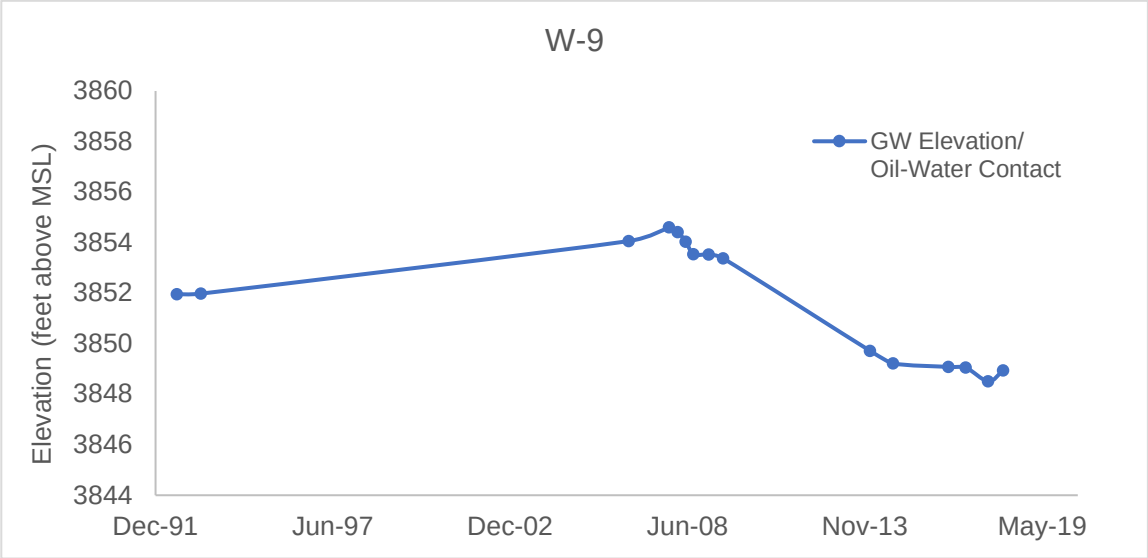
3858
3856
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact


W-9
Elevation (feet above MSL)
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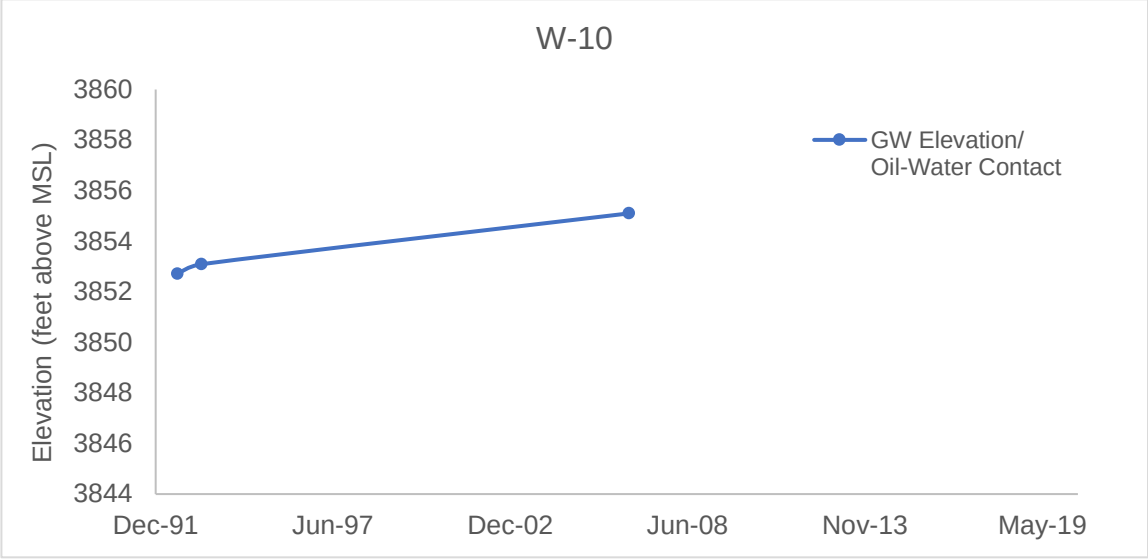
3856
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact


W-10
Elevation (feet above MSL)
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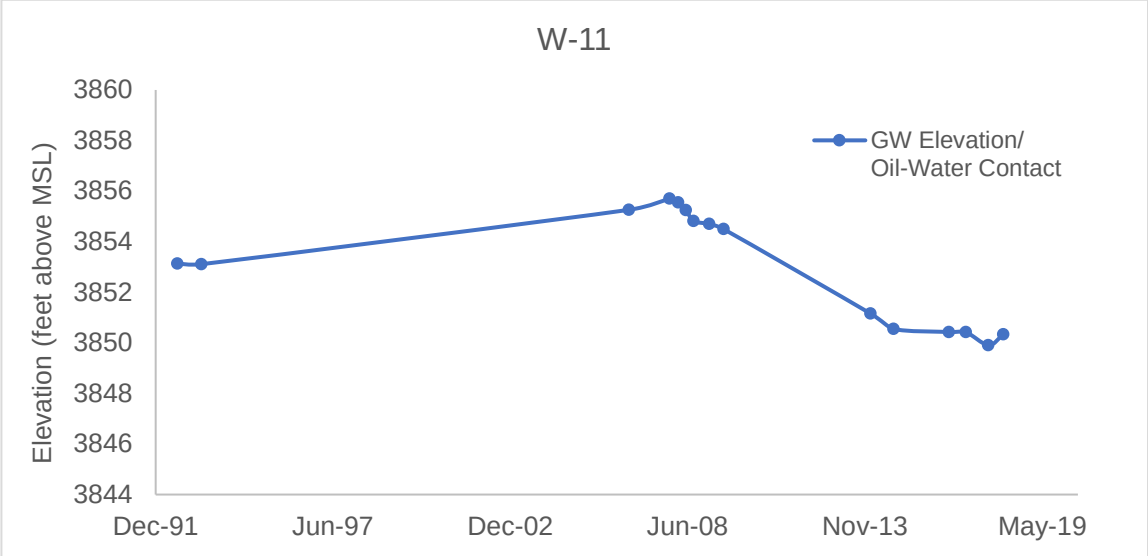
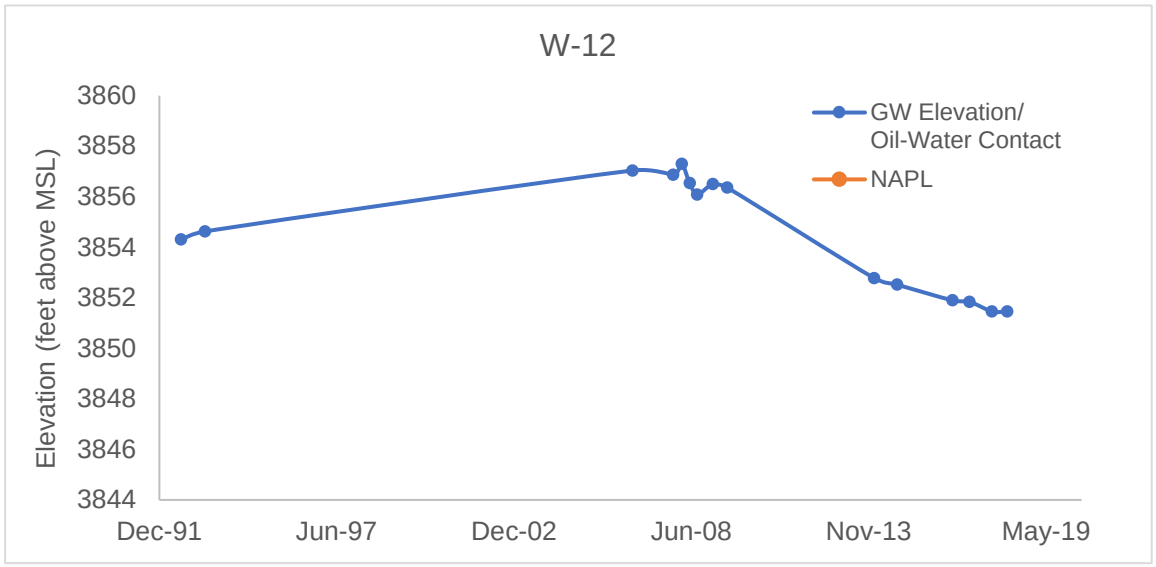
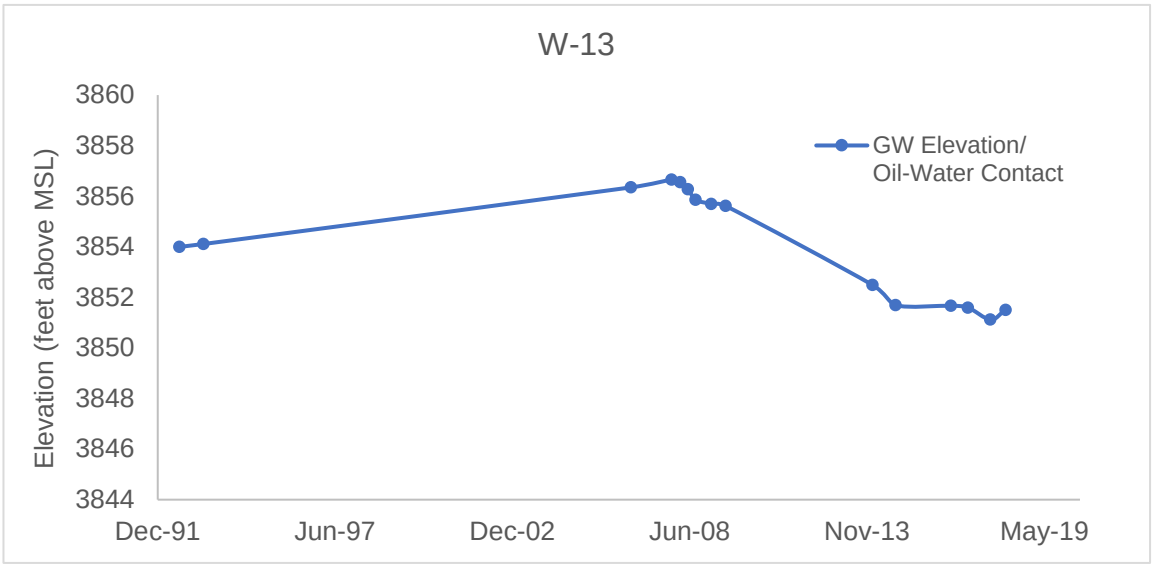
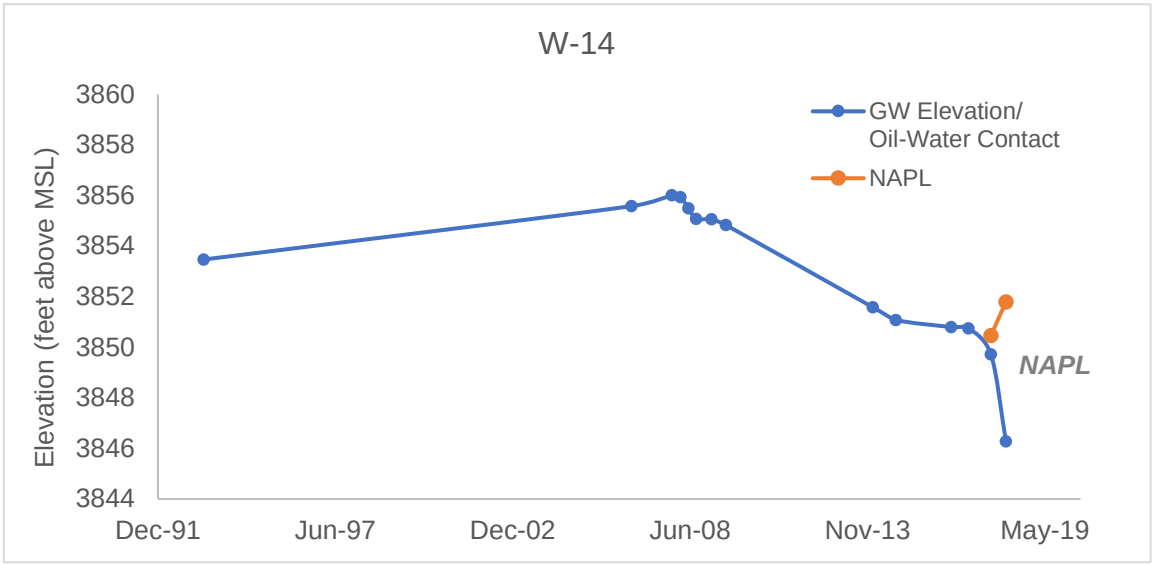
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact

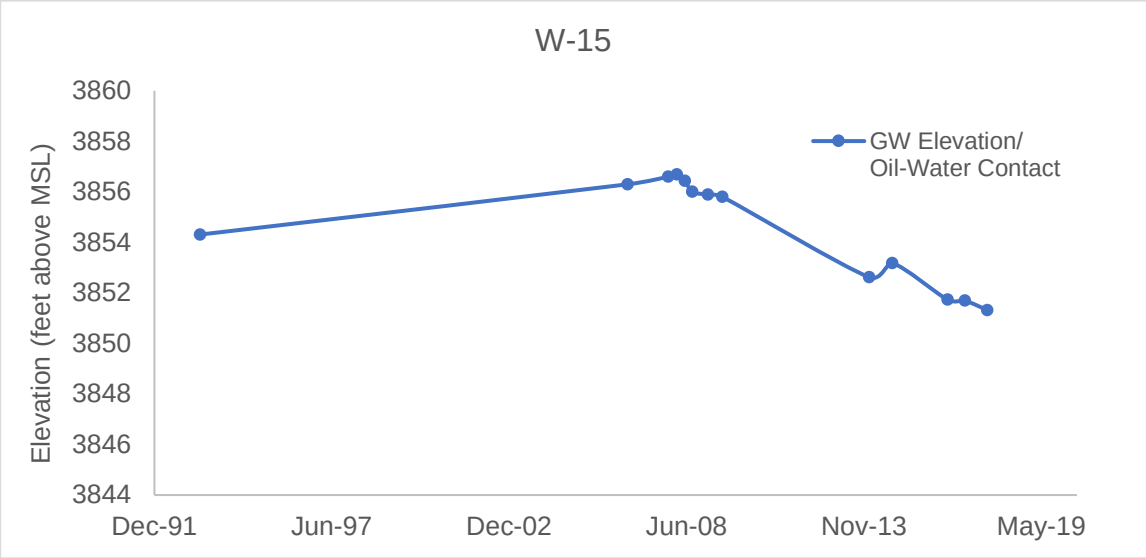

W-11
Elevation (feet above MSL)
3860
3858
3856
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact

Appendix A
Monitoring Well Hydrographs
Lovington 66








W-15
Elevation (feet above MSL)
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3858
3856
3854
3852
3850
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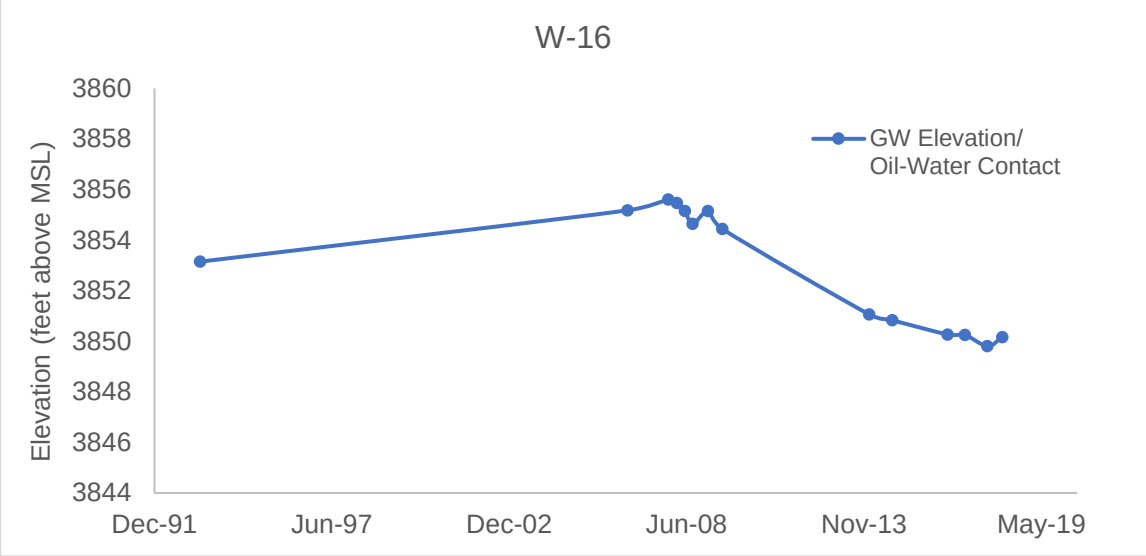
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact


W-16
Elevation (feet above MSL)
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3854
3852
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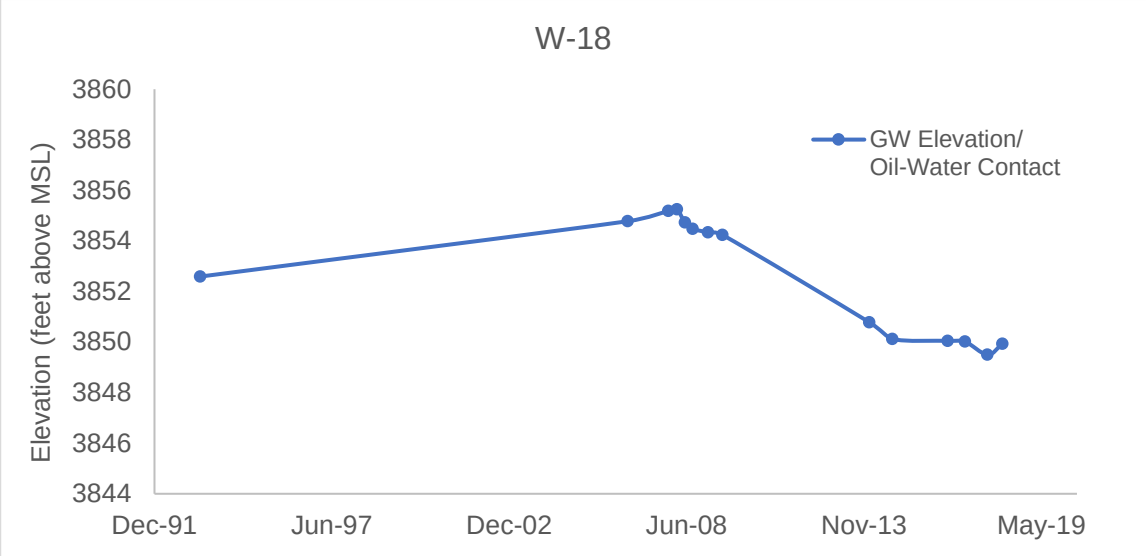
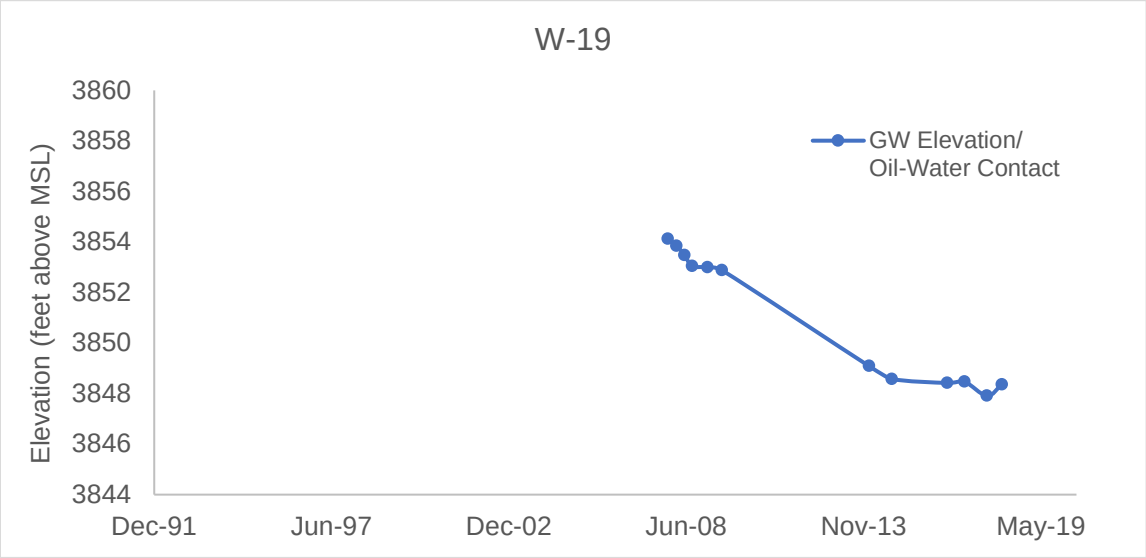
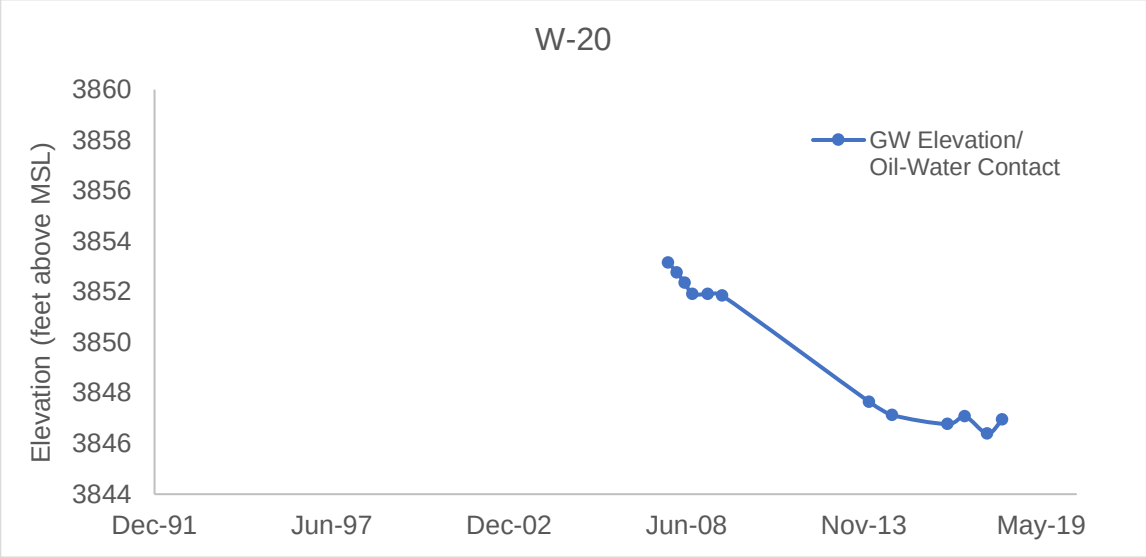
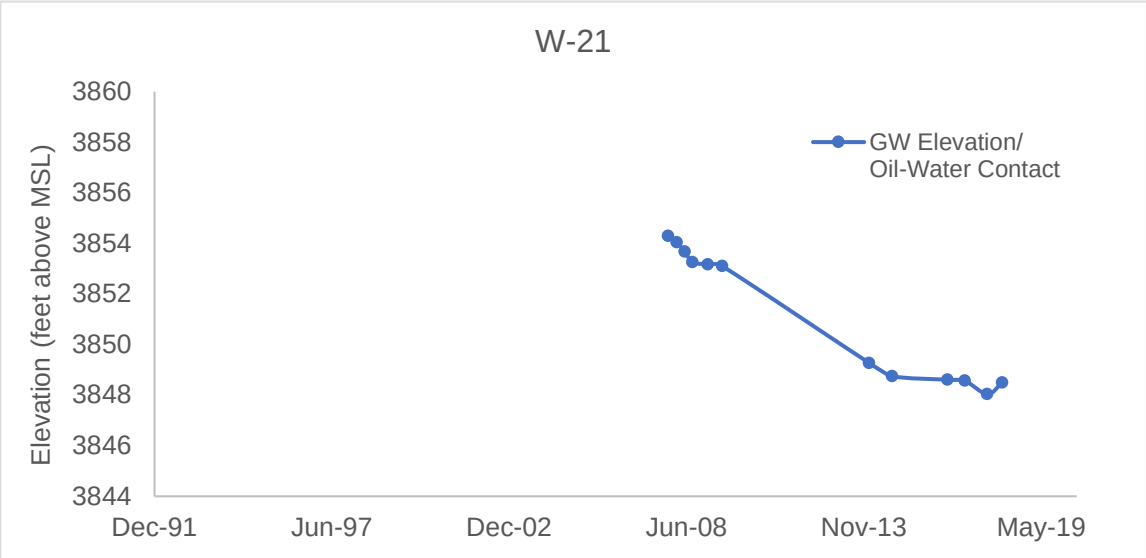
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact


W-18
Elevation (feet above MSL)
3860
3858
3856
3854
3852
3850
3848
3846
3844
Dec-91
Jun-97
Dec-02
Jun-08
Nov-13
May-19
GW Elevation/
Oil-Water Contact

Appendix A
Monitoring Well Hydrographs
Lovington 66







Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
MW1	6-Aug-05	3909.74	-	-	55.07	3854.67	
MW1	8-Aug-06	3909.74	-	-	54.36	3855.38	
MW1	7-Nov-07	3909.74	-	-	53.93	3855.81	
MW1	12-May-08	3909.74	-	-	54.36	3855.38	
MW1	7-Aug-08	3909.74	-	-	54.86	3854.88	
MW1	28-Jan-09	3909.74	-	-	54.91	3854.83	
MW1	10-Jul-09	3909.74	-	-	55.12	3854.62	
MW1	12-Feb-14	3909.74	-	-	58.47	3851.27	
MW1	7-Oct-14	3909.74	-	-	58.86	3850.88	
MW1	23-Jun-16	3909.74	-	-	59.19	3850.55	
MW1	2-Jan-17	3909.74	-	-	-	-	No access - vault bolts ground off and filled with epoxy
MW1	12-Sep-17	3909.74	-	-	-	-	No access - well vault cemented shut
MW2	6-Aug-05	3910.05	-	-	55.74	3854.31	
MW2	8-Aug-06	3910.05	-	-	55.04	3855.01	
MW2	7-Nov-07	3910.05	-	-	54.58	3855.47	
MW2	12-May-08	3910.05	-	-	55.05	3855	
MW2	7-Aug-08	3910.05	-	-	55.54	3854.51	
MW2	28-Jan-09	3910.05	-	-	55.56	3854.49	
MW2	10-Jul-09	3910.05	-	-	55.79	3854.26	
MW2	12-Feb-14	3910.05	-	-	-	-	Well Destroyed -- covered by new cement (parking lot)
MW3	6-Aug-05	3910.14	-	-	55.33	3854.81	
MW3	8-Aug-06	3910.14	-	-	54.65	3855.49	
MW3	7-Nov-07	3910.14	-	-	54.22	3855.92	
MW3	13-May-08	3910.14	-	-	54.76	3855.38	
MW3	7-Aug-08	3910.14	-	-	55.15	3854.99	
MW3	28-Jan-09	3910.14	-	-	55.16	3854.98	
MW3	10-Jul-09	3910.14	-	-	55.42	3854.72	
MW3	12-Feb-14	3910.14	-	-	-	-	Bolts on vault are cemented in place
MW3	23-Jun-16	3910.14	58.28	5.14	63.42	3850.575	
MW3	2-Jan-17	3910.14	58.36	5.11	63.47	3850.5025	
MW3	12-Sep-17	3910.14	60.16	0.51	60.67	3849.8525	
MW3	1-Mar-18	3910.14	59.75	2.55	62.3	3849.7525	
V1	29-Aug-92	3910.67	-	-	56.68	3853.99	
V1	25-May-93	3910.67	-	-	56.74	3853.93	
V1	8-Aug-06	3910.67	53.32	4.59	57.91	3856.2025	
V1	7-Nov-07	3910.67	53.01	4.58	57.59	3856.515	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
V1	13-Feb-08	3910.67	53.01	4.57	57.58	3856.5175	
V1	13-May-08	3910.67	53.41	4.57	57.98	3856.1175	
V1	7-Aug-08	3910.67	53.75	4.55	58.3	3855.7825	
V1		3910.67	-	-	-	-	Well Plugged & Abandoned
MPE1	15-Jun-16	Unknown	57.43	6.32	63.75	-	Not Surveyed
MPE1	8-Nov-16	Unknown	57.62	6.57	64.19	-	Not Surveyed
MPE1	2-Jan-17	Unknown	57.51	6.44	63.95	-	Not Surveyed
MPE1	11-Sep-17	Unknown	57.9	6.65	64.55	-	Not Surveyed
MPE1	20-Feb-18	Unknown	57.7	6.35	64.05	-	
W1	12-Feb-92	3911.33	-	-	-	-	0.125" of NAPL Present
W1	8-Jun-92	3911.33	-	-	-	-	>30" of NAPL Present
W1	24-Jun-92	3911.33	-	-	-	-	>30" of NAPL Present
W1	24-May-93	3911.33	-	-	-	-	NAPL Present
W1	28-Aug-93	3911.33	-	-	-	-	NAPL Present
W1	8-Aug-06	3911.33	54.23	3.15	57.38	3856.3125	
W1	7-Nov-07	3911.33	53.91	3.11	57.02	3856.6425	
W1	13-Feb-08	3911.33	53.89	3.16	57.05	3856.65	
W1	13-May-08	3911.33	54.25	3.37	57.62	3856.2375	
W1	7-Aug-08	3911.33	54.96	3.31	58.27	3855.5425	
W1	28-Jan-09	3911.33	55.39	0.31	55.7	3855.8625	
W1	10-Jul-09	3911.33	55.69	0.09	55.78	3855.6175	
W1	21-Jan-14	3911.33	57.3	2.78	60.08	3853.335	
W1	7-Oct-14	3911.33	57.91	6.64	64.55	3851.76	
W1	15-Jun-16	3911.33	58.18	6	64.18	3851.65	
W1	2-Jan-17	3911.33	58.26	6.16	64.42	3851.53	
W1	11-Sep-17	3911.33	58.65	6.37	65.02	3851.0875	
W1	20-Feb-18	3911.33	58.46	6.04	64.5	3851.36	
W2	13-Mar-92	3910.19	-	-	-	-	0.125" of NAPL Present
W2	8-Jun-92	3910.19	-	-	-	-	>30" of NAPL Present
W2	24-Jun-92	3910.19	-	-	-	-	>30" of NAPL Present
W2	28-Aug-92	3910.19	-	-	-	-	NAPL Present
W2	24-May-93	3910.19	-	-	-	-	NAPL Present
W2	8-Aug-06	3910.19	53.21	5.34	58.55	3855.645	
W2	7-Nov-07	3910.19	52.88	3.32	56.2	3856.48	
W2	13-Feb-08	3910.19	53.57	0.31	53.88	3856.5425	
W2	13-May-08	3910.19	53.98	0.38	54.36	3856.115	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W2	7-Aug-08	3910.19	54.34	0.44	54.78	3855.74	
W2	28-Jan-09	3910.19	54.44	0.03	54.47	3855.7425	
W2	10-Jul-09	3910.19	54.69	0.11	54.8	3855.4725	
W2	21-Jan-14	3910.19	56.23	7	63.23	3852.21	
W2	7-Oct-14	3910.19	56.87	6.98	63.85	3851.575	
W2	15-Jun-16	3910.19	57.11	6.49	63.6	3851.4575	
W2	2-Jan-17	3910.19	57.22	6.53	63.75	3851.3375	
W2	11-Sep-17	3910.19	57.61	6.72	64.33	3850.9	
W2	20-Feb-18	3910.19	57.43	6.39	63.82	3851.1625	
W3	13-Mar-92	3910.29	-	-	-	-	0.125" of NAPL Present
W3	8-Jun-92	3910.29	-	-	-	-	>30" of NAPL Present
W3	24-Jun-92	3910.29	-	-	-	-	>30" of NAPL Present
W3	28-Aug-92	3910.29	-	-	-	-	NAPL Present
W3	24-May-93	3910.29	-	-	-	-	NAPL Present
W3	8-Aug-06	3910.29	53.3	3.2	56.5	3856.19	
W3	7-Nov-07	3910.29	53.01	3.03	56.04	3856.5225	
W3	13-Feb-08	3910.29	53.65	0.13	53.78	3856.6075	
W3	13-May-08	3910.29	54.44	0.21	54.65	3855.7975	
W3	7-Aug-08	3910.29	54.08	0.18	54.26	3856.165	
W3	28-Jan-09	3910.29	54.5	0.06	54.56	3855.775	
W3	10-Jul-09	3910.29	54.75	0.02	54.77	3855.535	
W3	21-Jan-14	3910.29	56.36	6.66	63.02	3852.265	
W3	7-Oct-14	3910.29	56.96	6.74	63.7	3851.645	
W3	15-Jun-16	3910.29	57.21	6.32	63.53	3851.5	
W3	2-Jan-17	3910.29	57.32	6.36	63.68	3851.38	
W3	11-Sep-17	3910.29	57.75	6.41	64.16	3850.9375	
W3	20-Feb-18	3910.29	57.55	6.2	63.75	3851.19	
W4	24-Jun-92	99.62	-	-	57.04	42.58	
W4	28-Aug-92	99.62	-	-	56.69	42.93	
W4	25-May-93	99.62	-	-	56.48	43.14	
W4	8-Aug-06	99.62	-	-	-	-	Well Destroyed
W5	24-Jun-92	3911.71	-	-	57.59	3854.12	
W5	28-Aug-92	3911.71	-	-	57.24	3854.47	
W5	26-May-93	3911.71	-	-	57.02	3854.69	
W5	8-Aug-06	3911.71	-	-	54.88	3856.83	
W5	7-Nov-07	3911.71	-	-	54.61	3857.1	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W5	13-Feb-08	3911.71	-	-	54.63	3857.08	
W5	12-May-08	3911.71	-	-	54.87	3856.84	
W5	7-Aug-08	3911.71	-	-	55.36	3856.35	
W5	28-Jan-09	3911.71	-	-	55.36	3856.35	
W5	9-Jul-09	3911.71	-	-	55.54	3856.17	
W5	21-Jan-14	3911.71	-	-	58.51	3853.2	
W5	7-Oct-14	3911.71	-	-	59.24	3852.47	
W5	23-Jun-16	3911.71	-	-	59.39	3852.32	
W5	2-Jan-17	3911.71	-	-	59.38	3852.33	
W5	12-Sep-17	3911.71	-	-	59.88	3851.83	
W5	1-Mar-18	3911.71	-	-	59.55	3852.16	
W6	24-Jun-92	99.48	-	-	56.97	42.51	
W6	28-Aug-92	99.48	-	-	56.64	42.84	
W6	26-May-93	99.48	-	-	56.49	42.99	
W6	8-Aug-06	99.48	-	-	-	-	Well Destroyed
W7	28-Aug-92	3910.88	-	-	56.29	3854.59	
W7	25-May-93	3910.88	-	-	55.96	3854.92	
W7	8-Aug-06	3910.88	-	-	53.74	3857.14	
W7	7-Nov-07	3910.88	-	-	53.48	3857.4	
W7	12-Feb-08	3910.88	-	-	53.33	3857.55	
W7	12-May-08	3910.88	-	-	53.55	3857.33	
W7	6-Aug-08	3910.88	-	-	53.97	3856.91	
W7	28-Jan-09	3910.88	-	-	54.11	3856.77	
W7	9-Jul-09	3910.88	-	-	54.23	3856.65	
W7	21-Jan-14	3910.88	-	-	57.05	3853.83	
W7	7-Oct-14	3910.88	-	-	57.92	3852.96	
W7	23-Jun-16	3910.88	-	-	-	-	Well occluded by roots above the water level (57.73 ft)
W7	2-Jan-17	3910.88	-	-	-	-	Well occluded by roots above the water level (57.72 ft)
W7	12-Sep-17	3910.88	-	-	58.48	3852.4	
W7	1-Mar-18	3910.88	-	-	58.16	3852.72	
W8	28-Aug-92	3909.92	-	-	57.24	3852.68	
W8	25-May-93	3909.92	-	-	57.2	3852.72	
W8	8-Aug-06	3909.92	-	-	55.11	3854.81	
W8	7-Nov-07	3909.92	-	-	54.65	3855.27	
W8	13-Feb-08	3909.92	-	-	54.79	3855.13	
W8	12-May-08	3909.92	-	-	55.14	3854.78	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W8	7-Aug-08	3909.92	-	-	55.64	3854.28	
W8	28-Jan-09	3909.92	-	-	55.67	3854.25	
W8	9-Jul-09	3909.92	-	-	55.82	3854.1	
W8	21-Jan-14	3909.92	-	-	59.33	3850.59	
W8	7-Oct-14	3909.92	-	-	59.84	3850.08	
W8	23-Jun-16	3909.92	-	-	60.05	3849.87	
W8	2-Jan-17	3909.92	-	-	60.07	3849.85	
W8	12-Sep-17	3909.92	-	-	60.57	3849.35	
W8	1-Mar-18	3909.92	-	-	60.19	3849.73	
W9	28-Aug-92	3908.72	-	-	56.76	3851.96	
W9	25-May-93	3908.72	-	-	56.74	3851.98	
W9	8-Aug-06	3908.72	-	-	54.66	3854.06	
W9	7-Nov-07	3908.72	-	-	54.12	3854.6	
W9	13-Feb-08	3908.72	-	-	54.31	3854.41	
W9	12-May-08	3908.72	-	-	54.68	3854.04	
W9	7-Aug-08	3908.72	-	-	55.18	3853.54	
W9	28-Jan-09	3908.72	-	-	55.19	3853.53	
W9	9-Jul-09	3908.72	-	-	55.35	3853.37	
W9	21-Jan-14	3908.72	-	-	59.01	3849.71	
W9	7-Oct-14	3908.72	-	-	59.5	3849.22	
W9	23-Jun-16	3908.72	-	-	59.64	3849.08	
W9	2-Jan-17	3908.72	-	-	59.67	3849.05	
W9	12-Sep-17	3908.72	-	-	60.21	3848.51	
W9	1-Mar-18	3908.72	-	-	59.78	3848.94	
W10	28-Aug-92	3908.89	-	-	56.18	3852.71	
W10	26-May-93	3908.89	-	-	55.8	3853.09	
W10	8-Aug-06	3908.89	-	-	53.79	3855.1	
W10	13-Feb-08	3908.89	-	-	-	-	Unable to gauge well due to traffic constraints
W10	12-May-08	3908.89	-	-	-	-	Unable to gauge well due to traffic constraints
W10	7-Aug-08	3908.89	-	-	-	-	Unable to gauge well due to traffic constraints
W10	28-Jan-09	3908.89	-	-	-	-	Unable to gauge well due to traffic constraints
W10	9-Jul-09	3908.89	-	-	-	-	Unable to gauge well due to traffic constraints
W10	21-Jan-14	3908.89	-	-	-	-	No access to well, well vault broken
W10	7-Oct-14	3908.89	-	-	-	-	No access to well, well vault broken
W11	28-Aug-92	3909.96	-	-	56.82	3853.14	
W11	26-May-93	3909.96	-	-	56.85	3853.11	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W11	8-Aug-06	3909.96	-	-	54.7	3855.26	
W11	7-Nov-07	3909.96	-	-	54.26	3855.7	
W11	13-Feb-08	3909.96	-	-	54.41	3855.55	
W11	12-May-08	3909.96	-	-	54.71	3855.25	
W11	6-Aug-08	3909.96	-	-	55.14	3854.82	
W11	28-Jan-09	3909.96	-	-	55.26	3854.7	
W11	9-Jul-09	3909.96	-	-	55.46	3854.5	
W11	21-Jan-14	3909.96	-	-	58.8	3851.16	
W11	7-Oct-14	3909.96	-	-	59.41	3850.55	
W11	23-Jun-16	3909.96	-	-	59.53	3850.43	
W11	2-Jan-17	3909.96	-	-	59.54	3850.42	
W11	12-Sep-17	3909.96	-	-	60.05	3849.91	
W11	1-Mar-18	3909.96	-	-	59.63	3850.33	
W12	29-Aug-92	3910.59	-	-	56.28	3854.31	
W12	26-May-93	3910.59	-	-	55.96	3854.63	
W12	8-Aug-06	3910.59	-	-	53.55	3857.04	
W12	7-Nov-07	3910.59	-	-	53.72	3856.87	
W12	12-Feb-08	3910.59	-	-	53.29	3857.3	
W12	12-May-08	3910.59	-	-	54.05	3856.54	
W12	6-Aug-08	3910.59	-	-	54.5	3856.09	
W12	28-Jan-09	3910.59	-	-	54.09	3856.5	
W12	9-Jul-09	3910.59	-	-	54.23	3856.36	
W12	21-Jan-14	3910.59	-	-	57.81	3852.78	
W12	7-Oct-14	3910.59	-	-	58.07	3852.52	
W12	23-Jun-16	3910.59	-	-	58.69	3851.9	
W12	2-Jan-17	3910.59	-	-	58.75	3851.84	
W12	12-Sep-17	3910.59	-	-	59.13	3851.46	
W12	1-Mar-18	3910.59	-	-	-	-	Not Measured
W13	29-Aug-92	3910.36	-	-	56.36	3854	
W13	26-May-93	3910.36	-	-	56.25	3854.11	
W13	8-Aug-06	3910.36	-	-	54.01	3856.35	
W13	7-Nov-07	3910.36	-	-	53.7	3856.66	
W13	12-Feb-08	3910.36	-	-	53.8	3856.56	
W13	12-May-08	3910.36	-	-	54.08	3856.28	
W13	6-Aug-08	3910.36	-	-	54.5	3855.86	
W13	28-Jan-09	3910.36	-	-	54.66	3855.7	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W13	9-Jul-09	3910.36	-	-	54.74	3855.62	
W13	21-Jan-14	3910.36	-	-	57.87	3852.49	
W13	7-Oct-14	3910.36	-	-	58.67	3851.69	
W13	23-Jun-16	3910.36	-	-	58.69	3851.67	
W13	2-Jan-17	3910.36	-	-	58.76	3851.6	
W13	12-Sep-17	3910.36	-	-	59.24	3851.12	
W13	1-Mar-18	3910.36	-	-	58.85	3851.51	
W14	26-May-93	3909.73	-	-	56.26	3853.47	
W14	8-Aug-06	3909.73	-	-	54.15	3855.58	
W14	7-Nov-07	3909.73	-	-	53.72	3856.01	
W14	13-Feb-08	3909.73	-	-	53.8	3855.93	
W14	13-May-08	3909.73	-	-	54.24	3855.49	
W14	7-Aug-08	3909.73	-	-	54.65	3855.08	
W14	28-Jan-09	3909.73	-	-	54.67	3855.06	
W14	10-Jul-09	3909.73	-	-	54.9	3854.83	
W14	21-Jan-14	3909.73	-	-	58.15	3851.58	
W14	7-Oct-14	3909.73	-	-	58.65	3851.08	
W14	23-Jun-16	3909.73	-	-	58.93	3850.8	
W14	2-Jan-17	3909.73	-	-	58.98	3850.75	
W14	12-Sep-17	3909.73	59.27	0.74	60.01	3850.275	
W14	1-Mar-18	3909.73	57.93	5.52	63.45	3850.42	
W15	26-May-93	3909.71	-	-	55.4	3854.31	
W15	8-Aug-06	3909.71	-	-	53.41	3856.3	
W15	7-Nov-07	3909.71	-	-	53.11	3856.6	
W15	12-Feb-08	3909.71	-	-	53.02	3856.69	
W15	12-May-08	3909.71	-	-	53.27	3856.44	
W15	6-Aug-08	3909.71	-	-	53.71	3856	
W15	28-Jan-09	3909.71	-	-	53.82	3855.89	
W15	9-Jul-09	3909.71	-	-	53.91	3855.8	
W15	21-Jan-14	3909.71	-	-	57.09	3852.62	
W15	7-Oct-14	3909.71	-	-	56.53	3853.18	
W15	23-Jun-16	3909.71	-	-	57.98	3851.73	
W15	2-Jan-17	3909.71	-	-	58.02	3851.69	
W15	12-Sep-17	3909.71	-	-	58.39	3851.32	
W15	1-Mar-18	3909.71	-	-	-	-	Not Measured
W16	26-May-93	3908.67	-	-	55.52	3853.15	

Appendix A
Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W16	8-Aug-06	3908.67	-	-	53.49	3855.18	
W16	7-Nov-07	3908.67	-	-	53.06	3855.61	
W16	13-Feb-08	3908.67	-	-	53.2	3855.47	
W16	12-May-08	3908.67	-	-	53.52	3855.15	
W16	7-Aug-08	3908.67	-	-	54.03	3854.64	
W16	28-Jan-09	3908.67	-	-	53.52	3855.15	
W16	9-Jul-09	3908.67	-	-	54.23	3854.44	
W16	21-Jan-14	3908.67	-	-	57.61	3851.06	
W16	7-Oct-14	3908.67	-	-	57.84	3850.83	
W16	23-Jun-16	3908.67	-	-	58.4	3850.27	
W16	2-Jan-17	3908.67	-	-	58.42	3850.25	
W16	12-Sep-17	3908.67	-	-	58.86	3849.81	
W16	1-Mar-18	3908.67	-	-	58.5	3850.17	
W17	26-May-93	96.94	-	-	56.86	40.08	
W17	8-Aug-06	96.94	-	-	-	-	Well Destroyed
W18	26-May-93	3909.38	-	-	56.79	3852.59	
W18	8-Aug-06	3909.38	-	-	54.6	3854.78	
W18	7-Nov-07	3909.38	-	-	54.19	3855.19	
W18	12-Feb-08	3909.38	-	-	54.13	3855.25	
W18	12-May-08	3909.38	-	-	54.65	3854.73	
W18	6-Aug-08	3909.38	-	-	54.9	3854.48	
W18	28-Jan-09	3909.38	-	-	55.04	3854.34	
W18	9-Jul-09	3909.38	-	-	55.14	3854.24	
W18	21-Jan-14	3909.38	-	-	58.6	3850.78	
W18	7-Oct-14	3909.38	-	-	59.26	3850.12	
W18	23-Jun-16	3909.38	-	-	59.33	3850.05	
W18	2-Jan-17	3909.38	-	-	59.36	3850.02	
W18	12-Sep-17	3909.38	-	-	59.88	3849.5	
W18	1-Mar-18	3909.38	-	-	59.45	3849.93	
W19	7-Nov-07	3908.36	-	-	54.23	3854.13	
W19	13-Feb-08	3908.36	-	-	54.51	3853.85	
W19	12-May-08	3908.36	-	-	54.88	3853.48	
W19	6-Aug-08	3908.36	-	-	55.31	3853.05	
W19	28-Jan-09	3908.36	-	-	55.36	3853	
W19	9-Jul-09	3908.36	-	-	55.48	3852.88	
W19	21-Jan-14	3908.36	-	-	59.27	3849.09	

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Cumulative Groundwater Level Data
Lovington 66

Monitoring Well	Date Measured	Casing Elevation (ft above MSL)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft above MSL)	Comments
W19	7-Oct-14	3908.36	-	-	59.78	3848.58	
W19	23-Jun-16	3908.36	-	-	59.94	3848.42	
W19	2-Jan-17	3908.36	-	-	59.89	3848.47	
W19	12-Sep-17	3908.36	-	-	60.45	3847.91	
W19	1-Mar-18	3908.36	-	-	60	3848.36	
W20	7-Nov-07	3907.45	-	-	54.29	3853.16	
W20	13-Feb-08	3907.45	-	-	54.69	3852.76	
W20	12-May-08	3907.45	-	-	55.09	3852.36	
W20	6-Aug-08	3907.45	-	-	55.53	3851.92	
W20	28-Jan-09	3907.45	-	-	55.54	3851.91	
W20	9-Jul-09	3907.45	-	-	55.6	3851.85	
W20	21-Jan-14	3907.45	-	-	59.8	3847.65	
W20	7-Oct-14	3907.45	-	-	60.32	3847.13	
W20	23-Jun-16	3907.45	-	-	60.68	3846.77	
W20	2-Jan-17	3907.45	-	-	60.37	3847.08	
W20	12-Sep-17	3907.45	-	-	61.05	3846.4	
W20	1-Mar-18	3907.45	-	-	60.5	3846.95	
W21	7-Nov-07	3908.49	-	-	54.19	3854.3	
W21	13-Feb-08	3908.49	-	-	54.45	3854.04	
W21	12-May-08	3908.49	-	-	54.81	3853.68	
W21	6-Aug-08	3908.49	-	-	55.23	3853.26	
W21	28-Jan-09	3908.49	-	-	55.32	3853.17	
W21	9-Jul-09	3908.49	-	-	55.39	3853.1	
W21	21-Jan-14	3908.49	-	-	59.22	3849.27	
W21	7-Oct-14	3908.49	-	-	59.74	3848.75	
W21	23-Jun-16	3908.49	-	-	59.88	3848.61	
W21	2-Jan-17	3908.49	-	-	59.92	3848.57	
W21	12-Sep-17	3908.49	-	-	60.45	3848.04	
W21	1-Mar-18	3908.49	-	-	60	3848.49	

APPENDIX B

Cumulative NAPL Gauging and Recovery Data

Appendix B
Cumulative NAPL Gauging and Recovery
Lovington 66

Monitor Well	Date Recovered	Prior to NAPL Bailing Event			Post Bailing Event			Total NAPL Recovered[1]	Comments
		Depth To NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)		
W-1	3-Sep-08	54.69	58.52	3.83	-	57.22	0	6	NAPL Bailing Event
W-1	27-Jan-09	54.69	58.22	3.53	-	56.25	0	6	NAPL Bailing Event
W-1	12-May-09	54.85	57.78	2.93	-	56.62	0	1.9	NAPL Bailing Event
W-1	10-Jul-09	55.33	56.99	1.66	-	56.69	0	1.08	NAPL Bailing Event
W-1	12-Feb-14	57.3	60.08	2.78	-	57.88	0	8.5	NAPL Bailing Event
W-1	9-Jun-14	57.72	64.31	6.59	-	59.85	0	4.18	NAPL Bailing Event
W-1	15-Oct-14	57.91	64.55	6.64	-	60.2	0	20.05	NAPL Bailing Event
W-1	2-Jun-15	58.11	64.89	6.78	60.41	60.51	0.1	5.75	NAPL Bail-Down Recovery Test
W-1	13-Jul-15	57.12	63.96	6.84	-	-	0	47.61	MPE Pilot Test
W-1	15-Jun-16	58.18	64.18	6	61.3	61.31	0.01	4.24	NAPL Bailing Event
W-1	8-Nov-16	58.38	64.68	6.3	60.7	60.75	0.05	12.8	NAPL Bailing Event
W-1	21-Dec-16	58.26	64.42	6.16	61.27	61.28	0.01	6.88	NAPL Bailing Event
W-1	18-Apr-17	58.17	64.02	5.85	-	59.91	0	7.08	NAPL Bailing Event
W-1	11-Sep-17	58.65	65.02	6.37	-	61.63	0	4.14	NAPL Bailing Event
W-1	11-Dec-17	58.69	65	6.31	-	61.86	0	7.68	NAPL Bailing Event
W-1	20-Feb-18	58.46	64.5	6.04	-	61.21	0	7.2	NAPL Bailing Event
W-2	3-Sep-08	54.5	54.94	0.44	-	55.52	0	0.25	NAPL Bailing Event
W-2	27-Jan-09	54.48	54.81	0.33	-	55.55	0	0.25	NAPL Bailing Event
W-2	12-May-09	54.5	54.83	0.33	-	55.64	0	0.21	NAPL Bailing Event
W-2	10-Jul-09	54.68	54.96	0.28	-	55.5	0	0.18	NAPL Bailing Event
W-2	12-Feb-14	56.25	63.26	7.01	-	58.6	0	9.75	NAPL Bailing Event
W-2	9-Jun-14	56.67	63.64	6.97	-	58.87	0	9.15	NAPL Bailing Event
W-2	15-Oct-14	56.87	63.85	6.98	-	59.42	0	15.85	NAPL Bailing Event
W-2	2-Jun-15	57.07	64.26	7.19	59.3	59.32	0.02	6.2	NAPL Bail-Down Recovery Test
W-2	13-Jul-15	58.13	64.67	6.54	-	-	0	25.92	MPE Pilot Test
W-2	15-Jun-16	57.11	63.6	6.49	59.81	59.82	0.01	5.88	NAPL Bailing Event
W-2	8-Nov-16	57.32	64.01	6.69	59.93	59.95	0.02	8.27	NAPL Bailing Event
W-2	21-Dec-16	57.22	63.75	6.53	60.17	60.18	0.01	6.48	NAPL Bailing Event
W-2	18-Apr-17	57.13	63.28	6.15	-	59.63	0	5.08	NAPL Bailing Event
W-2	11-Sep-17	57.61	64.33	6.72	-	60.65	0	4.36	NAPL Bailing Event
W-2	11-Dec-17	57.63	64.26	6.63	-	60.37	0	10.28	NAPL Bailing Event
W-2	20-Feb-18	57.43	63.82	6.39	-	60.1	0	7.2	NAPL Bailing Event
W-3	3-Sep-08	54.6	54.81	0.21	-	55.57	0	0.25	NAPL Bailing Event
W-3	27-Jan-09	54.56	54.69	0.13	-	55.52	0	0.25	NAPL Bailing Event
W-3	12-May-09	54.58	54.68	0.1	-	55.54	0	0.065	NAPL Bailing Event
W-3	10-Jul-09	54.78	54.85	0.07	-	55.64	0	0.045	NAPL Bailing Event
W-3	12-Feb-14	56.36	63.03	6.67	-	58.05	0	9.75	NAPL Bailing Event
W-3	9-Jun-14	56.78	63.43	6.65	-	59.07	0	9.3	NAPL Bailing Event

Appendix B
Cumulative NAPL Gauging and Recovery
Lovington 66

Monitor Well	Date Recovered	Prior to NAPL Bailing Event			Post Bailing Event			Total NAPL Recovered[1]	Comments
		Depth To NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)		
W-3	15-Oct-14	56.96	63.7	6.74	-	60.02	0	21.1	NAPL Bailing Event
W-3	2-Jun-15	57.17	64.1	6.93	59.8	59.95	0.15	7	NAPL Bail-Down Recovery Test
W-3	15-Jun-16	57.21	63.53	6.32	-	-	0	8.88	MPE Pilot Test
W-3	8-Nov-16	57.42	63.9	6.48	60.12	60.17	0.05	12	NAPL Bailing Event
W-3	21-Dec-16	57.32	63.68	6.36	-	60.58	0	7.6	NAPL Bailing Event
W-3	18-Apr-17	57.22	63.28	6.06	-	60.06	0	6.88	NAPL Bailing Event
W-3	11-Sep-17	57.75	64.16	6.41	-	60.91	0	4.16	NAPL Bailing Event
W-3	11-Dec-17	57.76	64.17	6.41	-	60.58	0	10.88	NAPL Bailing Event
W-3	20-Feb-18	57.55	63.75	6.2	-	60.16	0	4	NAPL Bailing Event
MPE-1	12-Jul-15	57.4	64.08	6.68	61.61	61.65	0.04	67.1	MPE Pilot Test
MPE-1	15-Jun-16	57.43	63.75	6.32	-	-	0		Not Bailed
MPE-1	8-Nov-16	57.62	64.19	6.57	60.03	60.07	0.04	8.28	NAPL Bailing Event
MPE-1	21-Dec-16	57.51	63.95	6.44	60.22	60.23	0.01	6.88	NAPL Bailing Event
MPE-1	18-Apr-17	57.44	63.58	6.14	-	59.85	0	9.28	NAPL Bailing Event
MPE-1	11-Sep-17	57.9	64.55	6.65	-	67.3	0	4.37	NAPL Bailing Event
MPE-1	11-Dec-17	57.93	64.5	6.57	-	64.7	0	13.08	NAPL Bailing Event
MPE-1	20-Feb-18	57.7	64.05	6.35	-	60.25	0	7.2	NAPL Bailing Event
V-1	3-Sep-08	53.92	58.45	4.53	-	55.2	0	1	NAPL Bailing Event, Well Plugged & Abandoned
							Cumulative Total NAPL Recovered at the Site (gallons)	***485.75***	

Notes:
NAPL = Non Aqueous Phase Liquid
[1] Measured in gallons - quantity is estimated based on the amount of NAPL in the purge fluid. Gallons of impacted water not reported on the table.
All NAPL recovered is temporarily stored in a 55-gallon drum on-site.
- = not measured

APPENDIX C

Groundwater Monitoring Field Forms

N.M.E.D. – DP-1041

Gandy Marley, Inc.

P.O. BOX 1658 • ROSWELL, NM 88202

LOAD INSPECTION FORM 18251

Date of Receipt: 02/20/18 Time of Receipt 1:00 AM / PM Cell Placement: UST 8

Quantity 140 Gallons T/CY: ______ Description: Monitor Well Purge H_2O Wolsted Oil ... Lovington New Mexico 12/06/17 – 02/20/18

Name/Address of Generator: Gibbs & Associates 5200 Pasadena Avenue NE Suite C Albuquerque NM 87113 505-821-3043

Origin of Materials (if different) ______

Transporter Name: CMS Environmental SCC ID No. ______

Name of Laboratory Performing Sample Analysis HEAL on file

TCLP (EPA Method 1311) ______ BTEX ✓ MTBE ______ TPH ✓ Non-Hazardous ✓ Exempt ______

Verification of No Free Liquids ______ Paint Filter Liquids Test Performed ______

Verification of Property Completed Manifest ______ Generator Manifest Number ______

As a condition to Gandy Marley, Inc.'s acceptance of the materials shipped as represented on this Load Inspection Form, Generator represents and warrants that the waste material shipped herewith is exempt from the Resource Conservation and Recovery Act of 1976, as amended from time to time, 40 U.S.C. Section 6901, et seq., The New Mexico Health and Safety Code, section 361.001, et seq., and regulations related thereto, OR has been characterized as non-hazardous material by virtue of appropriate laboratory analysis done in accordance with EPA-approved testing methods.

Further, as a condition to Gandy Marley, Inc.'s acceptance of the materials shipped as represented on this Load Inspection Form, Transporter represents and warrants that only the material delivered by Generator to Transporter is now delivered by Transporter to Gandy Marley, Inc.'s facility for disposal.

THIS WILL CERTIFY that the above Transporter loaded the material as represented on this Load Inspection Form at the above described location, and that it was tendered by the above described Generator. THIS WILL CERTIFY that no additional materials were added to this load, and that the material was delivered without incident.

Transporter: Clayton M Bowen (Print Name) [signature] (Signature)

GMI Employee: [initials] (Print Name) [signature] (Signature)

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well	Type of Data	Well No.
☒ MW ☐ Production ☐ Other ______	☐ Development ☒ Sampling ☐ Pump Test ☐ Other ______	Sheet 1 W-5 of 1 Sheets

1. Project	2. Project Location	3. Date
Walstad Lovington 66 GW Monitoring 2018	Goldeve Associates Walstad Oil 6-Lovington 66 424 S. Main St.	03/02/2018
4. Technician CMBarnhill, PG		
7. Method: Pumping Surging Air Lift (Bailing) Other	8. Manufacturer's Designation of Rig: DSR-2015	9. Location of Well (Site, Description): Monitor Well W-5

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/02/18 Time: 14:50	Date: 03/02/18 Time: 15:10	Date: / Time:
10. Total Depth of Well (from TOC): 64.70	15. Total Depth of Well (from TOC): /	20. Total Depth of Well (from TOC): /
11. Water Level (from TOC): 59.55	16. Water Level (from TOC): 59.81'	21. Water Level (from TOC): /

12. Water Column Height: 5.15'	Nom Dia	x = gal/ft Sch 40 (circled)	Sch 80	17. 3 Well Volumes: 2.47 Gallons	22. Size and Type of Pump or (Bailer)
13. Well Diameter: 2" SCH 40 PVC MW	(2")	(0.16)	0.1534	18. 5 Well Volumes: 4.12 Gallons	Poly 3.0' x 1.5" Disposable Bailer Twine, Tip
	4"	0.65	0.5972		
	6"	1.47	1.3540		
14. Well Volume (gal) (s) w.e. height): 0.824	8"	2.61	2.3720	19. Purge Volume: 2.50	

Final Field Analysis

23. Total Amount of Water Removed	24. Was Well Pumped Dry?	25. Was water added to well?	26. Was the Groundwater Sampled (Yes) No
2.50 Gallons	Yes (No)	(No) Yes; If yes, source:	If yes, what was the sample number & Date: W-5, 03/02/18. Sampling Personnel? CMB @ 15:10 3x40ml VOAs/Hdl/8260

27. Final Parameters

Time	Temp C	Conductivity mS/cm	pH	NTUs	WL	Removed	Flow Rate GPM	Photo Roll #, Observations
15:05	20.37	1.318	6.42	Turbid	59.81	2.5 Gal	0.25	Turbid

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Turbid Fine Silt Strong odor

29. Purgewater disposal method: ON Ground Surface

Sampling / Development Parameters

Time	Temp C	Conductivity mS/cm	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
14:55	20.72	1.343	6.37	Clear w/strong odor	59.55	Initial Parameters	0.99	0.25	-20.8/-191.9
15:00	20.54	1.336	6.37	Turbid	—	1	1.15	0.25	-22.2/-223.6
15:03	20.21	1.323	6.39	Fine Silt	—	2	1.28	0.25	-23.0/-223.8
15:05	20.37	1.318	6.42	" " "	59.81	2.50	1.32	0.25	-18.6/-220.9

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: [signature] Date: 03/02/2018

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well: ☒ MW ☐ Production ☐ Other _____
Type of Data: ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____
Well No. W-8, Sheet 1 of 1 Sheets

1. Project: Walsted 66 Lovington GW Monitoring 2018
2. Project Location: Golder & Associates, Walsted #1 / 66 - Lovington 66, 424 S. Main Street, Lovington, NM 88260
3. Date: 03/01/18
4. Technician: CM Barnhill, PG
7. Method: Pumping Surging Air Lift (Bailing) Other
8. Manufacturer's Designation of Rig: DSR-2015
9. Location of Well (Site, Description): Monitor Well W-8

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/01/18 Time: 15:10	Date: 03/01/18 Time: 15:35	Date: Time:
10. Total Depth of Well (from TOC): 65.21'	15. Total Depth of Well (from TOC):	20. Total Depth of Well (from TOC):
11. Water Level (from TOC): 60.19'	16. Water Level (from TOC): 60.48'	21. Water Level (from TOC):

12. Water Column Height: 5.02'
13. Well Diameter: 2" SCH 40 PVC MW
14. Well Volume (gal) (s) w.e. height: 0.803

Nom Dia	x = gal/ft Sch 40	Sch 80
2"	0.16	0.1534
4"	0.65	0.5972
6"	1.47	1.3540
8"	2.61	2.3720

17. 3 Well Volumes: 2.40 Gallons
18. 5 Well Volumes: 4.01 Gallons
19. Purge Volume: 2.50 Gallons
22. Size and Type of Pump or Bailer: Poly 3.0' x 1.5" Disposible Bailer, Twine, Tie

Final Field Analysis

23. Total Amount of Water Removed: 2.50 Gallons
24. Was Well Pumped Dry? Yes (No)
25. Was water added to well? (No) Yes If yes, source:
26. Was the Groundwater Sampled (Yes) No If yes, what was the sample number & Date: Sampling Personnel? W-8, 03/01/18 CMB @ 1530 3 x 40mL VOA's / HCl / 8260

27. Final Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL	Removed	Flow Rate	Photo Roll #, Observations
15:28	19.75	1.263	6.53	Gray Black	60.48	2.50 gal	0.25 GPM	Gray Black

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Gray Black H2O - Strong HC odor
29. Purgewater disposal method: On Ground Surface

Sampling / Development Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
15:17	20.25	1.268	6.31	Gray N/Strong HC odor	60.19'	Initial parameters	3.50	0.25	-20.4/-349.6
15:20	19.87	1.267	6.33	" "	—	1	3.38	0.25	-21.9/-353.7
15:23	19.01	1.328	6.59	Gray Black Strong odor	—	2	3.35	0.25	-27.4/-322.5
15:28	19.75	1.263	6.53	" "	60.48	2.50	2.75	0.25	-26.1/-338.1

(1) Note volume and physical character of sediments removed
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: [signature] PG Date: 03/01/18

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well: ☑ MW ☐ Production ☐ Other _____	Type of Data: ☐ Development ☑ Sampling ☐ Pump Test ☐ Other _____	Well No. W-9, Sheet 1 of 1 Sheets
1. Project: Walstad Lovington 66 GW Monitoring 2018	2. Project Location: Golder & Associates, Walstad Oil Co. - Lovington 66, 424 S. Main Street, Lovington, NM 88260	3. Date: 03/01/18
4. Technician: CM Barnhill, PG		
7. Method: Pumping Surging Air Lift (Bailing) Other	8. Manufacturer's Designation of Rig: DSR-2015	9. Location of Well (Site, Description): Monitor well W-9

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/01/18 Time: 15:58	Date: 03/01/18 Time: 16:25	Date: Time:
10. Total Depth of Well (from TOC): 64.80	15. Total Depth of Well (from TOC)	20. Total Depth of Well (from TOC)
11. Water Level (from TOC): 59.78'	16. Water Level (from TOC): 59.99'	21. Water Level (from TOC)

12. Water Column Height: 5.02'	Nom Dia	x = gal/ft Sch 40	Sch 80	17. 3 Well Volumes: 2.40 Gallons
13. Well Diameter: 2" SCH 40 PVC MW	2"	0.16	0.1534	18. 5 Well Volumes: 4.01 Gallons
14. Well Volume (gal) (s) w.e. height): 0.803	4"	0.65	0.5972	19. Purge Volume: 2.50 Gallons
	6"	1.47	1.3540	
	8"	2.61	2.3720	

22. Size and Type of Pump or (Bailer): Poly 3.0' x 1.5" Disposable Bailer, Twine, Tip

Final Field Analysis

23. Total Amount of Water Removed: 2.50 Gallons	24. Was Well Pumped Dry? Yes (No)	25. Was water added to well? (No) Yes If yes, source:	26. Was the Groundwater Sampled (Yes) No If yes, what was the sample number & Date: Sampling Personnel? W-9, 03/01/18 CMB @ 16:20 3x40mL Vials HCl, 8260

27. Final Parameters

Time	Temp C	Conductivity (mS/cm)	pH	NTUs (Gray Turbid)	WL	Removed	Flow Rate (gpm)	Photo Roll # / Observations
16:18	19.36	1.301	6.64		59.99'	2.50 Gal	0.25	Gray Black Strong HC odor

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Gray Black H_2S - Strong HC odor

29. Purgewater disposal method: On Ground Surface

Sampling / Development Parameters

Time	Temp C	Conductivity (mS/cm)	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
16:05	19.00	1.272	6.80	Clear to Black	59.78'	Initial parameters	1.09	0.25	-31.8/-339.0
16:10	19.50	1.216	6.73	Gray Strong HC odor	—	1	0.81	0.25	-30.6/-335.5
16:13	19.30	1.275	6.64	" " "	—	2	1.41	0.25	-28.1/-332.8
16:18	19.36	1.301	6.64	Gray Black Strong HC odor	59.99'	2.50	1.39	0.25	-28.3/-339.1

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: Christian M Ball PG — Date: 03/01/18

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well: ~~MW~~ ☐ Production ☐ Other _____	Type of Data: ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____	Well No. W-11, Sheet 1 of 1 Sheets
1. Project: Walstad 66 Lovington GW Monitoring 2018	2. Project Location: Goodnight Associates, Walstad Oil Co. Lovington 66, 424 S. Main Street, Lovington, NM 88260	3. Date: 03/01/18
4. Technician: CM Barnhill, PE		
7. Method: Pumping Surging Air Lift (Bailing) Other	8. Manufacturer's Designation of Rig: DSR-2015	9. Location of Well (Site, Description): Monitor Well W-11

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/01/18 Time: 14:20	Date: 03/01/18 Time:	Date: Time:
10. Total Depth of Well (from TOC): 65.0'	15. Total Depth of Well (from TOC): /	20. Total Depth of Well (from TOC):
11. Water Level (from TOC): 59.63'	16. Water Level (from TOC):	21. Water Level (from TOC):

12. Water Column Height: 5.37'	Nom Dia	x = gal/ft Sch 40	Sch 80	17. 3 Well Volumes: 2.57 Gallons
13. Well Diameter: 2" SCH 40 PVC MW	(2")	~~0.16~~	0.1534	18. 5 Well Volumes: 4.29 Gallons
14. Well Volume (gal) (s) w.e. height): 0.859	4"	0.65	0.5972	19. Purge Volume: 3 Gallons
	6"	1.47	1.3540	
	8"	2.61	2.3720	

22. Size and Type of Pump or (Bailer): Poly 30' x 1.5" Disposable Bailer, Twine, Tape

Final Field Analysis

23. Total Amount of Water Removed	24. Was Well Pumped Dry? Yes (No)	25. Was water added to well? (No) Yes If yes, source:	26. Was the Groundwater Sampled (Yes) No If yes, what was the sample number & Date: Sampling Personnel? W-11, 03/01/18 CMB @ 14:50 3x40mL VOA's/Hach/
3.0 Gallons	S/M		

27. Final Parameters

Time	Temp C	Conductivity (mS/cm)	pH	NTUs	WL	Removed	Flow Rate (GPM)	Observations	Photo Roll #, 8260
14:48	20.81	1.500	6.21	Turbid	59.85	3.61	0.25	Turbid Strong HC odor	

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Turbid Fine Silt Strong HC odor

29. Purgewater disposal method: On Ground Surface

Sampling / Development Parameters

Time	Temp C	Conductivity (mS/cm)	pH	NTUs	WL (from TOC)	Volume (gallons) (1)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
14:40	21.69	1.512	5.87	Clear Strong odor	59.63'	Initial parameters	6.26	0.25	-10.9/-280.1
14:42	21.16	1.560	6.09	Turbid w/ Strong odor		1	4.96	0.25	-15.5/-310.5
14:45	20.73	1.496	6.15	" " "		2	4.74	0.25	-17.1/-317.1
14:48	20.81	1.560	6.21	" " "	59.85	3	3.59	0.25	-18.2/-311.3

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: [signature] PE — Date: 03/01/18

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well ☒ MW ☐ Production ☐ Other _____	Type of Data ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____	Well No. W-16 Sheet 1 of 1 Sheets
1. Project Walstad Lovington 66 GW Monitoring 2018	2. Project Location Souder & Associates Walstad Oil Co. Lovington 66 424 S. Main St. Roswell, NM 88260	3. Date 03/02/18
4. Technician CM Barnhill, PG		
7. Method Pumping Surging Air Lift (Bailing) Other	8. Manufacturer & Designation of Rig DSR-2015	9. Location of Well (Site, Description) Monitor well W-16

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/02/18 Time: 14:08	Date: 03/20/18 Time: 14:22	Date: Time:
10. Total Depth of Well (from TOC) 64.90'	15. Total Depth of Well (from TOC)	20. Total Depth of Well (from TOC)
11. Water Level (from TOC) 58.50'	16. Water Level (from TOC) 58.80'	21. Water Level (from TOC)

12. Water Column Height 6.40'	Nom Dia	x = gal/ft Sch 40	Sch 80	17. 3 Well Volumes 3.072 Gallons
13. Well Diameter 2" SCH40 PVC MW	2"	0.16	0.1534	18. 5 Well Volumes 5.12 Gallons
14. Well Volume (gal) (s) w.e. height) 1.024	4"	0.65	0.5972	19. Purge Volume 3.25 Gallons
	6"	1.47	1.3540	
	8"	2.61	2.3720	

22. Size and Type of Pump or (Bailer) Poly 3.0' x 1.5" Disposable Bailer Twine, Tip -

Final Field Analysis

23. Total Amount of Water Removed 3.25 Gallons	24. Was Well Pumped Dry? Yes (No)	25. Was water added to well? (No) Yes If yes, source:	26. Was the Groundwater Sampled (Yes) No If yes, what was the sample number & Date: Sampling Personnel? W-16, 03/02/18 CMB @ 14:20 3x40mL VOAs/HCl & 250

27. Final Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL	Removed	GPM Flow Rate	Photo Roll #, Observations
14:18	19.97	1.511	6.55	Turbid	58.80'	3.25 Gal	0.25	Turbid Fine Silt

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Turbid Fine Silt

29. Purgewater disposal method: On Ground Surface

Sampling / Development Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
14:10	20.41	1.482	6.58	Turbid Fine Silt	58.50	First Parameters	1.74	0.25	-26.4/-121.4
14:12	20.32	1.528	6.51	" " "	—	1	1.46	0.25	-25.1/-127.7
14:14	20.03	1.515	6.49	" " "	—	2	1.49	0.25	-26.4/-135.8
14:16	19.97	1.511	6.55	Turbid Fine Silt	58.80'	3.25	1.78	0.25	-25.2/-134.1

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: [signature] PG — Date: 03/02/18

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well: ~~☒~~ MW; ☐ Production; ☐ Other _____
Type of Data: ☐ Development; ~~☒~~ Sampling; ☐ Pump Test; ☐ Other _____
Well No. Sheet 1: W-20 of 1 Sheets

1. Project: Walstad Lovington 66 GW Monitoring 2018
2. Project Location: Golder & Associates; Walstad Oil / G. Lovington 66; 424 S. Main Street; Lovington, NM 88260
3. Date: 03/02/2018
4. Technician: CM Barnhill, PE
7. Method: Pumping Surging Air Lift (Bailing) Other
8. Manufacturer's Designation of Rig: DSR-2015
9. Location of Well (Site, Description): Monitor well W-20

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/02/18 Time: 12:30	Date: 03/02/18 Time: 13:05	Date: Time:
10. Total Depth of Well (from TOC): 65.21'	15. Total Depth of Well (from TOC):	20. Total Depth of Well (from TOC):
11. Water Level (from TOC): 60.50'	16. Water Level (from TOC): 60.52'	21. Water Level (from TOC):

12. Water Column Height: 4.71
13. Well Diameter: 2" SCH 40 PVC MW
14. Well Volume (gal) (s) w.e. height): 0.7536

Nom Dia	x = gal/ft Sch 40	Sch 80
(2")	(0.16)	0.1534
4"	0.65	0.5972
6"	1.47	1.3540
8"	2.61	2.3720

17. 3 Well Volumes: 2.26 Gallons
18. 5 Well Volumes: 3.76 Gallons
19. Purge Volume: 2.50 Gallons
22. Size and Type of Pump or Bailer: Poly 3.0' x 1.5" Disposible Bailer, Twine, Tip

Final Field Analysis

23. Total Amount of Water Removed: 2.50 Gallons
24. Was Well Pumped Dry? Yes (No)
25. Was water added to well? (No) Yes If yes, source:
26. Was the Groundwater Sampled (Yes) No If yes, what was the sample number & Date: Sampling Personnel? W-20, 03/02/18 CMB @ 13:01 3 x 40mL VOA's/HCl 8260

27. Final Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL	Removed	GPM Flow Rate	Photo Roll #, Observations
13:00	18.63	0.996	7.01	TURBID	60.52'	2.50 Gal.	0.25	TURBID

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: TURBID Fine Silt
29. Purgewater disposal method: ON GROUND Surface

Sampling / Development Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
12:45	19.17	0.935	6.97	TURBID FINE SILT	60.50'	Initial parameters	5.72	0.25	-34.9/-215.5
12:55	19.03	0.950	6.94	" " "	—	1	6.13	0.25	-35.0/-176.3
12:58	18.77	0.973	6.97	" " "	—	2	6.22	0.25	-36.0/-161.4
13:00	18.63	0.996	7.01	TURBID FINE SILT	60.52'	2.50	5.84	0.25	-37.5/-138.8

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: Christopher M. Barnhill PE
Date: 03/02/18

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well: ☒ MW ☐ Production ☐ Other _____	Type of Data: ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____	Well No. W-19, Sheet 1 of 1 Sheets
1. Project: Walstad Lovington 66 GW Monitoring 2018	2. Project Location: Golder & Associates, Walstad Oil Co. Lovington 66, 424 S. Main Street, Lovington, NM 88260	3. Date: 03/02/2018
4. Technician: CM Barnhill		
7. Method: Pumping Surging Air Lift ~~Bailing~~ Other	8. Manufacturer's Designation of Rig: DSR-2015	9. Location of Well (Site, Description): Monitor Well W-19

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/02/18 Time: 11:45	Date: 03/02/18 Time: 12:18	Date: Time:
10. Total Depth of Well (from TOC): 65.31'	15. Total Depth of Well (from TOC):	20. Total Depth of Well (from TOC):
11. Water Level (from TOC): 60.0'	16. Water Level (from TOC): 60.07'	21. Water Level (from TOC):

12. Water Column Height: 5.31'	Nom Dia	x = gal/ft Sch 40	Sch 80	17. 3 Well Volumes: 2.54 Gallons
13. Well Diameter: 2" SCH 40 PVC MW	2"	0.16	0.1534	18. 5 Well Volumes: 4.24 Gallons
14. Well Volume (gal) (s) w.e. height): 0.8496	4"	0.65	0.5972	19. Purge Volume: 2.75 Gallons
	6"	1.47	1.3540	
	8"	2.61	2.3720	

22. Size and Type of Pump or Bailer: Poly 3.0' x 1.5" Disposable Bailer Twine, Tip.

Final Field Analysis

23. Total Amount of Water Removed: 2.75 Gallons	24. Was Well Pumped Dry? Yes ~~No~~	25. Was water added to well? ~~No~~ Yes If yes, source:	26. Was the Groundwater Sampled ~~Yes~~ No If yes, what was the sample number & Date: Sampling Personnel? W-19, 03/02/18 CMB 12:11 3x40mL VOAs/HCl/8260

27. Final Parameters

Time	Temp C	Conductivity mS/cm	pH	NTUs	WL	Removed	Flow Rate	Observations
12:10	19.73	1.068	6.74	Turbid	60.07'	2.75 Gal.	0.25 gpm	Turbid Strong HC odor

Photo Roll #, 8260

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Turbid Fine Silt - Strong HC odor

29. Purgewater disposal method: On Ground Surface

Sampling / Development Parameters

Time	Temp C	Conductivity mS/cm	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
12:00	19.41	1.022	6.79	Clear/No Odor	60.0	Initial parameters	4.80	0.25	-29.6/-248.8
12:04	19.82	1.011	6.92	Turbid	—	1	3.79	0.25	-34.1/-269.4
12:07	19.68	1.079	6.81	Fine Silt Strong Odor	—	2	3.70	0.25	-32.1/-291.0
12:10	19.73	1.068	6.74	" " "	60.07'	2.75	2.97	0.25	-30.2/-284.4

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: PK Date: 03/20/2018

CMB ENVIRONMENTAL & GEOLOGICAL SERVICES, INC. - WELL DATA FORM

Type Well: ☒ MW ☐ Production ☐ Other _____
Type of Data: ☐ Development ☒ Sampling ☐ Pump Test ☐ Other _____
Well No. Sheet 1: W-21 of 1 Sheets

1. Project: Walstad Lovington 66 GW Monitoring 2018
2. Project Location: Walker & Associates, Walstad O/G Lovington 66, 424 S. Main St. Lovington, NM 88260
3. Date: 03/02/2018
4. Technician: CM Barnhill, PG
7. Method: Pumping Surging Air Lift (Bailing) Other
8. Manufacturer's Designation of Rig: DSR-2015
9. Location of Well (Site, Description): Monitor Well W-21

Water Levels

Initial	Final	Final + 24 Hours
Date: 03/02/18 Time: 12:20	Date: 03/02/18 Time: 13:42	Date: Time:
10. Total Depth of Well (from TOC): 65.20'	15. Total Depth of Well (from TOC): /	20. Total Depth of Well (from TOC): /
11. Water Level (from TOC): 60.0	16. Water Level (from TOC): 60.13'	21. Water Level (from TOC): /

12. Water Column Height: 5.20'
13. Well Diameter: 2" SCH40 PVC MW
14. Well Volume (gal) (s) w.e. height): 0.832

Nom Dia	x = gal/ft Sch 40	Sch 80
(2")	(0.16)	0.1534
4"	0.65	0.5972
6"	1.47	1.3540
8"	2.61	2.3720

17. 3 Well Volumes: 2.496 Gallons
18. 5 Well Volumes: 4.16 Gallons
19. Purge Volume: 2.50 Gallons
22. Size and Type of Pump or (Bailer): Poly 3.0' x 1.5" Disposable Bailer Twine, Tie

Final Field Analysis

23. Total Amount of Water Removed: 2.50 Gallons
24. Was Well Pumped Dry? Yes (No)
25. Was water added to well? (No) Yes If yes, source:
26. Was the Groundwater Sampled (Yes) No
If yes, what was the sample number & Date: W-21, 03/02/18
Sampling Personnel? CMB @ 13:40 3x40mL VOA's/HCL 8260

27. Final Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL	Removed	GPM Flow Rate	Photo Roll #, Observations
13:38	19.47	1.043	6.84	Turbid	60.13'	2.50 Gal	0.25	Turbid Fine Silt

IF PETROLEUM IS IN THE WELL, DO NOT TAKE pH AND CONDUCTIVITY PARAMETERS

28. Physical Appearance and Remarks: Turbid Fine Silt
29. Purgewater disposal method: On Ground Surface

Sampling / Development Parameters

Time	Temp C	mS/cm Conductivity	pH	NTUs	WL (from TOC)	Volume (gallons)	Dissolved Oxygen	Flow Rate (gpm)	pHmv/ORP
13:30	19.57	1.024	6.94	Clear Hard	60.0	Initial parameters	4.29	0.25	-33.2/-138.1
13:32	19.48	1.038	6.76	Turbid Fine Silt	—	1	4.40	0.25	-31.6/-135.8
13:35	19.19	1.038	6.75	" "	—	2	4.51	0.25	-31.1/-129.7
13:38	19.47	1.043	6.84	Turbid Fine Silt	60.13'	2.50	4.14	0.25	-31.6/-119.8

(1) Note volume and physical character of sediments removed.
NTU = Nephelometric turbidity units
WL = Water Level from Top of PVC Casing

Checked By: [signature] PG
Date: 03/02/18

APPENDIX D

Analytical Laboratory Reports

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

March 08, 2018

Emily Clark

Golder Associates
5200 Pasadena, NE Suite C
Albuquerque, NM 87113
TEL: (505) 821-3043
FAX (505) 821-5273

RE: Walstad Oil Co Lovington 66 OrderNo.: 1803310

Dear Emily Clark:

Hall Environmental Analysis Laboratory received 9 sample(s) on 3/6/2018 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-5
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 3:07:00 PM
Lab ID: 1803310-001
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	9.9	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Toluene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Ethylbenzene	2.3	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Methyl tert-butyl ether (MTBE)	1.5	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2,4-Trimethylbenzene	1.1	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Naphthalene	ND	2.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Acetone	ND	10		µg/L	1	3/7/2018 11:20:22 PM	W49632
Bromobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Bromodichloromethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Bromoform	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Bromomethane	ND	3.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
2-Butanone	ND	10		µg/L	1	3/7/2018 11:20:22 PM	W49632
Carbon disulfide	ND	10		µg/L	1	3/7/2018 11:20:22 PM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Chlorobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Chloroethane	ND	2.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Chloroform	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Chloromethane	ND	3.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
2-Chlorotoluene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
4-Chlorotoluene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
cis-1,2-DCE	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Dibromochloromethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Dibromomethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2-Dichloropropane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	1	3/7/2018 11:20:22 PM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-5
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 3:07:00 PM
Lab ID: 1803310-001
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
2-Hexanone	ND	10		µg/L	1	3/7/2018 11:20:22 PM	W49632
Isopropylbenzene	1.1	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	1	3/7/2018 11:20:22 PM	W49632
Methylene Chloride	ND	3.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
n-Butylbenzene	ND	3.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
n-Propylbenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
sec-Butylbenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Styrene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
tert-Butylbenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
trans-1,2-DCE	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Vinyl chloride	ND	1.0		µg/L	1	3/7/2018 11:20:22 PM	W49632
Xylenes, Total	2.7	1.5		µg/L	1	3/7/2018 11:20:22 PM	W49632
Surr: 1,2-Dichloroethane-d4	99.4	70-130		%Rec	1	3/7/2018 11:20:22 PM	W49632
Surr: 4-Bromofluorobenzene	116	70-130		%Rec	1	3/7/2018 11:20:22 PM	W49632
Surr: Dibromofluoromethane	105	70-130		%Rec	1	3/7/2018 11:20:22 PM	W49632
Surr: Toluene-d8	104	70-130		%Rec	1	3/7/2018 11:20:22 PM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-8
Project: Walstad Oil Co Lovington 66
Collection Date: 3/1/2018 3:30:00 PM
Lab ID: 1803310-002
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	12000	1000		µg/L	1E	3/7/2018 11:49:51 PM	W49632
Toluene	5200	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Ethylbenzene	2200	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Methyl tert-butyl ether (MTBE)	12000	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2,4-Trimethylbenzene	1800	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,3,5-Trimethylbenzene	470	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2-Dichloroethane (EDC)	230	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2-Dibromoethane (EDB)	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Naphthalene	480	200		µg/L	100	3/8/2018 12:19:11 AM	W49632
1-Methylnaphthalene	ND	400		µg/L	100	3/8/2018 12:19:11 AM	W49632
2-Methylnaphthalene	ND	400		µg/L	100	3/8/2018 12:19:11 AM	W49632
Acetone	ND	1000		µg/L	100	3/8/2018 12:19:11 AM	W49632
Bromobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Bromodichloromethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Bromoform	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Bromomethane	ND	300		µg/L	100	3/8/2018 12:19:11 AM	W49632
2-Butanone	ND	1000		µg/L	100	3/8/2018 12:19:11 AM	W49632
Carbon disulfide	ND	1000		µg/L	100	3/8/2018 12:19:11 AM	W49632
Carbon Tetrachloride	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Chlorobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Chloroethane	ND	200		µg/L	100	3/8/2018 12:19:11 AM	W49632
Chloroform	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Chloromethane	ND	300		µg/L	100	3/8/2018 12:19:11 AM	W49632
2-Chlorotoluene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
4-Chlorotoluene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
cis-1,2-DCE	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
cis-1,3-Dichloropropene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2-Dibromo-3-chloropropane	ND	200		µg/L	100	3/8/2018 12:19:11 AM	W49632
Dibromochloromethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Dibromomethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2-Dichlorobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,3-Dichlorobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,4-Dichlorobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Dichlorodifluoromethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,1-Dichloroethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,1-Dichloroethene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2-Dichloropropane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,3-Dichloropropane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
2,2-Dichloropropane	ND	200		µg/L	100	3/8/2018 12:19:11 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-8
Project: Walstad Oil Co Lovington 66
Collection Date: 3/1/2018 3:30:00 PM
Lab ID: 1803310-002
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Hexachlorobutadiene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
2-Hexanone	ND	1000		µg/L	100	3/8/2018 12:19:11 AM	W49632
Isopropylbenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
4-Isopropyltoluene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
4-Methyl-2-pentanone	ND	1000		µg/L	100	3/8/2018 12:19:11 AM	W49632
Methylene Chloride	ND	300		µg/L	100	3/8/2018 12:19:11 AM	W49632
n-Butylbenzene	ND	300		µg/L	100	3/8/2018 12:19:11 AM	W49632
n-Propylbenzene	180	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
sec-Butylbenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Styrene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
tert-Butylbenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,1,1,2-Tetrachloroethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,1,2,2-Tetrachloroethane	ND	200		µg/L	100	3/8/2018 12:19:11 AM	W49632
Tetrachloroethene (PCE)	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
trans-1,2-DCE	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
trans-1,3-Dichloropropene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2,3-Trichlorobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2,4-Trichlorobenzene	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,1,1-Trichloroethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,1,2-Trichloroethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Trichloroethene (TCE)	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Trichlorofluoromethane	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
1,2,3-Trichloropropane	ND	200		µg/L	100	3/8/2018 12:19:11 AM	W49632
Vinyl chloride	ND	100		µg/L	100	3/8/2018 12:19:11 AM	W49632
Xylenes, Total	4900	150		µg/L	100	3/8/2018 12:19:11 AM	W49632
Surr: 1,2-Dichloroethane-d4	95.2	70-130		%Rec	100	3/8/2018 12:19:11 AM	W49632
Surr: 4-Bromofluorobenzene	116	70-130		%Rec	100	3/8/2018 12:19:11 AM	W49632
Surr: Dibromofluoromethane	101	70-130		%Rec	100	3/8/2018 12:19:11 AM	W49632
Surr: Toluene-d8	104	70-130		%Rec	100	3/8/2018 12:19:11 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-9
Project: Walstad Oil Co Lovington 66
Collection Date: 3/1/2018 4:20:00 PM
Lab ID: 1803310-003
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	4100	200		µg/L	200	3/8/2018 12:48:41 AM	W49632
Toluene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Ethylbenzene	35	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Methyl tert-butyl ether (MTBE)	660	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2,4-Trimethylbenzene	370	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,3,5-Trimethylbenzene	90	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2-Dichloroethane (EDC)	600	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2-Dibromoethane (EDB)	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Naphthalene	120	40		µg/L	20	3/8/2018 1:18:07 AM	W49632
1-Methylnaphthalene	ND	80		µg/L	20	3/8/2018 1:18:07 AM	W49632
2-Methylnaphthalene	ND	80		µg/L	20	3/8/2018 1:18:07 AM	W49632
Acetone	ND	200		µg/L	20	3/8/2018 1:18:07 AM	W49632
Bromobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Bromodichloromethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Bromoform	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Bromomethane	ND	60		µg/L	20	3/8/2018 1:18:07 AM	W49632
2-Butanone	ND	200		µg/L	20	3/8/2018 1:18:07 AM	W49632
Carbon disulfide	ND	200		µg/L	20	3/8/2018 1:18:07 AM	W49632
Carbon Tetrachloride	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Chlorobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Chloroethane	ND	40		µg/L	20	3/8/2018 1:18:07 AM	W49632
Chloroform	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Chloromethane	ND	60		µg/L	20	3/8/2018 1:18:07 AM	W49632
2-Chlorotoluene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
4-Chlorotoluene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
cis-1,2-DCE	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
cis-1,3-Dichloropropene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2-Dibromo-3-chloropropane	ND	40		µg/L	20	3/8/2018 1:18:07 AM	W49632
Dibromochloromethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Dibromomethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2-Dichlorobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,3-Dichlorobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,4-Dichlorobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Dichlorodifluoromethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,1-Dichloroethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,1-Dichloroethene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2-Dichloropropane	20	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,3-Dichloropropane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
2,2-Dichloropropane	ND	40		µg/L	20	3/8/2018 1:18:07 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-9
Project: Walstad Oil Co Lovington 66
Collection Date: 3/1/2018 4:20:00 PM
Lab ID: 1803310-003
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Hexachlorobutadiene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
2-Hexanone	ND	200		µg/L	20	3/8/2018 1:18:07 AM	W49632
Isopropylbenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
4-Isopropyltoluene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
4-Methyl-2-pentanone	ND	200		µg/L	20	3/8/2018 1:18:07 AM	W49632
Methylene Chloride	ND	60		µg/L	20	3/8/2018 1:18:07 AM	W49632
n-Butylbenzene	ND	60		µg/L	20	3/8/2018 1:18:07 AM	W49632
n-Propylbenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
sec-Butylbenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Styrene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
tert-Butylbenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,1,1,2-Tetrachloroethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,1,2,2-Tetrachloroethane	ND	40		µg/L	20	3/8/2018 1:18:07 AM	W49632
Tetrachloroethene (PCE)	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
trans-1,2-DCE	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
trans-1,3-Dichloropropene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2,3-Trichlorobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2,4-Trichlorobenzene	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,1,1-Trichloroethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,1,2-Trichloroethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Trichloroethene (TCE)	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Trichlorofluoromethane	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
1,2,3-Trichloropropane	ND	40		µg/L	20	3/8/2018 1:18:07 AM	W49632
Vinyl chloride	ND	20		µg/L	20	3/8/2018 1:18:07 AM	W49632
Xylenes, Total	38	30		µg/L	20	3/8/2018 1:18:07 AM	W49632
Surr: 1,2-Dichloroethane-d4	104	70-130		%Rec	20	3/8/2018 1:18:07 AM	W49632
Surr: 4-Bromofluorobenzene	119	70-130		%Rec	20	3/8/2018 1:18:07 AM	W49632
Surr: Dibromofluoromethane	105	70-130		%Rec	20	3/8/2018 1:18:07 AM	W49632
Surr: Toluene-d8	102	70-130		%Rec	20	3/8/2018 1:18:07 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-19
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 12:11:00 PM
Lab ID: 1803310-004
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	1.4	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Toluene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Ethylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2,4-Trimethylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,3,5-Trimethylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2-Dichloroethane (EDC)	71	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Naphthalene	ND	2.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Acetone	ND	10		µg/L	2	3/8/2018 1:46:59 AM	W49632
Bromobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Bromodichloromethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Bromoform	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Bromomethane	ND	3.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
2-Butanone	ND	10		µg/L	2	3/8/2018 1:46:59 AM	W49632
Carbon disulfide	ND	10		µg/L	2	3/8/2018 1:46:59 AM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Chlorobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Chloroethane	ND	2.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Chloroform	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Chloromethane	ND	3.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
2-Chlorotoluene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
4-Chlorotoluene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
cis-1,2-DCE	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Dibromochloromethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Dibromomethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2-Dichloropropane	4.9	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	2	3/8/2018 1:46:59 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-19
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 12:11:00 PM
Lab ID: 1803310-004
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
2-Hexanone	ND	10		µg/L	2	3/8/2018 1:46:59 AM	W49632
Isopropylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	2	3/8/2018 1:46:59 AM	W49632
Methylene Chloride	ND	3.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
n-Butylbenzene	ND	3.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
n-Propylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
sec-Butylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Styrene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
tert-Butylbenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
trans-1,2-DCE	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Vinyl chloride	ND	1.0		µg/L	2	3/8/2018 1:46:59 AM	W49632
Xylenes, Total	ND	1.5		µg/L	2	3/8/2018 1:46:59 AM	W49632
Surr: 1,2-Dichloroethane-d4	105	70-130		%Rec	2	3/8/2018 1:46:59 AM	W49632
Surr: 4-Bromofluorobenzene	119	70-130		%Rec	2	3/8/2018 1:46:59 AM	W49632
Surr: Dibromofluoromethane	103	70-130		%Rec	2	3/8/2018 1:46:59 AM	W49632
Surr: Toluene-d8	104	70-130		%Rec	2	3/8/2018 1:46:59 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-11
Project: Walstad Oil Co Lovington 66
Collection Date: 3/1/2018 2:50:00 PM
Lab ID: 1803310-005
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	1.0	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Toluene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Ethylbenzene	1.1	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Methyl tert-butyl ether (MTBE)	80	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2,4-Trimethylbenzene	2.2	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,3,5-Trimethylbenzene	1.5	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2-Dichloroethane (EDC)	40	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Naphthalene	ND	2.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Acetone	ND	10		µg/L	1	3/8/2018 2:16:24 AM	W49632
Bromobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Bromodichloromethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Bromoform	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Bromomethane	ND	3.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
2-Butanone	ND	10		µg/L	1	3/8/2018 2:16:24 AM	W49632
Carbon disulfide	ND	10		µg/L	1	3/8/2018 2:16:24 AM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Chlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Chloroethane	ND	2.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Chloroform	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Chloromethane	ND	3.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
2-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
4-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
cis-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Dibromochloromethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Dibromomethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	1	3/8/2018 2:16:24 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-11
Project: Walstad Oil Co Lovington 66
Collection Date: 3/1/2018 2:50:00 PM
Lab ID: 1803310-005
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
2-Hexanone	ND	10		µg/L	1	3/8/2018 2:16:24 AM	W49632
Isopropylbenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	1	3/8/2018 2:16:24 AM	W49632
Methylene Chloride	ND	3.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
n-Butylbenzene	ND	3.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
n-Propylbenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
sec-Butylbenzene	1.2	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Styrene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
tert-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
trans-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Vinyl chloride	ND	1.0		µg/L	1	3/8/2018 2:16:24 AM	W49632
Xylenes, Total	1.8	1.5		µg/L	1	3/8/2018 2:16:24 AM	W49632
Surr: 1,2-Dichloroethane-d4	96.2	70-130		%Rec	1	3/8/2018 2:16:24 AM	W49632
Surr: 4-Bromofluorobenzene	110	70-130		%Rec	1	3/8/2018 2:16:24 AM	W49632
Surr: Dibromofluoromethane	103	70-130		%Rec	1	3/8/2018 2:16:24 AM	W49632
Surr: Toluene-d8	106	70-130		%Rec	1	3/8/2018 2:16:24 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-16
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 2:20:00 PM
Lab ID: 1803310-006
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Toluene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Ethylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Naphthalene	ND	2.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Acetone	ND	10		µg/L	1	3/8/2018 2:45:12 AM	W49632
Bromobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Bromodichloromethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Bromoform	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Bromomethane	ND	3.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
2-Butanone	ND	10		µg/L	1	3/8/2018 2:45:12 AM	W49632
Carbon disulfide	ND	10		µg/L	1	3/8/2018 2:45:12 AM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Chlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Chloroethane	ND	2.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Chloroform	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Chloromethane	ND	3.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
2-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
4-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
cis-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Dibromochloromethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Dibromomethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	1	3/8/2018 2:45:12 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-16
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 2:20:00 PM
Lab ID: 1803310-006
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
2-Hexanone	ND	10		µg/L	1	3/8/2018 2:45:12 AM	W49632
Isopropylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	1	3/8/2018 2:45:12 AM	W49632
Methylene Chloride	ND	3.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
n-Butylbenzene	ND	3.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
n-Propylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
sec-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Styrene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
tert-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
trans-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Vinyl chloride	ND	1.0		µg/L	1	3/8/2018 2:45:12 AM	W49632
Xylenes, Total	ND	1.5		µg/L	1	3/8/2018 2:45:12 AM	W49632
Surr: 1,2-Dichloroethane-d4	99.2	70-130		%Rec	1	3/8/2018 2:45:12 AM	W49632
Surr: 4-Bromofluorobenzene	122	70-130		%Rec	1	3/8/2018 2:45:12 AM	W49632
Surr: Dibromofluoromethane	101	70-130		%Rec	1	3/8/2018 2:45:12 AM	W49632
Surr: Toluene-d8	104	70-130		%Rec	1	3/8/2018 2:45:12 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-20
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 1:01:00 PM
Lab ID: 1803310-007 **Matrix:** AQUEOUS **Received Date:** 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Toluene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Ethylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Naphthalene	ND	2.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Acetone	ND	10		µg/L	1	3/8/2018 3:14:35 AM	W49632
Bromobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Bromodichloromethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Bromoform	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Bromomethane	ND	3.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
2-Butanone	ND	10		µg/L	1	3/8/2018 3:14:35 AM	W49632
Carbon disulfide	ND	10		µg/L	1	3/8/2018 3:14:35 AM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Chlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Chloroethane	ND	2.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Chloroform	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Chloromethane	ND	3.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
2-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
4-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
cis-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Dibromochloromethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Dibromomethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	1	3/8/2018 3:14:35 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-20
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 1:01:00 PM
Lab ID: 1803310-007 **Matrix:** AQUEOUS **Received Date:** 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
2-Hexanone	ND	10		µg/L	1	3/8/2018 3:14:35 AM	W49632
Isopropylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	1	3/8/2018 3:14:35 AM	W49632
Methylene Chloride	ND	3.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
n-Butylbenzene	ND	3.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
n-Propylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
sec-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Styrene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
tert-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
trans-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Vinyl chloride	ND	1.0		µg/L	1	3/8/2018 3:14:35 AM	W49632
Xylenes, Total	ND	1.5		µg/L	1	3/8/2018 3:14:35 AM	W49632
Surr: 1,2-Dichloroethane-d4	95.7	70-130		%Rec	1	3/8/2018 3:14:35 AM	W49632
Surr: 4-Bromofluorobenzene	118	70-130		%Rec	1	3/8/2018 3:14:35 AM	W49632
Surr: Dibromofluoromethane	104	70-130		%Rec	1	3/8/2018 3:14:35 AM	W49632
Surr: Toluene-d8	102	70-130		%Rec	1	3/8/2018 3:14:35 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-21
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 1:40:00 PM
Lab ID: 1803310-008
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Toluene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Ethylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Naphthalene	ND	2.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Acetone	ND	10		µg/L	1	3/8/2018 3:43:31 AM	W49632
Bromobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Bromodichloromethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Bromoform	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Bromomethane	ND	3.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
2-Butanone	ND	10		µg/L	1	3/8/2018 3:43:31 AM	W49632
Carbon disulfide	ND	10		µg/L	1	3/8/2018 3:43:31 AM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Chlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Chloroethane	ND	2.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Chloroform	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Chloromethane	ND	3.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
2-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
4-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
cis-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Dibromochloromethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Dibromomethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	1	3/8/2018 3:43:31 AM	W49632

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Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: W-21
Project: Walstad Oil Co Lovington 66
Collection Date: 3/2/2018 1:40:00 PM
Lab ID: 1803310-008
Matrix: AQUEOUS
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
2-Hexanone	ND	10		µg/L	1	3/8/2018 3:43:31 AM	W49632
Isopropylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	1	3/8/2018 3:43:31 AM	W49632
Methylene Chloride	ND	3.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
n-Butylbenzene	ND	3.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
n-Propylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
sec-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Styrene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
tert-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
trans-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Vinyl chloride	ND	1.0		µg/L	1	3/8/2018 3:43:31 AM	W49632
Xylenes, Total	ND	1.5		µg/L	1	3/8/2018 3:43:31 AM	W49632
Surr: 1,2-Dichloroethane-d4	96.9	70-130		%Rec	1	3/8/2018 3:43:31 AM	W49632
Surr: 4-Bromofluorobenzene	117	70-130		%Rec	1	3/8/2018 3:43:31 AM	W49632
Surr: Dibromofluoromethane	104	70-130		%Rec	1	3/8/2018 3:43:31 AM	W49632
Surr: Toluene-d8	104	70-130		%Rec	1	3/8/2018 3:43:31 AM	W49632

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Qualifiers:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: Trip Blank
Project: Walstad Oil Co Lovington 66
Collection Date:
Lab ID: 1803310-009
Matrix: TRIP BLANK
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Toluene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Ethylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Naphthalene	ND	2.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
2-Methylnaphthalene	ND	4.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Acetone	ND	10		µg/L	1	3/8/2018 4:12:55 AM	W49632
Bromobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Bromodichloromethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Bromoform	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Bromomethane	ND	3.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
2-Butanone	ND	10		µg/L	1	3/8/2018 4:12:55 AM	W49632
Carbon disulfide	ND	10		µg/L	1	3/8/2018 4:12:55 AM	W49632
Carbon Tetrachloride	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Chlorobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Chloroethane	ND	2.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Chloroform	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Chloromethane	ND	3.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
2-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
4-Chlorotoluene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
cis-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Dibromochloromethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Dibromomethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,3-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,4-Dichlorobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Dichlorodifluoromethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,1-Dichloroethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,1-Dichloroethene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,3-Dichloropropane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
2,2-Dichloropropane	ND	2.0		µg/L	1	3/8/2018 4:12:55 AM	W49632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Golder Associates
Client Sample ID: Trip Blank
Project: Walstad Oil Co Lovington 66
Collection Date:
Lab ID: 1803310-009
Matrix: TRIP BLANK
Received Date: 3/6/2018 9:35:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Hexachlorobutadiene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
2-Hexanone	ND	10		µg/L	1	3/8/2018 4:12:55 AM	W49632
Isopropylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
4-Isopropyltoluene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
4-Methyl-2-pentanone	ND	10		µg/L	1	3/8/2018 4:12:55 AM	W49632
Methylene Chloride	ND	3.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
n-Butylbenzene	ND	3.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
n-Propylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
sec-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Styrene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
tert-Butylbenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
trans-1,2-DCE	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,1,1-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,1,2-Trichloroethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Trichloroethene (TCE)	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Trichlorofluoromethane	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
1,2,3-Trichloropropane	ND	2.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Vinyl chloride	ND	1.0		µg/L	1	3/8/2018 4:12:55 AM	W49632
Xylenes, Total	ND	1.5		µg/L	1	3/8/2018 4:12:55 AM	W49632
Surr: 1,2-Dichloroethane-d4	96.0	70-130		%Rec	1	3/8/2018 4:12:55 AM	W49632
Surr: 4-Bromofluorobenzene	117	70-130		%Rec	1	3/8/2018 4:12:55 AM	W49632
Surr: Dibromofluoromethane	101	70-130		%Rec	1	3/8/2018 4:12:55 AM	W49632
Surr: Toluene-d8	103	70-130		%Rec	1	3/8/2018 4:12:55 AM	W49632

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Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1803310**

08-Mar-18

Client: Golder Associates

Project: Walstad Oil Co Lovington 66

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **W49632**	RunNo: **49632**
Prep Date:	Analysis Date: **3/7/2018**	SeqNo: **1604439** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1803310**

08-Mar-18

Client: Golder Associates

Project: Walstad Oil Co Lovington 66

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **W49632**	RunNo: **49632**
Prep Date:	Analysis Date: **3/7/2018**	SeqNo: **1604439** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.7		10.00		96.8	70	130			
Surr: 4-Bromofluorobenzene	12		10.00		118	70	130			
Surr: Dibromofluoromethane	10		10.00		101	70	130			
Surr: Toluene-d8	10		10.00		104	70	130			

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **W49632**	RunNo: **49632**
Prep Date:	Analysis Date: **3/7/2018**	SeqNo: **1604440** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	19	1.0	20.00	0	93.1	70	130			
Toluene	21	1.0	20.00	0	103	70	130			
Chlorobenzene	22	1.0	20.00	0	108	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1803310**

08-Mar-18

Client: Golder Associates

Project: Walstad Oil Co Lovington 66

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **W49632**	RunNo: **49632**
Prep Date:	Analysis Date: **3/7/2018**	SeqNo: **1604440** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloroethene	21	1.0	20.00	0	106	70	130			
Trichloroethene (TCE)	18	1.0	20.00	0	88.8	70	130			
Surr: 1,2-Dichloroethane-d4	9.8		10.00		98.4	70	130			
Surr: 4-Bromofluorobenzene	12		10.00		121	70	130			
Surr: Dibromofluoromethane	10		10.00		103	70	130			
Surr: Toluene-d8	10		10.00		105	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: **Golder Assoc** Work Order Number: **1803310** RcptNo: **1**

Received By: **Mandy Woods** **3/6/2018 9:35:00 AM**

Completed By: **Erin Melendrez** **3/6/2018 3:09:25 PM**

Reviewed By: MDS 3/6/18 MW 3/6/18

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? UPS

Log In

3. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☑ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
8. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
9. VOA vials have zero headspace? Yes ☑ No ☐ No VOA Vials ☐
10. Were any sample containers received broken? Yes ☐ No ☑
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes ☑ No ☐
12. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
13. Is it clear what analyses were requested? Yes ☑ No ☐
14. Were all holding times able to be met? (If no, notify customer for authorization.) Yes ☑ No ☐

# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)
Adjusted? _____
Checked by: _____

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date: _____
By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: _____
Client Instructions: _____

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.4	Good	Yes			

Chain-of-Custody Record

Client: Golder & Associates, Inc

ATTN: Emily Clarke, CPSS

Mailing Address: 5200 Pasadena Ave NE Suite C
Albuquerque, NM 87113

Phone #: 505.821.3043

email or Fax#: Emily_Clark@golder.com

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☑ Standard ☐ Rush _____

Project Name: Golder Walstad Oil Co. Lovington 66

Project #: GW Monitoring 2018
Walstad Oil Co. Lovington 66

Project Manager:
Emily Clarke, CPSS

Sampler:

On Ice: ☒ Yes ☐ No

Sample Temperature: 2.4°

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1803310	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA) Fluoride	8270 (Semi-VOA)	Air Bubbles (Y or N)
03/02/18	15:07	H_2O	W-5	3x40mL VOA's	$HgCl_2$	-001										X X		N
03/02/18	15:30	H_2O	W-8			-002										X		N
03/01/18	16:20	H_2O	W-9			-003										X		N
3/02/18	12:11	H_2O	W-14			-004										X		N
03/01/18	14:50	H_2O	W-11			-005										X		N
03/02/18	14:20	H_2O	W-16			-006										X		N
03/02/18	13:00	H_2O	W-20			-007										X		N
03/02/18	13:40	H_2O	W-21			-008										X		N
			Trip Blank	2x40mL VOA's	$HgCl_2$	-009												

Date	Time	Relinquished by:	Received by:	Date	Time
03/05/18	0610		UPS @ 3/6	3/6/18	0935
Date:	Time:	Relinquished by:	Received by:	Date	Time

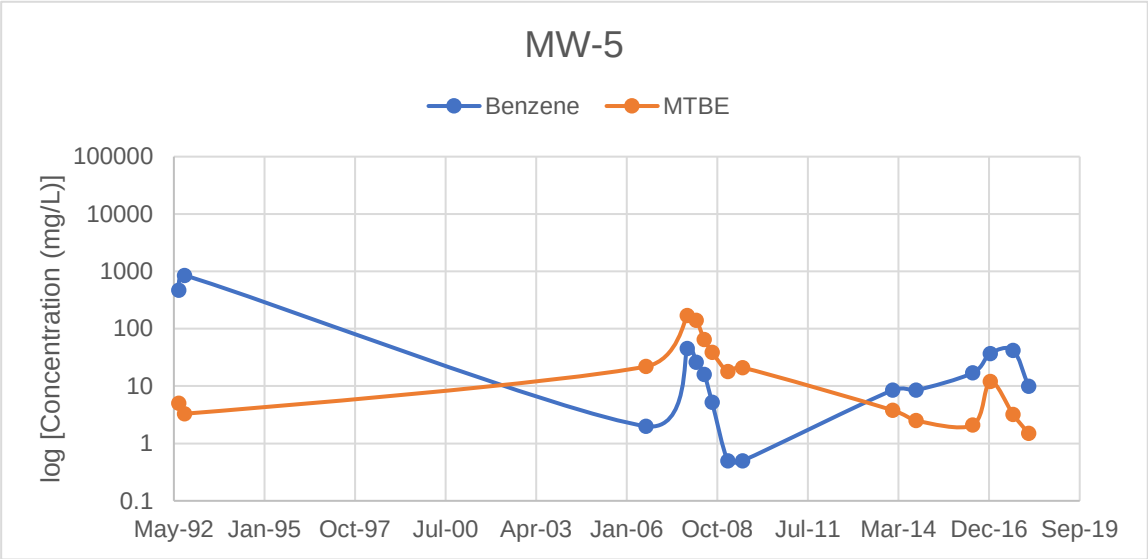
Remarks:
Any Questions Please Call Emily Clarke @ 505.821.3043

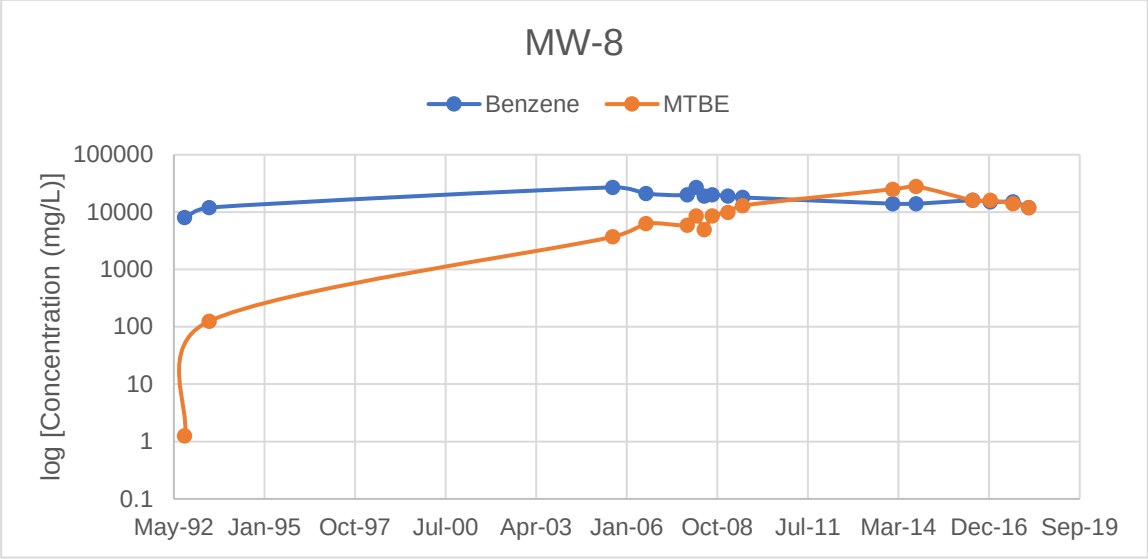
If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

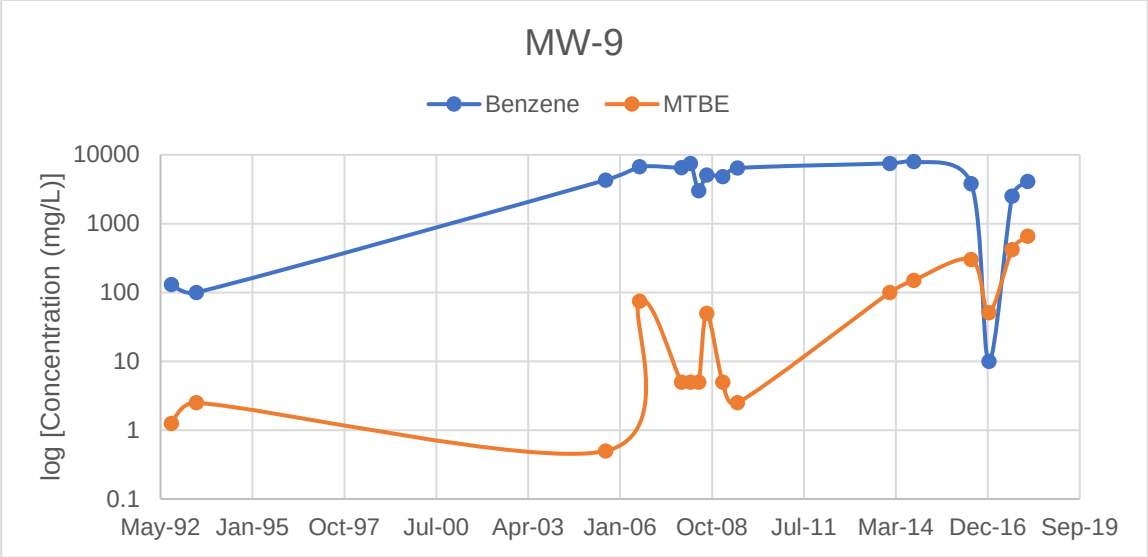
APPENDIX E

Volatile Organic Compound Concentration Trends and Analytical Data

Appendix E
Volatile Organic Compound Concentration Trends
Lovington 66

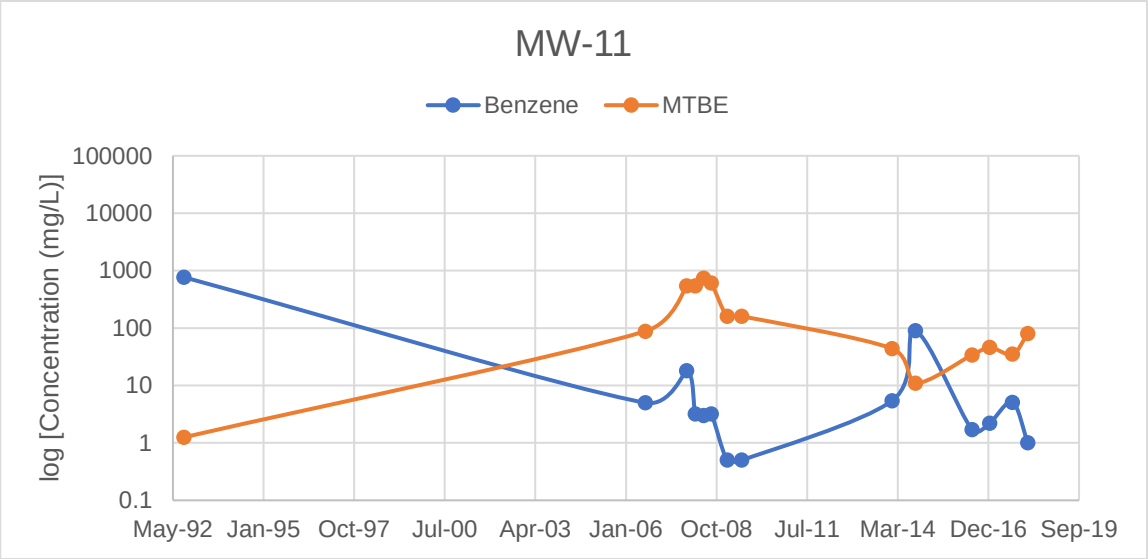


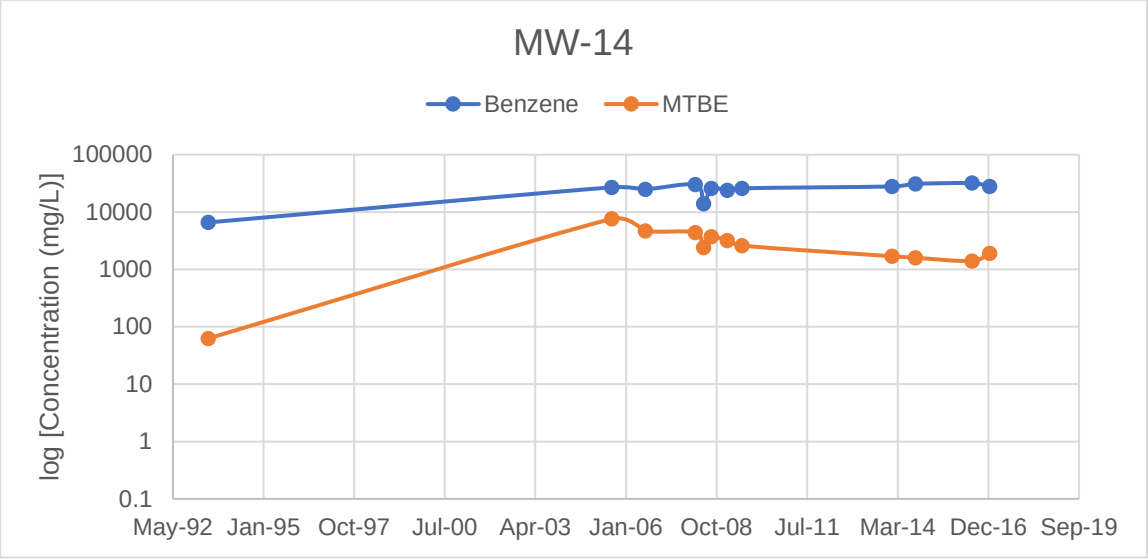


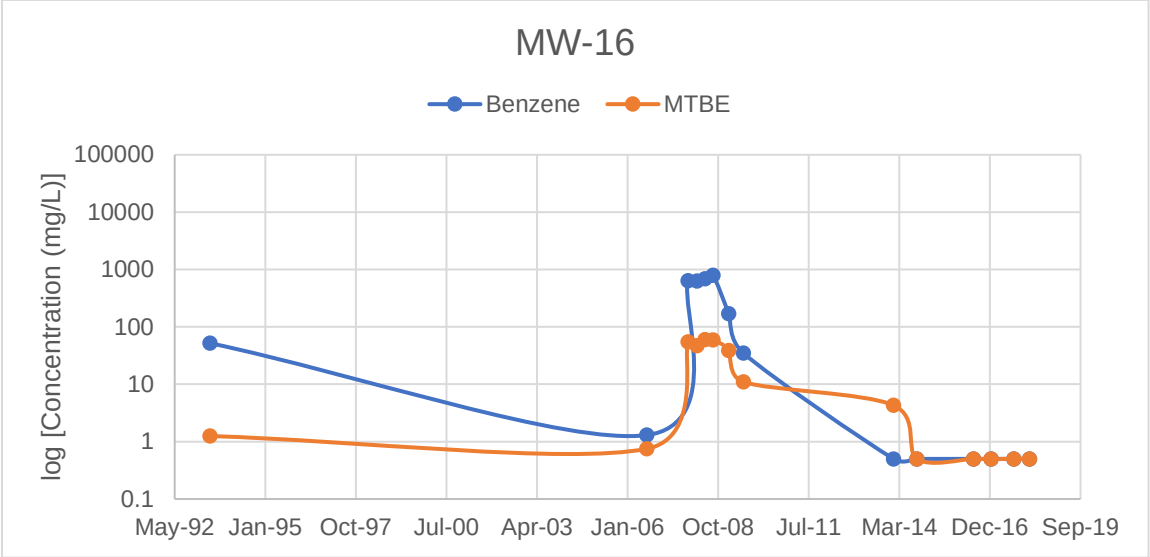


Note: Non-detects are shown as half the detection limit

Appendix E
Volatile Organic Compound Concentration Trends
Lovington 66







Note: Non-detects are shown as half the detection limit

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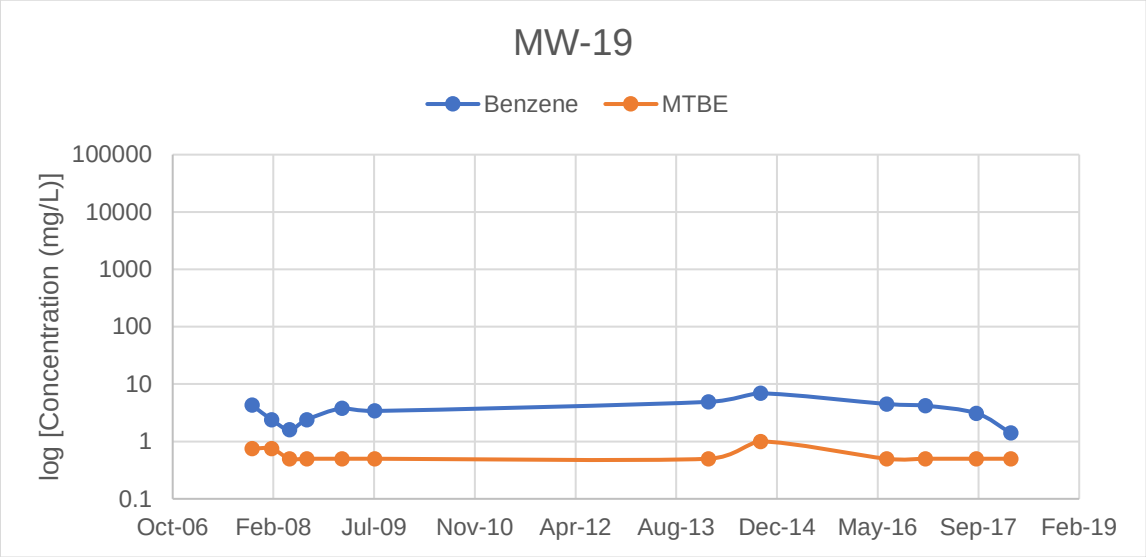
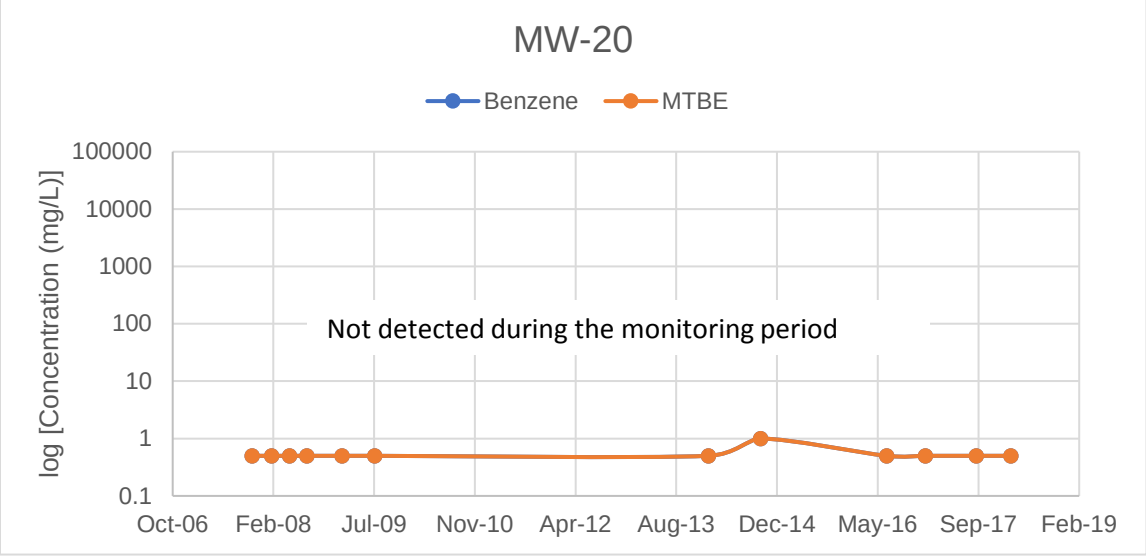
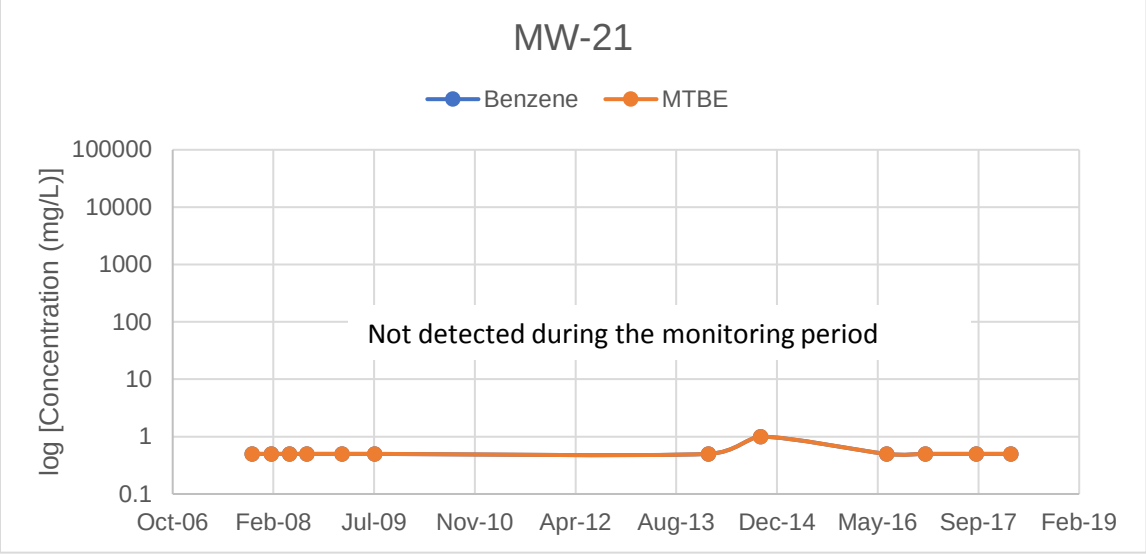
Volatile Organic Compound Concentration Trends
Lovington 66







Note: Non-detects are shown as half the detection limit

Appendix E
Summary of Volatile Organic Compound Analytical Data
Lovington 66

Monitoring Well	Date Sampled	Concentrations in Groundwater (µg/L)								Notes
		Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDB	EDC	PAH	
NMWQCC Standard		**10**	**750**	**750**	**620**	**100**	**0.1**	**10**	**30**	
W-2	13-Mar-92	**29,878**	**28,953**	**3,874**	**13,109**	**5,921**	NA	NA	NA	
W-3	13-Mar-92	**10,493**	**8,961**	**1,253**	**5,320**	**5,150**	NA	NA	NA	
W-4	24-Jun-92	**200**	53	21	40	<5.0	NA	NA	NA	
W-4	28-Aug-92	**1,400**	430	95	300	<2.5	NA	NA	NA	
W-4	25-May-93	**2,500**	**980**	310	470	<63	NA	NA	NA	
W-4	8-Aug-06	NA	NA	NA	NA	NA	NA	NA	NA	Well destroyed
W-5	24-Jun-92	**470**	250	41	290	<10	NA	NA	NA	
W-5	28-Aug-92	**850**	400	58	450	3.3	NA	NA	NA	
W-5	9-Aug-06	2.0	<1.0	3.7	<3.0	22	<1.0	<1.0	<2.0	
W-5	7-Nov-07	**45**	8.5	29	15	**170**	<1.0	<1.0	4.9	
W-5	13-Feb-08	**26**	1.1	24	<1.5	**140**	<1.0	<1.0	4.5	
W-5	12-May-08	**16**	<1.0	7.6	<1.5	65	<1.0	<1.0	<2.0	
W-5	7-Aug-08	5.2	<1.0	3.7	<1.5	39	<1.0	<1.0	<2.0	
W-5	28-Jan-09	<1.0	<1.0	<1.0	<1.5	18	<1.0	<1.0	<2.0	
W-5	9-Jul-09	<1.0	<1.0	<1.0	<1.5	21	<1.0	<1.0	<2.0	
W-5	21-Jan-14	8.5	1.0	2.7	2.5	3.8	<1.0	<1.0	<2.0	
W-5	7-Oct-14	8.5	<2.0	<2.0	<3.0	2.5	<2.0	<2.0	<4.0	
W-5	23-Jun-16	**17**	<1.0	7.5	7.0	2.1	<1.0	<1.0	<2.0	
W-5	2-Jan-17	**37**	1.9	9.6	12	12	<1.0	<1.0	<2.0	
W-5	12-Sep-17	**42**	<2.0	5.6	10	3.2	<1.0	<1.0	<8.0	
W-5	1-Mar-18	9.9	<1.0	2.3	2.7	1.5	<1.0	<1.0	<10	
W-6	24-Jun-92	**1,400**	**1,200**	48	500	<25	NA	NA	NA	
W-6	28-Aug-92	**3,000**	**2,700**	93	**860**	<2.5	NA	NA	NA	
W-6	8-Aug-06	NA	NA	NA	NA	NA	NA	NA	NA	Well destroyed
W-7	28-Aug-92	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NA	NA	
W-7	25-May-93	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NA	NA	
W-7	8-Aug-06	<1.0	<1.0	<1.0	<3.0	<1.5	<1.0	<1.0	<2.0	
W-7	7-Nov-07	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-8	28-Aug-92	**8,000**	**9,500**	690	**5,200**	<2.5	NA	NA	NA	
W-8	25-May-93	**12,000**	**8,300**	**1,500**	**8,800**	<250	NA	NA	NA	
W-8	4-Aug-05	**27,000**	**35,000**	**3,800**	**18,000**	**3,700**	**1,100**	**4,300**	**622**	
W-8	9-Aug-06	**21,000**	**29,000**	**2,600**	**13,000**	**6,300**	<500	**3,700**	**1,100**	
W-8	7-Nov-07	**20,000**	**27,000**	**3,200**	**15,000**	**5,900**	**440**	**4,100**	**770**	
W-8	13-Feb-08	**27,000**	**39,000**	**4,800**	**16,000**	**8,600**	**670**	**4,000**	**1,350**	
W-8	12-May-08	**19,000**	**22,000**	**1,800**	**8,000**	**4,900**	**250**	**2,100**	**400**	
W-8	7-Aug-08	**20,000**	**24,000**	**2,400**	**11,000**	**8,600**	**270**	**2,900**	**670**	
W-8	28-Jan-09	**19,000**	**26,000**	**2,500**	**11,000**	**9,800**	**290**	**3,000**	**570**	

Appendix E
Summary of Volatile Organic Compound Analytical Data
Lovington 66

Monitoring Well	Date Sampled	Concentrations in Groundwater (µg/L)								Notes
		Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDB	EDC	PAH	
NMWQCC Standard		**10**	**750**	**750**	**620**	**100**	**0.1**	**10**	**30**	
W-8	9-Jul-09	**18,000**	**26,000**	**2,400**	**11,000**	**13,000**	**230**	**2,300**	**500**	
W-8	21-Jan-14	**14,000**	**8,800**	**2,300**	**7,900**	**25,000**	<100	**610**	**610**	
W-8	7-Oct-14	**14,000**	**7,000**	**2,400**	**7,600**	**28,000**	<100	**440**	**590**	
W-8	23-Jun-16	**16,000**	**7,300**	**2,100**	**6,000**	**16,000**	<200	**320**	**540**	
W-8	2-Jan-17	**15,000**	**7,200**	**2,100**	**5,700**	**16,000**	<200	**350**	**430**	
W-8	12-Sep-17	**15,000**	**6,100**	**2,100**	**4,900**	**14,000**	<200	**260**	**594**	
W-8	1-Mar-18	**12,000**	**5,200**	**2,200**	**4,900**	**12,000**	<100	**230**	**480**	
W-9	28-Aug-92	**130**	8.2	16	140	<2.5	NA	NA	NA	
W-9	25-May-93	**100**	6.3	2.5	170	<5.0	NA	NA	NA	
W-9	4-Aug-05	**4,300**	180	**850**	**830**	<1.0	<0.01	**320**	29	
W-9	9-Aug-06	**6,700**	560	**1,200**	**1,400**	<150	<100	**650**	**250**	
W-9	7-Nov-07	**6,500**	120	620	450	<10	<10	**360**	**51**	
W-9	13-Feb-08	**7,500**	130	**910**	590	<10	<10	**450**	**129**	
W-9	12-May-08	**3,000**	63	**800**	360	<10	<10	**480**	**228**	
W-9	7-Aug-08	**5,100**	<100	**830**	300	<100	<100	**520**	<200	
W-9	28-Jan-09	**4,800**	<10	370	380	<10	<10	**580**	**120**	
W-9	9-Jul-09	**6,400**	<5.0	**1,100**	460	<5.0	<5.0	**570**	**139**	
W-9	21-Jan-14	**7,500**	<10	**1,200**	250	**100**	<10	**910**	**180**	
W-9	7-Oct-14	**8,000**	<50	**1,200**	210	**150**	<50	**960**	**180**	
W-9	23-Jun-16	**3,800**	<50	290	<7.5	**300**	<50	**410**	<100	
W-9	2-Jan-17	**10**	<1.0	1.5	<1.5	51	<1.0	**60**	<2.0	
W-9	12-Sep-17	**2,500**	<1.0	110	61	**420**	<1.0	**510**	**43**	
W-9	1-Mar-18	**4,100**	<1.0	35	38	**660**	<20	**600**	**120**	
W-10*	28-Aug-92	**1,100**	11	120	440	<2.5	NA	NA	NA	
W-10*	4-Aug-05	**940**	2.6	**930**	140	**2,400**	**0.1**	**48**	27	
W-10*	9-Aug-06	**420**	<1.0	31	<3.0	22	<1.0	**12**	**121**	
W-10*	7-Oct-14	NA	NA	NA	NA	NA	NA	NA	NA	No access to well, well vault broken
W-11	28-Aug-92	**770**	13	13	280	<2.5	NA	NA	NA	
W-11	9-Aug-06	5.0	<1.0	62	44	88	<1.0	**33**	<2.0	
W-11	7-Nov-07	**18**	<1.0	38	13	**540**	<1.0	**35**	<2.0	
W-11	13-Feb-08	3.2	<1.0	41	5.1	**540**	<1.0	**37**	<2.0	
W-11	12-May-08	3.0	<1.0	31	3.7	**740**	<1.0	**36**	<2.0	
W-11	6-Aug-08	3.2	<1.0	28	2.5	**610**	<1.0	**38**	<2.0	
W-11	28-Jan-09	<1.0	<1.0	40	5.7	**160**	<1.0	**44**	<2.0	
W-11	9-Jul-09	<1.0	<1.0	34	7.2	**160**	<1.0	**44**	<2.0	
W-11	21-Jan-14	5.4	<1.0	25	1.8	44	<1.0	**51**	<2.0	
W-11	7-Oct-14	**90**	<5.0	150	<7.5	11	<5.0	**57**	<10	

Appendix E
Summary of Volatile Organic Compound Analytical Data
Lovington 66

Monitoring Well	Date Sampled	Concentrations in Groundwater (µg/L)								Notes
		Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDB	EDC	PAH	
NMWQCC Standard		**10**	**750**	**750**	**620**	**100**	**0.1**	**10**	**30**	
W-11	23-Jun-16	1.7	<1.0	47	<1.5	34	<1.0	**63**	<2.0	
W-11	2-Jan-17	2.2	<1.0	27	4.2	46	<1.0	**58**	2.2	
W-11	12-Sep-17	5.1	<1.0	24	<1.5	35	<1.0	**52**	3.9	
W-11	1-Mar-18	1.0	<1.0	1.1	1.8	80	<1.0	**40**	<4.0	
W-12	29-Aug-92	**87**	6.1	2.6	180	<2.5	NA	NA	NA	
W-12	8-Aug-06	<1.0	<1.0	<1.0	<3.0	<1.5	<1.0	<1.0	<2.0	
W-13	29-Aug-92	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NA	NA	
W-13	8-Aug-06	<1.0	<1.0	<1.0	<3.0	<1.5	<1.0	<1.0	<2.0	
W-14	26-May-93	**6,600**	**4,300**	**1,200**	**4,000**	<125	NA	NA	NA	
W-14	5-Aug-05	**27,000**	**26,000**	**4,900**	**9,500**	**7,600**	**3.3**	**120**	**413**	
W-14	9-Aug-06	**25,000**	**23,000**	**4,000**	**9,500**	**4,700**	<500	<500	**1,200**	
W-14	13-Feb-08	**30,000**	**23,000**	**4,900**	**13,000**	**4,400**	<50	**210**	**1,270**	
W-14	13-May-08	**14,000**	**6,500**	**2,800**	**6,300**	**2,400**	<10	**170**	**1,001**	
W-14	7-Aug-08	**26,000**	**20,000**	**4,400**	**11,000**	**3,700**	<100	**160**	**840**	
W-14	28-Jan-09	**24,000**	**19,000**	**2,200**	**8,700**	**3,200**	<100	**150**	**640**	
W-14	10-Jul-09	**26,000**	**24,000**	**4,000**	**11,000**	**2,600**	<50	**160**	**590**	
W-14	21-Jan-14	**28,000**	**27,000**	**4,000**	**12,000**	**1,700**	<100	**120**	**730**	
W-14	7-Oct-14	**31,000**	**31,000**	**4,200**	**11,000**	**1,600**	<200	<200	**700**	
W-14	23-Jun-16	**32,000**	**35,000**	**4,000**	**13,000**	**1,400**	<200	<200	**760**	
W-14	2-Jan-17	**28,000**	**31,000**	**3,800**	**12,000**	**1,900**	<200	<200	**620**	
W-14	12-Sep-17	NA	NA	NA	NA	NA	NA	NA	NA	Not Measured, NAPL present
W-14	1-Mar-18	NA	NA	NA	NA	NA	NA	NA	NA	Not Measured, NAPL present
W-15	26-May-93	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NA	NA	
W-15	8-Aug-06	<1.0	<1.0	<1.0	<3.0	<1.5	<1.0	<1.0	<2.0	
W-16	26-May-93	**52**	<0.5	7.9	15	<2.5	NA	NA	NA	
W-16	8-Aug-06	1.3	14	2.9	<3.0	<1.5	<1.0	<1.0	<2.0	
W-16	7-Nov-07	**640**	<1.0	22	12	55	<1.0	**23**	**363**	
W-16	13-Feb-08	**630**	<1.0	12	8.6	47	<1.0	**17**	**342**	
W-16	12-May-08	**690**	<1.0	12	3.6	60	<1.0	**21**	**327**	
W-16	7-Aug-08	**790**	<1.0	5.4	<1.5	59	<1.0	**17**	**352**	
W-16	28-Jan-09	**170**	<1.0	<1.0	<1.5	39	<1.0	**13**	**120**	
W-16	9-Jul-09	**35**	<1.0	1.3	<1.5	11	<1.0	3.8	15	
W-16	21-Jan-14	<1.0	<1.0	<1.0	<1.5	4.3	<1.0	<1.0	<2.0	
W-16	7-Oct-14	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-16	23-Jun-16	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-16	2-Jan-17	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-16	12-Sep-17	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0	

Appendix E
Summary of Volatile Organic Compound Analytical Data
Lovington 66

Monitoring Well	Date Sampled	Concentrations in Groundwater (µg/L)								Notes
		Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDB	EDC	PAH	
NMWQCC Standard		**10**	**750**	**750**	**620**	**100**	**0.1**	**10**	**30**	
W-16	2-Mar-18	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0	
W-17	26-May-93	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NA	NA	
W-17	8-Aug-06	NA	NA	NA	NA	NA	NA	NA	NA	Well Destroyed
W-18	26-May-93	1.6	1.8	<0.5	2.0	<2.5	NA	NA	NA	
W-18	8-Aug-06	<1.0	<1.0	<1.0	<3.0	<1.5	<1.0	<1.0	<2.0	
W-19	8-Nov-07	4.3	<1.0	<1.0	<1.5	<1.5	<1.0	**23**	<2.0	
W-19	13-Feb-08	2.4	<1.0	<1.0	<1.5	<1.5	<1.0	**10**	<2.0	
W-19	12-May-08	1.6	<1.0	<1.0	<1.5	<1.0	<1.0	9.2	<2.0	
W-19	6-Aug-08	2.4	<1.0	<1.0	<1.5	<1.0	<1.0	**19**	<2.0	
W-19	28-Jan-09	3.8	<1.0	<1.0	<1.5	<1.0	<1.0	**37**	<2.0	
W-19	9-Jul-09	3.4	<1.0	<1.0	<1.5	<1.0	<1.0	**37**	<2.0	
W-19	21-Jan-14	4.9	<1.0	<1.0	<1.5	<1.0	<1.0	**59**	<2.0	
W-19	7-Oct-14	6.9	<2.0	<2.0	<3.0	<2.0	<2.0	**100**	<4.0	
W-19	23-Jun-16	4.5	<1.0	<1.0	<1.5	<1.0	<1.0	**79**	<2.0	
W-19	2-Jan-17	4.2	<1.0	<1.0	<1.5	<1.0	<1.0	**97**	<2.0	
W-19	12-Sep-17	3.1	1.3	<1.0	<1.5	<1.0	<1.0	**130**	<4.0	
W-19	2-Mar-18	1.4	<1.0	<1.0	<1.5	<1.0	<1.0	**71**	<4.0	
W-20	8-Nov-07	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	13-Feb-08	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	12-May-08	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	6-Aug-08	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	28-Jan-09	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	9-Jul-09	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	21-Jan-14	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	7-Oct-14	<2.0	<2.0	<2.0	<3.0	<2.0	<2.0	<2.0	<4.0	
W-20	23-Jun-16	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	2-Jan-17	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-20	12-Sep-17	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0	
W-20	2-Mar-18	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0	
W-21	8-Nov-07	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	12-Feb-08	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	12-May-08	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	6-Aug-08	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	28-Jan-09	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	9-Jul-09	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	21-Jan-14	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	7-Oct-14	<2.0	<2.0	<2.0	<3.0	<2.0	<2.0	<2.0	<4.0	

Appendix E
Summary of Volatile Organic Compound Analytical Data
Lovington 66

Monitoring Well	Date Sampled	Concentrations in Groundwater (µg/L)								Notes
		Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE	EDB	EDC	PAH	
NMWQCC Standard		**10**	**750**	**750**	**620**	**100**	**0.1**	**10**	**30**	
W-21	23-Jun-16	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	2-Jan-17	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<2.0	
W-21	12-Sep-17	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0	
W-21	2-Mar-18	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0	
V-1	29-Aug-92	**250**	680	240	**810**	<2.5	NA	NA	NA	
V-1	25-May-93	**5,000**	**14,000**	**3,000**	**10,000**	**600**	NA	NA	NA	

Notes:
Groundwater samples analyzed by EPA Method 8260B
Bold font indicates analyte above New Mexico Water Quality Control Commission Standard
µg/L = micrograms per liter
MTBE = methyle tert-butyl ether
EDB = ethylene dibromide
EDC = ethylene dichloride
PAHs = Polynuclear aromatic hydrocarbon concentrations; total naphthalene plus 1-methylnaphthalene and 2-methylnaphthalene per NMAC 20.6.2
NA = Not Analyzed
Wells W-2, W-3, W-7, W-12, W-13, W-15, and W-18 are not included in the sampling schedule
Wells W-4, W-6, W-10, and W-17 are all destroyed or inaccessible

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