

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix B MTCA Method B and C Calculation Workbooks

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: GP-18-27-28

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	1.18	0.03%
AL_EC >6-8	1.305	0.04%
AL_EC >8-10	7.71	0.22%
AL_EC >10-12	74.9	2.13%
AL_EC >12-16	365	10.39%
AL_EC >16-21	388	11.04%
AL_EC >21-34	374	10.64%
AR_EC >8-10	8.025	0.23%
AR_EC >10-12	27.475	0.78%
AR_EC >12-16	316.975	9.02%
AR_EC >16-21	1020	29.03%
AR_EC >21-34	915.39	26.05%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0.025	0.00%
1-Methyl Naphthalene	10	0.28%
2-Methyl Naphthalene	0.025	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.86	0.02%
Benzo(b)fluoranthene	0.25	0.01%
Benzo(k)fluoranthene	0.25	0.01%
Benzo(a)pyrene	0.25	0.01%
Chrysene	1.5	0.04%
Dibenz(a,h)anthracene	0.25	0.01%
Indeno(1,2,3-cd)pyrene	0.25	0.01%
Sum	3513.86	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, benzene, toluene, ethylbenzene, total xylenes, naphthalene, and 2-methyl naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>GP-18-27-28</u>
Measured Soil TPH Concentration, mg/kg: 3,513.860

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,091	9.80E-07	1.68E+00	Fail
	Method C	29,420	2.43E-07	1.19E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	521	4.20E-05	2.21E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	2,091.02	29,419.65
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.09E+03	5.83E-07	1.00E+00	YES	2.94E+04	2.04E-06	1.00E+00
Total Risk=1E-5	NO	3.59E+04	1.00E-05	1.71E+01	NO	1.44E+05	1.00E-05	4.91E+00
Risk of Benzene= 1E-6	NO	4.25E+06	1.19E-03	2.03E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	5.90E+03	1.64E-06	2.82E+00				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	Total Risk = 1E-5
Protective Ground Water Concentration, ug/L	413.31
Protective Soil Concentration, mg/kg	521.41

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	NO	4.46E+02	1.11E-05	1.00E+00	5.85E+02
Total Risk = 1E-5	YES	4.13E+02	1.00E-05	9.38E-01	5.21E+02
Total Risk = 1E-6	YES	5.37E+01	1.00E-06	1.34E-01	4.88E+01
Risk of cPAHs mixture= 1E-5	NO	1.65E+03	9.43E-05	3.97E+00	100% NAPL
Benzene MCL = 5 ug/L	NO	1.10E+03	4.54E-05	2.32E+00	4.07E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 110000 mg/kg TPH.

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: GP-27-14-14.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	1.01	0.01%
AL_EC >6-8	1.135	0.02%
AL_EC >8-10	9.41	0.14%
AL_EC >10-12	154	2.24%
AL_EC >12-16	949	13.80%
AL_EC >16-21	1080	15.71%
AL_EC >21-34	879	12.78%
AR_EC >8-10	10.525	0.15%
AR_EC >10-12	48.45	0.70%
AR_EC >12-16	560.8	8.16%
AR_EC >16-21	1900	27.63%
AR_EC >21-34	1252.94	18.22%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0.05	0.00%
1-Methyl Naphthalene	15	0.22%
2-Methyl Naphthalene	7.2	0.10%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	2	0.03%
Benzo(b)fluoranthene	0.35	0.01%
Benzo(k)fluoranthene	0.05	0.00%
Benzo(a)pyrene	0.65	0.01%
Chrysene	3.8	0.06%
Dibenz(a,h)anthracene	0.16	0.00%
Indeno(1,2,3-cd)pyrene	0.05	0.00%
Sum	6875.82	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, Benzene, Toluene, Ethylbenzene, Total Xylenes, Naphthalene, n-Hexane, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. In this particular sample 0.25 feet of silty sand followed by 0.25 feet of silt was logged; therefore an average site-specific porosity for sand and silt (0.5125; average of 0.466 for sand and 0.559 for silt) was used for the input. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.5125	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.2125	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water

concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022

Site Name: POL-TPH

Sample Name: GP-27-14-14.5

Measured Soil TPH Concentration, mg/kg: **6,875.820**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,058	1.83E-06	3.34E+00	Fail
	Method C	30,226	4.54E-07	2.27E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	499	4.22E-05	3.21E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	2,057.73	30,225.63
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.06E+03	5.48E-07	1.00E+00	YES	3.02E+04	2.00E-06	1.00E+00
Total Risk=1E-5	NO	3.76E+04	1.00E-05	1.83E+01	NO	1.51E+05	1.00E-05	5.01E+00
Risk of Benzene= 1E-6	NO	8.32E+06	2.22E-03	4.05E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	5.48E+03	1.46E-06	2.66E+00				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	369.02
Protective Soil Concentration, mg/kg	498.57

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.69E+02	7.14E-06	1.00E+00	4.99E+02
Total Risk = 1E-5	NO	4.67E+02	1.00E-05	1.24E+00	7.28E+02
Total Risk = 1E-6	YES	6.52E+01	1.00E-06	1.86E-01	6.58E+01
Risk of cPAHs mixture= 1E-5	NO	1.46E+03	6.79E-05	4.55E+00	100% NAPL
Benzene MCL = 5 ug/L	NO	1.24E+03	4.97E-05	3.62E+00	1.13E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 135000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/09/22

Site Name: POL-TPH

Sample Name: GP-36-13-14

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	13.15	0.25%
AL_EC >6-8	44.45	0.86%
AL_EC >8-10	167	3.22%
AL_EC >10-12	352	6.80%
AL_EC >12-16	1240	23.94%
AL_EC >16-21	1180	22.79%
AL_EC >21-34	246	4.75%
AR_EC >8-10	47.3	0.91%
AR_EC >10-12	115.9	2.24%
AR_EC >12-16	608	11.74%
AR_EC >16-21	969	18.71%
AR_EC >21-34	169.786	3.28%
Benzene	0.25	0.00%
Toluene	0.27	0.01%
Ethylbenzene	4.7	0.09%
Total Xylenes	1.5	0.03%
Naphthalene	1.1	0.02%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	18	0.35%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.064	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	5178.62	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, AR_EC >8-10, and some cPAHs

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for 1- and 2-Methylnaphthalenes available.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/9/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>GP-36-13-14</u>
Measured Soil TPH Concentration, mg/kg: 5,178.620

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,639	6.42E-08	3.16E+00	Fail
	Method C	28,361	1.44E-08	1.83E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	247	8.36E-05	7.26E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,639.49	28,360.59
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.64E+03	2.03E-08	1.00E+00	YES	2.84E+04	7.86E-08	1.00E+00
Total Risk=1E-5	NO	8.07E+05	1.00E-05	4.92E+02	NO	3.61E+06	1.00E-05	1.27E+02
Risk of Benzene= 1E-6	NO	3.76E+05	4.66E-06	2.29E+02	NA			
Risk of cPAHs mixture= 1E-6	NO	1.03E+05	1.27E-06	6.27E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	384.71
Protective Soil Concentration, mg/kg	246.94

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.85E+02	5.51E-06	1.00E+00	2.47E+02
Total Risk = 1E-5	NO	6.47E+02	1.00E-05	1.65E+00	4.52E+02
Total Risk = 1E-6	YES	7.13E+01	1.00E-06	1.86E-01	4.47E+01
Risk of cPAHs mixture= 1E-5	NO	3.70E+03	2.37E-04	1.37E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	4.35E+02	6.29E-06	1.13E+00	2.82E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 95000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/09/22

Site Name: POL-TPH

Sample Name: GP-36-16-17

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	30.6	0.29%
AL_EC >6-8	403	3.77%
AL_EC >8-10	443	4.14%
AL_EC >10-12	824	7.70%
AL_EC >12-16	2360	22.06%
AL_EC >16-21	2340	21.87%
AL_EC >21-34	518	4.84%
AR_EC >8-10	178.8	1.67%
AR_EC >10-12	560	5.23%
AR_EC >12-16	817	7.64%
AR_EC >16-21	1780	16.64%
AR_EC >21-34	399.674	3.74%
Benzene	0.61	0.01%
Toluene	0.47	0.00%
Ethylbenzene	7.6	0.07%
Total Xylenes	2.6	0.02%
Naphthalene	2	0.02%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	32	0.30%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.091	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.11	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	10699.68	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for some cPAHs

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for 1- and 2-Methylnaphthalenes available.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/9/2022

Site Name: POL-TPH

Sample Name: GP-36-16-17

Measured Soil TPH Concentration, mg/kg: **10,699.680**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,618	9.33E-08	6.61E+00	Fail
	Method C	28,339	1.93E-08	3.78E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	164	1.51E-04	1.57E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,617.76	28,338.82
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.62E+03	1.41E-08	1.00E+00	YES	2.83E+04	5.12E-08	1.00E+00
Total Risk=1E-5	NO	1.15E+06	1.00E-05	7.09E+02	NO	5.54E+06	1.00E-05	1.95E+02
Risk of Benzene= 1E-6	NO	3.19E+05	2.78E-06	1.97E+02	NA			
Risk of cPAHs mixture= 1E-6	NO	1.79E+05	1.56E-06	1.11E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	316.93
Protective Soil Concentration, mg/kg	164.13

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.17E+02	4.33E-06	1.00E+00	1.64E+02
Total Risk = 1E-5	NO	6.99E+02	1.00E-05	2.20E+00	3.81E+02
Total Risk = 1E-6	YES	7.32E+01	1.00E-06	2.31E-01	3.79E+01
Risk of cPAHs mixture= 1E-5	NO	5.28E+03	2.69E-04	2.15E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	4.56E+02	6.29E-06	1.44E+00	2.38E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 93000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/10/22

Site Name: POL-TPH

Sample Name: MW-33-12-12.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	7.575	0.06%
AL_EC >6-8	12.4	0.09%
AL_EC >8-10	109	0.80%
AL_EC >10-12	686	5.04%
AL_EC >12-16	3280	24.08%
AL_EC >16-21	2970	21.80%
AL_EC >21-34	721	5.29%
AR_EC >8-10	52.525	0.39%
AR_EC >10-12	758	5.56%
AR_EC >12-16	2160	15.86%
AR_EC >16-21	2380	17.47%
AR_EC >21-34	485.75	3.57%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.1	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	13622.74	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for benzene, toluene, ethylbenzene, total xylenes, n-hexane, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene available.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/10/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>MW-33-12-12.5</u>
Measured Soil TPH Concentration, mg/kg: 13,622.740

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,752	5.17E-08	7.78E+00	Fail
	Method C	30,191	1.27E-08	4.51E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	202	3.34E-06	1.19E+01	Fail
	Target TPH GW Conc. @ 500 ug/L	304	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,751.81	30,190.83
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.75E+03	6.65E-09	1.00E+00	YES	3.02E+04	2.82E-08	1.00E+00
Total Risk=1E-5	NO	2.64E+06	1.00E-05	1.50E+03	NO	1.07E+07	1.00E-05	3.54E+02
Risk of Benzene= 1E-6	NO	1.65E+07	6.26E-05	9.42E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	2.68E+05	1.02E-06	1.53E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	340.00
Protective Soil Concentration, mg/kg	201.75

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.40E+02	1.03E-07	1.00E+00	2.02E+02
Total Risk = 1E-5	NO	3.77E+03	5.44E-06	1.41E+01	100% NAPL
Total Risk = 1E-6	NO	1.94E+03	1.00E-06	6.23E+00	2.23E+03
Risk of cPAHs mixture= 1E-5	NO	3.77E+03	5.44E-06	1.41E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	3.77E+03	5.44E-06	1.41E+01	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	1.55E-07	1.47E+00	3.04E+02

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: MW-39-13-14

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	7.575	0.04%
AL_EC >6-8	33.1	0.19%
AL_EC >8-10	199	1.13%
AL_EC >10-12	888	5.05%
AL_EC >12-16	4300	24.44%
AL_EC >16-21	4570	25.98%
AL_EC >21-34	629	3.58%
AR_EC >8-10	62.825	0.36%
AR_EC >10-12	522	2.97%
AR_EC >12-16	2680	15.24%
AR_EC >16-21	3290	18.70%
AR_EC >21-34	408.779	2.32%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.071	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	17590.74	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and some cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>MW-39-13-14</u>
Measured Soil TPH Concentration, mg/kg: 17,590.740

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,771	5.13E-08	9.93E+00	Fail
	Method C	30,439	1.26E-08	5.78E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	296	2.89E-06	7.23E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,771.42	30,439.15
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.77E+03	5.17E-09	1.00E+00	YES	3.04E+04	2.19E-08	1.00E+00
Total Risk=1E-5	NO	3.43E+06	1.00E-05	1.94E+03	NO	1.39E+07	1.00E-05	4.57E+02
Risk of Benzene= 1E-6	NO	2.13E+07	6.21E-05	1.20E+04	NA			
Risk of cPAHs mixture= 1E-6	NO	3.48E+05	1.02E-06	1.97E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	412.00
Protective Soil Concentration, mg/kg	296.02

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.12E+02	1.17E-07	1.00E+00	2.96E+02
Total Risk = 1E-5	NO	2.78E+03	4.26E-06	8.22E+00	100% NAPL
Total Risk = 1E-6	NO	1.71E+03	1.00E-06	4.37E+00	3.05E+03
Risk of cPAHs mixture= 1E-5	NO	2.78E+03	4.26E-06	8.22E+00	100% NAPL
Benzene MCL = 5 ug/L	NO	2.78E+03	4.26E-06	8.22E+00	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/10/22

Site Name: POL-TPH

Sample Name: OIP-08-19-20

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	0	0.00%
AL_EC >6-8	269	1.74%
AL_EC >8-10	820	5.29%
AL_EC >10-12	1070	6.90%
AL_EC >12-16	3280	21.16%
AL_EC >16-21	2820	18.19%
AL_EC >21-34	870	5.61%
AR_EC >8-10	394.8	2.55%
AR_EC >10-12	1360	8.77%
AR_EC >12-16	2121	13.68%
AR_EC >16-21	1990	12.84%
AR_EC >21-34	392.658	2.53%
Benzene	1.1	0.01%
Toluene	0.74	0.00%
Ethylbenzene	27	0.17%
Total Xylenes	3.2	0.02%
Naphthalene	0	0.00%
1-Methyl Naphthalene	32	0.21%
2-Methyl Naphthalene	27	0.17%
n-Hexane	23	0.15%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.057	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.16	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	15501.84	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6 and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for naphthalene was available.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation, a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/10/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-08-19-20</u>
Measured Soil TPH Concentration, mg/kg: 15,501.840

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,621	1.34E-06	9.57E+00	Fail
	Method C	28,930	3.26E-07	5.36E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	108	2.60E-04	2.75E+01	Fail
	Target TPH GW Conc. @ 500 ug/L	192	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,620.60	28,930.44
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.62E+03	1.40E-07	1.00E+00	YES	2.89E+04	6.09E-07	1.00E+00
Total Risk = 1E-5	NO	1.15E+05	1.00E-05	7.12E+01	NO	4.75E+05	1.00E-05	1.64E+01
Risk of Benzene = 1E-6	NO	2.56E+05	2.22E-05	1.58E+02	NA			
Risk of cPAHs mixture = 1E-6	NO	2.77E+05	2.40E-05	1.71E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	282.38
Protective Soil Concentration, mg/kg	108.17

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.82E+02	5.00E-06	1.00E+00	1.08E+02
Total Risk = 1E-5	NO	5.61E+02	1.00E-05	1.99E+00	2.17E+02
Total Risk = 1E-6	YES	5.63E+01	1.00E-06	1.99E-01	2.16E+01
Risk of cPAHs mixture = 1E-5	NO	7.58E+03	3.72E-04	3.32E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	4.97E+02	8.84E-06	1.76E+00	1.91E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 94000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	8.89E-06	1.77E+00	1.92E+02

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-15-15-16

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	0.425	0.01%
AL_EC >6-8	0.785	0.02%
AL_EC >8-10	11.3	0.29%
AL_EC >10-12	154	3.98%
AL_EC >12-16	1060	27.38%
AL_EC >16-21	1090	28.15%
AL_EC >21-34	313	8.08%
AR_EC >8-10	5.575	0.14%
AR_EC >10-12	30.7	0.79%
AR_EC >12-16	203	5.24%
AR_EC >16-21	736	19.01%
AR_EC >21-34	266.825	6.89%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	3872.025	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, AL_EC >8-10, AR_EC >8-10, Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and cPAHs.

No lab data for 1- and 2-Methylnaphthalenes and naphthalene available.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-15-15-16</u>
Measured Soil TPH Concentration, mg/kg: 3,872.025

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,716	5.07E-08	2.26E+00	Fail
	Method C	29,091	1.25E-08	1.33E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	961	5.50E-06	1.86E+00	Fail
	Target TPH GW Conc. @ 500 ug/L	1,669	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,716.11	29,090.91
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.72E+03	2.25E-08	1.00E+00	YES	2.91E+04	9.39E-08	1.00E+00
Total Risk=1E-5	NO	7.64E+05	1.00E-05	4.45E+02	NO	3.10E+06	1.00E-05	1.07E+02
Risk of Benzene= 1E-6	NO	4.69E+06	6.14E-05	2.73E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	7.76E+04	1.02E-06	4.52E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	382.04
Protective Soil Concentration, mg/kg	961.28

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.82E+02	1.65E-06	1.00E+00	9.61E+02
Total Risk = 1E-5	NO	8.64E+02	1.00E-05	2.46E+00	9.31E+03
Total Risk = 1E-6	YES	2.84E+02	1.00E-06	7.67E-01	5.69E+02
Risk of cPAHs mixture= 1E-5	NO	1.07E+03	2.10E-05	3.35E+00	100% NAPL
Benzene MCL = 5 ug/L	NO	7.29E+02	6.29E-06	1.98E+00	4.62E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 95000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
Target TPH GW Conc = 500 ug/L	5.00E+02	2.72E-06	1.30E+00	1.67E+03

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-20-11-11.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	0.72	0.08%
AL_EC >6-8	25.8	2.84%
AL_EC >8-10	71.3	7.86%
AL_EC >10-12	119	13.12%
AL_EC >12-16	31.8	3.51%
AL_EC >16-21	7.05	0.78%
AL_EC >21-34	7.05	0.78%
AR_EC >8-10	50.58	5.58%
AR_EC >10-12	263.5	29.06%
AR_EC >12-16	279	30.76%
AR_EC >16-21	20.1	2.22%
AR_EC >21-34	20.065	2.21%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.11	0.01%
Total Xylenes	0.11	0.01%
Naphthalene	10.5	1.16%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.01%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.005	0.00%
Benzo(b)fluoranthene	0.005	0.00%
Benzo(k)fluoranthene	0.005	0.00%
Benzo(a)pyrene	0.005	0.00%
Chrysene	0.005	0.00%
Dibenz(a,h)anthracene	0.005	0.00%
Indeno(1,2,3-cd)pyrene	0.005	0.00%
Sum	906.885	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, AL_EC >16-21, AR_EC >21-34, Benzene, Toluene, n-Hexane, and some cPAHs.

No lab data for 1-Methyl Naphthalene and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-20-11-11.5</u>
Measured Soil TPH Concentration, mg/kg: 906.885

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,724	1.08E-08	5.26E-01	Pass
	Method C	32,455	2.59E-09	2.79E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	45	6.84E-06	1.92E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,724.48	32,454.52
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.72E+03	2.05E-08	1.00E+00	YES	3.25E+04	9.26E-08	1.00E+00
Total Risk=1E-5	NO	8.40E+05	1.00E-05	4.87E+02	NO	3.50E+06	1.00E-05	1.08E+02
Risk of Benzene= 1E-6	NO	1.10E+06	1.31E-05	6.37E+02	NA			
Risk of cPAHs mixture= 1E-6	NO	9.09E+04	1.08E-06	5.27E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	263.21
Protective Soil Concentration, mg/kg	44.98

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.63E+02	3.44E-07	1.00E+00	4.50E+01
Total Risk = 1E-5	NO	6.71E+03	1.00E-05	2.61E+01	1.37E+03
Total Risk = 1E-6	NO	7.66E+02	1.00E-06	2.91E+00	1.31E+02
Risk of cPAHs mixture= 1E-5	NO	1.47E+04	6.37E-05	6.00E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	4.65E+03	6.29E-06	1.78E+01	8.31E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 152000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-23-14-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	8.325	0.07%
AL_EC >6-8	12.05	0.10%
AL_EC >8-10	137	1.17%
AL_EC >10-12	629	5.39%
AL_EC >12-16	2910	24.93%
AL_EC >16-21	3110	26.65%
AL_EC >21-34	467	4.00%
AR_EC >8-10	34.325	0.29%
AR_EC >10-12	436.1	3.74%
AR_EC >12-16	909	7.79%
AR_EC >16-21	2660	22.79%
AR_EC >21-34	320.792	2.75%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	36.9	0.32%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.058	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	11670.94	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and some cPAHs.

No lab data for 1-Methyl Naphthalene and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 10/11/2022

Site Name: POL-TPH

Sample Name: OIP-23-14-15

Measured Soil TPH Concentration, mg/kg: **11,670.940**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,645	5.11E-08	7.09E+00	Fail
	Method C	27,861	1.26E-08	4.19E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	223	3.66E-06	9.06E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,644.97	27,860.63
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.64E+03	7.21E-09	1.00E+00	YES	2.79E+04	3.01E-08	1.00E+00
Total Risk=1E-5	NO	2.28E+06	1.00E-05	1.39E+03	NO	9.26E+06	1.00E-05	3.32E+02
Risk of Benzene= 1E-6	NO	1.41E+07	6.19E-05	8.59E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	2.32E+05	1.02E-06	1.41E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	277.51
Protective Soil Concentration, mg/kg	222.55

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.78E+02	1.33E-07	1.00E+00	2.23E+02
Total Risk = 1E-5	NO	2.68E+03	6.53E-06	1.11E+01	100% NAPL
Total Risk = 1E-6	NO	1.21E+03	1.00E-06	4.53E+00	1.87E+03
Risk of cPAHs mixture= 1E-5	NO	2.68E+03	6.53E-06	1.11E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	2.65E+03	6.29E-06	1.09E+01	7.01E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 96000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/09/22

Site Name: POL-TPH

Sample Name: OIP-23-19-20

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	7.48	0.02%
AL_EC >6-8	39.4	0.09%
AL_EC >8-10	623	1.42%
AL_EC >10-12	2820	6.41%
AL_EC >12-16	12100	27.52%
AL_EC >16-21	11300	25.70%
AL_EC >21-34	1560	3.55%
AR_EC >8-10	109.894	0.25%
AR_EC >10-12	1020	2.32%
AR_EC >12-16	3970	9.03%
AR_EC >16-21	9510	21.63%
AR_EC >21-34	912.485	2.08%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.081	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.42	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.16	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.23	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	43973.34	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, benzene, toluene, ethylbenzene, and some cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/9/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-23-19-20</u>
Measured Soil TPH Concentration, mg/kg: 43,973.340

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,567	7.13E-08	2.81E+01	Fail
	Method C	26,993	1.76E-08	1.63E+00	Fail
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	335	1.53E-06	6.38E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,567.36	26,992.69
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.57E+03	2.54E-09	1.00E+00	YES	2.70E+04	1.08E-08	1.00E+00
Total Risk=1E-5	NO	6.17E+06	1.00E-05	3.94E+03	NO	2.50E+07	1.00E-05	9.26E+02
Risk of Benzene= 1E-6	NO	5.32E+07	8.63E-05	3.40E+04	NA			
Risk of cPAHs mixture= 1E-6	NO	6.24E+05	1.01E-06	3.98E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	338.27
Protective Soil Concentration, mg/kg	334.53

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.38E+02	5.27E-08	1.00E+00	3.35E+02
Total Risk = 1E-5	NO	1.98E+03	1.73E-06	6.61E+00	100% NAPL
Total Risk = 1E-6	NO	1.69E+03	1.00E-06	5.49E+00	1.25E+04
Risk of cPAHs mixture= 1E-5	NO	1.98E+03	1.73E-06	6.61E+00	100% NAPL
Benzene MCL = 5 ug/L	NO	1.98E+03	1.73E-06	6.61E+00	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 95000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-23-23-24

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	13.275	0.17%
AL_EC >6-8	19.15	0.25%
AL_EC >8-10	69.6	0.90%
AL_EC >10-12	300	3.87%
AL_EC >12-16	1600	20.67%
AL_EC >16-21	1770	22.86%
AL_EC >21-34	261	3.37%
AR_EC >8-10	22.925	0.30%
AR_EC >10-12	323	4.17%
AR_EC >12-16	1680	21.70%
AR_EC >16-21	1520	19.63%
AR_EC >21-34	162.825	2.10%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	0	0.00%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	7742.19	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, AL_EC >6-8, AL_EC >8- 10, benzene, toluene, ethylbenzene, total xylenes, n-hexane, and cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

No lab data for 1- and 2-Methylnaphthalenes and naphthalenes available.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-23-23-24</u>
Measured Soil TPH Concentration, mg/kg: 7,742.190

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,963	5.07E-08	3.94E+00	Fail
	Method C	33,031	1.25E-08	2.34E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	232	4.35E-06	8.17E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,963.47	33,031.50
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.96E+03	1.29E-08	1.00E+00	YES	3.30E+04	5.33E-08	1.00E+00
Total Risk=1E-5	NO	1.53E+06	1.00E-05	7.78E+02	NO	6.20E+06	1.00E-05	1.88E+02
Risk of Benzene= 1E-6	NO	9.37E+06	6.14E-05	4.77E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	1.55E+05	1.02E-06	7.91E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	440.94
Protective Soil Concentration, mg/kg	232.19

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.41E+02	2.08E-07	1.00E+00	2.32E+02
Total Risk = 1E-5	NO	3.66E+03	9.41E-06	1.08E+01	100% NAPL
Total Risk = 1E-6	NO	1.53E+03	1.00E-06	3.46E+00	1.18E+03
Risk of cPAHs mixture= 1E-5	NO	3.66E+03	9.41E-06	1.08E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	3.34E+03	6.29E-06	9.49E+00	1.63E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 98000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-30-20-21

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	0.655	0.01%
AL_EC >6-8	6.23	0.06%
AL_EC >8-10	32.8	0.34%
AL_EC >10-12	154	1.58%
AL_EC >12-16	1250	12.80%
AL_EC >16-21	1680	17.21%
AL_EC >21-34	1960	20.08%
AR_EC >8-10	18.212	0.19%
AR_EC >10-12	48.07	0.49%
AR_EC >12-16	527	5.40%
AR_EC >16-21	1730	17.72%
AR_EC >21-34	2317.16	23.73%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.063	0.00%
Naphthalene	8.03	0.08%
1-Methyl Naphthalene	13	0.13%
2-Methyl Naphthalene	15	0.15%
n-Hexane	0.125	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.05	0.00%
Benzo(b)fluoranthene	0.24	0.00%
Benzo(k)fluoranthene	0.05	0.00%
Benzo(a)pyrene	0.4	0.00%
Chrysene	2	0.02%
Dibenz(a,h)anthracene	0.05	0.00%
Indeno(1,2,3-cd)pyrene	0.05	0.00%
Sum	9763.25	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for AL_EC >5-6, Benzene, Toluene, Ethylbenzene, Total Xylenes, n-Hexane, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-30-20-21</u>
Measured Soil TPH Concentration, mg/kg: 9,763.250

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,331	1.11E-06	4.19E+00	Fail
	Method C	34,457	2.76E-07	2.83E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	650	3.09E-05	3.58E+00	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	2,330.68	34,456.93
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.33E+03	2.65E-07	1.00E+00	YES	3.45E+04	9.74E-07	1.00E+00
Total Risk=1E-5	NO	8.78E+04	1.00E-05	3.77E+01	NO	3.54E+05	1.00E-05	1.03E+01
Risk of Benzene= 1E-6	NO	1.18E+07	1.35E-03	5.07E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	1.59E+04	1.81E-06	6.83E+00				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	310.55
Protective Soil Concentration, mg/kg	650.19

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.11E+02	5.57E-06	1.00E+00	6.50E+02
Total Risk = 1E-5	NO	4.69E+02	1.00E-05	1.53E+00	1.31E+03
Total Risk = 1E-6	YES	7.32E+01	1.00E-06	2.37E-01	1.07E+02
Risk of cPAHs mixture= 1E-5	NO	1.23E+03	4.59E-05	4.79E+00	100% NAPL
Benzene MCL = 5 ug/L	NO	1.11E+03	3.82E-05	4.20E+00	2.26E+04
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 161000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-47-17-17.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	238	1.41%
AL_EC >6-8	597	3.53%
AL_EC >8-10	915	5.41%
AL_EC >10-12	1330	7.86%
AL_EC >12-16	4090	24.17%
AL_EC >16-21	3540	20.92%
AL_EC >21-34	992	5.86%
AR_EC >8-10	152.2	0.90%
AR_EC >10-12	512.8	3.03%
AR_EC >12-16	1245	7.36%
AR_EC >16-21	2620	15.49%
AR_EC >21-34	502.345	2.97%
Benzene	2.4	0.01%
Toluene	0.99	0.01%
Ethylbenzene	42.7	0.25%
Total Xylenes	4.1	0.02%
Naphthalene	23.2	0.14%
1-Methyl Naphthalene	38	0.22%
2-Methyl Naphthalene	27	0.16%
n-Hexane	45	0.27%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.13	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.4	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	16918.39	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half detection limits were used for Toluene, Xylenes, and some cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-47-17-17.5</u>
Measured Soil TPH Concentration, mg/kg: 16,918.390

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,543	1.66E-06	1.10E+01	Fail
	Method C	27,274	3.96E-07	6.20E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	96	5.01E-04	2.18E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,542.67	27,274.41
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.54E+03	1.51E-07	1.00E+00	YES	2.73E+04	6.39E-07	1.00E+00
Total Risk=1E-5	NO	1.02E+05	1.00E-05	6.62E+01	NO	4.27E+05	1.00E-05	1.57E+01
Risk of Benzene= 1E-6	NO	1.28E+05	1.25E-05	8.30E+01	NA			
Risk of cPAHs mixture= 1E-6	NO	2.46E+05	2.41E-05	1.60E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

	Benzene MCL = 5 ug/L
Most Stringent Criterion	
Protective Ground Water Concentration, ug/L	208.82
Protective Soil Concentration, mg/kg	95.67

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	NO	3.31E+02	1.22E-05	1.00E+00	1.52E+02
Total Risk = 1E-5	NO	2.72E+02	1.00E-05	8.21E-01	1.25E+02
Total Risk = 1E-6	YES	2.71E+01	1.00E-06	8.18E-02	1.25E+01
Risk of cPAHs mixture= 1E-5	NO	5.65E+03	7.15E-04	2.83E+01	100% NAPL
Benzene MCL = 5 ug/L	YES	2.09E+02	7.68E-06	6.31E-01	9.57E+01
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 92000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-47-11-12

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	263.4	5.81%
AL_EC >6-8	827	18.25%
AL_EC >8-10	332	7.33%
AL_EC >10-12	465	10.26%
AL_EC >12-16	6.65	0.15%
AL_EC >16-21	6.65	0.15%
AL_EC >21-34	6.65	0.15%
AR_EC >8-10	297.8	6.57%
AR_EC >10-12	1009	22.27%
AR_EC >12-16	1230	27.14%
AR_EC >16-21	6.65	0.15%
AR_EC >21-34	6.615	0.15%
Benzene	0.015	0.00%
Toluene	0.12	0.00%
Ethylbenzene	27	0.60%
Total Xylenes	2.2	0.05%
Naphthalene	41	0.90%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	3.6	0.08%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.005	0.00%
Benzo(b)fluoranthene	0.005	0.00%
Benzo(k)fluoranthene	0.005	0.00%
Benzo(a)pyrene	0.005	0.00%
Chrysene	0.005	0.00%
Dibenz(a,h)anthracene	0.005	0.00%
Indeno(1,2,3-cd)pyrene	0.005	0.00%
Sum	4531.385	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for benzene and some cPAHs

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.466	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.166	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-47-11-12</u>
Measured Soil TPH Concentration, mg/kg: 4,531.385

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,384	1.08E-08	1.90E+00	Fail
	Method C	45,763	2.59E-09	9.90E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	Use A2.2	4.91E-06	3.46E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	2,384.42	45,763.08
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.38E+03	5.68E-09	1.00E+00	YES	4.58E+04	2.61E-08	1.00E+00
Total Risk=1E-5	NO	4.19E+06	1.00E-05	1.76E+03	NO	1.75E+07	1.00E-05	3.83E+02
Risk of Benzene= 1E-6	NO	5.49E+06	1.31E-05	2.30E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	4.54E+05	1.08E-06	1.90E+02				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	451.98
Protective Soil Concentration, mg/kg	56.09

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	4.52E+02	8.54E-08	1.00E+00	5.61E+01
Total Risk = 1E-5	NO	1.68E+04	1.00E-05	4.21E+01	3.61E+04
Total Risk = 1E-6	NO	5.43E+03	1.00E-06	1.20E+01	6.52E+02
Risk of cPAHs mixture= 1E-5	NO	1.70E+04	1.10E-05	4.29E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	1.51E+04	6.29E-06	3.75E+01	7.21E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 91000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-66-12-12.5

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	0	0.00%
AL_EC >6-8	36.2	2.15%
AL_EC >8-10	243	14.41%
AL_EC >10-12	198	11.74%
AL_EC >12-16	266	15.78%
AL_EC >16-21	199	11.80%
AL_EC >21-34	44.5	2.64%
AR_EC >8-10	56.93	3.38%
AR_EC >10-12	199.975	11.86%
AR_EC >12-16	168.4	9.99%
AR_EC >16-21	176	10.44%
AR_EC >21-34	92.825	5.51%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.12	0.01%
Total Xylenes	0.05	0.00%
Naphthalene	0.025	0.00%
1-Methyl Naphthalene	1.7	0.10%
2-Methyl Naphthalene	1.9	0.11%
n-Hexane	1.1	0.07%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	1685.94	100.00%

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for benzene, toluene, ethylbenzene, total xylenes, and cPAHs.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-66-12-12.5</u>
Measured Soil TPH Concentration, mg/kg: 1,685.940

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,334	1.16E-07	1.26E+00	Fail
	Method C	24,278	2.87E-08	6.94E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	92	1.46E-05	1.24E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,333.67	24,277.57
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.33E+03	9.16E-08	1.00E+00	YES	2.43E+04	4.13E-07	1.00E+00
Total Risk=1E-5	NO	1.46E+05	1.00E-05	1.09E+02	NO	5.88E+05	1.00E-05	2.42E+01
Risk of Benzene= 1E-6	NO	2.04E+06	1.40E-04	1.53E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	3.38E+04	2.32E-06	2.53E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	244.69
Protective Soil Concentration, mg/kg	91.66

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	2.45E+02	9.77E-07	1.00E+00	9.17E+01
Total Risk = 1E-5	NO	2.23E+03	1.00E-05	9.05E+00	1.04E+03
Total Risk = 1E-6	NO	2.50E+02	1.00E-06	1.02E+00	9.38E+01
Risk of cPAHs mixture= 1E-5	NO	7.80E+03	5.92E-05	3.06E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	3.06E+03	1.46E-05	1.24E+01	1.68E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 146000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-67-11-12

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	16.93	0.13%
AL_EC >6-8	248	1.90%
AL_EC >8-10	544	4.16%
AL_EC >10-12	796	6.09%
AL_EC >12-16	1480	11.33%
AL_EC >16-21	1500	11.48%
AL_EC >21-34	330	2.53%
AR_EC >8-10	504.888	3.86%
AR_EC >10-12	1821.1	13.94%
AR_EC >12-16	4290	32.84%
AR_EC >16-21	1230	9.42%
AR_EC >21-34	252.097	1.93%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.062	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	48.9	0.37%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	0.32	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.08	0.00%
Benzo(b)fluoranthene	0.63	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.093	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	13063.29	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for benzene, toluene, total xylenes, and some cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area; therefore, zero was entered: MTBE, EDB, and EDC

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-67-11-12</u>
Measured Soil TPH Concentration, mg/kg: 13,063.290

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	2,116	1.39E-07	6.17E+00	Fail
	Method C	37,613	3.44E-08	3.47E-01	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	88	3.18E-06	2.91E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	2,116.46	37,613.26
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	2.12E+03	2.25E-08	1.00E+00	YES	3.76E+04	9.90E-08	1.00E+00
Total Risk=1E-5	NO	9.41E+05	1.00E-05	4.45E+02	NO	3.80E+06	1.00E-05	1.01E+02
Risk of Benzene= 1E-6	NO	1.58E+07	1.68E-04	7.47E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	9.47E+04	1.01E-06	4.47E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	353.61
Protective Soil Concentration, mg/kg	87.87

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.54E+02	4.69E-08	1.00E+00	8.79E+01
Total Risk = 1E-5	NO	1.02E+04	4.99E-06	3.31E+01	100% NAPL
Total Risk = 1E-6	NO	5.35E+03	1.00E-06	1.63E+01	2.10E+03
Risk of cPAHs mixture= 1E-5	NO	1.02E+04	4.99E-06	3.31E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	1.02E+04	4.99E-06	3.31E+01	100% NAPL
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 154000 mg/kg TPH.

3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 10/11/22

Site Name: POL-TPH

Sample Name: OIP-67-14.5-15

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	4.42	0.18%
AL_EC >6-8	119	4.76%
AL_EC >8-10	145	5.81%
AL_EC >10-12	234	9.37%
AL_EC >12-16	205	8.21%
AL_EC >16-21	231	9.25%
AL_EC >21-34	21.8	0.87%
AR_EC >8-10	117.925	4.72%
AR_EC >10-12	426.2	17.06%
AR_EC >12-16	776	31.07%
AR_EC >16-21	185	7.41%
AR_EC >21-34	19.125	0.77%
Benzene	0.015	0.00%
Toluene	0.025	0.00%
Ethylbenzene	0.025	0.00%
Total Xylenes	0.05	0.00%
Naphthalene	11.8	0.47%
1-Methyl Naphthalene	0	0.00%
2-Methyl Naphthalene	0	0.00%
n-Hexane	1	0.04%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.025	0.00%
Benzo(b)fluoranthene	0.025	0.00%
Benzo(k)fluoranthene	0.025	0.00%
Benzo(a)pyrene	0.025	0.00%
Chrysene	0.025	0.00%
Dibenz(a,h)anthracene	0.025	0.00%
Indeno(1,2,3-cd)pyrene	0.025	0.00%
Sum	2497.56	100.00%

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

Half reporting limits were used for Benzene, Toluene, Ethylbenzene, Total Xylenes, and cPAHs.

No lab data for Naphthalene, 1-Methyl Naphthalene, and 2-Methyl Naphthalene.

The following constituents have never been detected within this area therefore, zero was entered: MTBE, EDB, and EDC.

Site-specific laboratory values were used for porosity and fraction organic carbon (foc) from similar soil descriptions from the Site. The average porosity was used for site-specific measurements for similar soil type at the depth where the sample was collected. The average total organic carbon was used for the foc, and samples were collected from representative uncontaminated soil > 1 meter below the surface, consistent WAC 173-340-747 (5)(b)(i).

Default values were used for volumetric water content and soil bulk density.

For conservation a value of 1 was used for the dilution factor.

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.559	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.259	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.0403	Unitless
Dilution Factor:	1	Unitless

4. Target TPH Ground Water Concentration (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: <u>10/11/2022</u>
Site Name: <u>POL-TPH</u>
Sample Name: <u>OIP-67-14.5-15</u>
Measured Soil TPH Concentration, mg/kg: 2,497.560

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,991	5.07E-08	1.25E+00	Fail
	Method C	36,300	1.25E-08	6.88E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	Use A2.2	6.01E-06	2.17E+01	Fail
	NA	NA	NA	NA	NA

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	1,990.72	36,299.79
Most Stringent Criterion	HI =1	HI =1

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	YES	1.99E+03	4.04E-08	1.00E+00	YES	3.63E+04	1.82E-07	1.00E+00
Total Risk=1E-5	NO	4.93E+05	1.00E-05	2.47E+02	NO	2.00E+06	1.00E-05	5.51E+01
Risk of Benzene= 1E-6	NO	3.02E+06	6.14E-05	1.52E+03	NA			
Risk of cPAHs mixture= 1E-6	NO	5.01E+04	1.02E-06	2.52E+01				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	HI=1
Protective Ground Water Concentration, ug/L	331.72
Protective Soil Concentration, mg/kg	76.11

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	YES	3.32E+02	2.09E-07	1.00E+00	7.61E+01
Total Risk = 1E-5	NO	8.51E+03	1.00E-05	2.84E+01	5.09E+03
Total Risk = 1E-6	NO	1.65E+03	1.00E-06	4.93E+00	3.60E+02
Risk of cPAHs mixture= 1E-5	NO	1.14E+04	2.46E-05	3.85E+01	100% NAPL
Benzene MCL = 5 ug/L	NO	6.87E+03	6.29E-06	2.23E+01	2.65E+03
MTBE = 20 ug/L	NA	NA	NA	NA	NA

Note: 100% NAPL is 151000 mg/kg TPH.

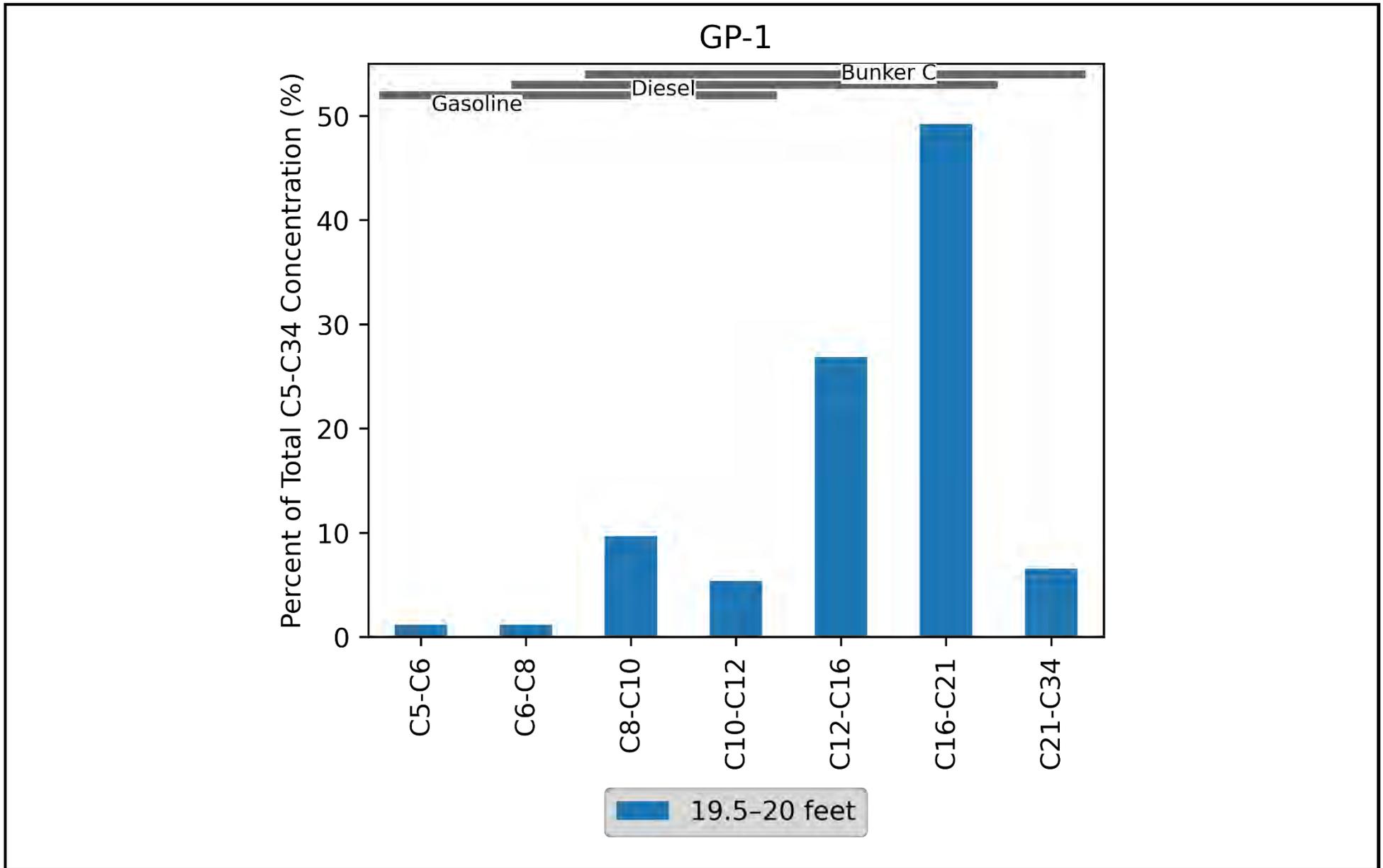
3.2. Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	NA

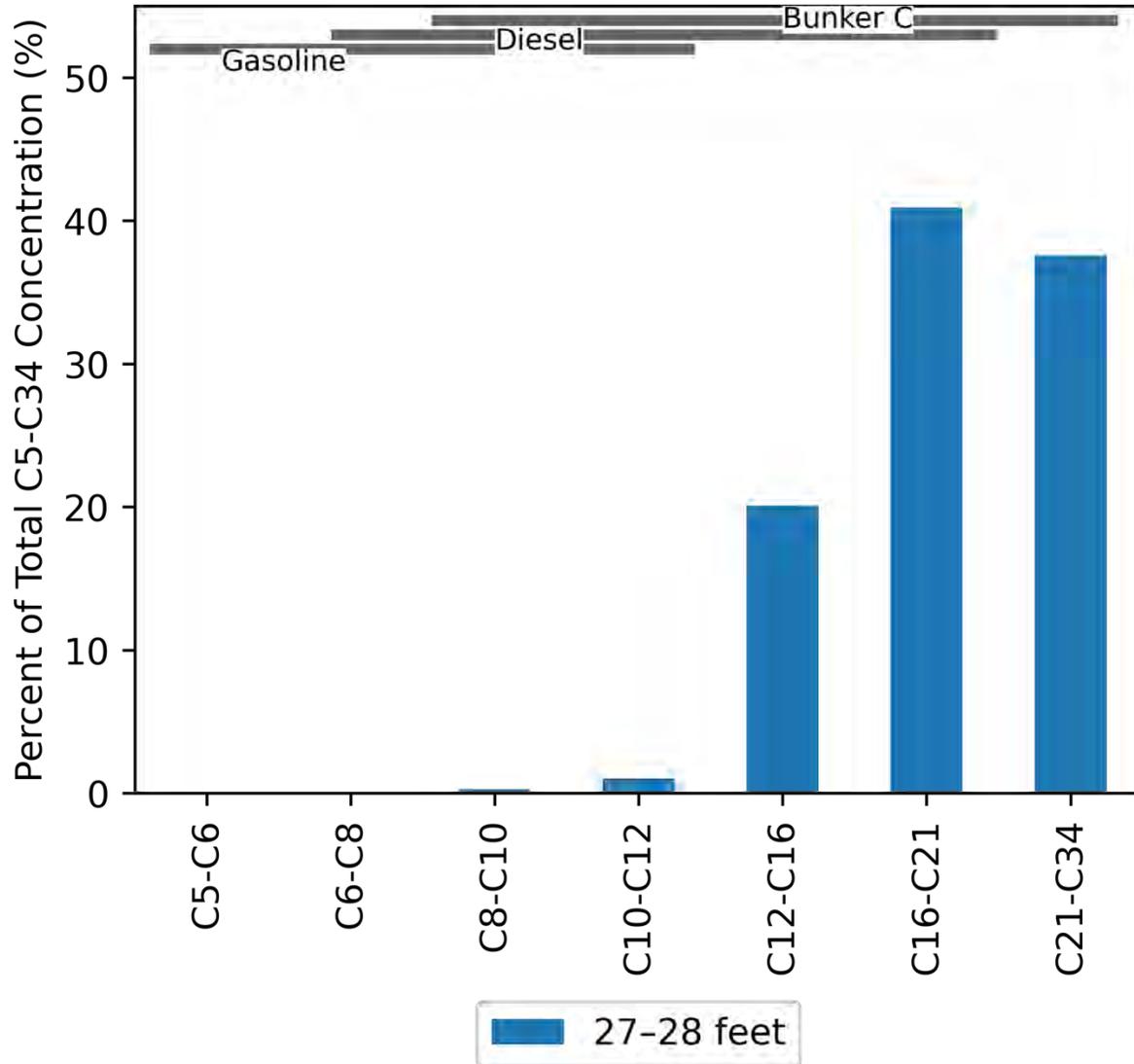
Remedial Investigation/Feasibility Study

Port of Longview TPH Site

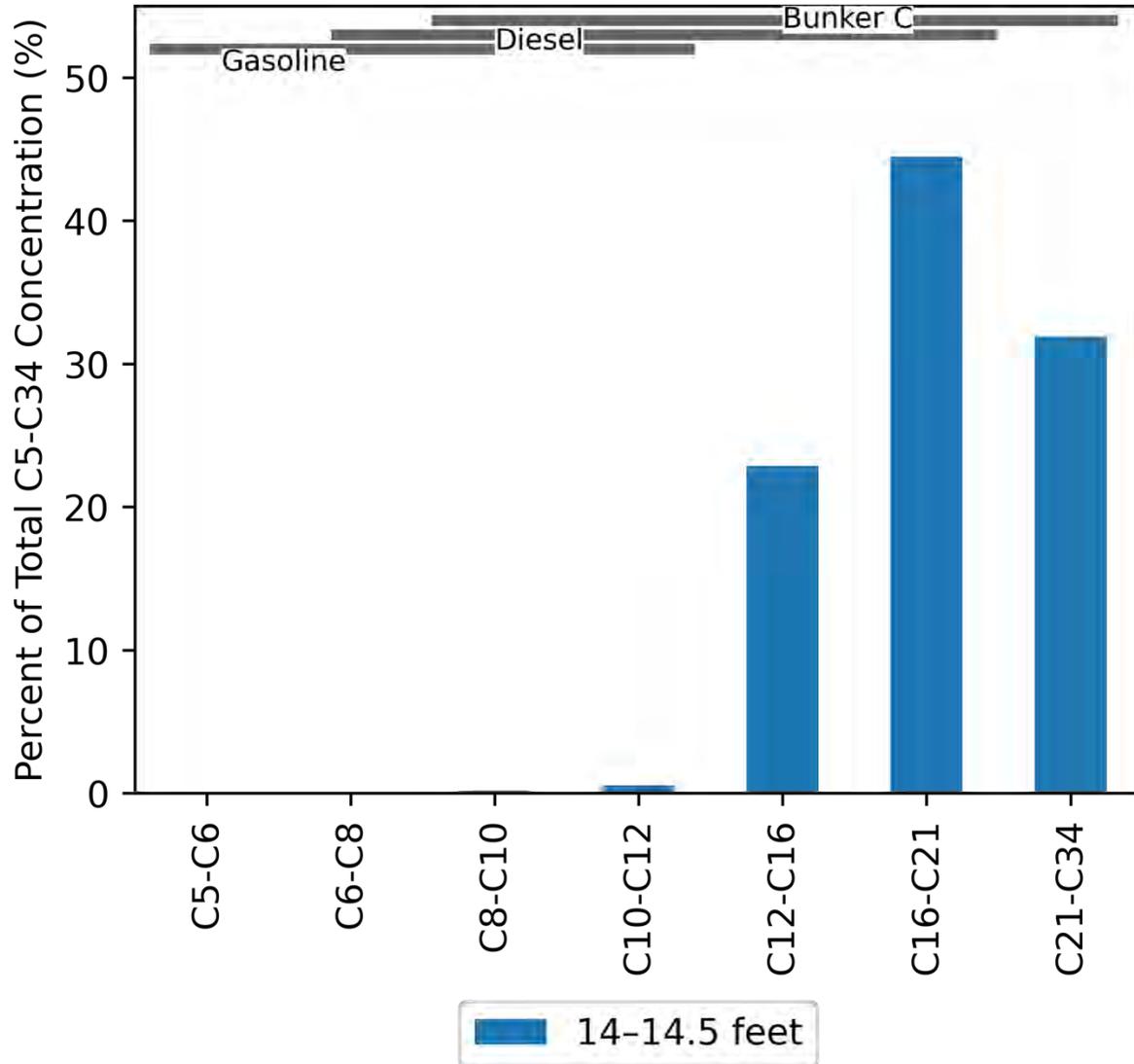
Appendix C EPH/VPH Plots



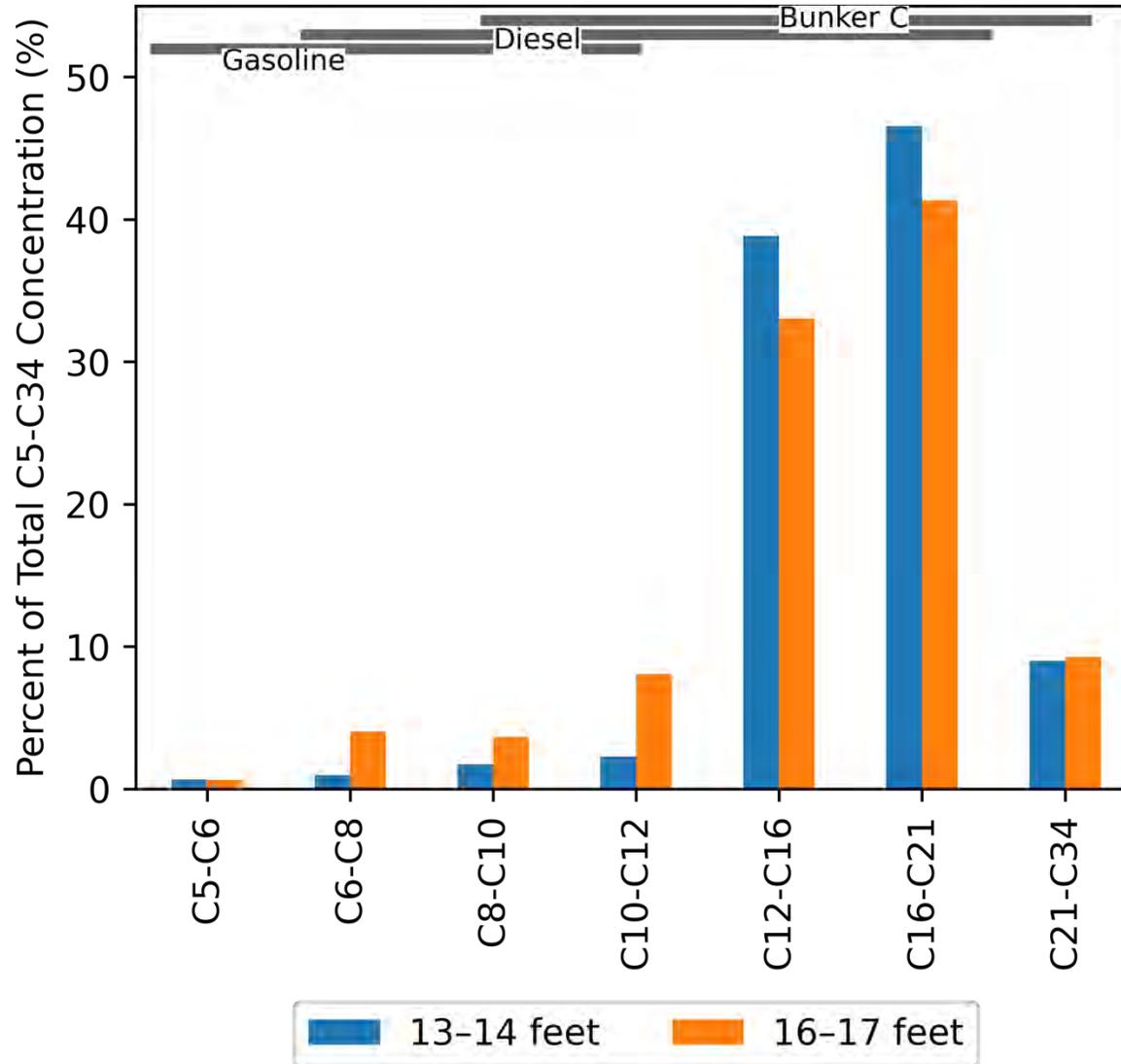
GP-18



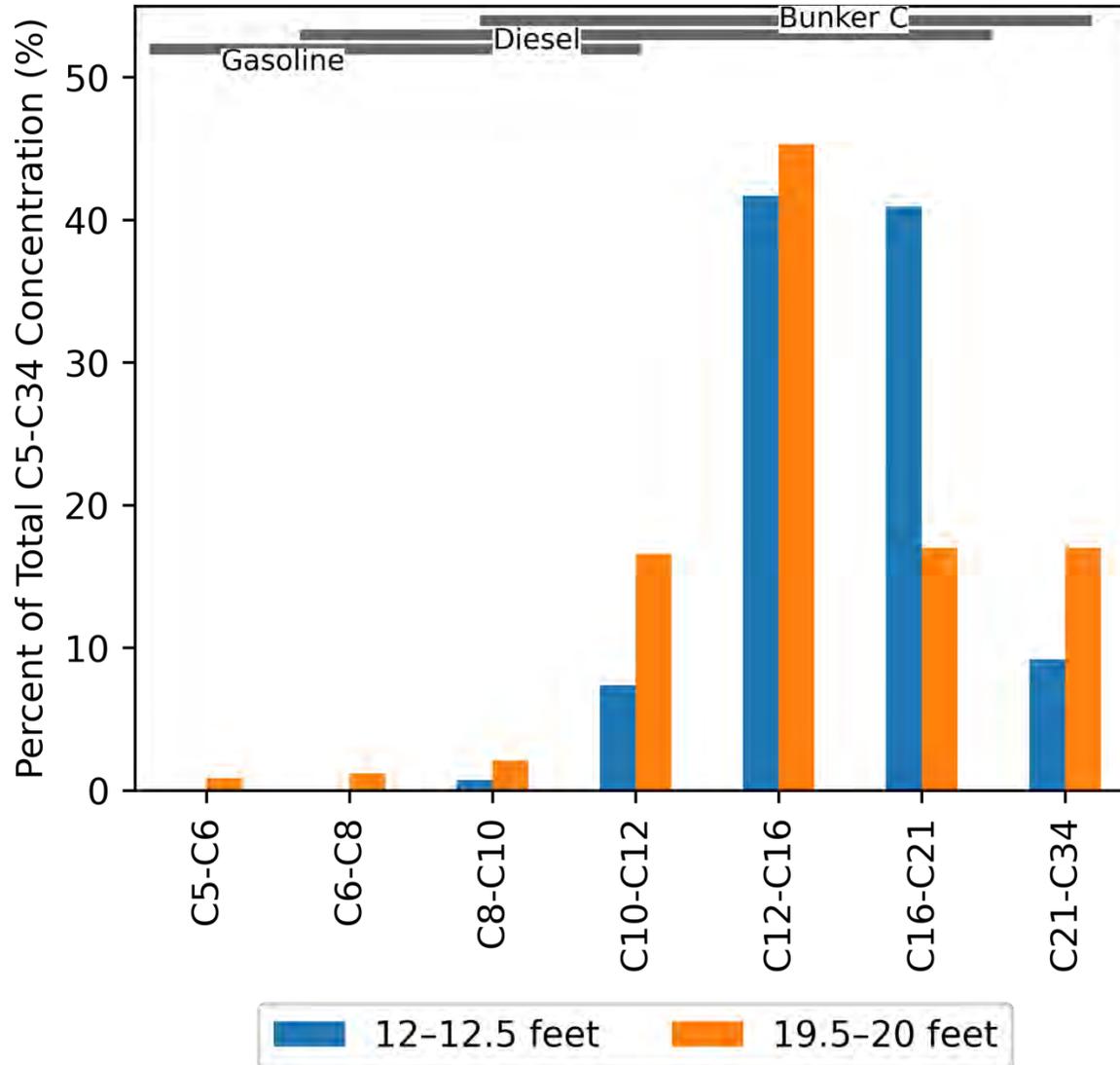
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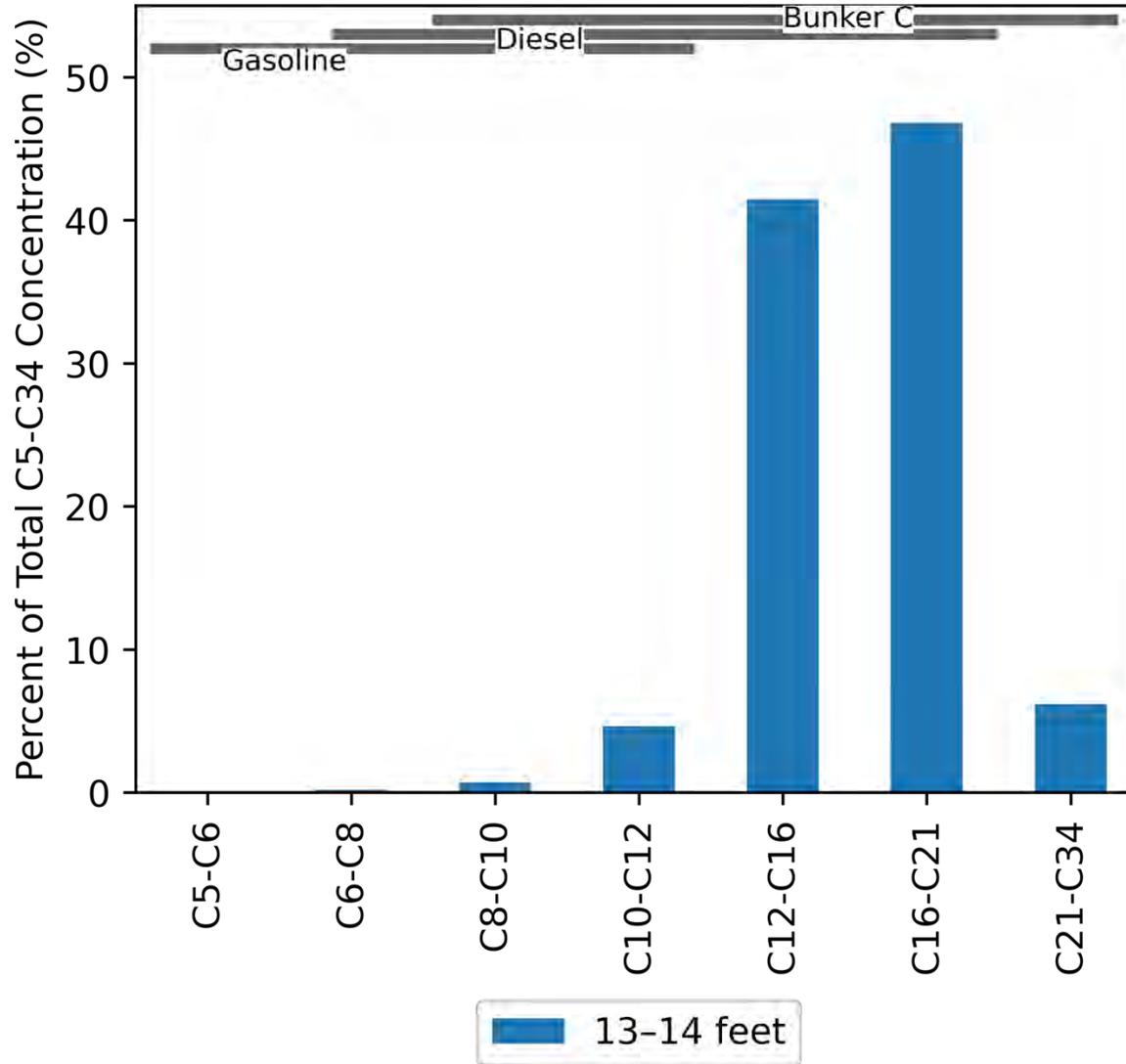
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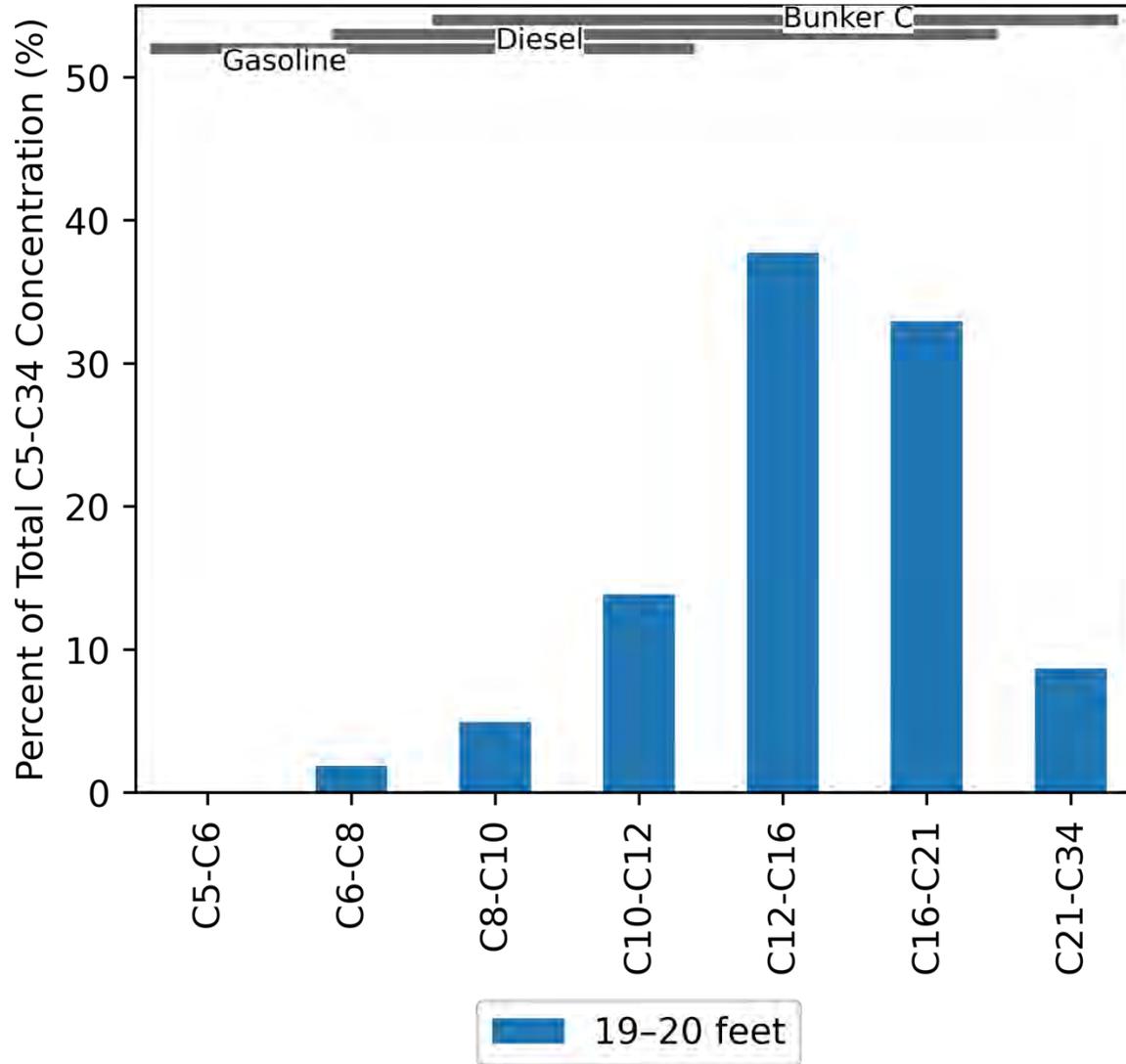
MW-33



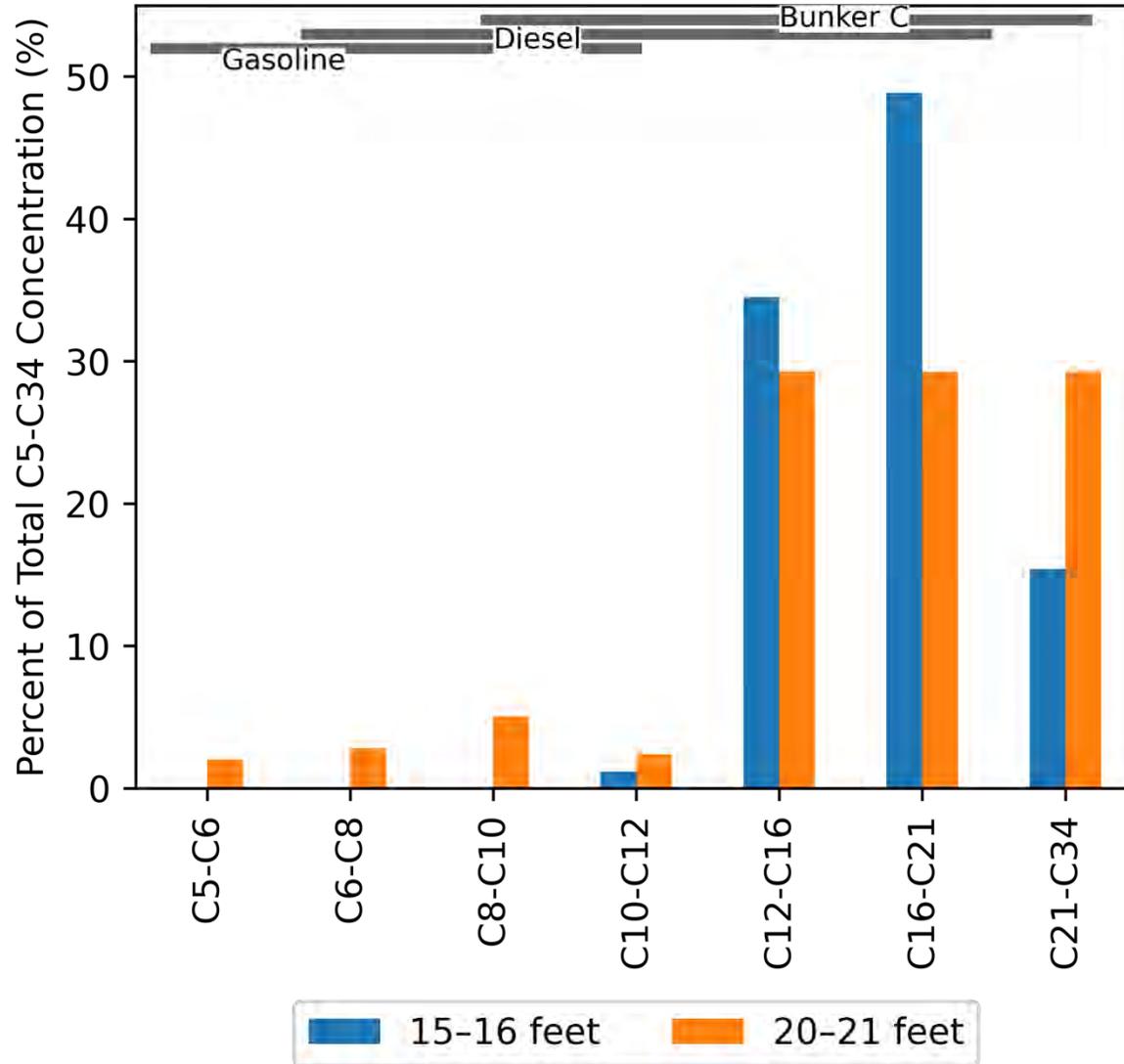
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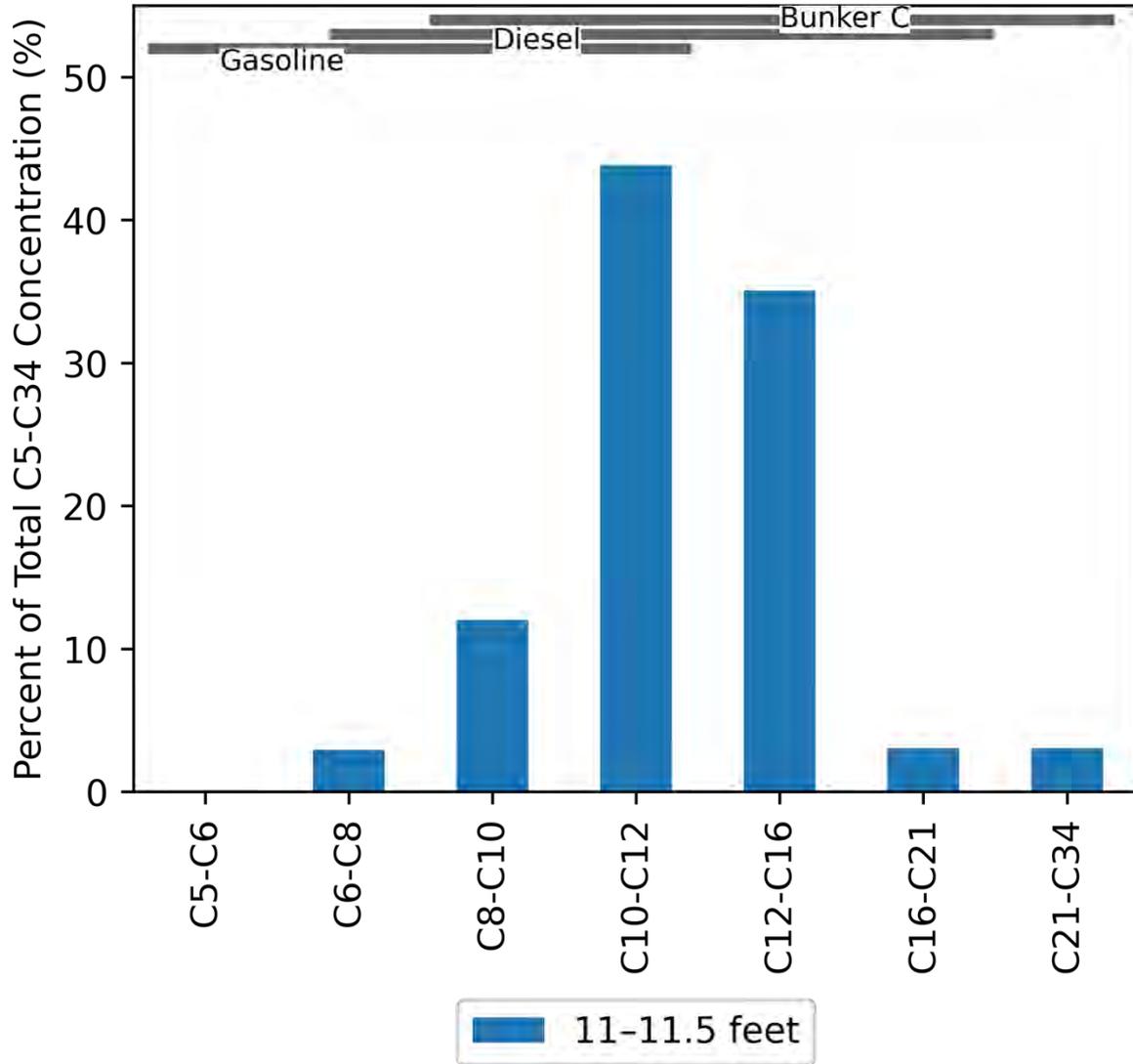
OIP-08



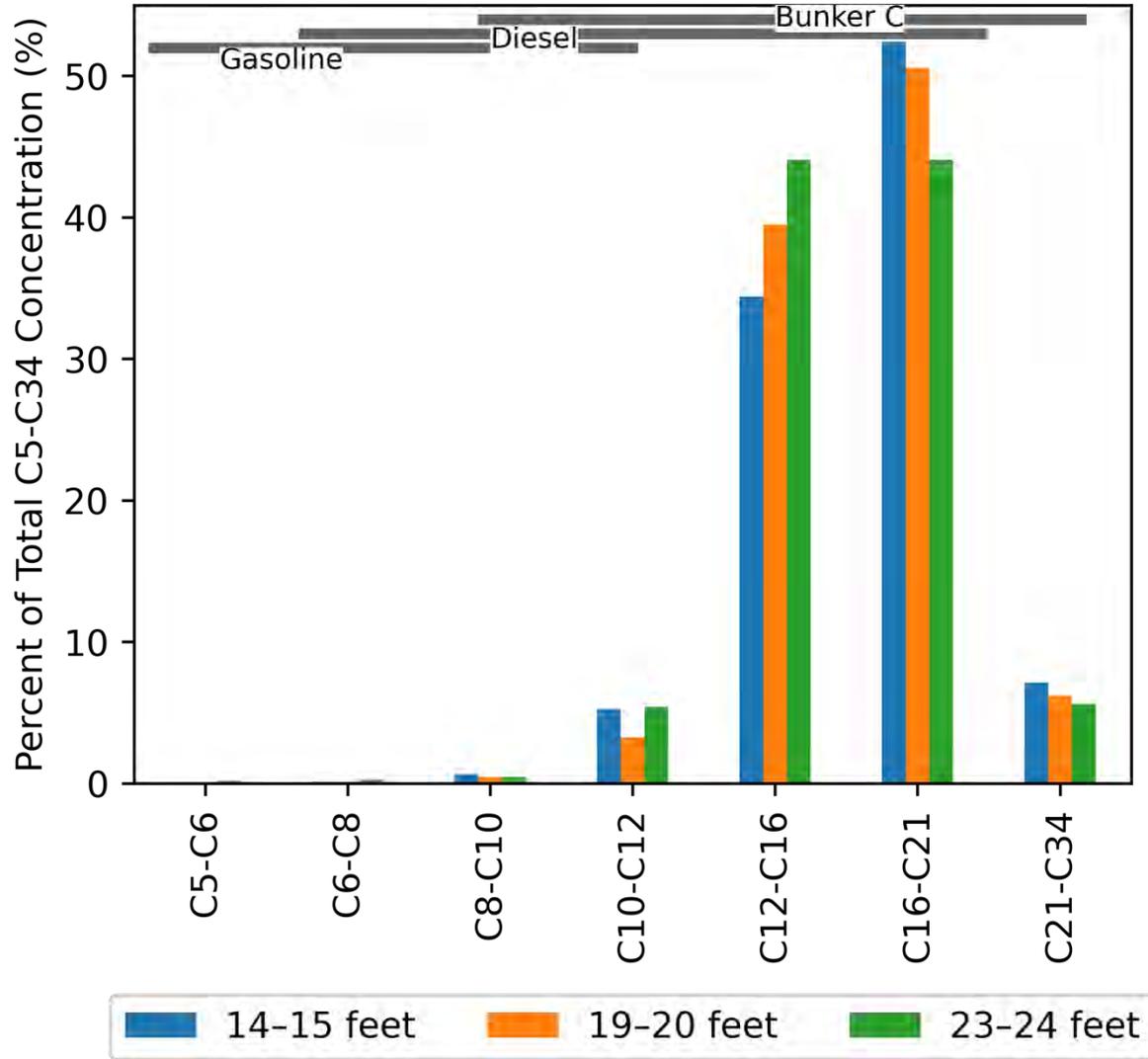
OIP-15



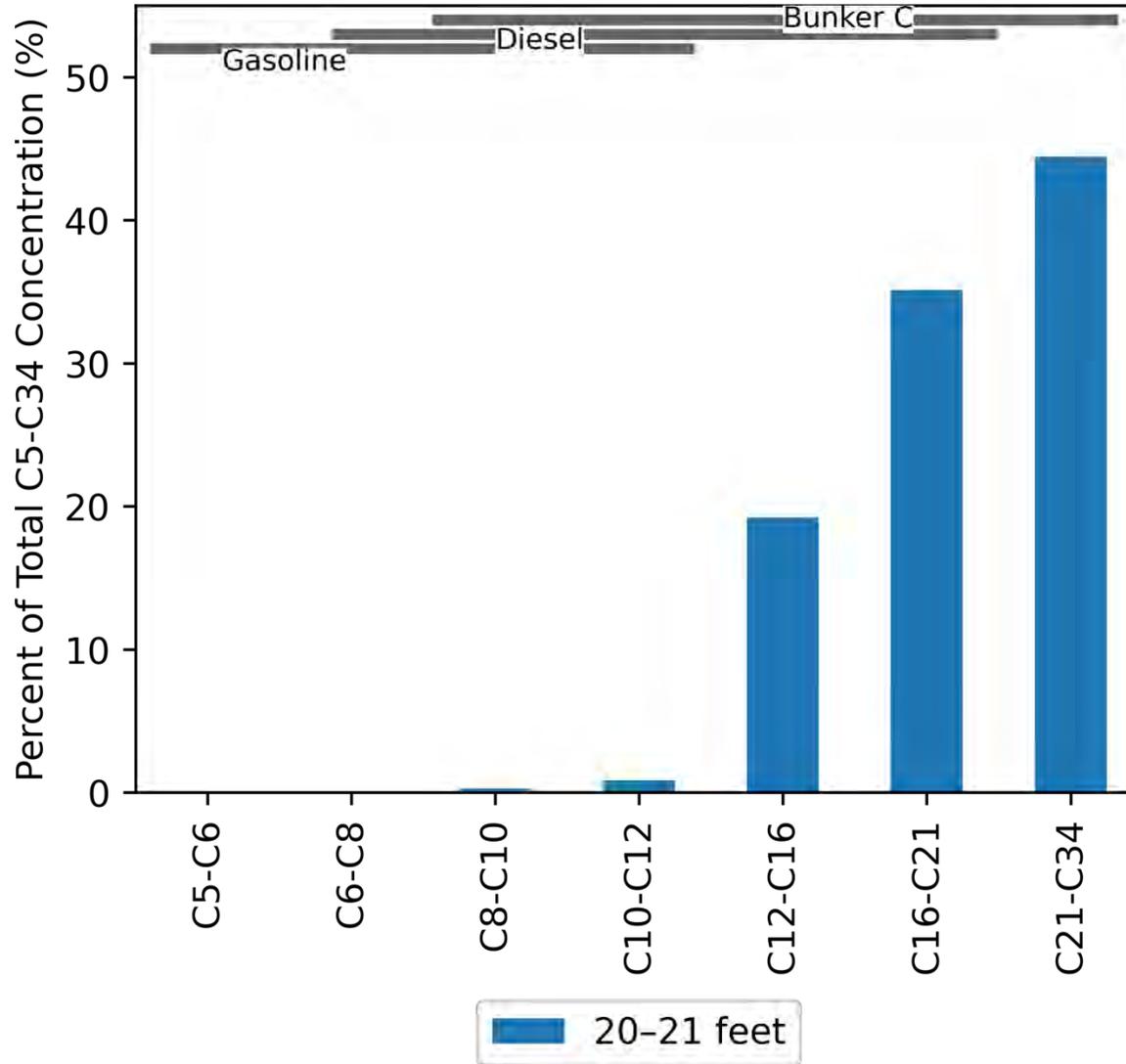
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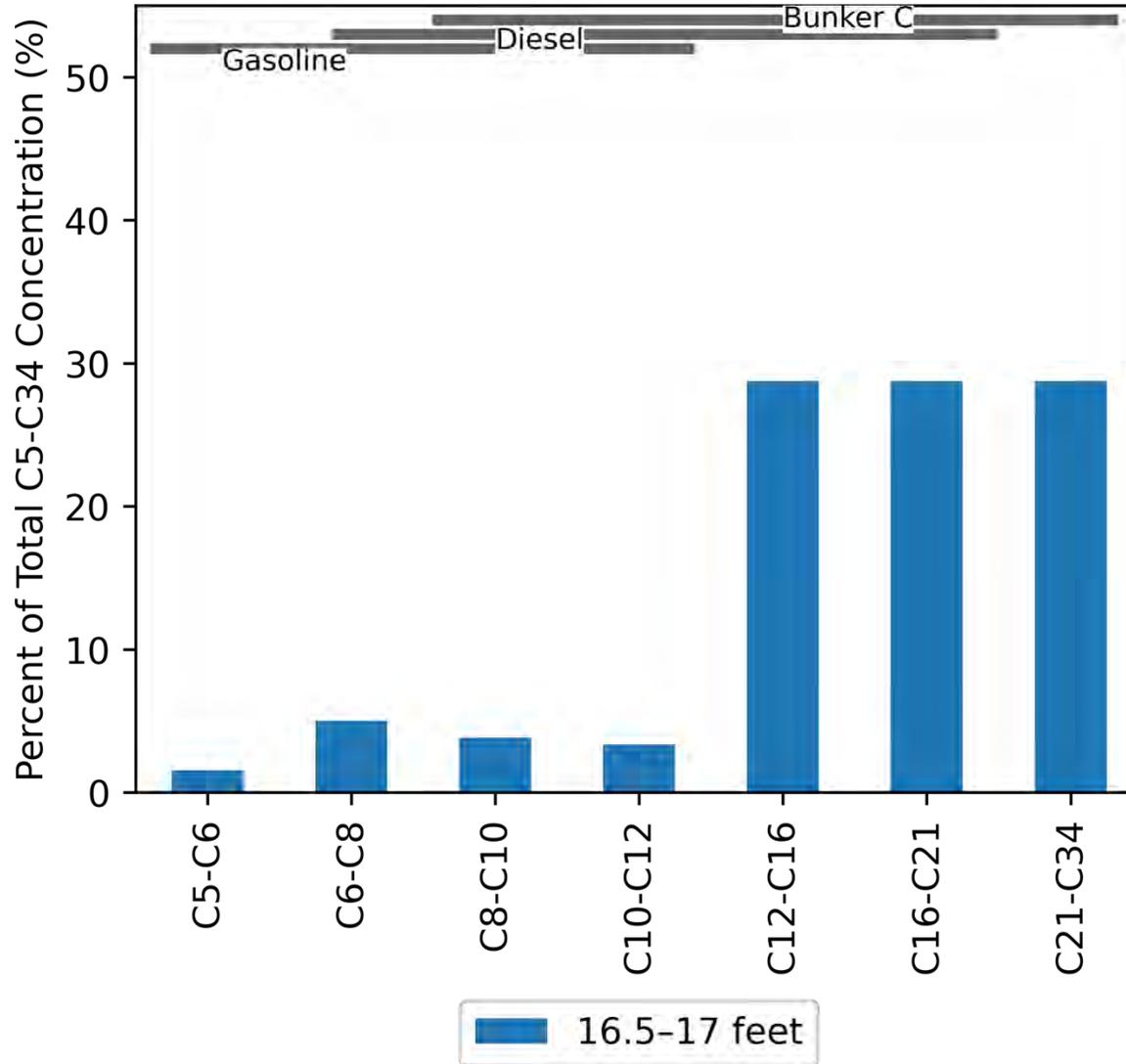
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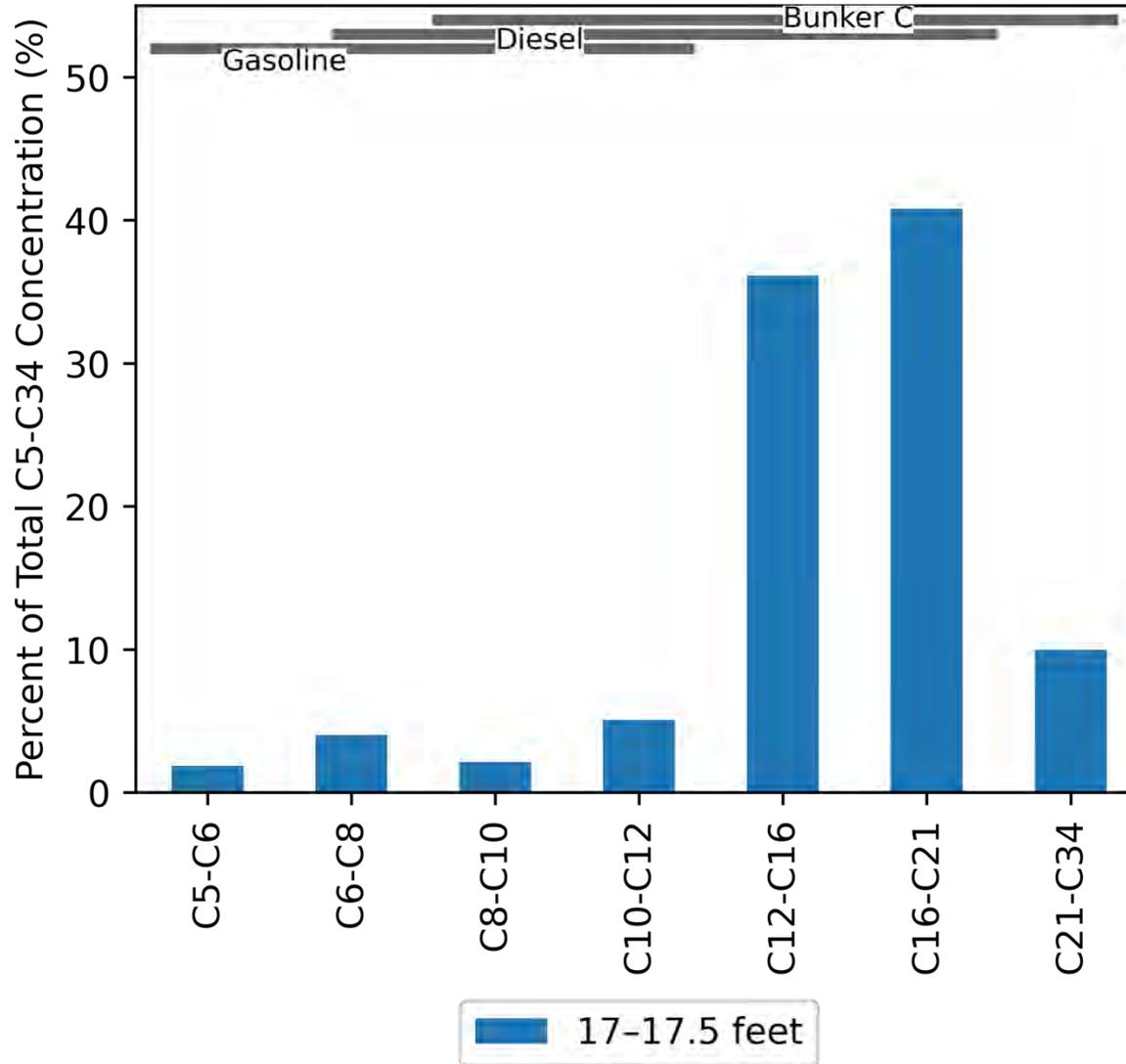
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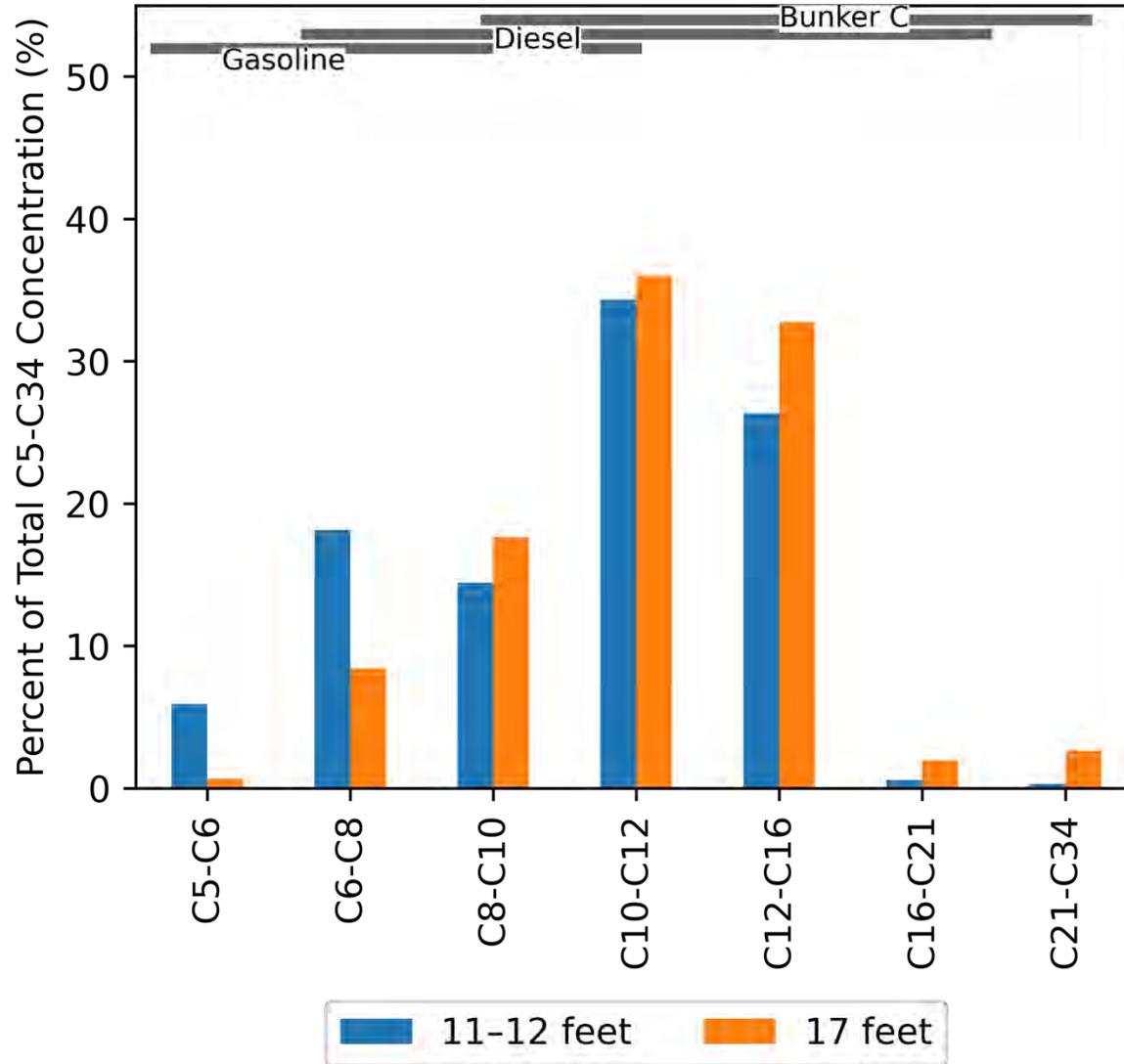
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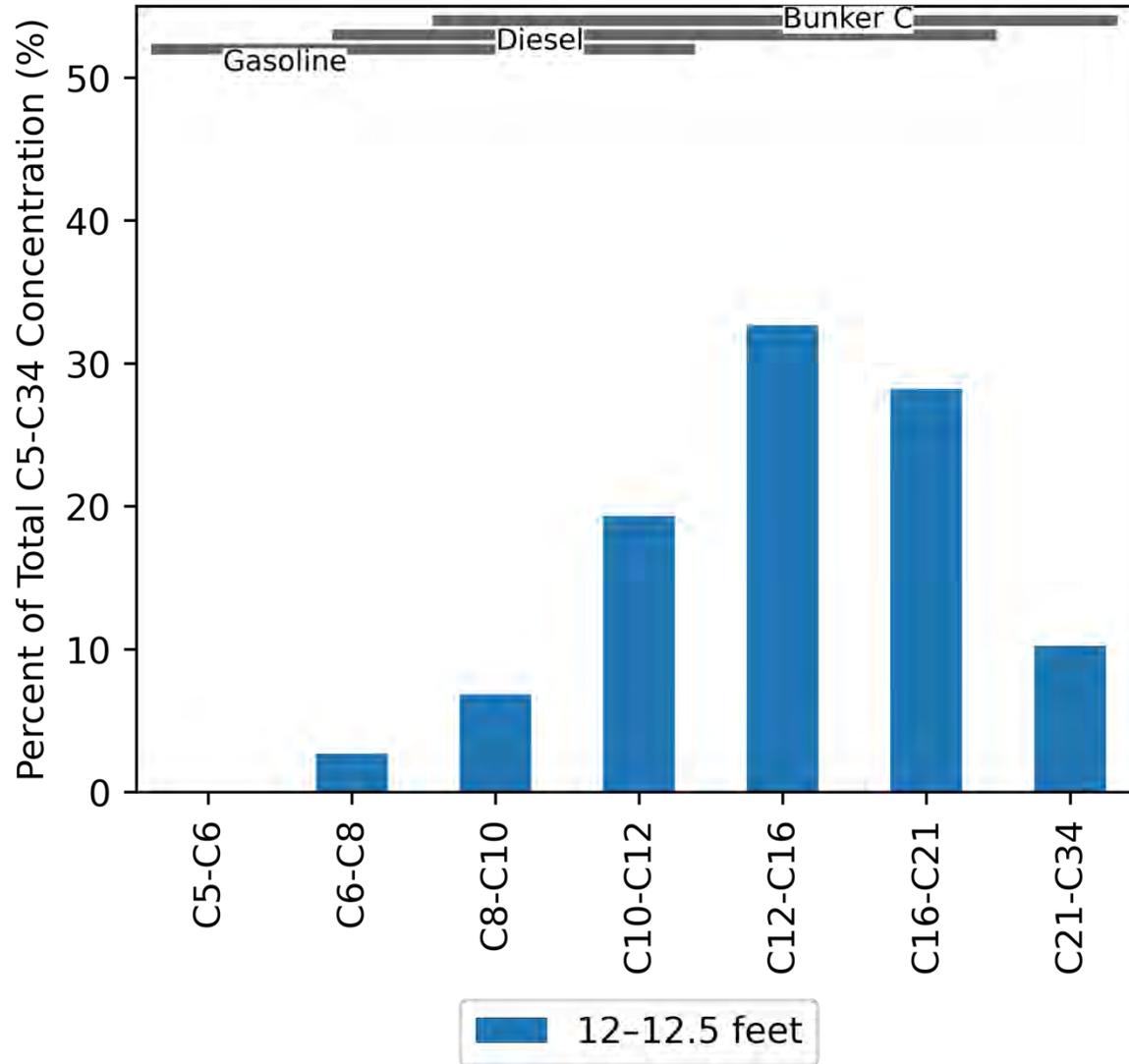
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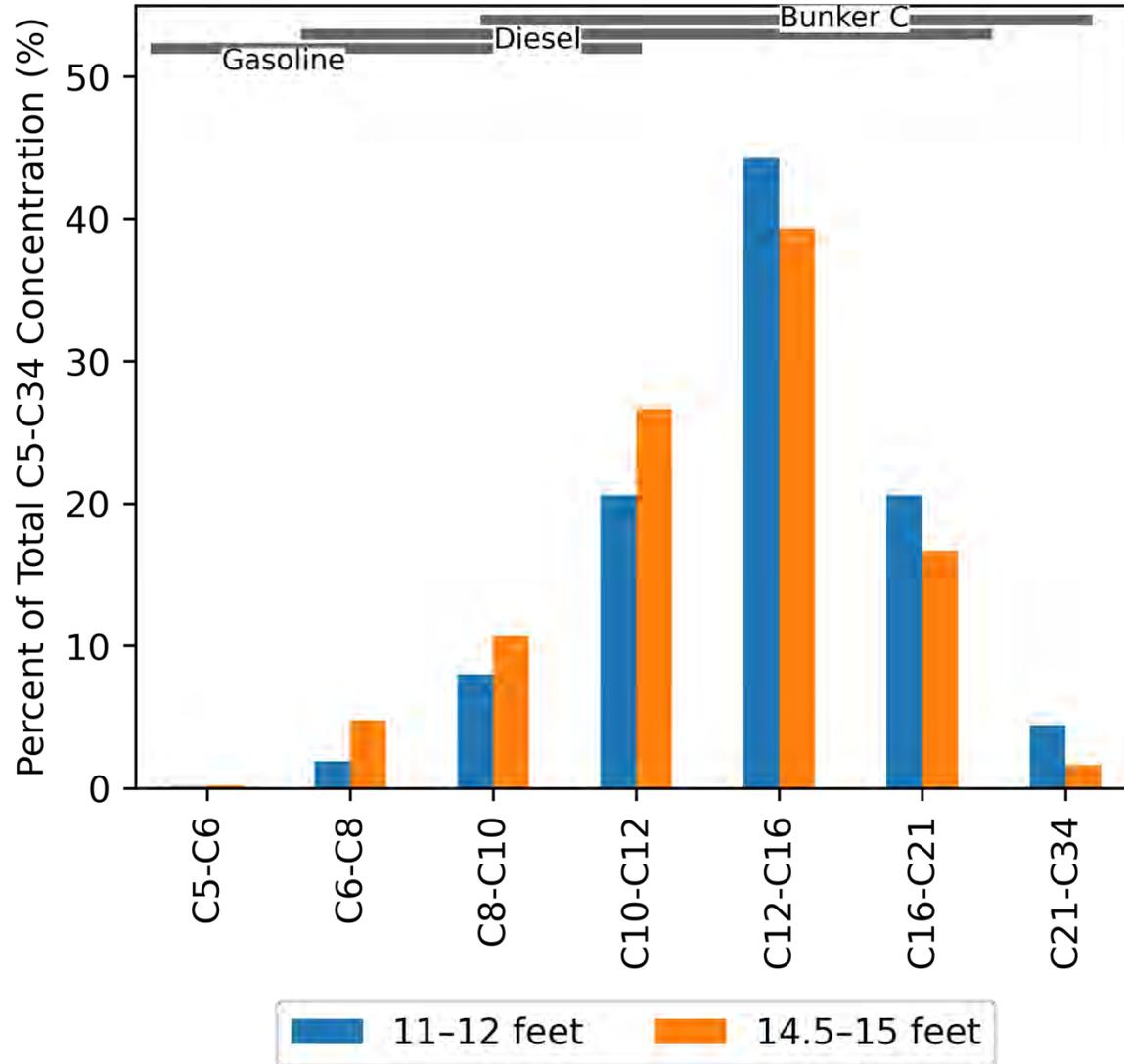
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OIP-66



OIP-67



Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix D Monitored Natural Attenuation at Port of Longview TPH Site

Appendix D

Monitored Natural Attenuation at Port of Longview TPH Site

INTRODUCTION AND PURPOSE

Monitored natural attenuation (MNA) is the observed, unaided reduction of contaminant concentration and mass by using the natural assimilative capacity of a groundwater/soil system in situ. This ubiquitous process includes a variety of physical, chemical, or biological attributes under favorable conditions to reduce the toxicity, mobility, and concentration of contaminants without human intervention. The reduction in concentrations is due primarily to several fate and transport processes including destructive processes, such as biodegradation, and nondestructive mechanisms, such as dilution, sorption, volatilization, and dispersion (USEPA 1999).

Natural attenuation processes typically occur at all contaminated sites, but to varying degrees of effectiveness depending on the types and concentrations of contaminants present and the physical, chemical, and biological characteristics of the soil and groundwater. One of the most important components of natural attenuation at a petroleum-contaminated site is biodegradation. Contaminant biodegradation is largely based upon microbial respiration. In respiration, microbes gain energy from the consumption or oxidation of electron donors coupled to the utilization or reduction of electron acceptors. Contaminants will either serve as electron donors or electron acceptors. For example, during the aerobic metabolism of petroleum hydrocarbons in the biodegradation process, oxygen is the electron acceptor, while hydrocarbons are the electron donors and may eventually be oxidized completely to CO₂. Under anaerobic conditions, alternative electron acceptors, such as nitrate and sulfate, may be utilized in contaminant oxidation in the absence of oxygen. In general, biodegradation processes follow an order of favorable electron acceptor availability: O₂ → Mn⁴⁺ → NO³⁻ → Fe³⁺ → SO₄²⁻ → CH₄ → CO₂. The microbes will utilize the next available electron acceptor in the above order when one acceptor is scarce or absent.

The occurrence of biodegradation can be determined from site analytical monitoring of the changes in groundwater bulk geochemistry, the presence of metabolic by-products, and the depletion of electron acceptors and donors. As a result, several chemical compounds in groundwater, including nitrate, manganese, ferrous iron, sulfate, methane, and total alkalinity can be measured and used as indicators of natural attenuation. Their presence, or absence, in comparison to background levels and dissolved oxygen (DO) levels can therefore be used to infer biodegradative processes. DO levels and oxidation-reduction potential (ORP) are used to assess whether biodegradation is aerobic or anaerobic.

Typically, these parameters are measured in monitoring well locations throughout light non-aqueous phase liquid (LNAPL) source area and dissolved groundwater contaminant plume as well as upgradient and downgradient locations that are not impacted by contaminants. Parameters are compared to the approximate distances of monitoring locations from the former LNAPL plume boundary and/or source area as well as measured concentrations of diesel-range organics (DRO), oil-range organics (ORO), and/or gasoline-range organics (GRO; Ecology 2005a). MNA is indicated by a depletion in DO, nitrate, and sulfate and increases in manganese (Mn²⁺), ferrous iron (Fe³⁺), methane (CH₄), and total alkalinity within the contaminant plume.

GROUNDWATER MNA AT THE PORT OF LONGVIEW TPH SITE

Multiple electron acceptors or metabolic byproducts were measured in groundwater to determine if natural attenuation is occurring at the Site. Groundwater samples were collected from 16 monitoring well locations between May 2020 and February 2021 in four quarterly monitoring events designed to capture seasonal variations of Site groundwater conditions. Samples were collected using the methodologies described in the Remedial Investigation Work Plan (RIWP; Floyd|Snider 2019) and analyzed for the following MNA parameters:

- DO by YSI DSS Pro field meter (measured during sampling);
- Nitrate and sulfate by USEPA Method 300.0
- Manganese (soluble) by USEPA Method 200.8
- Total alkalinity (as CaCO₃) by SM 2320B
- Methane by RSK-175
- Ferrous Iron (soluble) by Hach Field Test Kit.

To document and assess MNA, Ecology recommends including at least one upgradient location with uncontaminated groundwater; one location within the source (most impacted) area; two wells near the contaminated plume center line; and one downgradient “sentinel” well with uncontaminated groundwater in the sampling plan (Ecology 2005a). Figures 9.2 and 9.3 show the extent of the LNAPL and dissolved-phase GRO and total DRO and ORO plumes at the Site. The dissolved-phase hydrocarbon plumes in the perched water-bearing zone (perched zone) are approximately centered around MW-09 and within the vicinity of MW-28 and extend to the northwest on the west side of Port Way. The dissolved-phase plumes within the alluvial aquifer is approximately centered around MW-09, MW-34, and MW-39 and does not extend to the northwest across Port Way. Consequently, monitoring wells screened in both water-bearing zones were sampled for MNA parameters at different distances from the presumed source area (MW-09 and areas with soil concentrations exceeding their respective residual saturation levels) in addition to upgradient and downgradient locations outside of the plumes. It should be noted that for the purposes of this analysis, there is no measurable LNAPL at present that is detected in a monitoring well within the perched zone source area. However, historically, LNAPL was present at perched zone well MW-16 (Golder 1993). Additionally, soil samples collected at MW-26 and MW-40 within the perched zone contain concentrations that exceed residual saturation levels; therefore, soil within the vicinities of MW-26 and MW-40 can be considered source zone areas.

MNA RESULTS

MNA analytical results for the 16 locations as well as field parameters for all monitoring well locations are shown in Table 4.7. The parameters were interpreted by plotting their concentration in two different approaches: (1) MNA parameters versus total DRO and ORO concentrations and (2) MNA parameters versus the approximate total distance of the monitoring well from the source area. These plots were constructed to document varying levels and stages of biodegradation within the dissolved-phase plumes and uncontaminated groundwater. Separate plots were created for monitoring wells screened in the perched zone and alluvial aquifer as the nature and extents of the dissolved-phase plumes in each

water-bearing zone are not identical. The MNA parameters were plotted against total DRO and ORO versus GRO concentrations because the total DRO and ORO plume encompasses the GRO plume and is inferred to be the primary constituent of the LNAPL present at MW-09 (AGRA 1995).

ALLUVIAL AQUIFER

DO data from monitoring wells screened within the alluvial aquifer are shown in Figures D.1 through D.7, which follow the order of favorable electron acceptor availability. DO versus distance, within the alluvial aquifer, shows a decrease in the DO content of groundwater with decreasing distance to the approximate boundary of the LNAPL plume and source area (Figure D.1). Additionally, DO versus total DRO and ORO indicate an exponential decrease of DO content with increasing total DRO and ORO concentration (Figure D.8). These results suggest that natural attenuation due to aerobic respiration is occurring beneath the Site.

Nitrate and sulfate data collected from the alluvial aquifer monitoring wells are shown in Figures D.2, D.5, D.9, and D.12. Nitrate and sulfate results compared to distance from the source area and total DRO and ORO show similar trends to the DO data; lower concentrations are present within the plume area, and higher concentrations are present in areas outside of the plume. These data provide evidence that anaerobic biodegradation in the form of denitrification and sulfate reduction is likely occurring within the alluvial aquifer groundwater plume.

Manganese, ferrous iron, and methane data collected from the alluvial aquifer groundwater are shown in Figures D.3, D.4, D.6, D.10, D.11, and D.13 and show opposite trends to the nitrate, sulfate, and DO data: manganese, ferrous iron, and methane concentrations increase within the groundwater plume and correspond with monitoring well locations with high total DRO and ORO concentrations. These data indicate that anaerobic biodegradation via manganese and iron reduction and methanogenesis is likely occurring within the groundwater plume at the Site. The presence of elevated methane levels within the groundwater plume are indicative of strongly reducing conditions.

Total alkalinity in the form of CaCO_3 in alluvial aquifer groundwater data are shown in Figures D.7 and D.14. CaCO_3 is a metabolic byproduct of biodegradation and can be expected to increase in areas where microbial activity is occurring. Total alkalinity data, except for MW-31, appear to generally increase with increasing total DRO and ORO concentrations, providing evidence for increased microbial activity within petroleum-impacted groundwater. MW-31 has elevated alkalinity at low total DRO and ORO concentrations with respect to other monitoring wells and the cause is uncertain.

Perched Water-Bearing Zone

DO and average total DRO and ORO concentrations were plotted versus the straight-line distance from each source area (i.e., vicinities of MW-26 or MW-40) for the plumes located in the northern and southern portions of the perched zone (Figures D.15 through D.17). Comparisons of other MNA parameters versus distance from source areas were less useful for assessing the presence of natural attenuation in the perched zone, likely because the dissolved-phase groundwater plume has two different possible source areas and multiple groundwater flow directions. However, all MNA parameters were plotted against the Total DRO and ORO groundwater concentration in each perched zone monitoring well (Figures D.8 through D.14).

Figures D.15 through D.17 also show that average DO generally increases with increasing distance up and down gradient from possible source areas and DO is higher in locations with lower total DRO and ORO concentrations. This indicates that aerobic biodegradation is ongoing or has occurred in groundwater closest to source areas, toward the interior of the plumes. The exception is at locations MW-02, MW-04, and MW-30, which are located downgradient of source areas and are the western extents of the northern and southern plumes. These locations have high average DO and total DRO and ORO concentrations, relative to other sample locations. It is likely that a portion of the total DRO and ORO concentrations are detections of organic material in this area. This is supported by the laboratory reports for samples collected at MW-02, MW-04, and MW-30, which indicate that the chromatograms do not match the fuel standards used for instrument calibration (Table 4.5). Based on these observations, biodegradation has likely occurred at these three locations, and a portion of the total DRO and ORO concentrations detected are metabolic byproducts of biodegradation (e.g., alcohols and organic acids, with possible phenols, aldehydes, ketones). These byproducts have oxygen in their molecules and are not hydrocarbons but are included as DRO detections.

DO, nitrate, and sulfate concentrations in perched zone monitoring wells show strong negative correlations with total DRO and ORO groundwater concentrations. These data provide evidence for denitrification and sulfate reduction occurring at monitoring well locations with petroleum-impacted groundwater. Total alkalinity, manganese, ferrous iron, and methane concentrations do not appear to increase with total DRO and ORO, indicating that iron and manganese reduction, methanogenesis, and CaCO_3 production are not ongoing at these locations. It should be noted that the production of methane is the “least energetically preferred” thermodynamic reaction and occurs only when electron acceptors from the other microbial reactions are depleted. A lack of biodegradation of GRO or benzene, which produce higher alkalinity in groundwater, in perched zone groundwater may explain the low groundwater CaCO_3 concentrations.

It should be noted that MW-30, which is located west of the Site, consistently showed anomalously high nitrate and sulfate concentrations (almost an order of magnitude higher than other locations); therefore, concentrations were not included in the sulfate or nitrate versus total DRO and ORO plots. These elevated sulfate and nitrate concentrations could indicate an influx of these compounds from another source or that denitrification and/or sulfate reduction are not ongoing at MW-30. As mentioned previously, a portion of the total DRO and ORO concentrations detected in MW-30 may be detections of metabolic byproducts of biodegradation and not all the detections are hydrocarbons, which is why the data do not show a decrease of DO, denitrification, and sulfate reduction or an increase in total alkalinity, manganese, ferrous iron, and methane concentrations.

PLUME STATUS AT THE PORT OF LONGVIEW TPH SITE

For MNA to be considered a feasible cleanup action alternative, natural attenuation must be actively reducing contaminant concentrations at a site. Typically, a contaminant plume expands until it reaches steady state, at which point the mass loading rate of petroleum hydrocarbons from the source area is approximately equal to the natural attenuation rate, and the plume is considered stable. When the natural attenuation rate exceeds the source mass loading rate, the plume begins to shrink over time. Generally,

MNA is considered a feasible cleanup action alternative at sites where the contaminant plumes can be shown to be either stable or shrinking.

To evaluate plume status at the Site, historical groundwater data was combined with RI data to create time series plots of contaminant concentrations at select monitoring well locations, both within and around the dissolved-phase plumes, shown in Figures D.18 through D.21. Mann-Kendall non-parametric tests were conducted at select locations using Module 1 of Ecology's natural attenuation data analysis tool package (Ecology 2005b), and results are shown in Figures D.22 through D.25.

Alluvial Aquifer

Time series plots of GRO and total DRO and ORO were generated for alluvial aquifer wells MW-01, MW-06, MW-10, MW-12, MW-22, MW-23, MW-31, and MW-32 (Figures D.18 through D.20). A time series plot of benzene was also constructed for wells MW-03, MW-07, MW-8, MW-10, and MW-12, which are the only locations that have consistently been sampled for benzene throughout the duration of monitoring (Figure D.21). GRO and total DRO and ORO concentrations in perimeter alluvial aquifer monitoring locations MW-01, MW-06, MW-22, MW-23, MW-31, and MW-32 gradually decreased between 1991 and present, and, except for total DRO and ORO results from MW-06, were all below laboratory reporting limits during this time. Although a spike in the total DRO and ORO concentration at MW-06 was observed in August 2020, impacts were not detected in downgradient location MW-01. The consistent lack of GRO and total DRO and ORO detections at perimeter alluvial aquifer monitoring wells indicate that the dissolved-phase groundwater plume in the alluvial aquifer is stable and has not migrated off property within the alluvial aquifer.

MW-10 and MW-12, which are located within the groundwater plume, generally showed decreases in total DRO and ORO, GRO, and benzene over the past approximately 25 years. Despite recent increases in GRO and total DRO and ORO concentrations at both locations, data from the most recent 2021 sampling event indicate that concentrations of the two analytes remain less than historical maximum concentrations. Mann-Kendall analyses at both MW-10 and MW-12 show that total DRO and ORO, GRO, and benzene, toluene, ethylbenzene, and total xylenes (BTEX) contaminant plumes are either shrinking or stable at these locations. These results, coupled with the documented reduction of contaminant concentrations within the dissolved-phase groundwater plume provide additional evidence of ongoing natural attenuation at the Site.

Perched Water-Bearing Zone

Time series plots of GRO and total DRO and ORO were generated for perched zone wells MW-02, MW-17, MW-28, and MW-30 (Figures D.18 through D.20). Although there has been some variability, concentrations of both GRO and total DRO and ORO at perimeter wells MW-02 and MW-30 have remained stable or decreased substantially since the late-1990s, indicating that the plume is stable or shrinking and natural attenuation processes are active at these locations. Mann-Kendall analyses support this observation at both MW-02 and MW-30 and confirm that contaminant plumes at these locations are stable or shrinking. Reductions in contaminant concentrations relative to historical maximums were also observed at locations MW-17 and MW-28, which are located more proximal to the presumed source area(s) and indicate that natural attenuation is ongoing within perched zone groundwater.

RESTORATION TIME FRAME PREDICTIONS AND BIOSCREEN WORKBOOK

Groundwater data collected over the years were insufficient to generate a prediction for the time to reach cleanup levels using Ecology's MNA workbook. Therefore, EPA's Bioscreen Natural Attenuation Decision Support System workbook and groundwater trend data were used to estimate the time to meet cleanup levels based on first-order biodegradation and instantaneous models (EPA 1996).

The preferred alternative proposes to remediate areas with elevated TPH concentrations beneath the rail lines and areas to the west of the rail lines with TPH concentrations in soil exceeding their respective MTCA Method A cleanup levels. Therefore, some areas beneath the rail lines that contain TPH exceedances in soil will rely on natural attenuation. The area within the vicinity of MW-12 has the greatest TPH concentrations and the greatest contaminant mass of the areas that will rely on natural attenuation, so this location serves as an appropriate basis for estimating the site restoration time frame.

The Bioscreen model was used as supporting evidence for the estimated restoration time frames calculated using groundwater concentration trends for MW-12, which is outside the injection extents proposed in Alternatives 3 and 4. Site data including MNA and soil properties were used as inputs. GRO, DRO, and BTEX mass were calculated using recent soil data; historical soil data collected in the early 1990s are likely not representative of current concentrations. If site-specific data were unknown, the default inputs were used, as suggested by the user manual. Figures D.26 and D.27 show the model inputs.

Bioscreen utilizes two biodegradation models: instantaneous and first-order decay. First-order decay incorporates the effects of adsorption, dispersion, and aerobic biodegradation but does not address specific anaerobic decay reactions. The first-order decay model does not account for site-specific information such as the availability of electron acceptors. In addition, it does not assume any biodegradation of dissolved constituents in the source zone. In other words, this model assumes that biodegradation starts immediately downgradient of the source and that it does not depress the concentrations of dissolved organics in the source zone itself. Therefore, the first-order decay is conservative, and the decay rate is likely quicker than predicted by the first-order decay.

Modeling work conducted by GSI indicates that first-order expressions may not be as accurate for describing natural attenuation processes as the instantaneous reaction assumption (Connor et al. 1994). Biodegradation of organic contaminants in groundwater is more difficult to quantify using a first-order decay equation because electron acceptor limitations are not considered. A more accurate prediction of biodegradation effects may be realized by incorporating the instantaneous reaction equation into a transport model. The bioscreen user's manual concludes that the first-order model may underpredict rate of source depletion (USEPA 1996); and the instantaneous reaction model may be more accurate for estimating rate of source depletion (Newell et al. 1995).

The Bioscreen model shows that

- The DRO source area half-life ranges between 2 and 20 years for instantaneous and first-order decay, respectively (Figure D.26); and
- The GRO source area half-life ranges between 5 and 30 years for instantaneous and first-order decay, respectively (Figure D.27).

Because first-order decay would provide a conservative estimate for the reasons described above, the half-life for the source area outside the preferred remedial alternative treatment area will likely fall somewhere in between these results. Areas within the treatment zone of the preferred alternative, where the instantaneous model is more applicable to support natural attenuation after treatment, are likely to have a much shorter restoration time frame.

Additionally, historical GRO and DRO concentrations for MW-12 were plotted over time (Figure D.28). The trendlines show declining concentrations over the past 30 years. The trendlines were extrapolated to show that GRO and DRO concentrations will both meet their respective cleanup levels within 28 to 30 years in areas outside the remedial implementation extent.

CONCLUSIONS

Analytical groundwater results at the Site provide evidence that natural attenuation of groundwater contaminants by various types of biodegradation is occurring in both water-bearing zones. Alluvial aquifer results indicate that both aerobic and anaerobic biodegradation is occurring, particularly within the dissolved-phase plume that surrounds the LNAPL in MW-09. Results from the perched zone show that natural attenuation due to biodegradation processes is ongoing at monitoring well locations with petroleum-impacted groundwater. Furthermore, historical Site groundwater data coupled with Mann-Kendall analyses indicate that the dissolved-phase plumes in both water-bearing zones are stable or shrinking. Additionally, the Bioscreen model and the concentration trendlines for MW-12 show that the GRO and DRO in the area outside the remedial implementation extent will meet their respective groundwater cleanup levels via ongoing natural attenuation. These results provide support for the inclusion of MNA as a viable alternative to reduce groundwater contaminant concentrations.

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LIST OF ATTACHMENTS

Figure D.1	Dissolved Oxygen vs. Distance (Alluvial)
Figure D.2	Nitrate vs. Distance (Alluvial)
Figure D.3	Ferrous Iron vs. Distance (Alluvial)
Figure D.4	Total Manganese vs. Distance (Alluvial)
Figure D.5	Sulfate vs. Distance (Alluvial)
Figure D.6	Methane vs. Distance (Alluvial)
Figure D.7	Total Alkalinity vs. Distance (Alluvial)
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Figure D.18	GRO and Total DRO and ORO Time Series (MW-01, MW-02, MW-06, and MW-10)
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Figure D.21	Benzene Time Series (Alluvial)
Figure D.22	Mann-Kendall Plume Stability Test Results (MW-02)

- Figure D.23 Mann-Kendall Plume Stability Test Results (MW-10)
- Figure D.24 Mann-Kendall Plume Stability Test Results (MW-12)
- Figure D.25 Mann-Kendall Plume Stability Test Results (MW-30)
- Figure D.26 DRO Bioscreen Inputs
- Figure D.27 GRO -Kendall Plume Stability Test Results (MW-12)
- Figure D.28 MW-12 Trendlines for GRO and DRO Concentrations

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Appendix D
Monitored Natural Attenuation at Port
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Figures

Figure D.1 Dissolved Oxygen vs. Distance (Alluvial)

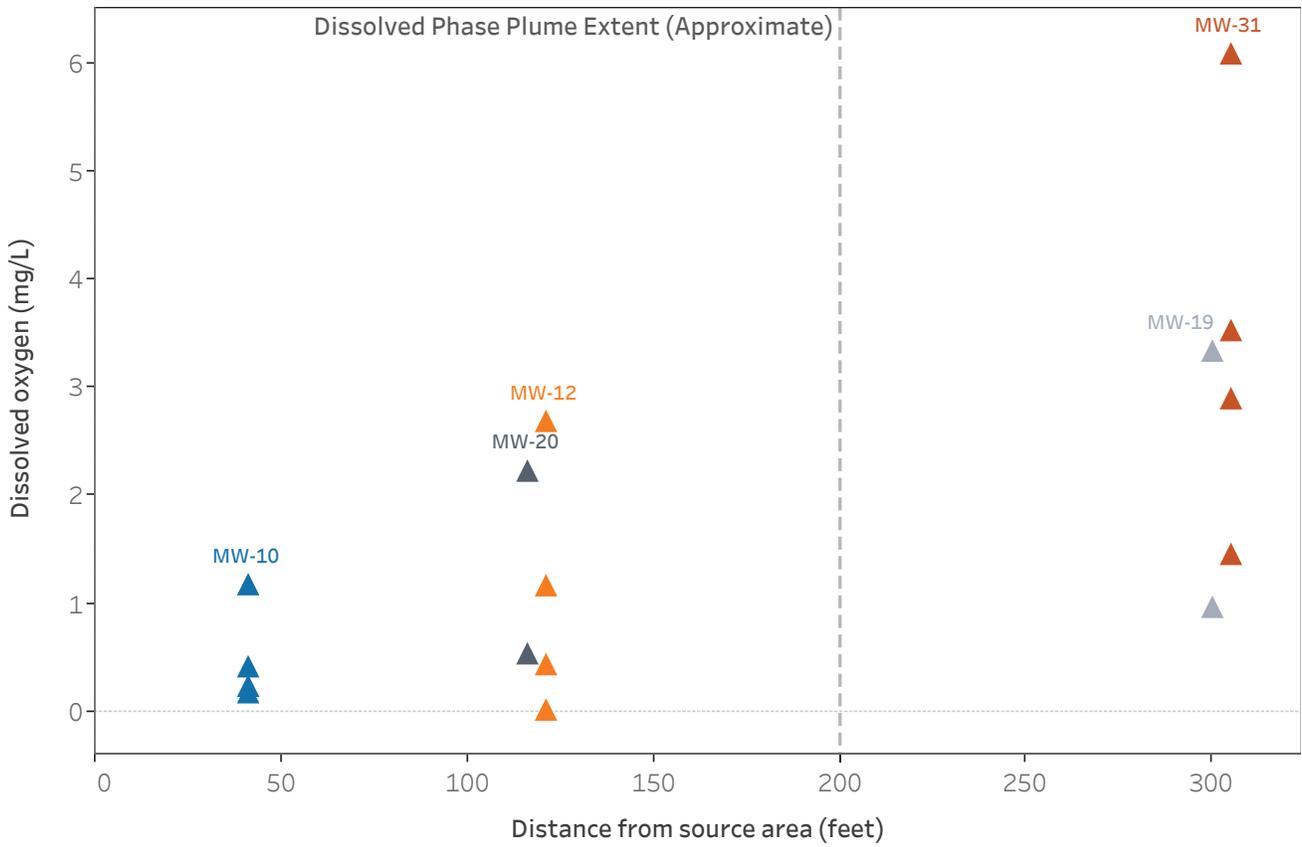


Figure D.2 Nitrate vs. Distance (Alluvial)

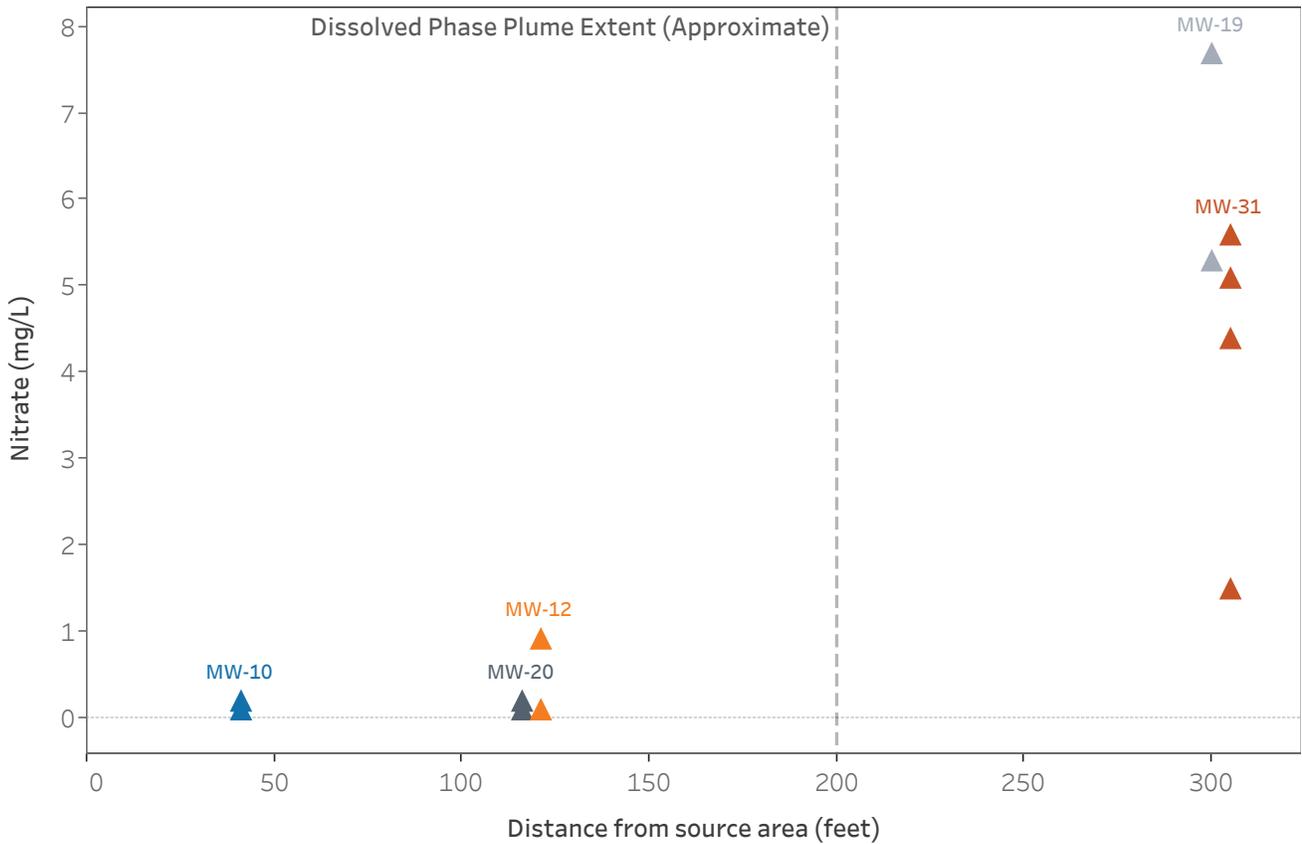


Figure D.3 Ferrous Iron vs. Distance (Alluvial)

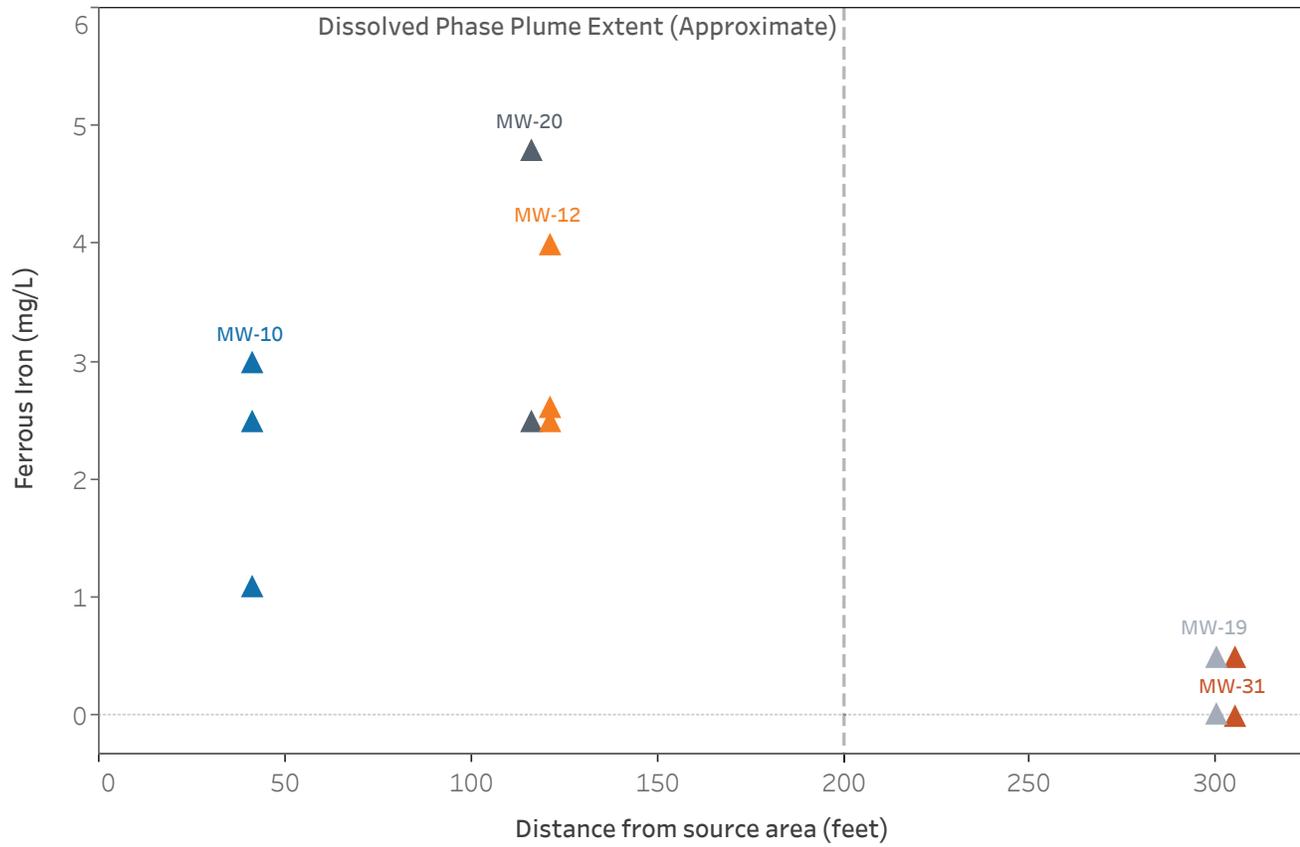


Figure D.4 Total Manganese vs. Distance (Alluvial)

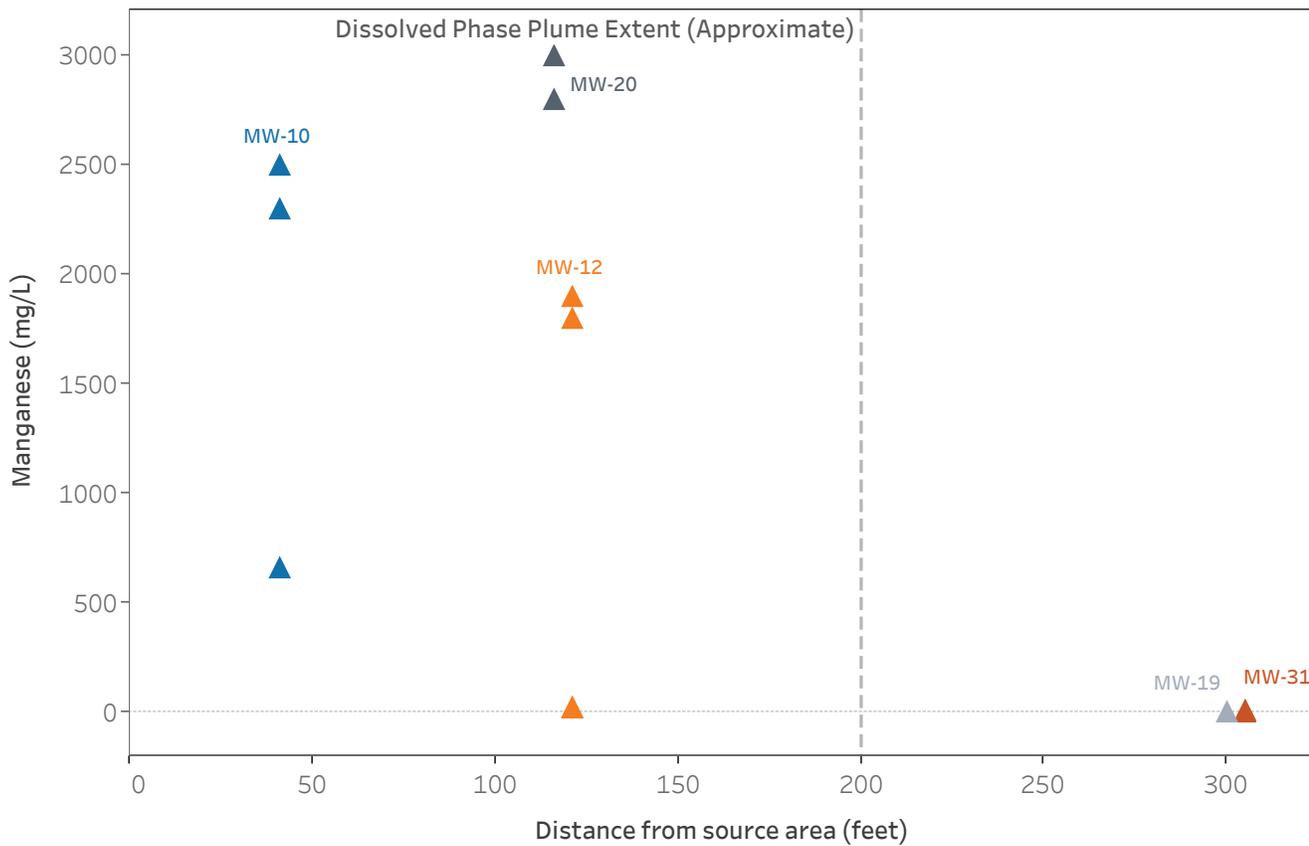


Figure D.5 Sulfate vs. Distance (Alluvial)

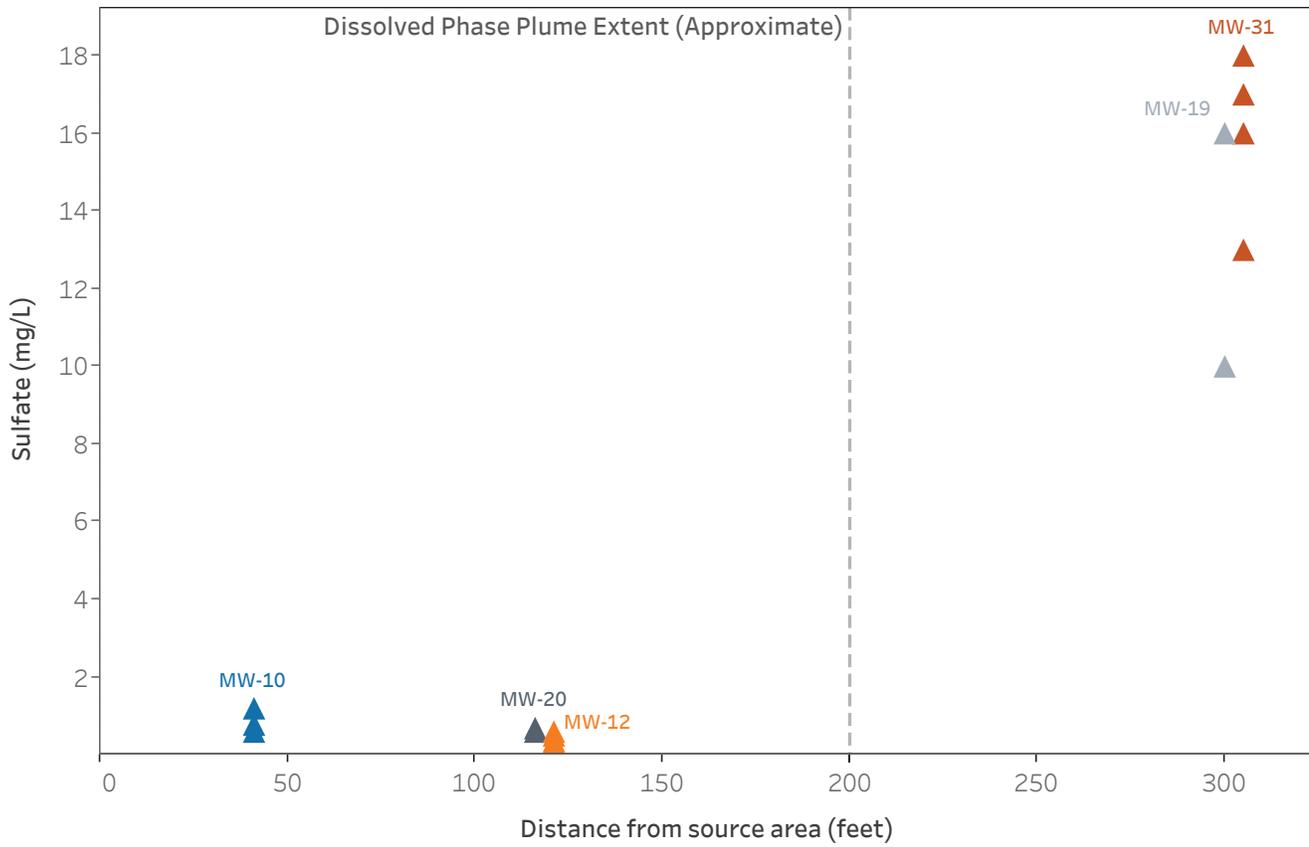


Figure D.6 Methane vs. Distance (Alluvial)

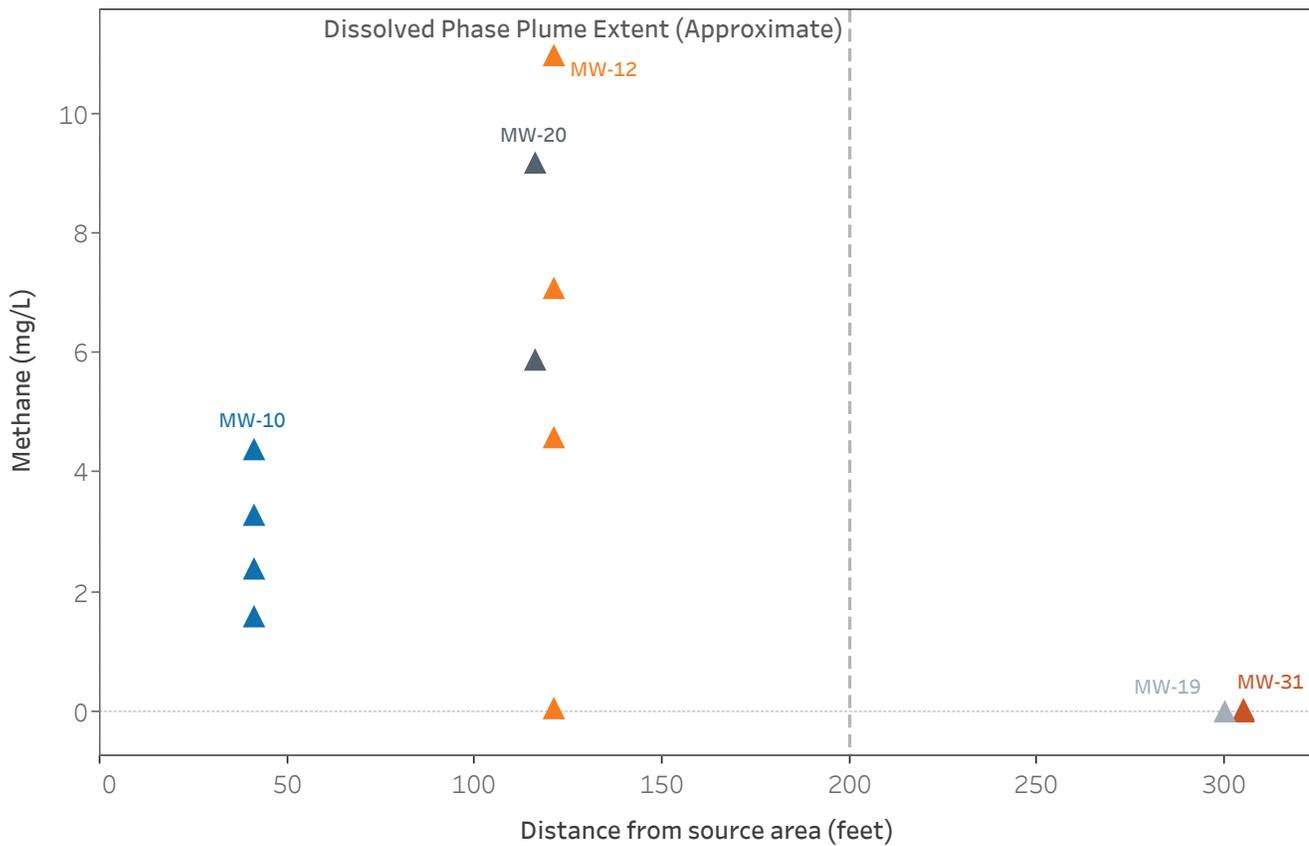


Figure D.7 Total Alkalinity vs. Distance (Alluvial)

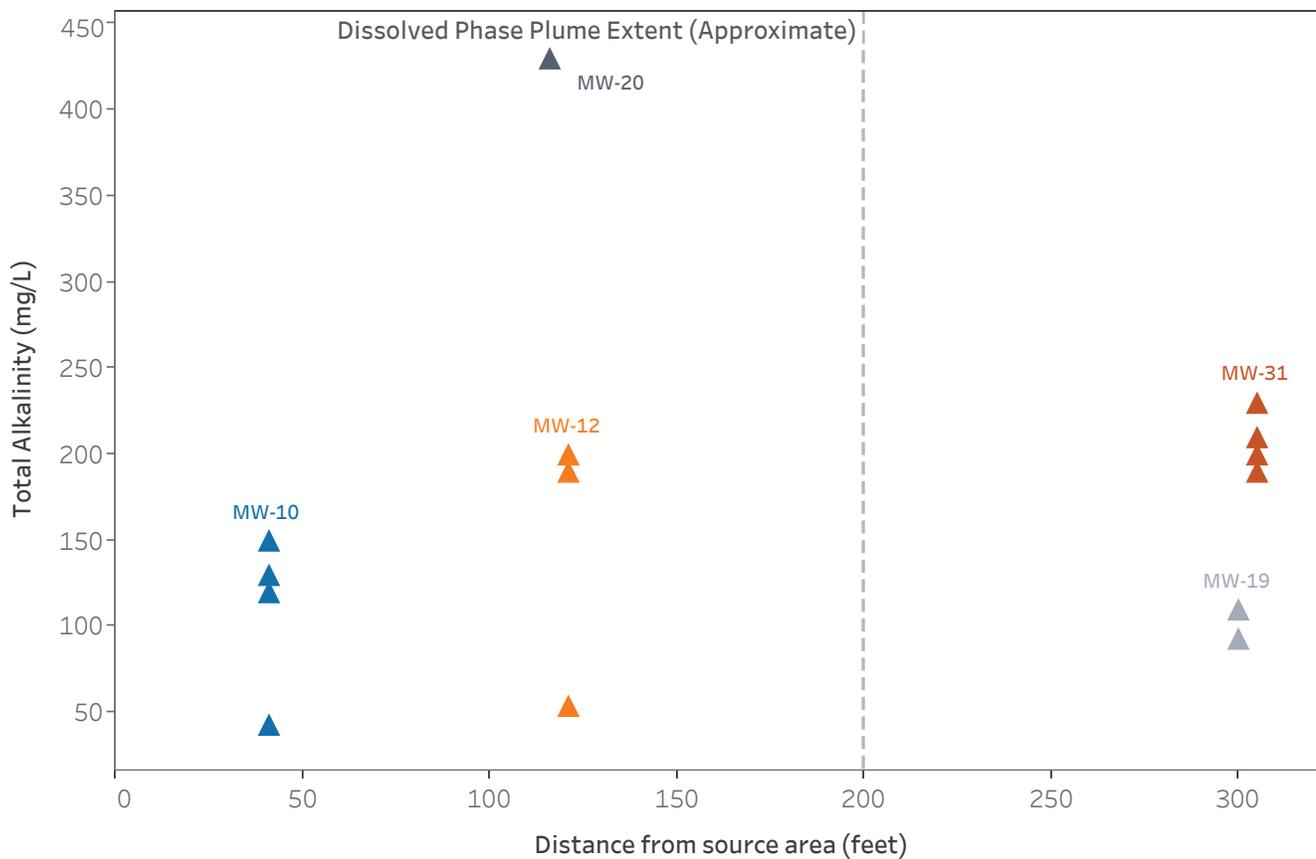


Figure D.8 Dissolved Oxygen vs. Total DRO and ORO

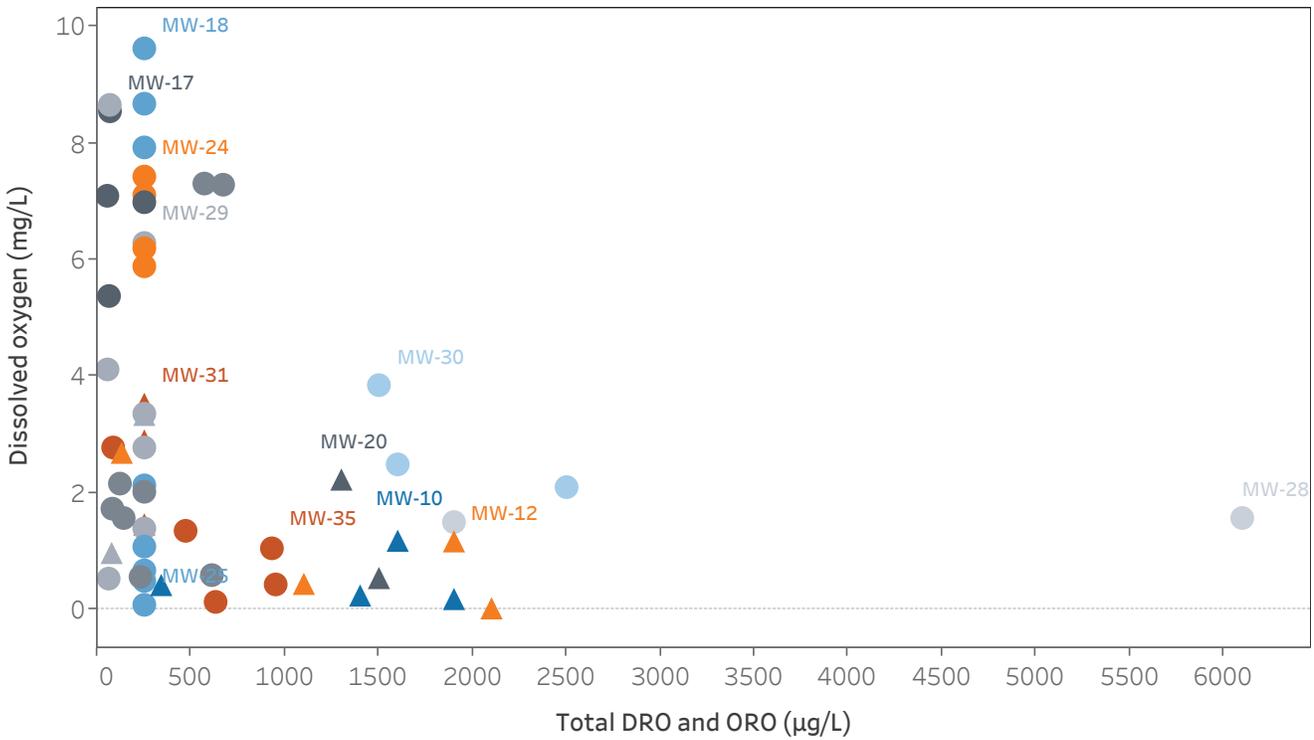


Figure D.9 Nitrate vs. Total DRO and ORO

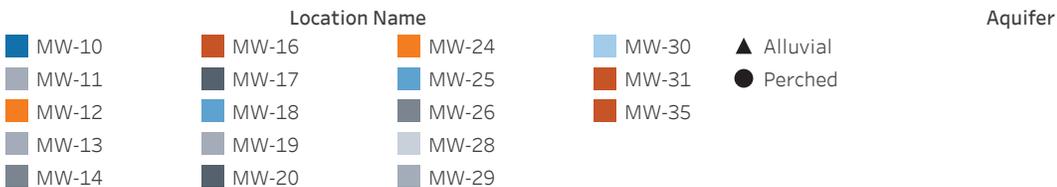
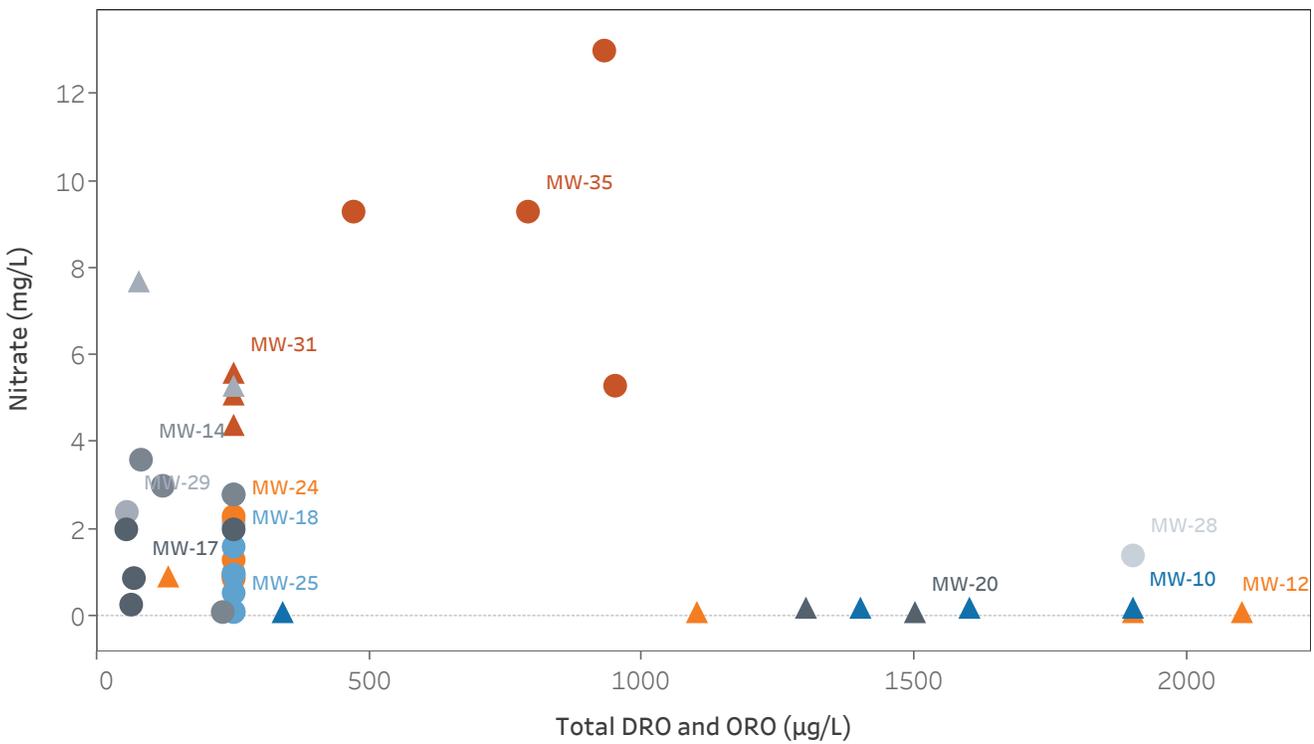


Figure D.10 Ferrrous Iron vs. Total DRO and ORO

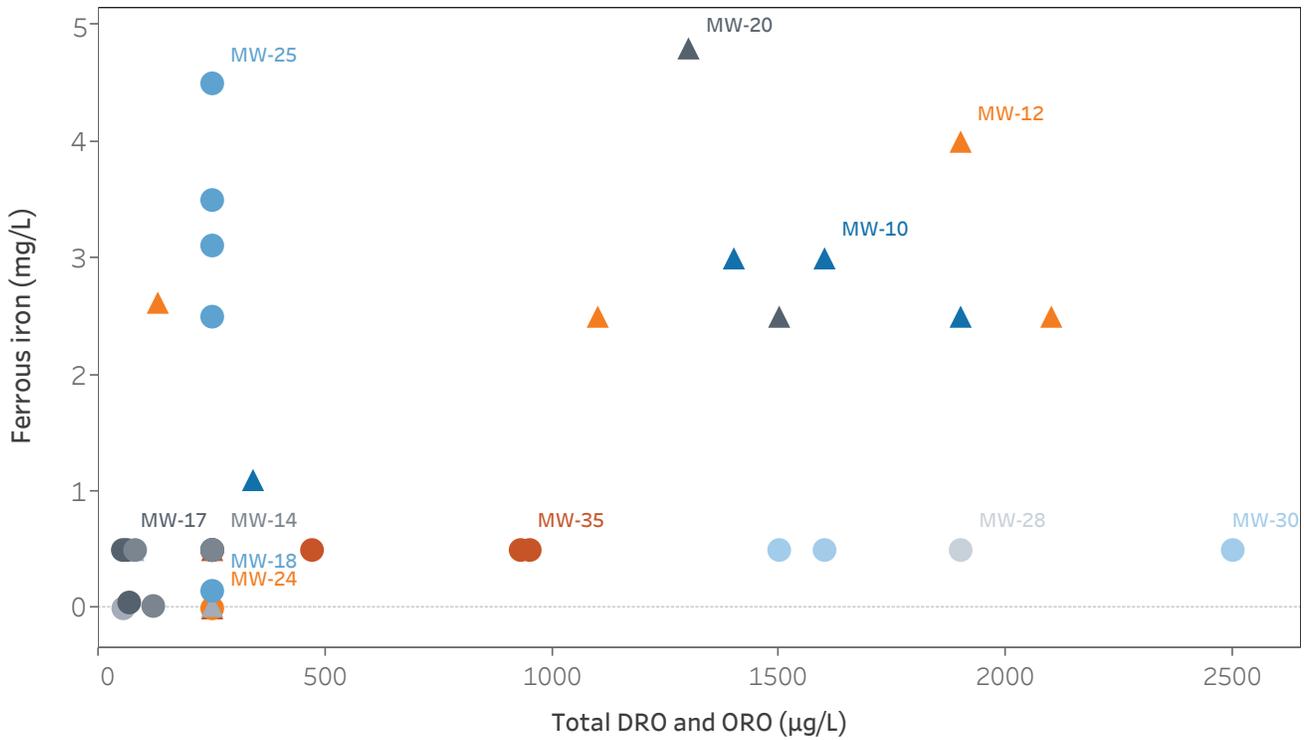


Figure D.11 Total Manganese vs. Total DRO and ORO

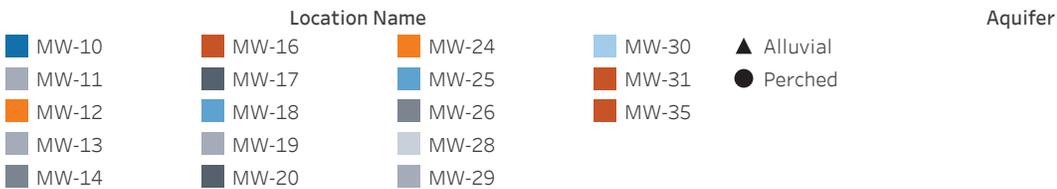
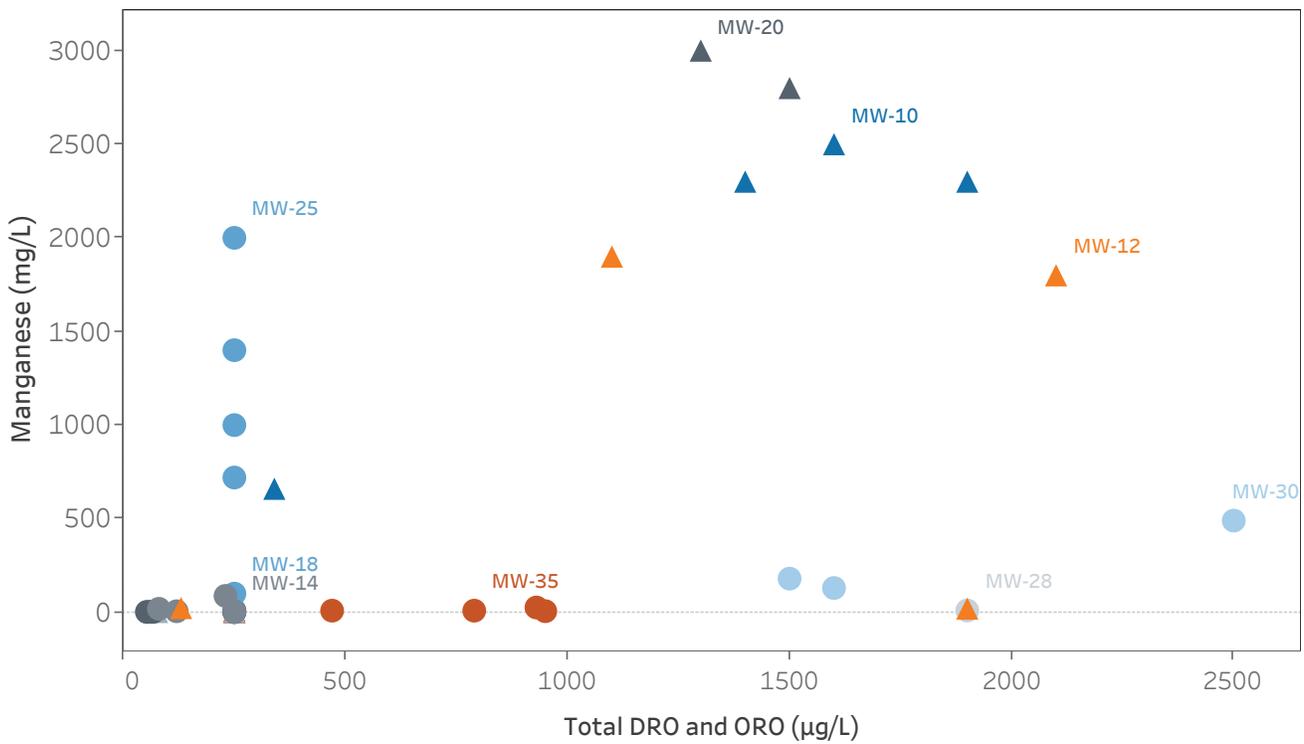


Figure D.12 Sulfate vs. Total DRO and ORO

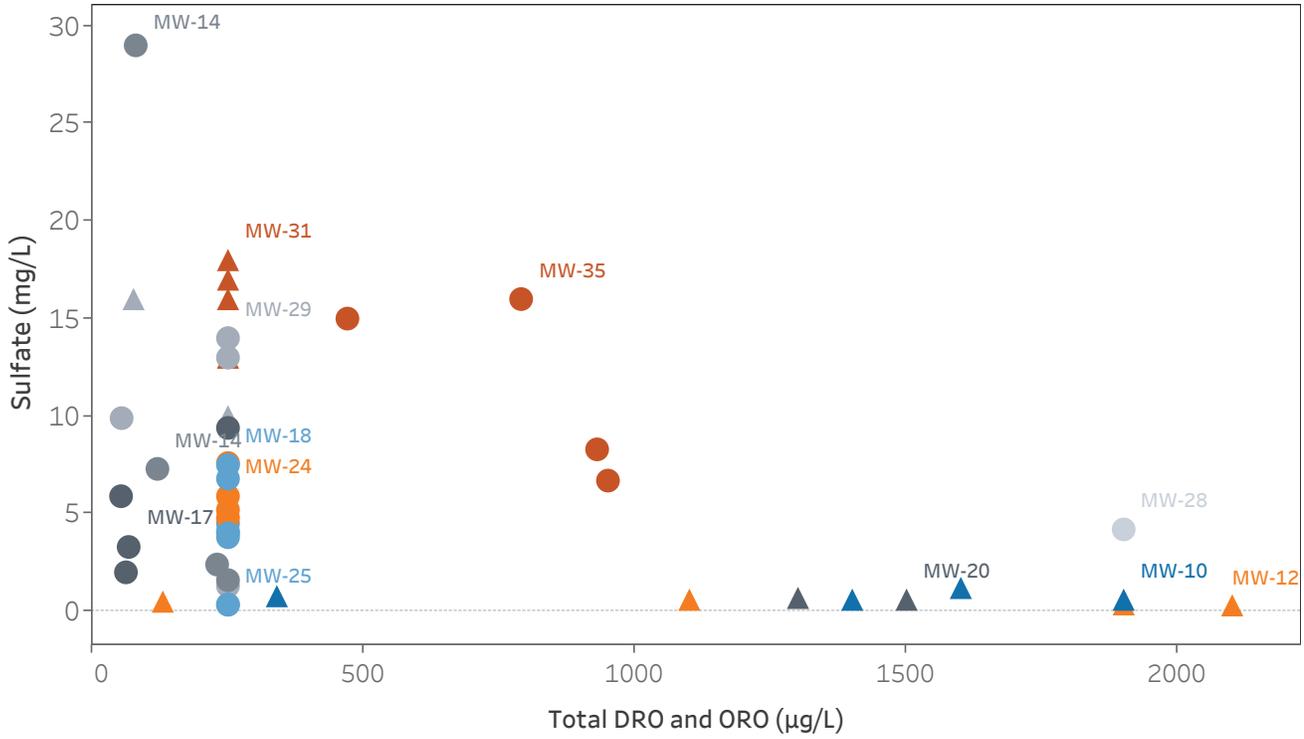


Figure D.13 Methane vs. Total DRO and ORO

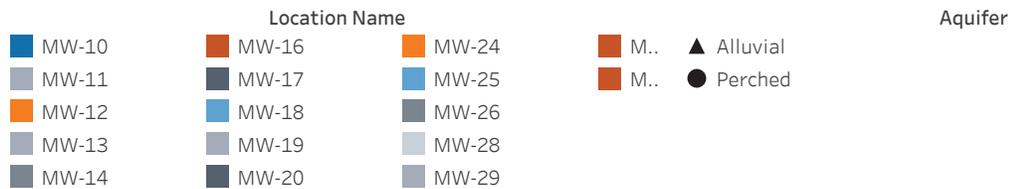
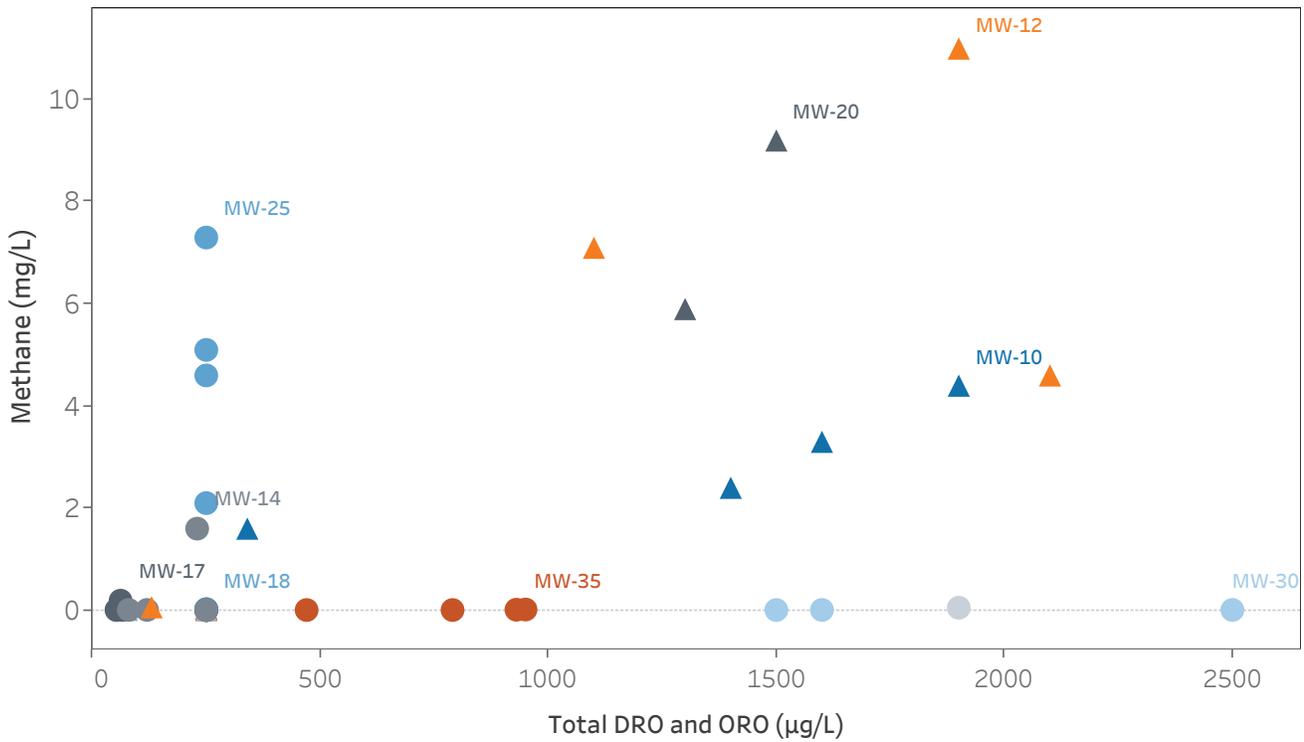


Figure D.14 Total Alkalinity vs. Total DRO and ORO

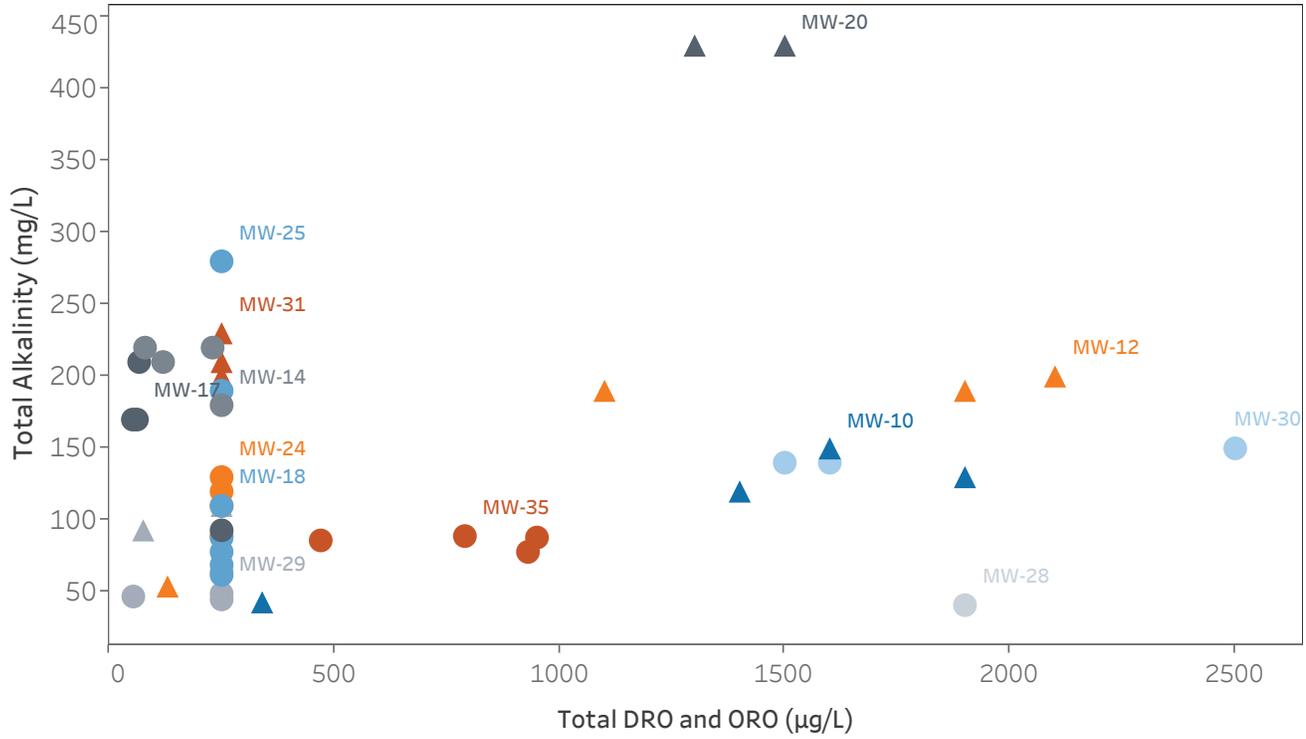


Figure D.15 Dissolved Oxygen and Total DRO and ORO vs. Distance (Perched Zone North)

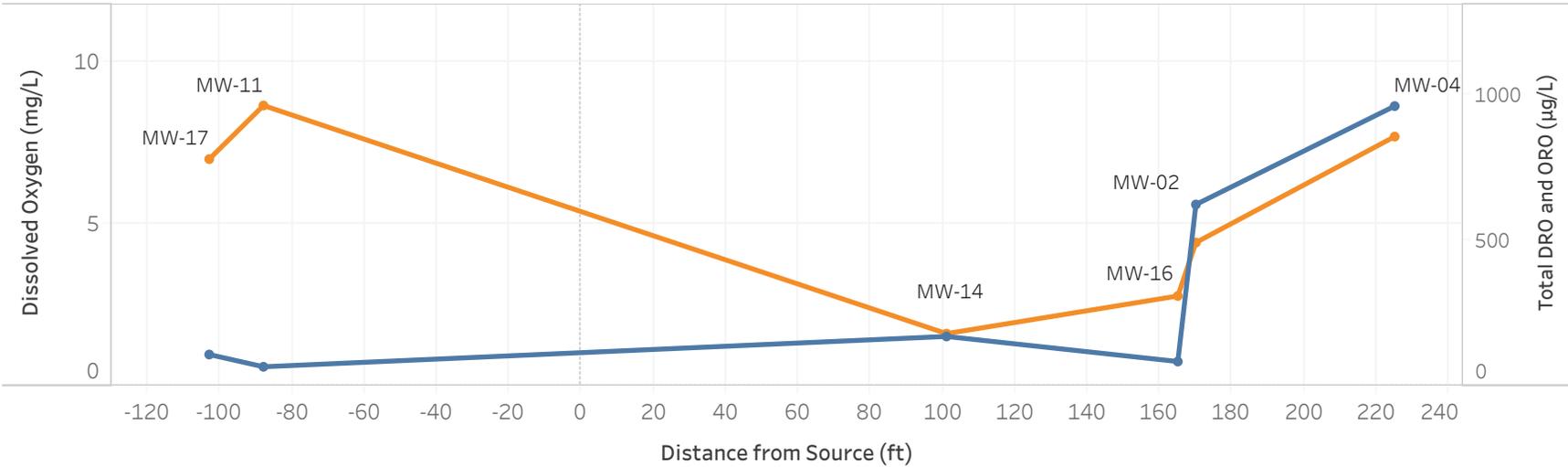
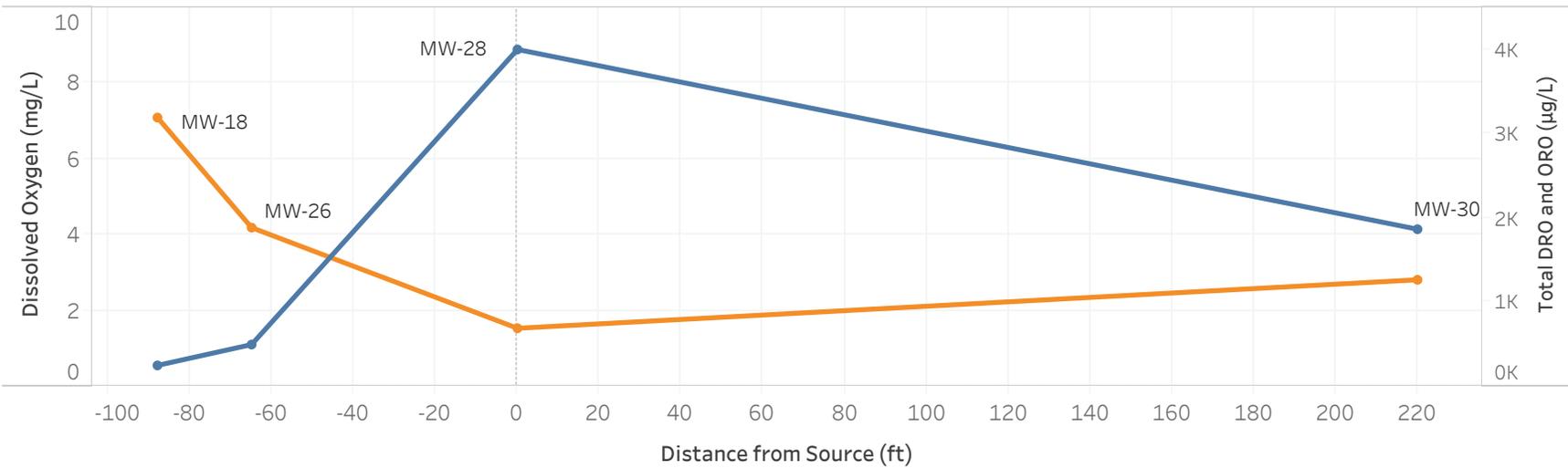


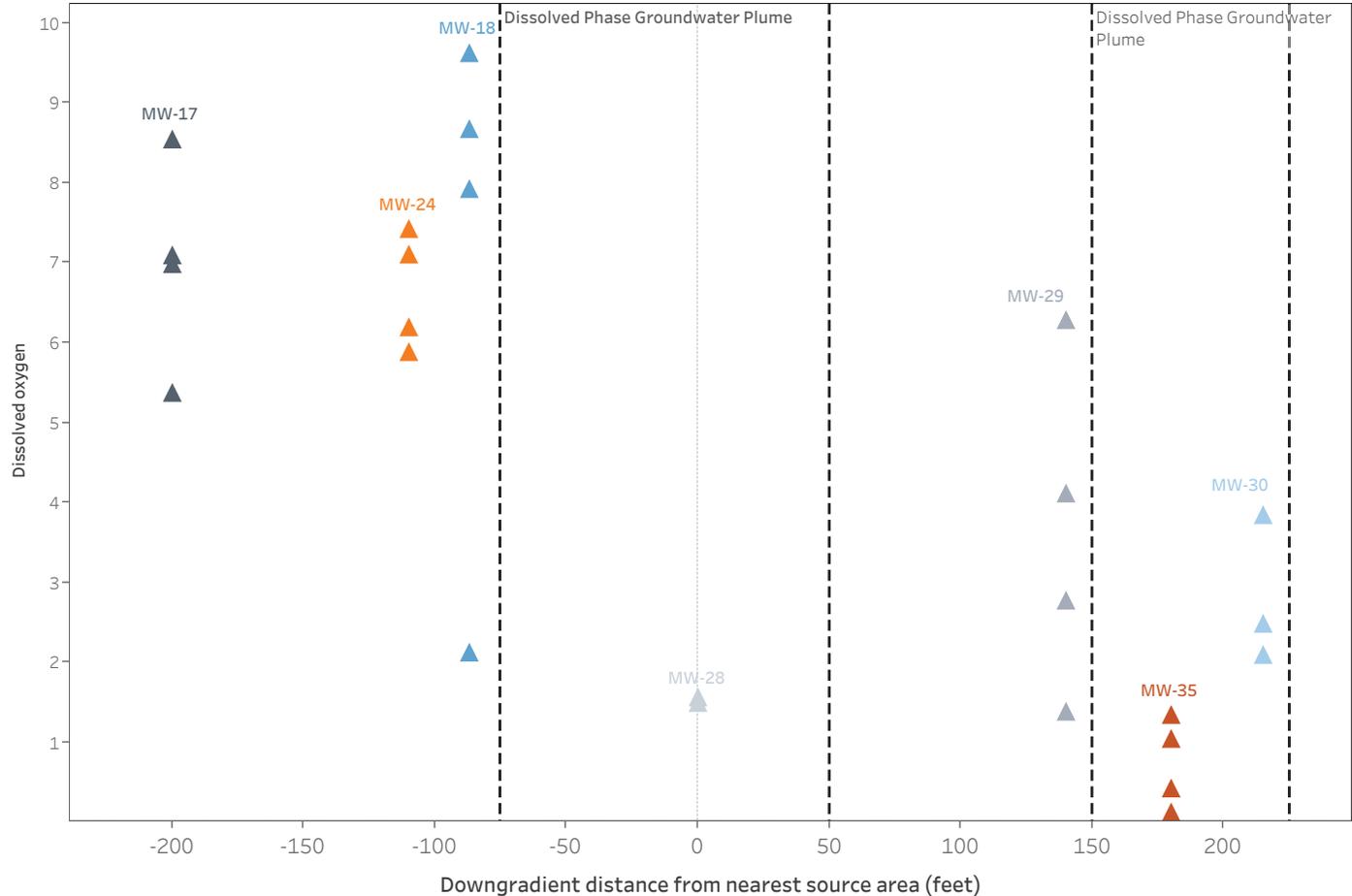
Figure D.16 Dissolved Oxygen and Total DRO and ORO vs. Distance (Perched Zone South)



Legend

- Avg. Dissolved oxygen
- Avg. Total DRO and ORO

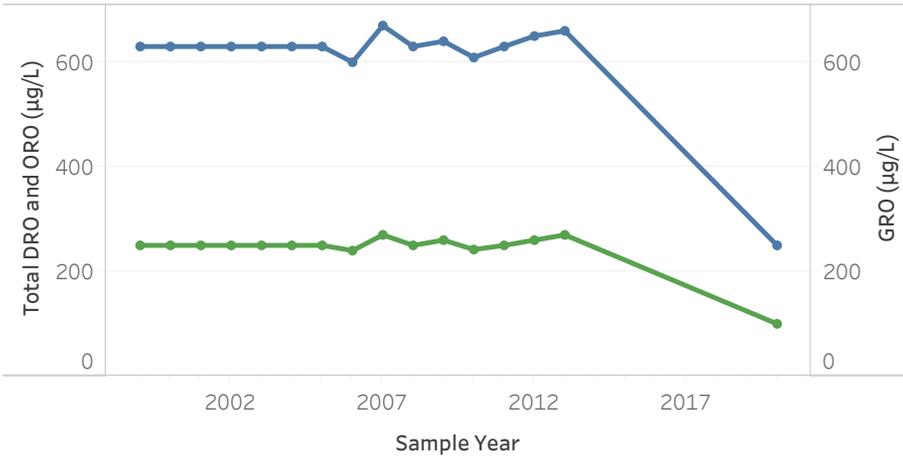
Figure D.17 Dissolved Oxygen vs. Distance (Perched)



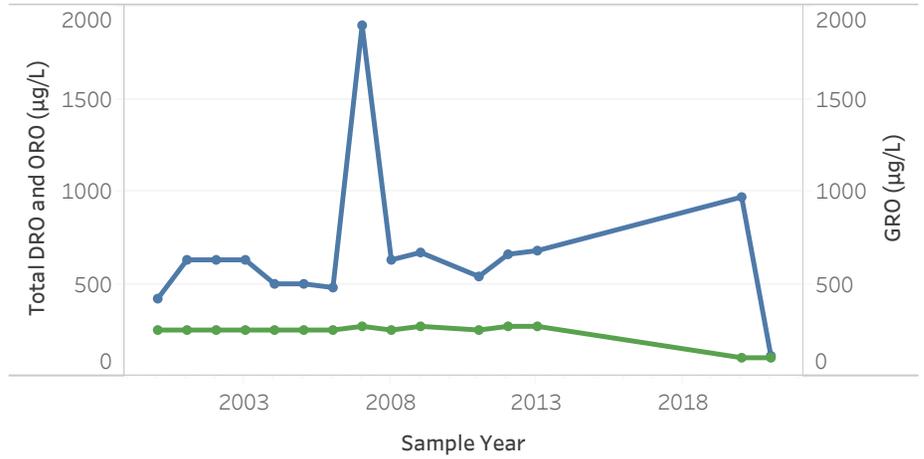
- Location Name
- MW-17
 - MW-24
 - MW-29
 - MW-35
 - MW-18
 - MW-28
 - MW-30

Figure D.18 GRO and Total DRO and ORO Time Series (MW-01, MW-02, MW-06, and MW-10)

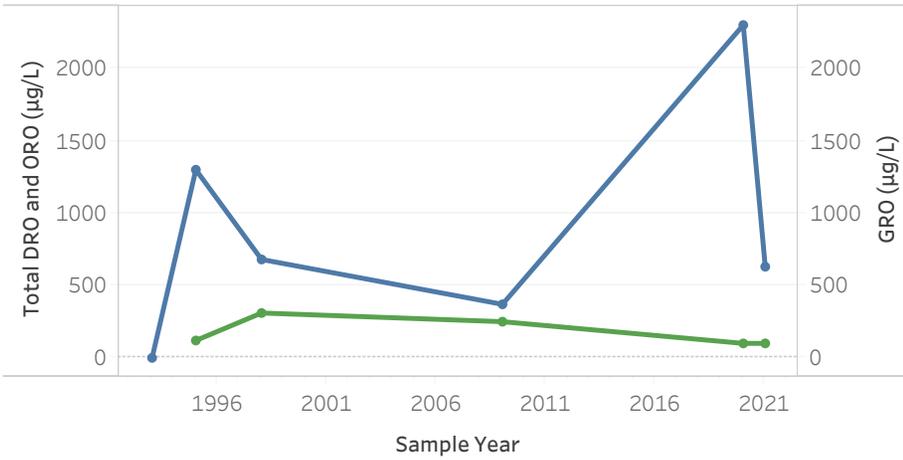
MW-01



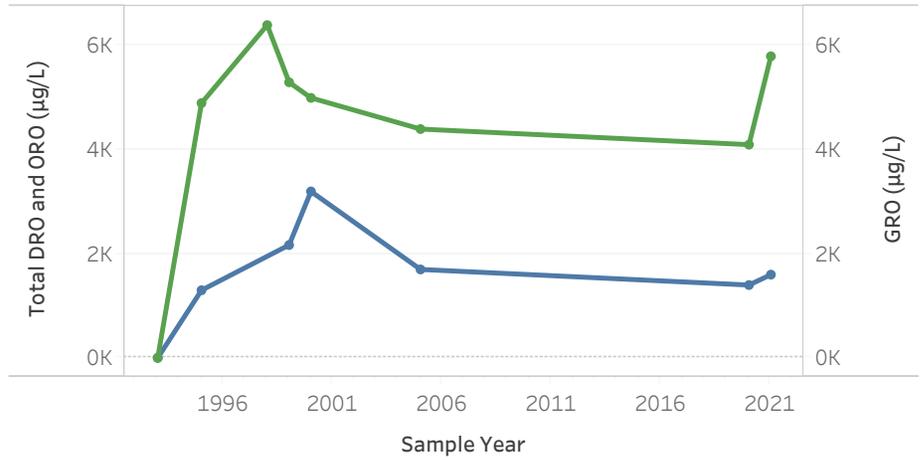
MW-02



MW-06



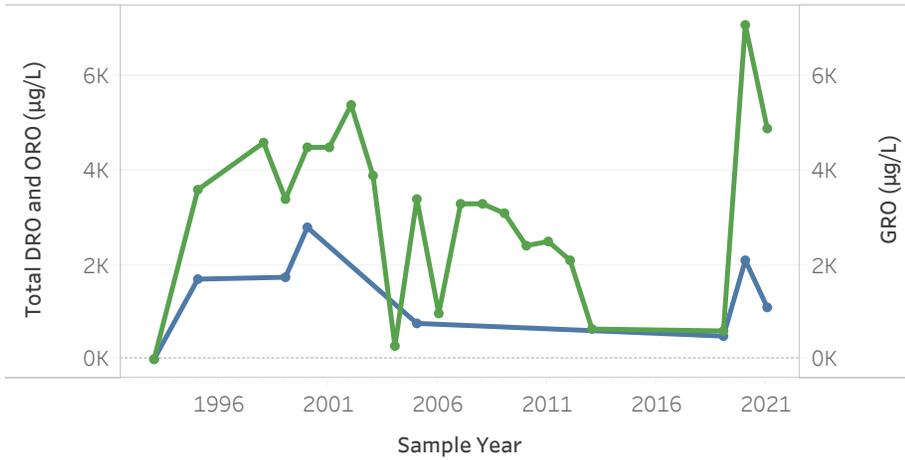
MW-10



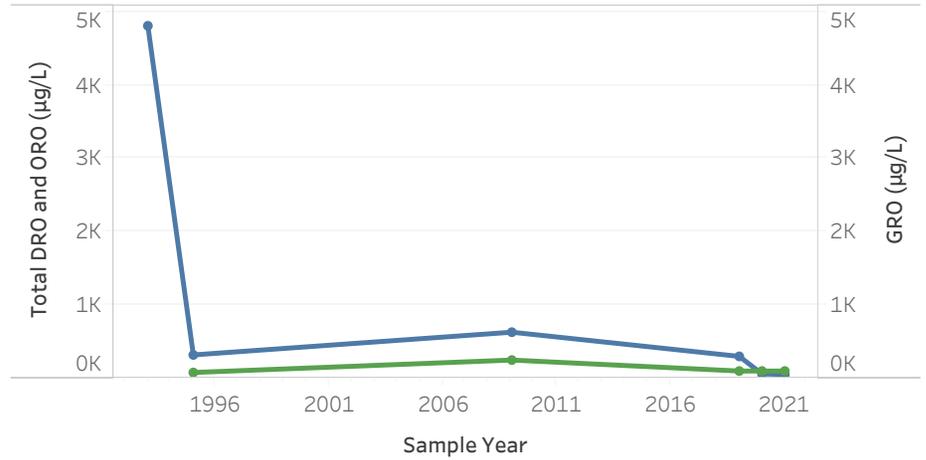
■ Total DRO and ORO
 ■ GRO

Figure D.19 GRO and Total DRO and ORO Time Series (MW-12, MW-17, MW-22, and MW-23)

MW-12



MW-17



MW-22

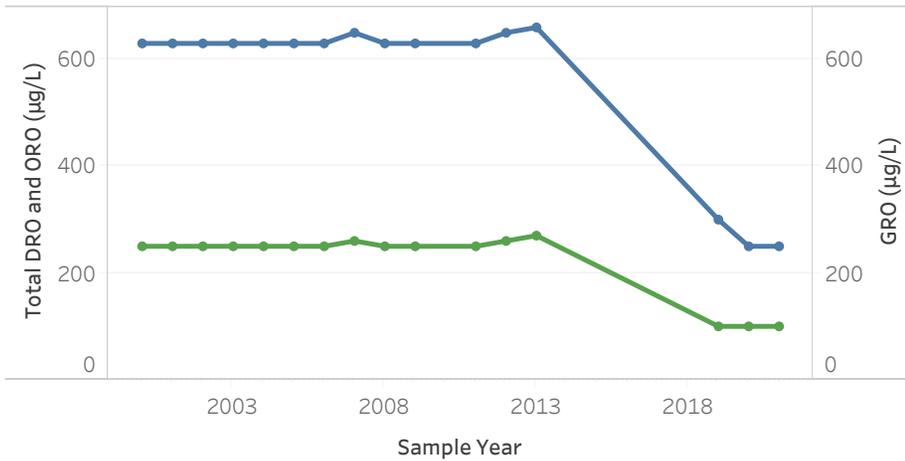
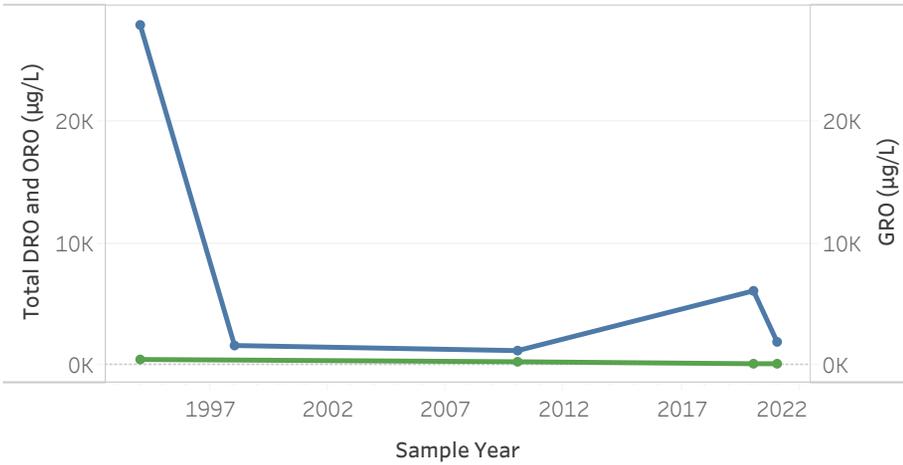
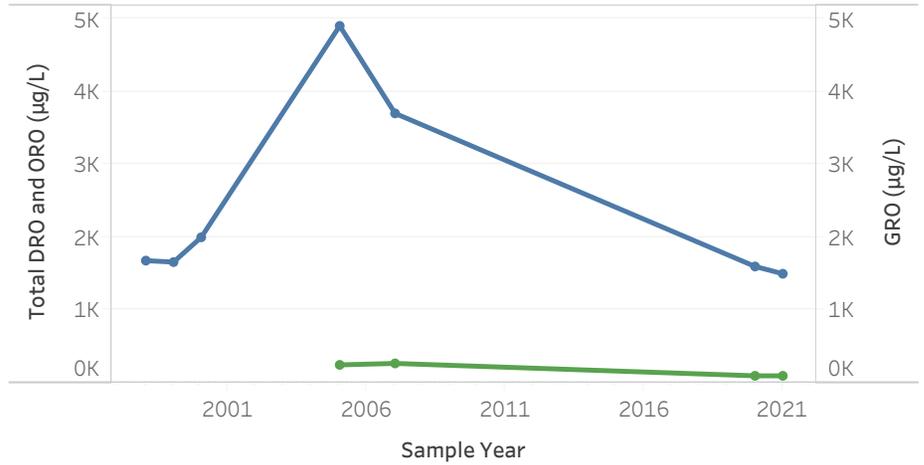


Figure D.20 GRO and Total DRO and ORO Time Series (MW-28, MW-30, MW-31, and MW-32)

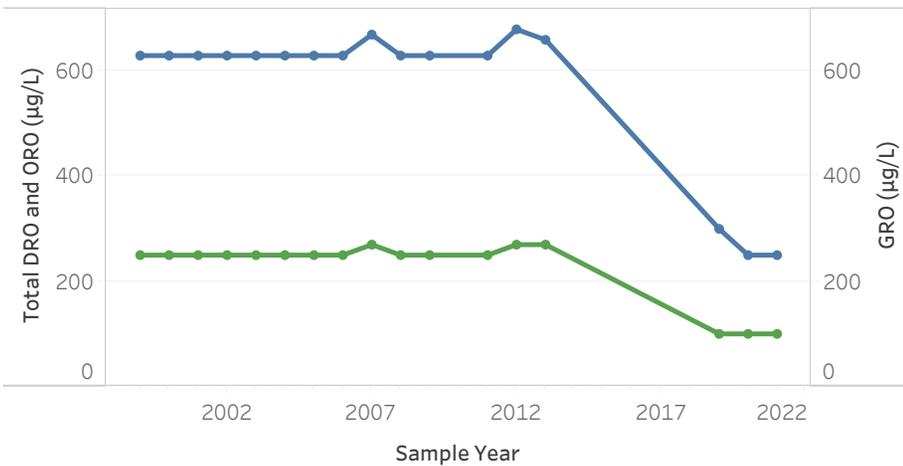
MW-28



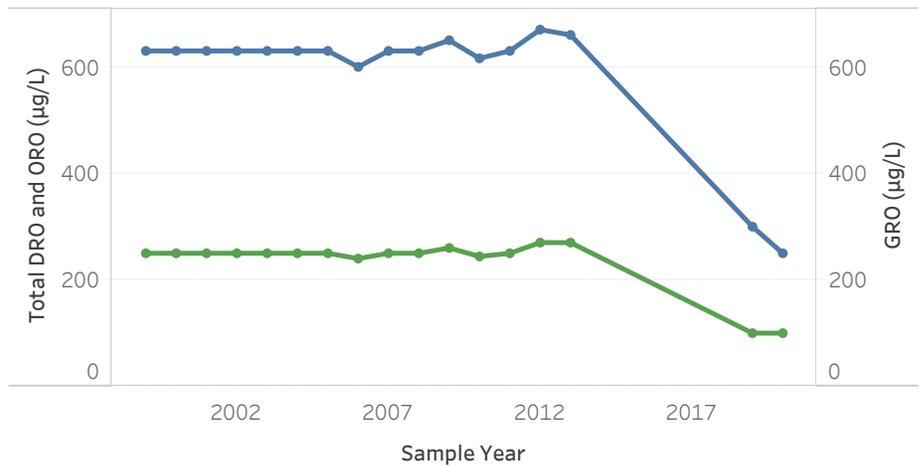
MW-30



MW-31

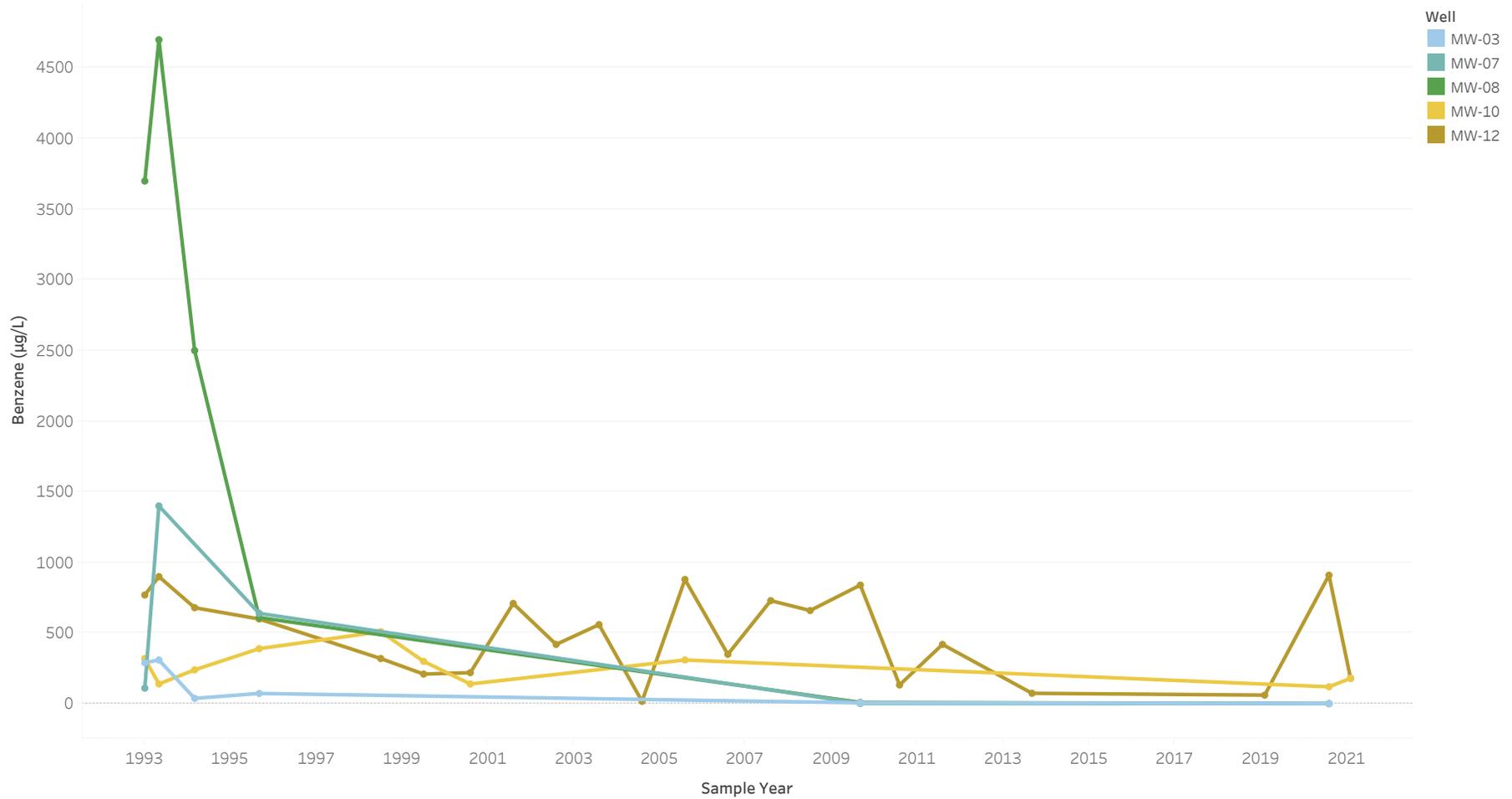


MW-32



■ Total DRO and ORO
 ■ GRO

Figure D.21 Benzene Time Series (Alluvial)



Sample Date Month vs. Benzene. Color shows details about Well. The data is filtered on Aquifer, which keeps Alluvial. The view is filtered on Well and Exclusions (Benzene,MONTH(Sample Date),Well). The Well filter keeps MW-03, MW-07, MW-08, MW-10 and MW-12. The Exclusions (Benzene,MONTH(Sample Date),Well) filter keeps 253 members.

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name: POL-TPH
 Site Address: 10 E Port Way, Longview, WA
 Additional Description: _____

Well (Sampling) Location? MW-02
 Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

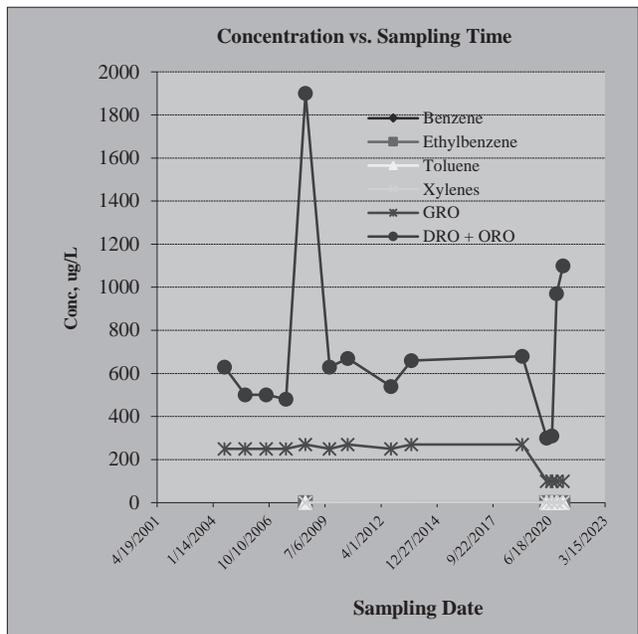
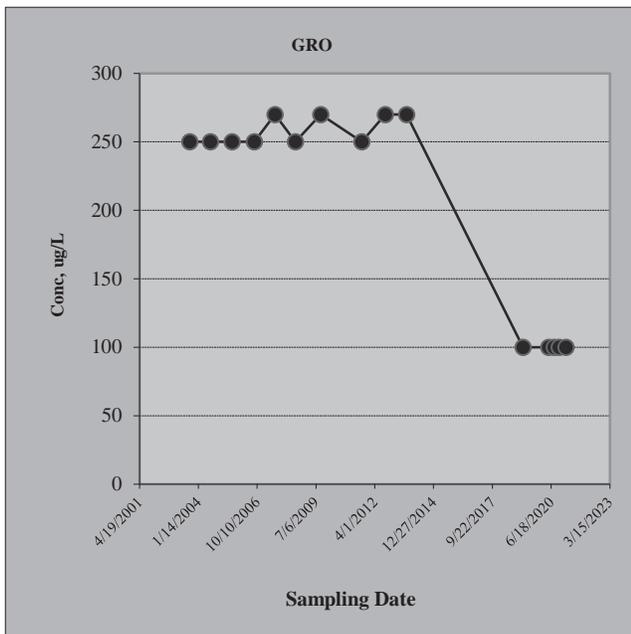
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	8/21/2003					250	630
#2	8/5/2004					250	500
#3	8/10/2005					250	500
#4	8/21/2006					250	480
#5	8/10/2007	0.5	1	1	1	270	1900
#6	7/22/2008					250	630
#7	9/24/2009					270	670
#8	8/18/2010						
#9	8/26/2011					250	540
#10	9/28/2012					270	660
#11	9/26/2013					270	680
#12	2/27/2019	1	1	1	2	100	300
#13	5/6/2020	0.35	1	1	2	100	310
#14	8/10/2020	0.35	1	1	2	100	970
#15	11/2/2020	0.35	1	1	2	100	1100
#16	2/23/2021	0.35	1	1	2	100	110

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
Confidence Level Calculated?	86.40%	-500.00%	-500.00%	76.50%	93.00%	53.90%
Plume Stability?	Shrinking	Stable	Stable	Stable	Shrinking	Stable
Coefficient of Variation?		CV <= 1	CV <= 1	CV <= 1		CV <= 1
Mann-Kendall Statistic "S" value?	-7	0	0	5	-32	3
Number of Sampling Rounds?	6	6	6	6	15	15
Average Concentration?	0.48	1.00	1.00	1.83	205.33	665.33
Standard Deviation?	0.26	0.00	0.00	0.41	77.54	421.03
Coefficient of Variation?	0.54	0.00	0.00	0.22	0.38	0.63
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? GRO
 Plume Stability? Shrinking



Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name: **POL-TPH**
 Site Address: **10 E Port Way, Longview, WA**
 Additional Description:

Well (Sampling) Location? **MW-10**
 Level of Confidence (Decision Criteria)? **85%**

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

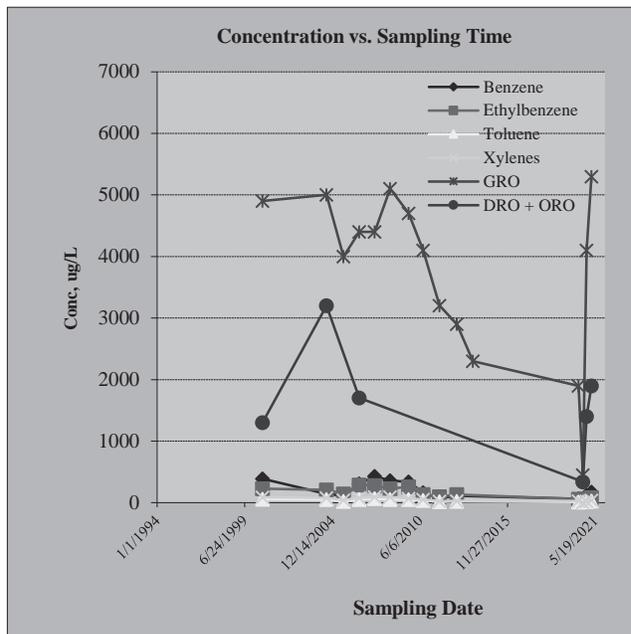
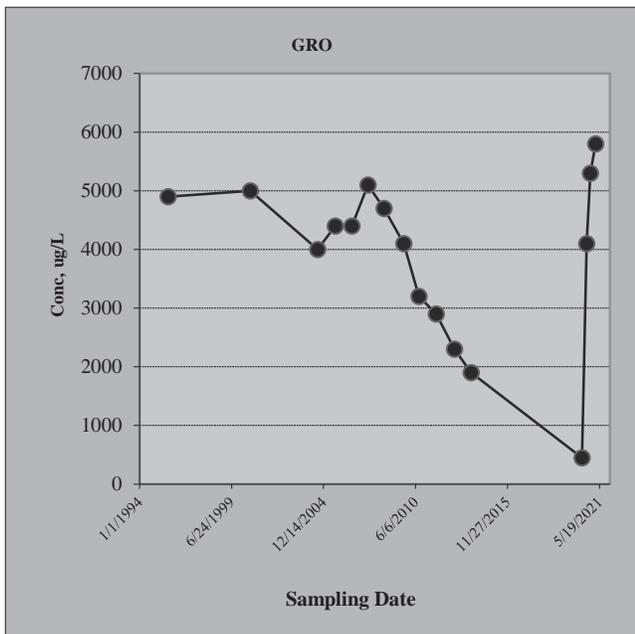
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	9/13/1995	390	230	57	88	4900	1300
#2	8/3/2000	140	210	50	75	5000	3200
#3	8/5/2004	110	140	21	42	4000	
#4	8/26/2005	310	290	51	77.4	4400	1700
#5	8/21/2006	430	280	65	90	4400	
#6	8/9/2007	360	230	54	90.6	5100	
#7	7/23/2008	340	260	51	65.6	4700	
#8	9/24/2009	160	130	37	54.3	4100	
#9	8/19/2010	70	99	16	22	3200	
#10	8/26/2011	110	130	24	28	2900	
#11	9/28/2012					2300	
#12	9/26/2013	64	55	13	25	1900	
#13	5/6/2020	42	7.6	5	2.5	450	340
#14	8/10/2020	120	60	19	20	4100	1400
#15	11/2/2020	170	83	28	38	5300	1900
#16	2/23/2021	180	68	31	46	5800	1600

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
Confidence Level Calculated?	91.60%	99.90%	98.20%	99.20%	84.70%	50.00%
Plume Stability?	Shrinking	Shrinking	Shrinking	Shrinking	Stable	Stable
Coefficient of Variation?					CV <= 1	CV <= 1
Mann-Kendall Statistic "S" value?	-30	-61	-44	-49	-24	1
Number of Sampling Rounds?	15	15	15	15	16	7
Average Concentration?	199.73	151.51	34.80	50.96	3909.38	1634.29
Standard Deviation?	129.77	91.45	18.65	28.77	1423.64	853.36
Coefficient of Variation?	0.65	0.60	0.54	0.56	0.36	0.52
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? **GRO**
 Plume Stability? **Stable**



Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name: **POL-TPH**
 Site Address: **10 E Port Way, Longview, WA**
 Additional Description:

Well (Sampling) Location? **MW-12**
 Level of Confidence (Decision Criteria)? **85%**

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

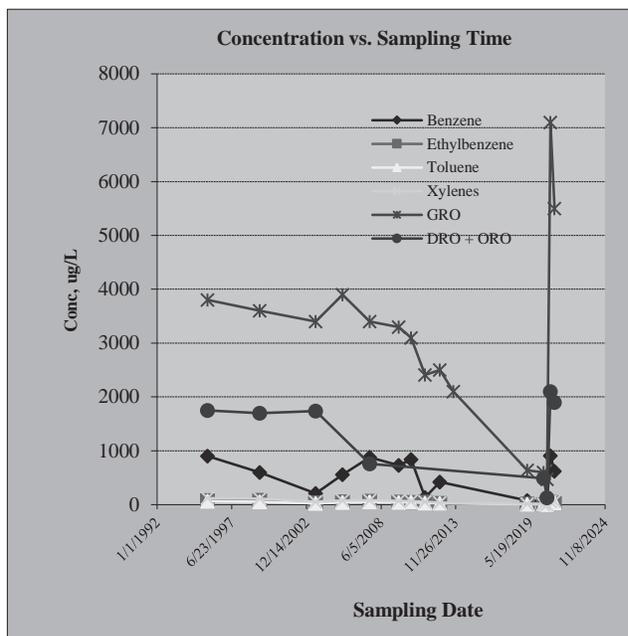
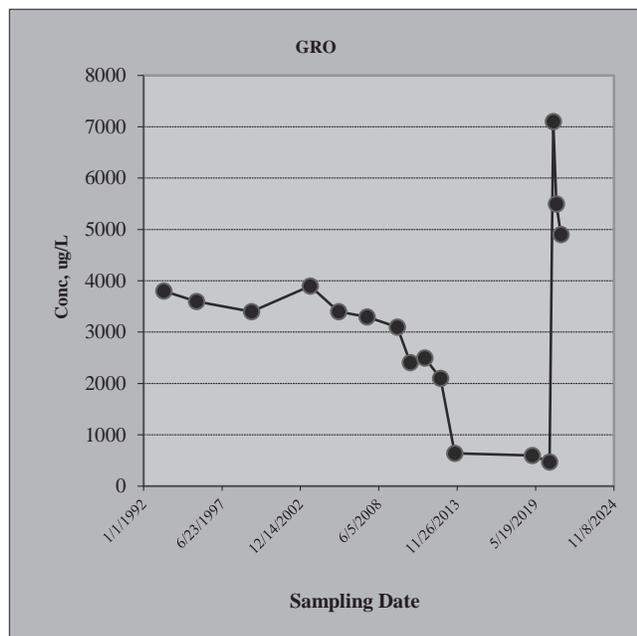
		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	5/27/1993	900	74	67	120	3800	1750
#2	9/13/1995	600	84	56	110	3600	1700
#3	7/16/1999	210	34	24	56	3400	1740
#4	8/21/2003	560	54	40	74.7	3900	
#5	8/11/2005	880	63	52	84	3400	760
#6	8/9/2007	730	48	42	72.2	3300	
#7	9/23/2009	840	44	48	67	3100	
#8	8/19/2010	133	46.1	29.6	52	2410	
#9	8/25/2011	420	24	25	38	2500	
#10	9/27/2012					2100	
#11	9/26/2013	74	13	6	11	640	
#12	2/27/2019	61	3.5	6.4	6.2	600	490
#13	5/6/2020	81	2	2.8	3.6	470	130
#14	8/10/2020	910	46	42	58	7100	2100
#15	11/2/2020	620	39	39	63	5500	1900
#16	2/23/2021	180	36	23	39	4900	1100

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
Confidence Level Calculated?	89.90%	99.80%	99.20%	99.90%	91.70%	61.90%
Plume Stability?	Shrinking	Shrinking	Shrinking	Shrinking	Shrinking	Stable
Coefficient of Variation?						CV <= 1
Mann-Kendall Statistic "S" value?	-27	-57	-50	-61	-33	-4
Number of Sampling Rounds?	15	15	15	15	16	9
Average Concentration?	479.93	40.71	33.52	56.98	3170.00	1296.67
Standard Deviation?	331.70	23.57	19.12	34.28	1780.94	699.34
Coefficient of Variation?	0.69	0.58	0.57	0.60	0.56	0.54
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? **GRO**
 Plume Stability? **Shrinking**



Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name: POL-TPH
 Site Address: 10 E Port Way, Longview, WA
 Additional Description: _____

Well (Sampling) Location? MW-30
 Level of Confidence (Decision Criteria)? 85%

1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
#1	8/24/1998						1680
#2	11/18/1999						1660
#3	8/19/2002					250	
#4	8/5/2004					250	
#5	8/10/2005					250	4900
#6	8/21/2006					250	
#7	8/10/2007	0.5	1	1	1	270	3680
#8	7/23/2008					250	
#9	9/25/2009					250	
#10	8/20/2010					255	
#11	8/26/2011					250	
#12	9/28/2012					250	
#13	9/26/2013					270	
#14	8/11/2020	0.35	1	1	2	100	1600
#15	11/2/2020	0.35	1	1	2	100	2500
#16	2/24/2021	0.35	1	1	2	100	1500

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Benzene	Ethylbenzene	Toluene	Xylenes	GRO	DRO + ORO
Confidence Level Calculated?	62.50%	37.50%	37.50%	62.50%	86.00%	80.90%
Plume Stability?	Stable	Stable	Stable	Stable	Shrinking	Stable
Coefficient of Variation?	CV <= 1	CV <= 1	CV <= 1	CV <= 1	CV <= 1	CV <= 1
Mann-Kendall Statistic "S" value?	-3	0	0	3	-21	-7
Number of Sampling Rounds?	4	4	4	4	14	7
Average Concentration?	0.39	1.00	1.00	1.75	221.07	2502.86
Standard Deviation?	0.08	0.00	0.00	0.50	65.99	1312.78
Coefficient of Variation?	0.19	0.00	0.00	0.29	0.30	0.52
Blank if No Errors found						

3. Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? GRO
 Plume Stability? Shrinking

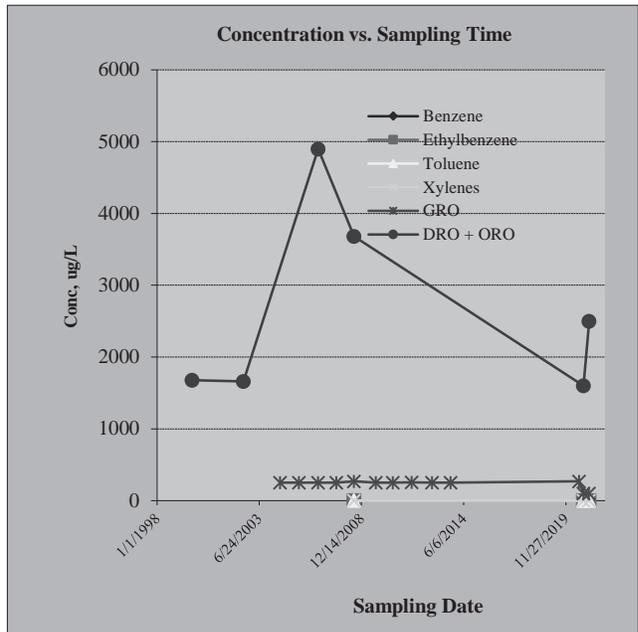
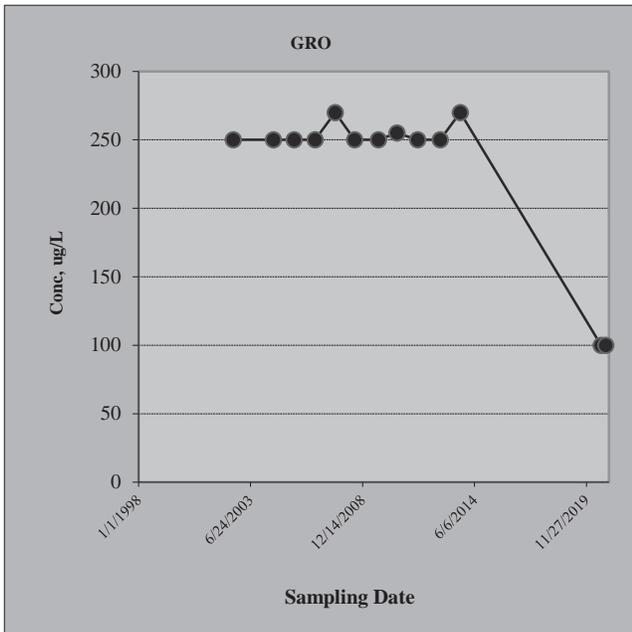


Figure D.26 DRO Bioscreen Inputs

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence Version 1.4

POL-TPH DRO
Figure D.26 DRO
Run Name

Data Input Instructions:

115 → 1. Enter value directly... or
↑ or 0.02 → 2. Calculate by filling in grey cells below. (To restore formulas, hit button below)

Variable* → Data used directly in model.
20 → Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity* Vs (ft/yr)
↑ or

Hydraulic Conductivity K (cm/sec)
Hydraulic Gradient i (ft/ft)
Porosity n (-)

2. DISPERSION

Longitudinal Dispersivity* alpha x (ft)
Transverse Dispersivity* alpha y (ft)
Vertical Dispersivity* alpha z (ft)
↑ or

Estimated Plume Length Lp (ft)

3. ADSORPTION

Retardation Factor* R (-)
↑ or

Soil Bulk Density rho (kg/l)
Partition Coefficient Koc (L/kg)
Fraction Organic Carbon foc (-)

4. BIODEGRADATION

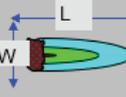
1st Order Decay Coeff* lambda (per yr)
↑ or

Solute Half-Life t-half (year)
or Instantaneous Reaction Model

Delta Oxygen* DO (mg/L)
Delta Nitrate* NO3 (mg/L)
Observed Ferrous Iron* Fe2+ (mg/L)
Delta Sulfate* SO4 (mg/L)
Observed Methane* CH4 (mg/L)

5. GENERAL

Modeled Area Length* (ft) L
Modeled Area Width* (ft) W
Simulation Time* (yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* (ft)

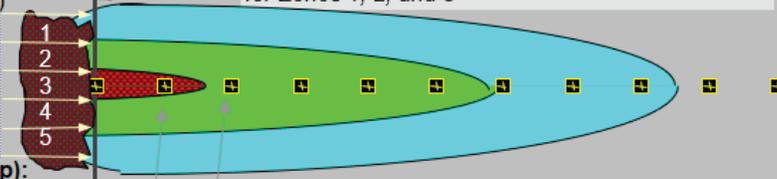
Source Zones:

Width* (ft)	Conc. (mg/L)*
40	0.274
60	1.3
90	2.1
60	1.3
40	0.274

Source Halflife (see Help): (yr) (yr)
Inst. React 1st Order

Soluble Mass (Kg)
In Source NAPL, Soil

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	2.1	1.3			.274						.1
Dist. from Source (ft)	0	8	16	24	32	40	48	56	64	72	80

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE

View Output

RUN ARRAY

View Output

Help

Recalculate

Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Figure D.27 GRO Bioscreen Inputs

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence *Version 1.4*

POL-TPH GRO Plu
Figure D.27 - GRO
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ or 2. Calculate by filling in grey
0.02 → cells below. (To restore
formulas, hit button below).
Variable* → Data used directly in model.
20 → Value calculated by model.
(Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity* Vs (ft/yr)
or

Hydraulic Conductivity K (cm/sec)
Hydraulic Gradient i (ft/ft)
Porosity n (-)

2. DISPERSION

Longitudinal Dispersivity* alpha x (ft)
Transverse Dispersivity* alpha y (ft)
Vertical Dispersivity* alpha z (ft)
or

Estimated Plume Length Lp (ft)

3. ADSORPTION

Retardation Factor* R (-)
or

Soil Bulk Density rho (kg/l)
Partition Coefficient Koc (L/kg)
Fraction Organic Carbon foc (-)

4. BIODEGRADATION

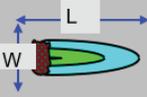
1st Order Decay Coeff* lambda (per yr)
or

Solute Half-Life t-half (year)
or Instantaneous Reaction Model

Delta Oxygen* DO (mg/L)
Delta Nitrate* NO3 (mg/L)
Observed Ferrous Iron* Fe2+ (mg/L)
Delta Sulfate* SO4 (mg/L)
Observed Methane* CH4 (mg/L)

5. GENERAL

Modeled Area Length* (ft) L
Modeled Area Width* (ft) W
Simulation Time* (yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* (ft)

Source Zones:

Width* (ft)	Conc. (mg/L)*
35	0.1
30	2.3
100	5
30	2.3
35	0.1

Source Half-life (see Help):
 (yr)
 Inst. React. 1st Order
 Soluble Mass (Kg)
 In Source NAPL, Soil

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	5.0	2.3			.14						
Dist. from Source (ft)	0	9	18	27	36	45	53	62	71	80	89

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE

View Output

RUN ARRAY

View Output

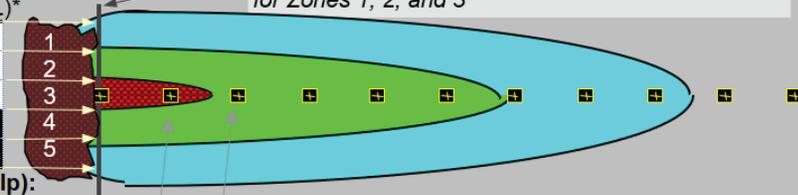
Help

Recalculate

Paste Example Dataset

Restore Formulas for Vs,

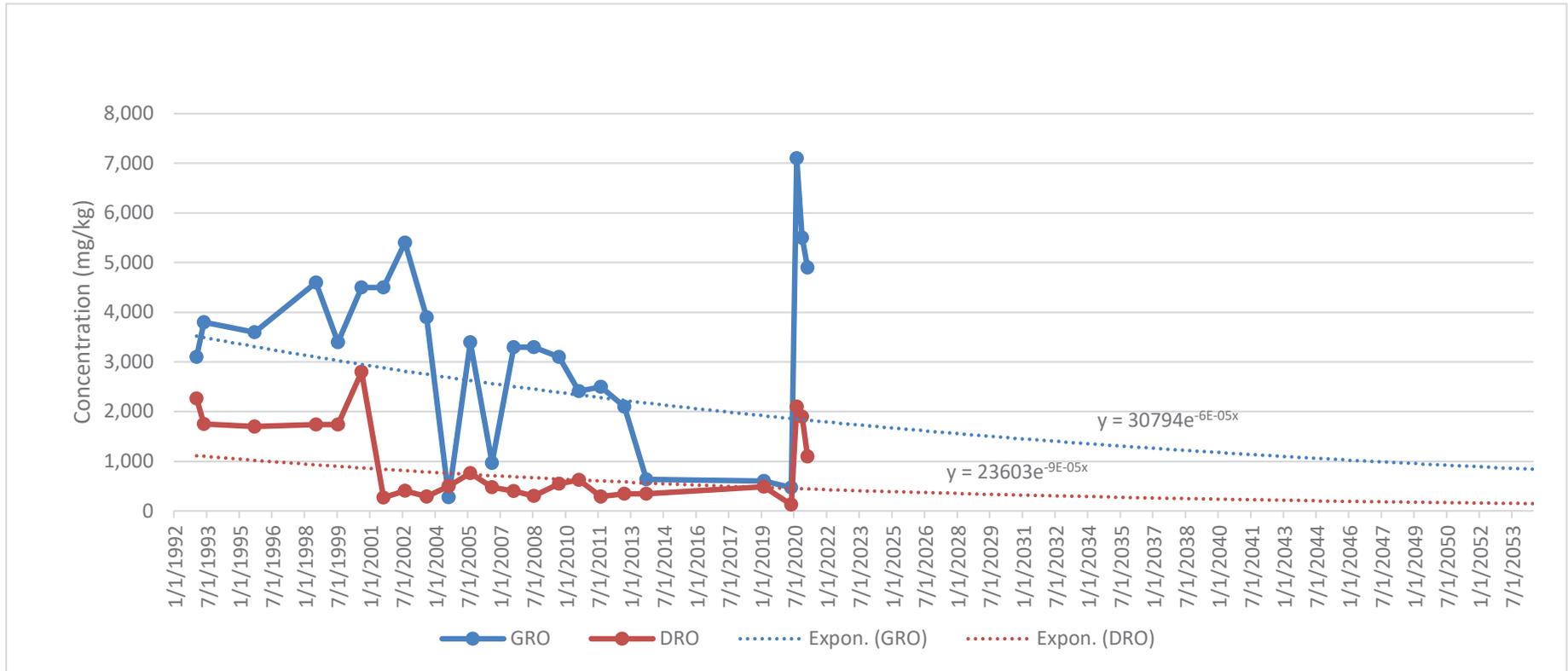
Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

Figure D.28 - MW-12 Trendlines for GRO and DRO Concentrations



Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix E Laboratory Analytical Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

November 12, 2020

Gabriel Cisneros, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr Cisneros:

Included are the results from the testing of material submitted on November 3, 2020 from the POL-TPH 10E Port Way, Longview WA, F&BI 011053 project. There are 12 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Megan King
FDS1112R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on November 3, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH 10E Port Way, Longview WA, F&BI 011053 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Floyd-Snider</u>
011053 -01	SVP-2-110320
011053 -02	SVP-1-110320
011053 -03	SVP-101-110320

Non-petroleum compounds identified in the air phase hydrocarbon (APH) ranges were subtracted per the MA-APH method.

The 2-propanol concentration for sample SVP-2-110320 exceeded the calibration range. The data were flagged accordingly.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-2-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-01 1/3.3
Date Analyzed:	11/06/20	Data File:	110524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	210
APH EC9-12 aliphatics	310
APH EC9-10 aromatics	<82

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-1-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-02 1/3.2
Date Analyzed:	11/06/20	Data File:	110526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	<130
APH EC9-12 aliphatics	480
APH EC9-10 aromatics	82

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	SVP-101-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-03 1/3.1
Date Analyzed:	11/06/20	Data File:	110527.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	<120
APH EC9-12 aliphatics	480
APH EC9-10 aromatics	86

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	Not Applicable	Lab ID:	00-2659 MB
Date Analyzed:	11/05/20	Data File:	110512.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration
	ug/m3
APH EC5-8 aliphatics	<40
APH EC9-12 aliphatics	<50
APH EC9-10 aromatics	<25

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-2-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-01 1/3.3
Date Analyzed:	11/06/20	Data File:	110524.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration	
	ug/m3	ppbv
2-Propanol	330 ve	130 ve
Benzene	<1.1	<0.33
Toluene	<62	<16
Ethylbenzene	9.0	2.1
m,p-Xylene	40	9.2
o-Xylene	16	3.6
Naphthalene	<0.86	<0.16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-1-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-02 1/3.2
Date Analyzed:	11/06/20	Data File:	110526.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration	
	ug/m3	ppbv
2-Propanol	<28	<11
Benzene	<1	<0.32
Toluene	<60	<16
Ethylbenzene	1.7	0.40
m,p-Xylene	7.4	1.7
o-Xylene	2.9	0.67
Naphthalene	<0.84	<0.16

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SVP-101-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	11/03/20	Lab ID:	011053-03 1/3.1
Date Analyzed:	11/06/20	Data File:	110527.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	104	70	130

Compounds:	Concentration	
	ug/m3	ppbv
2-Propanol	<27	<11
Benzene	<0.99	<0.31
Toluene	<58	<15
Ethylbenzene	1.4	0.33
m,p-Xylene	5.9	1.3
o-Xylene	2.3	0.54
Naphthalene	<0.81	<0.15

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH 10E Port Way, Longview WA
Date Collected:	Not Applicable	Lab ID:	00-2659 MB
Date Analyzed:	11/05/20	Data File:	110512.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration	
	ug/m3	ppbv
2-Propanol	<8.6	<3.5
Benzene	<0.32	<0.1
Toluene	<19	<5
Ethylbenzene	<0.43	<0.1
m,p-Xylene	<0.87	<0.2
o-Xylene	<0.43	<0.1
Naphthalene	<0.26	<0.05

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/12/20

Date Received: 11/03/20

Project: POL-TPH 10E Port Way, Longview WA, F&BI 011053

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES
FOR VOLATILES BY METHOD MA-APH**

Laboratory Code: 011053-01 1/3.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
APH EC5-8 aliphatics	ug/m3	210	200	5
APH EC9-12 aliphatics	ug/m3	310	340	9
APH EC9-10 aromatics	ug/m3	<82	<82	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	67	79	70-130
APH EC9-12 aliphatics	ug/m3	67	88	70-130
APH EC9-10 aromatics	ug/m3	67	107	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/12/20

Date Received: 11/03/20

Project: POL-TPH 10E Port Way, Longview WA, F&BI 011053

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES
FOR VOLATILES BY METHOD TO-15**

Laboratory Code: 011053-01 1/3.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
2-Propanol	ug/m3	330	340	3
Benzene	ug/m3	<1.1	<1.1	nm
Toluene	ug/m3	<62	<62	nm
Ethylbenzene	ug/m3	9.0	9.6	6
m,p-Xylene	ug/m3	40	43	7
o-Xylene	ug/m3	16	17	6
Naphthalene	ug/m3	<0.86	<0.86	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
2-Propanol	ug/m3	33	100	70-130
Benzene	ug/m3	43	101	70-130
Toluene	ug/m3	51	109	70-130
Ethylbenzene	ug/m3	59	93	70-130
m,p-Xylene	ug/m3	120	97	70-130
o-Xylene	ug/m3	59	95	70-130
Naphthalene	ug/m3	71	99	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

011053

SAMPLE CHAIN OF CUSTODY WMS

11-03-20

Report To Gabe Cisneros
 Company Floyd Snider
 Address 601 Union St, Suite 600
 City, State, ZIP Seattle, WA 98101
 Phone 206-292-2078 Email gabe.cisneros@floyd-snider.com

SAMPLERS (signature) [Signature]
 PROJECT NAME & ADDRESS POL-TPA 10 E post way, Longview, WA PO #
 NOTES: Run Standard analyses in accordance w/ memo #18 INVOICE TO

Page # 1 of 1
 TURNAROUND TIME
 Standard
 RUSH
 Rush charges authorized by:
 SAMPLE DISPOSAL
 Default: Clean after 3 days
 Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED					
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. (°Hg)	Field Initial Time	Final Vac. (°Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	Notes
SUP-2-110320	225	2296	225	IA / SG	11/3/2020	29.5	1213	4.5	1219		X		X	X	
SUP-1-110320	02	2302	224	IA / SG	11/3/20	30	1300	4.5	1306		X		X	X	
SUP-101-110320	03	3385	231	IA / SG	11/3/20	30	1300	4.5	1306		X		X	X	
				IA / SG											
				IA / SG											
				IA / SG											
				IA / SG											

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>[Signature]</u>	Gabe Cisneros	Floyd Snider	11/3	1829
<u>[Signature]</u>	BRYAN ABESSE	FBI	11/3	1829
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Samples received at 2200

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

November 11, 2020

Megan King, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Ms King:

Included are the results from the testing of material submitted on November 3, 2020 from the POL-TPH, F&BI 011055 project. There are 50 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Gabriel Cisneros
FDS1111R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on November 3, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 011055 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Floyd-Snider</u>
011055 -01	MW-08-110220
011055 -02	MW-10-110220
011055 -03	MW-31-110220
011055 -04	MW-35-110320
011055 -05	MW-34-110220
011055 -06	MW-33-110220
011055 -07	MW-133-110220
011055 -08	MW-40-110220
011055 -09	MW-14-11022020
011055 -10	MW-07-11022020
011055 -11	MW-26-110220
011055 -12	MW-30-110220
011055 -13	MW-36-110220
011055 -14	MW-37-110220
011055 -15	MW-38-110220
011055 -16	T-2-110220
011055 -17	UST-4-110220
011055 -18	UST-104-110220
011055 -19	MW-02-110220
011055 -20	MW-03-110220
011055 -21	MW-15-11022020
011055 -22	MW-39-11022020
011055 -23	MW-06-11022020
011055 -24	MW-12-110320
011055 -25	MW-17-110320
011055 -26	MW-18-110320
011055 -27	MW-22-110320
011055 -28	MW-23-110320
011055 -29	MW-29-110320
011055 -30	MW-24-110320
011055 -31	MW-25-110320

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/05/20
Date Analyzed: 11/06/20

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
MW-08-110220 011055-01	2,500	89
MW-10-110220 011055-02	5,300	88
MW-31-110220 011055-03	<100	92
MW-35-110320 011055-04	<100	89
MW-34-110220 011055-05	110	89
MW-33-110220 011055-06	170	91
MW-133-110220 011055-07	170	91
MW-40-110220 011055-08	1,600	114
MW-14-11022020 011055-09	<100	90
MW-07-11022020 011055-10	700	103
MW-26-110220 011055-11	<100	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/05/20
Date Analyzed: 11/06/20

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
MW-30-110220 011055-12	<100	89
MW-36-110220 011055-13	<100	88
MW-37-110220 011055-14	<100	79
MW-38-110220 011055-15	<100	74
T-2-110220 011055-16	<100	88
UST-4-110220 011055-17	<100	90
UST-104-110220 011055-18	<100	88
MW-02-110220 011055-19	<100	91
MW-03-110220 011055-20	370	97
MW-15-11022020 011055-21	180	91
MW-39-11022020 011055-22	370	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20
Date Received: 11/03/20
Project: POL-TPH, F&BI 011055
Date Extracted: 11/05/20
Date Analyzed: 11/06/20

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 50-150)
MW-06-11022020 011055-23	<100	89
MW-12-110320 011055-24	5,500	91
MW-17-110320 011055-25	<100	88
MW-18-110320 011055-26	<100	88
MW-22-110320 011055-27	<100	89
MW-23-110320 011055-28	<100	89
MW-29-110320 011055-29	<100	82
MW-24-110320 011055-30	<100	92
MW-25-110320 011055-31	<100	89
Method Blank 00-2405 MB	<100	96
Method Blank 00-2406 MB	<100	90

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20
 Date Received: 11/03/20
 Project: POL-TPH, F&BI 011055
 Date Extracted: 11/04/20
 Date Analyzed: 11/04/20 and 11/05/20

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-D_x
 Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
MW-08-110220 011055-01	2,100 x	370 x	94
MW-10-110220 011055-02	1,900 x	<250	101
MW-31-110220 011055-03	<50	<250	89
MW-35-110320 011055-04	620 x	330 x	95
MW-34-110220 011055-05	1,300 x	310 x	95
MW-33-110220 011055-06	890 x	<250	107
MW-133-110220 011055-07	890 x	<250	105
MW-40-110220 011055-08	3,400	400 x	107
MW-14-11022020 011055-09	80 x	<250	95
MW-07-11022020 011055-10	750	<250	102
MW-26-110220 011055-11	570 x	<250	114
MW-30-110220 011055-12	1,600 x	920 x	100

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20
 Date Received: 11/03/20
 Project: POL-TPH, F&BI 011055
 Date Extracted: 11/04/20
 Date Analyzed: 11/04/20 and 11/05/20

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-Dx**
 Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 41-152)
MW-36-110220 011055-13	<50	<250	101
MW-37-110220 011055-14	160 x	<250	88
MW-38-110220 011055-15	<50	<250	96
T-2-110220 011055-16	<50	<250	88
UST-4-110220 011055-17	<50	<250	100
UST-104-110220 011055-18	<50	<250	96
MW-02-110220 011055-19	630 x	460 x	102
MW-03-110220 011055-20	1,000 x	620 x	93
MW-15-11022020 011055-21	430 x	<250	97
MW-39-11022020 011055-22	5,500 x	1,200 x	118
MW-06-11022020 011055-23	1,300 x	400 x	109
MW-12-110320 011055-24	1,900 x	<250	101

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20
 Date Received: 11/03/20
 Project: POL-TPH, F&BI 011055
 Date Extracted: 11/04/20
 Date Analyzed: 11/04/20 and 11/05/20

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-Dx**
 Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 41-152)
MW-17-110320 011055-25	<50	<250	88
MW-18-110320 011055-26	<50	<250	107
MW-22-110320 011055-27	<50	<250	92
MW-23-110320 011055-28	<50	<250	100
MW-29-110320 011055-29	<50	<250	111
MW-24-110320 011055-30	<50	<250	91
MW-25-110320 011055-31	<50	<250	98
Method Blank 00-2471 MB	<50	<250	75
Method Blank 00-2472 MB	<50	<250	84

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-08-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-01
Date Analyzed:	11/05/20	Data File:	110520.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	1.1
Toluene	1.9
Ethylbenzene	<1
m,p-Xylene	2.6
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-02
Date Analyzed:	11/06/20	Data File:	110534.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	112	50	150
Toluene-d8	107	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	160 ve
Toluene	28
Ethylbenzene	83
m,p-Xylene	38
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-02 1/10
Date Analyzed:	11/09/20	Data File:	110940.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	170

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-31-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-03
Date Analyzed:	11/05/20	Data File:	110521.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-35-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-04
Date Analyzed:	11/05/20	Data File:	110522.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-05
Date Analyzed:	11/05/20	Data File:	110523.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	103	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-06
Date Analyzed:	11/05/20	Data File:	110524.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	103	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-133-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-07
Date Analyzed:	11/05/20	Data File:	110525.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-08
Date Analyzed:	11/05/20	Data File:	110526.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	57	121
Toluene-d8	106	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	320 ve
Toluene	9.6
Ethylbenzene	3.9
m,p-Xylene	4.5
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-08 1/10
Date Analyzed:	11/07/20	Data File:	110650.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	99	63	127
4-Bromofluorobenzene	96	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	300

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-14-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-09
Date Analyzed:	11/05/20	Data File:	110527.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-07-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-10
Date Analyzed:	11/05/20	Data File:	110538.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-26-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-11
Date Analyzed:	11/05/20	Data File:	110539.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-30-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-12
Date Analyzed:	11/05/20	Data File:	110540.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-36-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-13
Date Analyzed:	11/05/20	Data File:	110517.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	127	50	150
Toluene-d8	111	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-37-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-14
Date Analyzed:	11/05/20	Data File:	110541.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-38-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-15
Date Analyzed:	11/05/20	Data File:	110542.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	106	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	T-2-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-16
Date Analyzed:	11/05/20	Data File:	110543.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-4-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-17
Date Analyzed:	11/05/20	Data File:	110544.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-104-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-18
Date Analyzed:	11/05/20	Data File:	110545.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	57	121
Toluene-d8	100	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-02-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-19
Date Analyzed:	11/06/20	Data File:	110546.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-03-110220	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-20
Date Analyzed:	11/06/20	Data File:	110547.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	0.99
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-15-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-21
Date Analyzed:	11/06/20	Data File:	110548.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	94	57	121
Toluene-d8	102	63	127
4-Bromofluorobenzene	105	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-22
Date Analyzed:	11/05/20	Data File:	110518.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	106	50	150
4-Bromofluorobenzene	101	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-06-11022020	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-23
Date Analyzed:	11/05/20	Data File:	110519.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	114	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-24
Date Analyzed:	11/06/20	Data File:	110536.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	86	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	104	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	420 ve
Toluene	39
Ethylbenzene	39
m,p-Xylene	62
o-Xylene	1.4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-24 1/10
Date Analyzed:	11/06/20	Data File:	110535.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	90	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	620

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-17-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-25
Date Analyzed:	11/05/20	Data File:	110520.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	116	50	150
Toluene-d8	105	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-18-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-26
Date Analyzed:	11/05/20	Data File:	110521.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	110	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-22-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-27
Date Analyzed:	11/05/20	Data File:	110522.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	120	50	150
Toluene-d8	113	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-23-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-28
Date Analyzed:	11/05/20	Data File:	110523.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-29-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-29
Date Analyzed:	11/05/20	Data File:	110524.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	102	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-24-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-30
Date Analyzed:	11/05/20	Data File:	110525.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	50	150
Toluene-d8	111	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-25-110320	Client:	Floyd-Snider
Date Received:	11/03/20	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	011055-31
Date Analyzed:	11/06/20	Data File:	110526.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	109	50	150
Toluene-d8	110	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	00-2658 mb
Date Analyzed:	11/05/20	Data File:	110508.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 011055
Date Extracted:	11/05/20	Lab ID:	00-2663 mb
Date Analyzed:	11/05/20	Data File:	110516.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	118	50	150
Toluene-d8	104	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20

Date Received: 11/03/20

Project: POL-TPH, F&BI 011055

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 011055-08 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	1,600	103	102	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	115	70-119

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20

Date Received: 11/03/20

Project: POL-TPH, F&BI 011055

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 011055-13 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	98	97	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	110	70-119

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20

Date Received: 11/03/20

Project: POL-TPH, F&BI 011055

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 011055-08 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	3,500	84	94	50-150	11

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	105	63-142

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20

Date Received: 11/03/20

Project: POL-TPH, F&BI 011055

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 011055-13 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	<50	100	119	50-150	17

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	95	63-142

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20

Date Received: 11/03/20

Project: POL-TPH, F&BI 011055

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 011055-08 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	320	86 b	83 b	76-125	4 b
Toluene	ug/L (ppb)	10	9.6	94 b	98 b	76-122	4 b
Ethylbenzene	ug/L (ppb)	10	3.9	96 b	100 b	69-135	4 b
m,p-Xylene	ug/L (ppb)	20	4.5	97 b	99 b	69-135	2 b
o-Xylene	ug/L (ppb)	10	<1	99	104	60-140	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	101	97	69-134	4
Toluene	ug/L (ppb)	10	91	94	72-122	3
Ethylbenzene	ug/L (ppb)	10	95	94	77-124	1
m,p-Xylene	ug/L (ppb)	20	94	94	81-112	0
o-Xylene	ug/L (ppb)	10	95	95	81-121	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 11/11/20

Date Received: 11/03/20

Project: POL-TPH, F&BI 011055

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 011055-13 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	101	102	50-150	1
Toluene	ug/L (ppb)	10	<1	96	100	50-150	4
Ethylbenzene	ug/L (ppb)	10	<1	98	102	50-150	4
m,p-Xylene	ug/L (ppb)	20	<2	96	100	50-150	4
o-Xylene	ug/L (ppb)	10	<1	96	101	50-150	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	108	100	70-130	8
Toluene	ug/L (ppb)	10	90	98	70-130	9
Ethylbenzene	ug/L (ppb)	10	101	98	70-130	3
m,p-Xylene	ug/L (ppb)	20	99	96	70-130	3
o-Xylene	ug/L (ppb)	10	100	97	70-130	3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

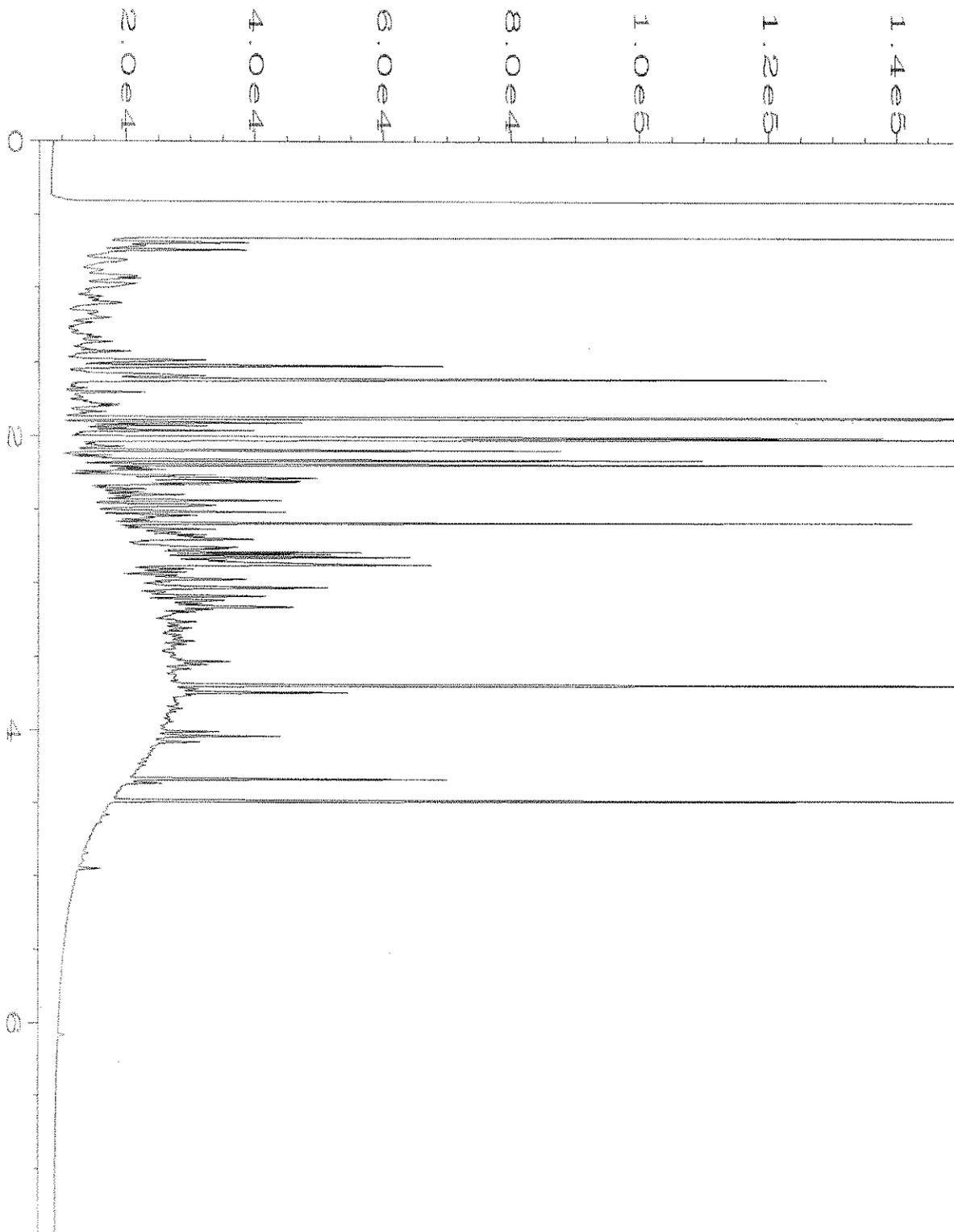
nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

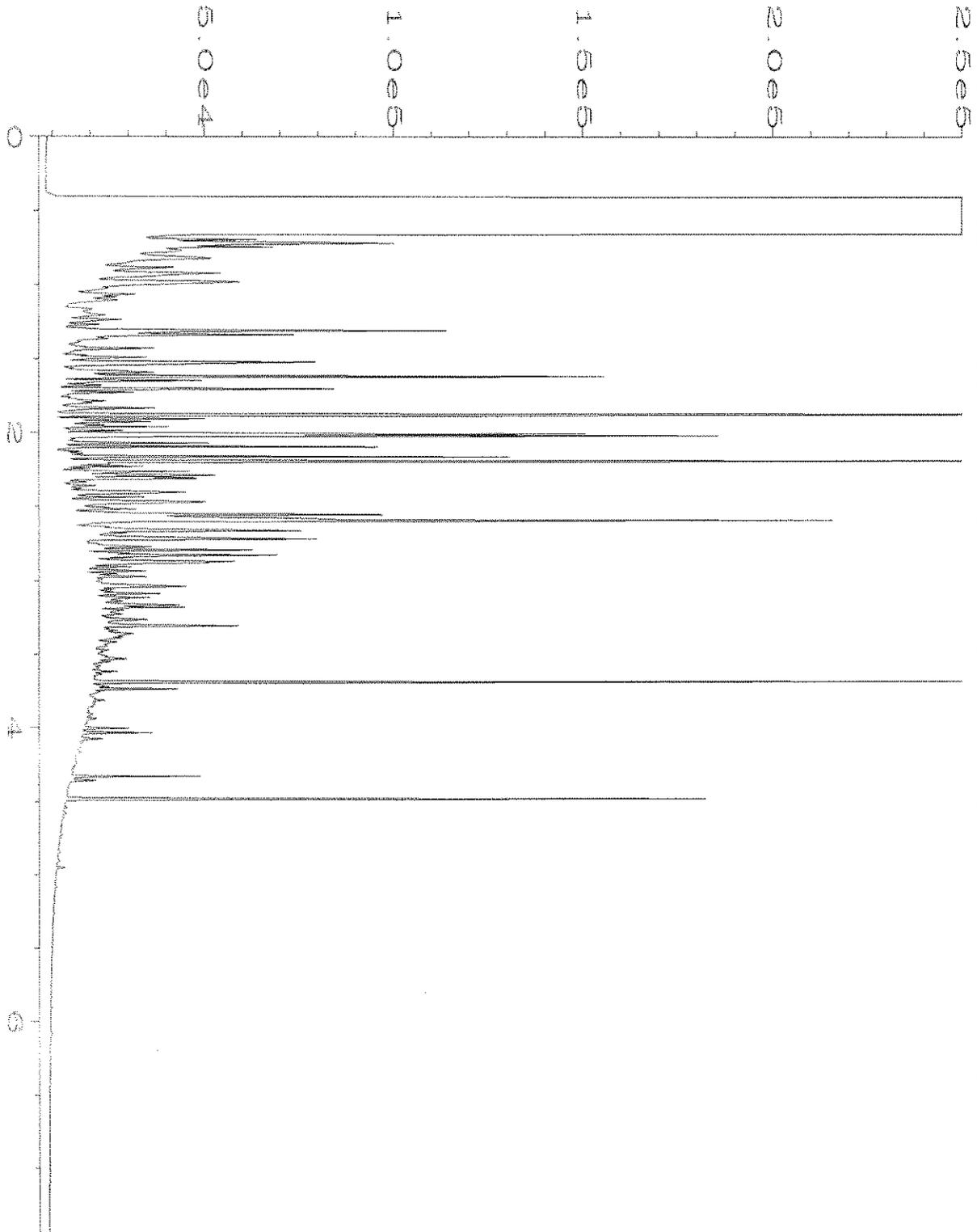
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

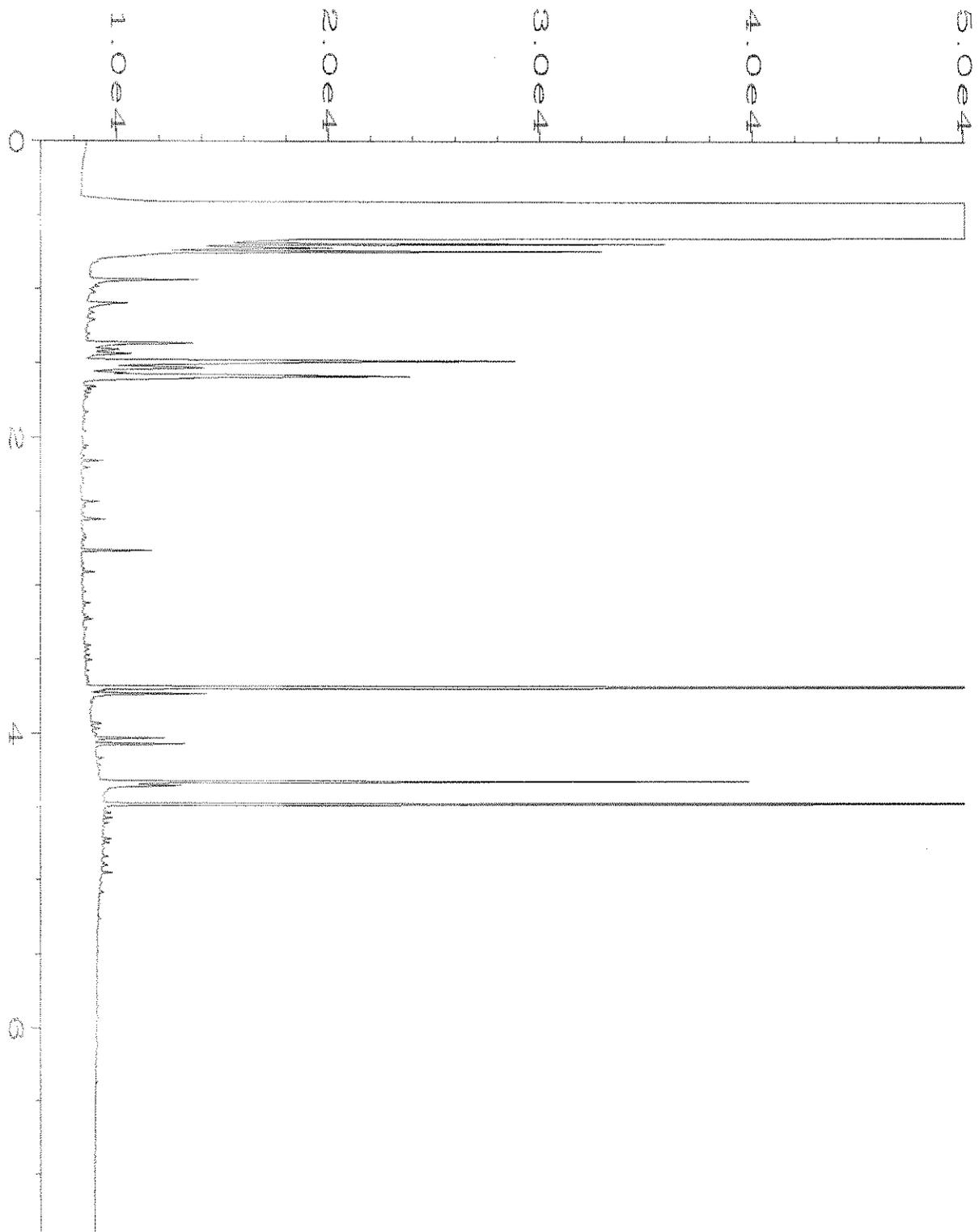
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.



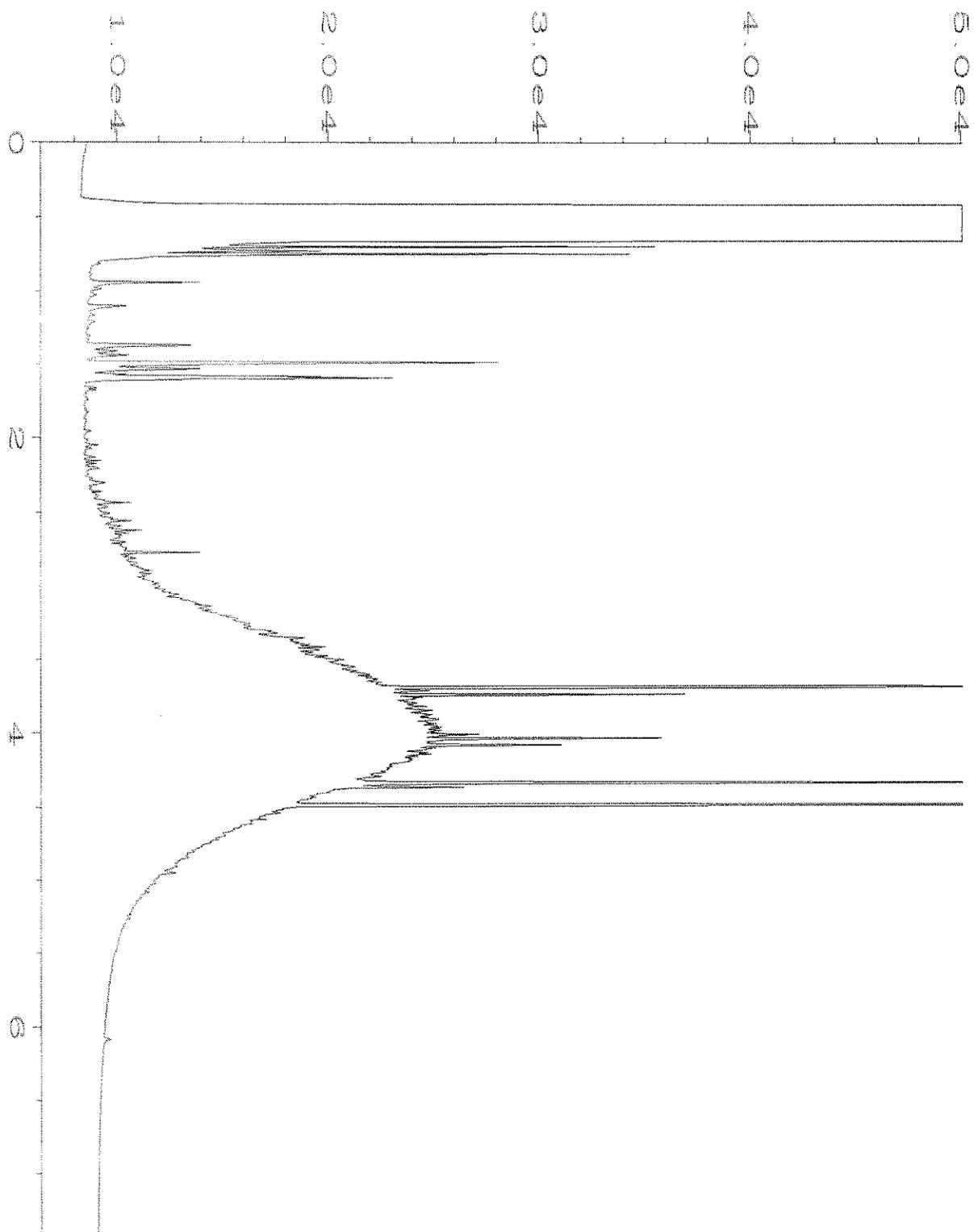
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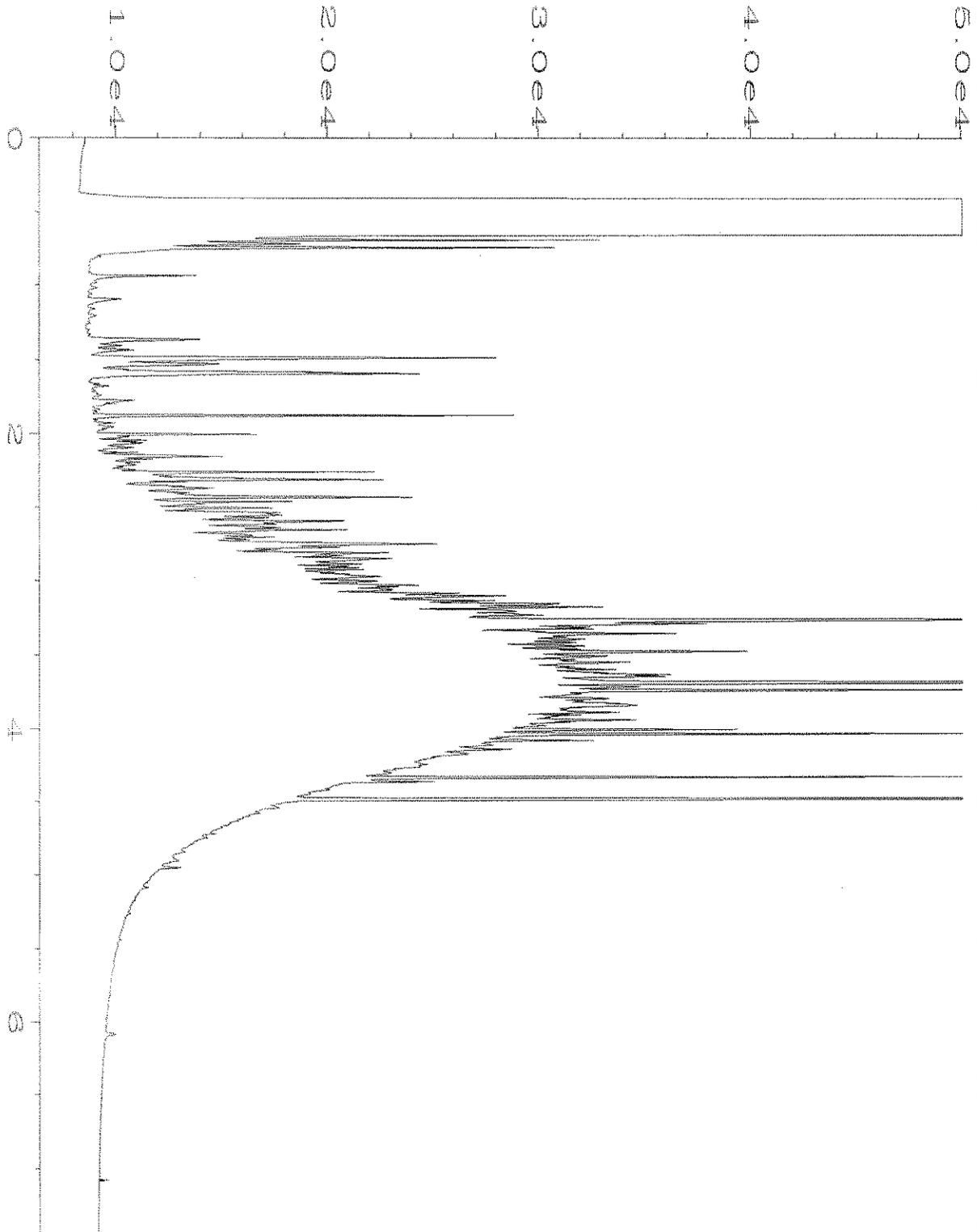
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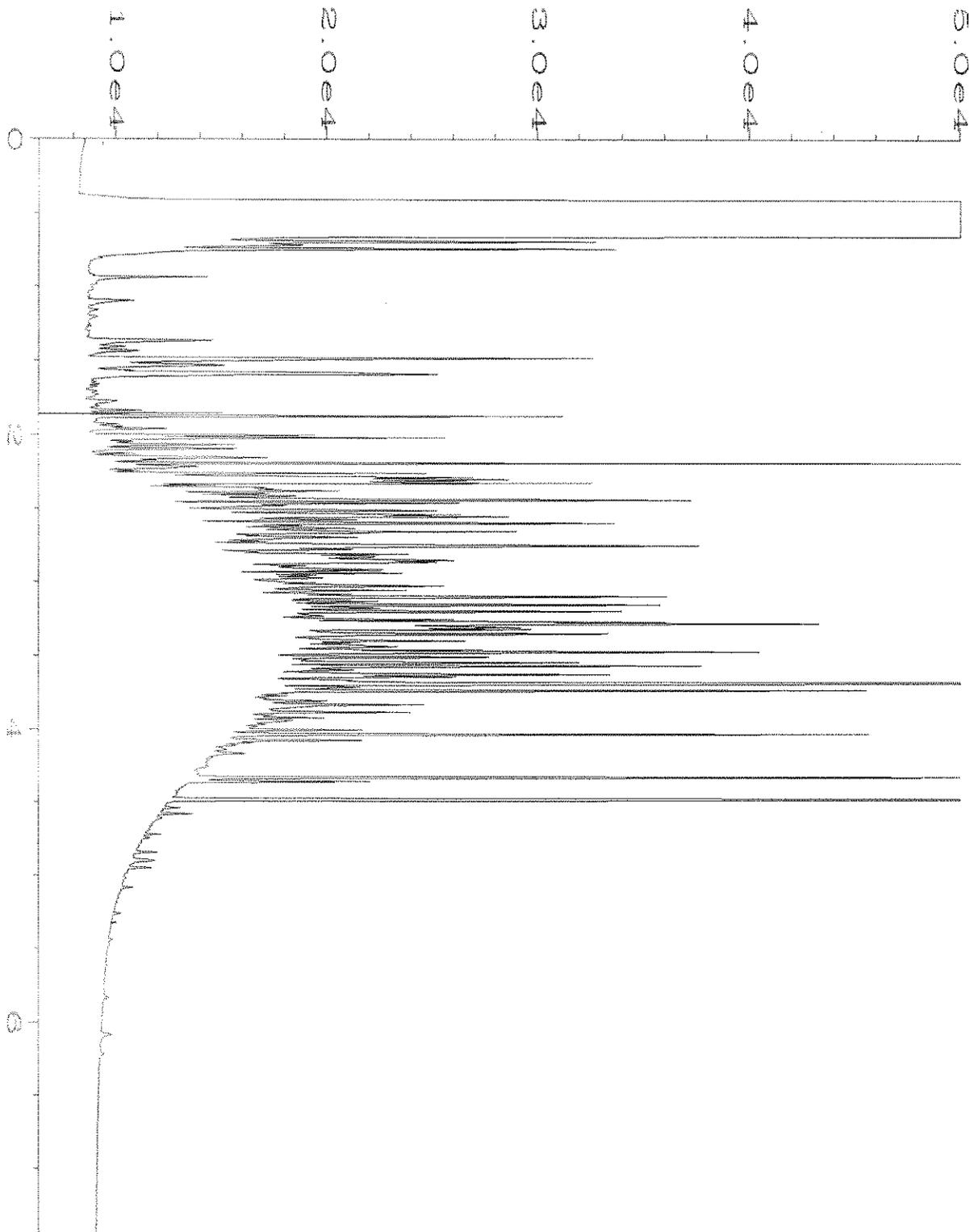
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Report Created on:	05 Nov 20 10:19 AM		



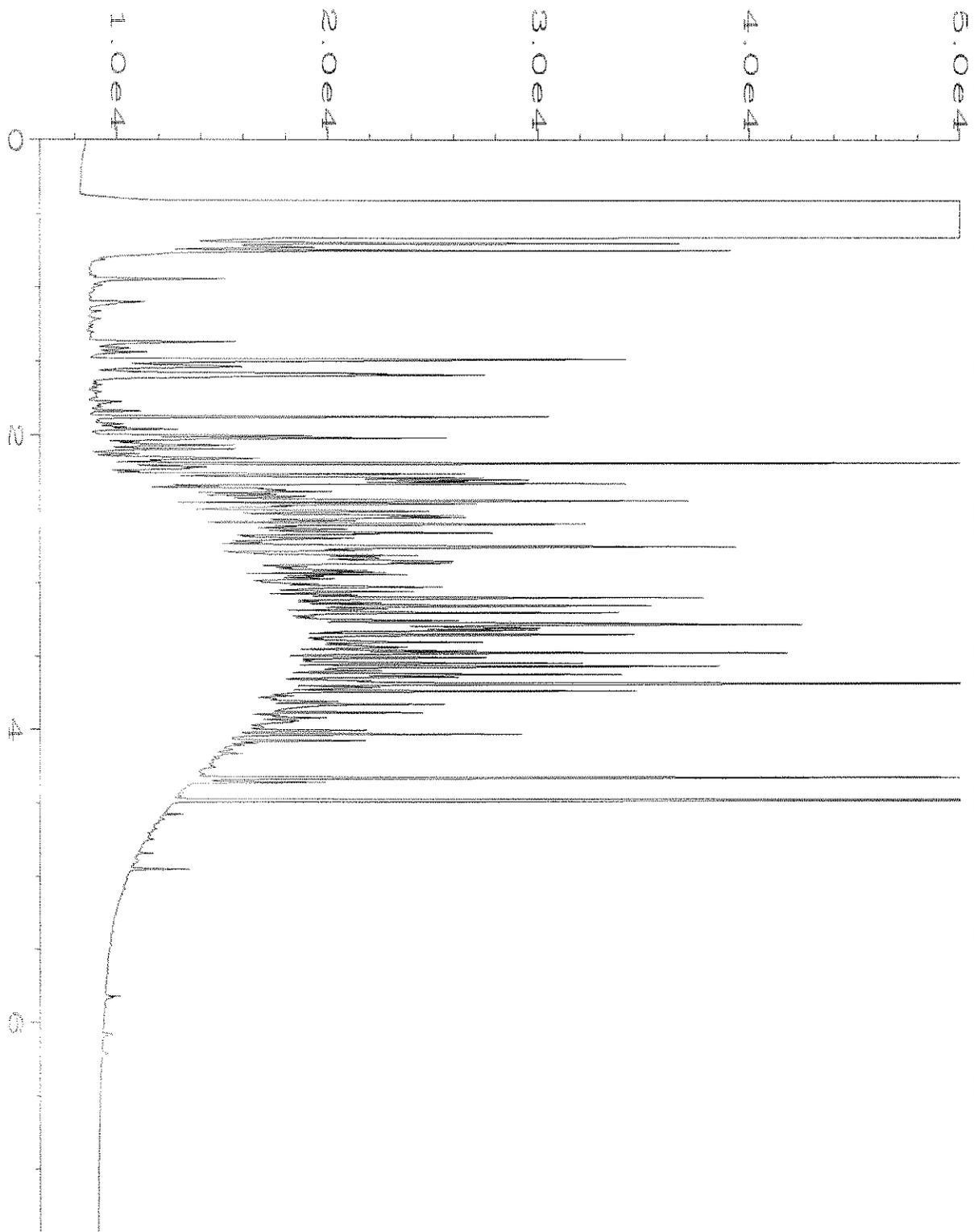
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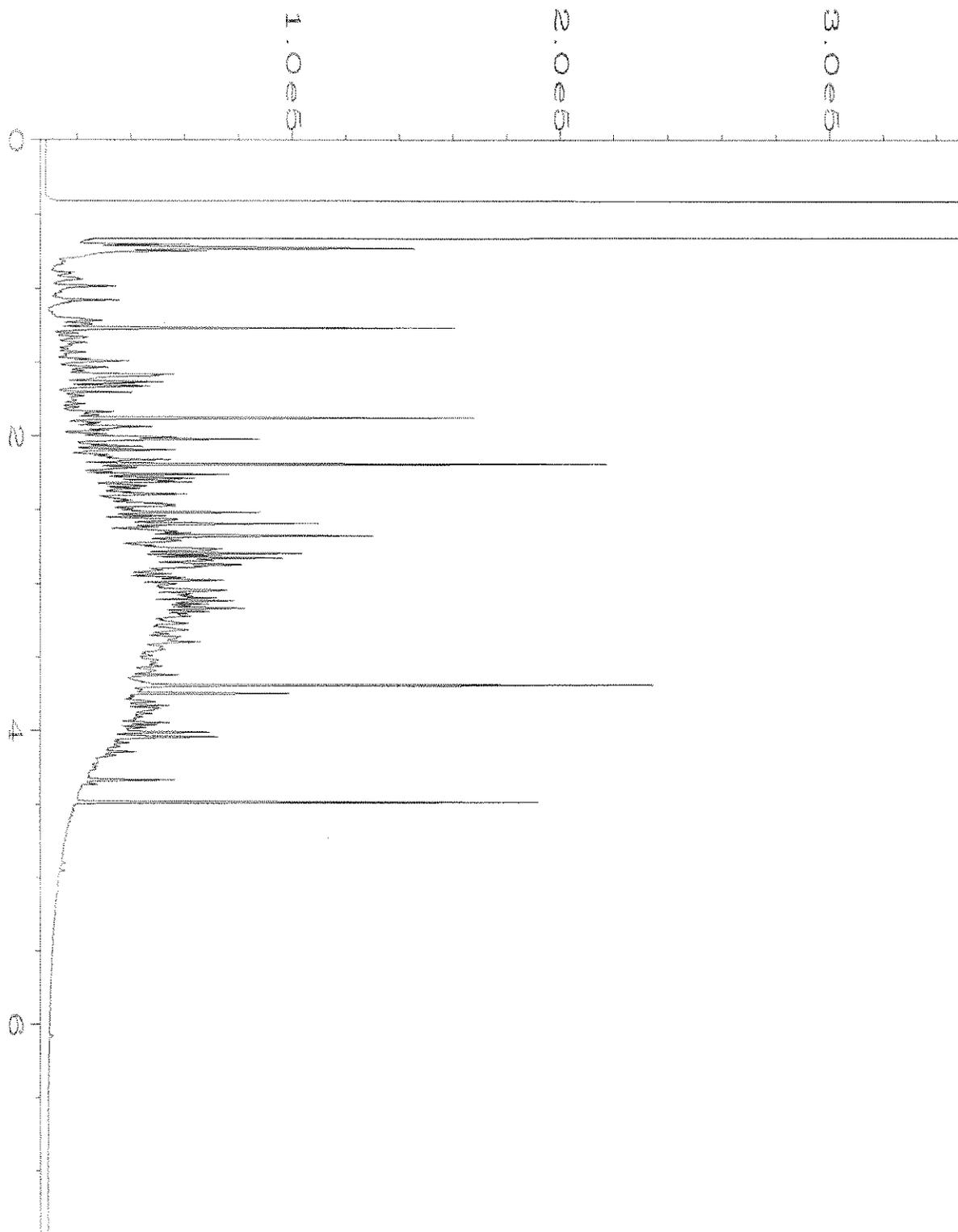
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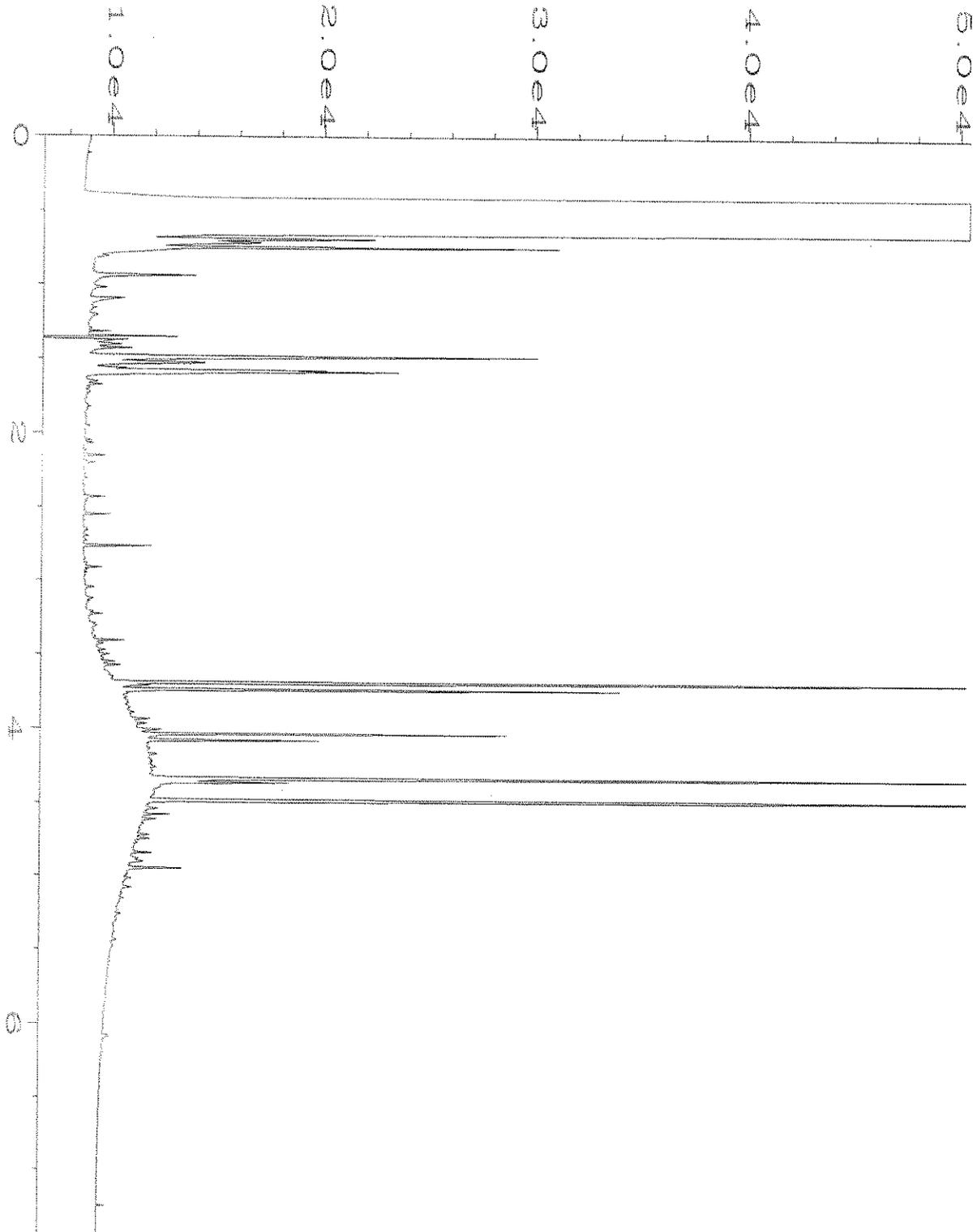
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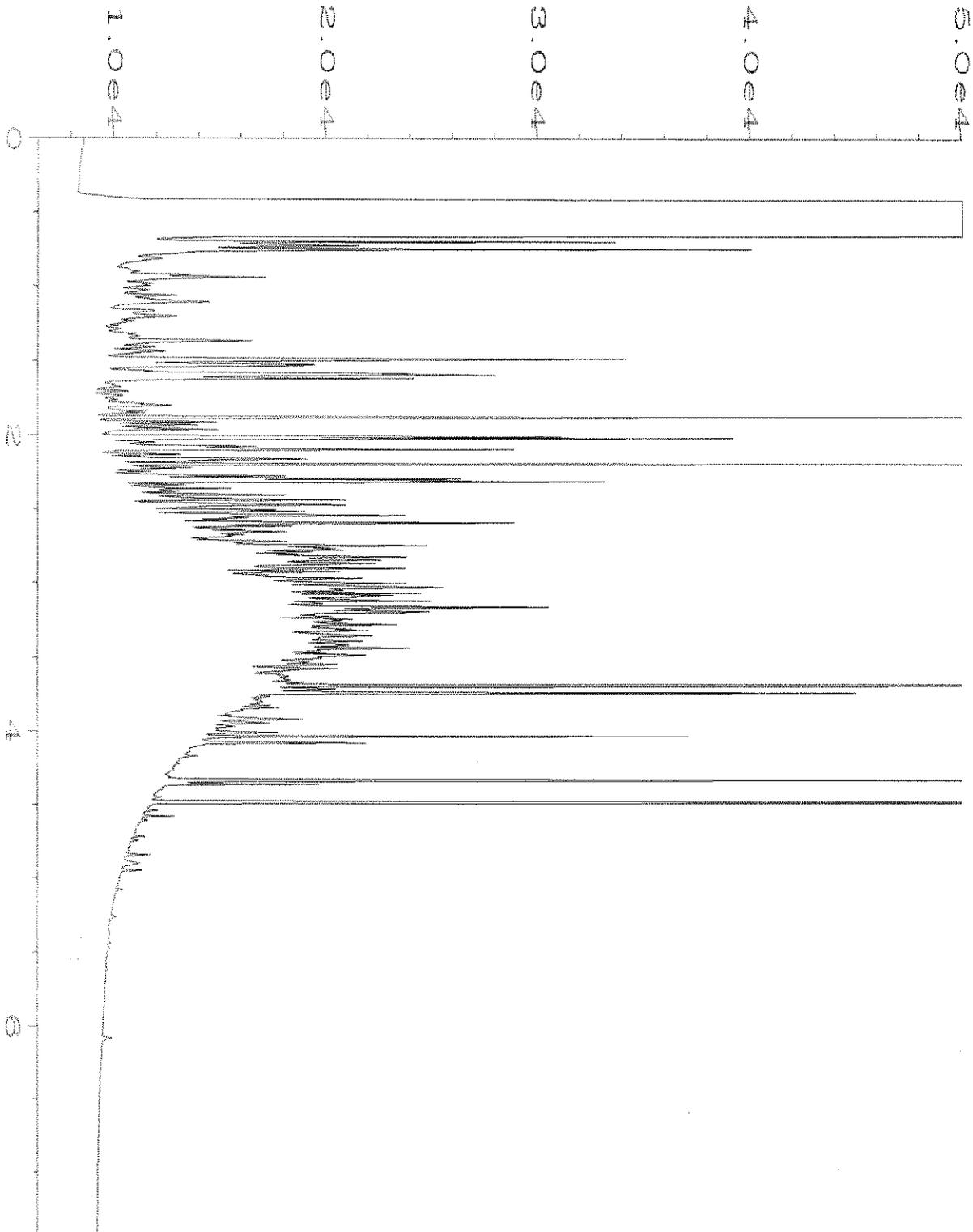
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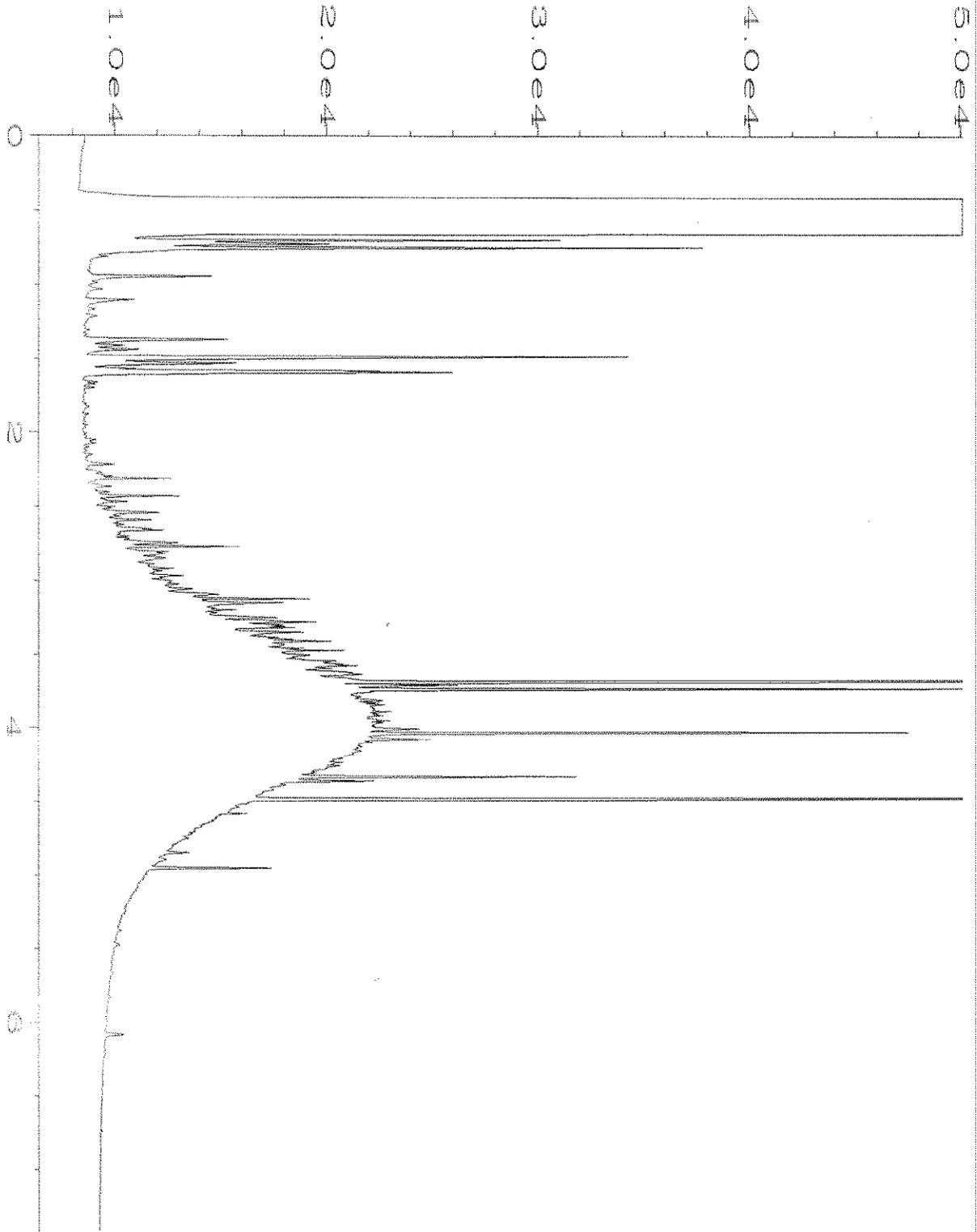
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Sample Name	: 011055-08	Sequence Line	: 6
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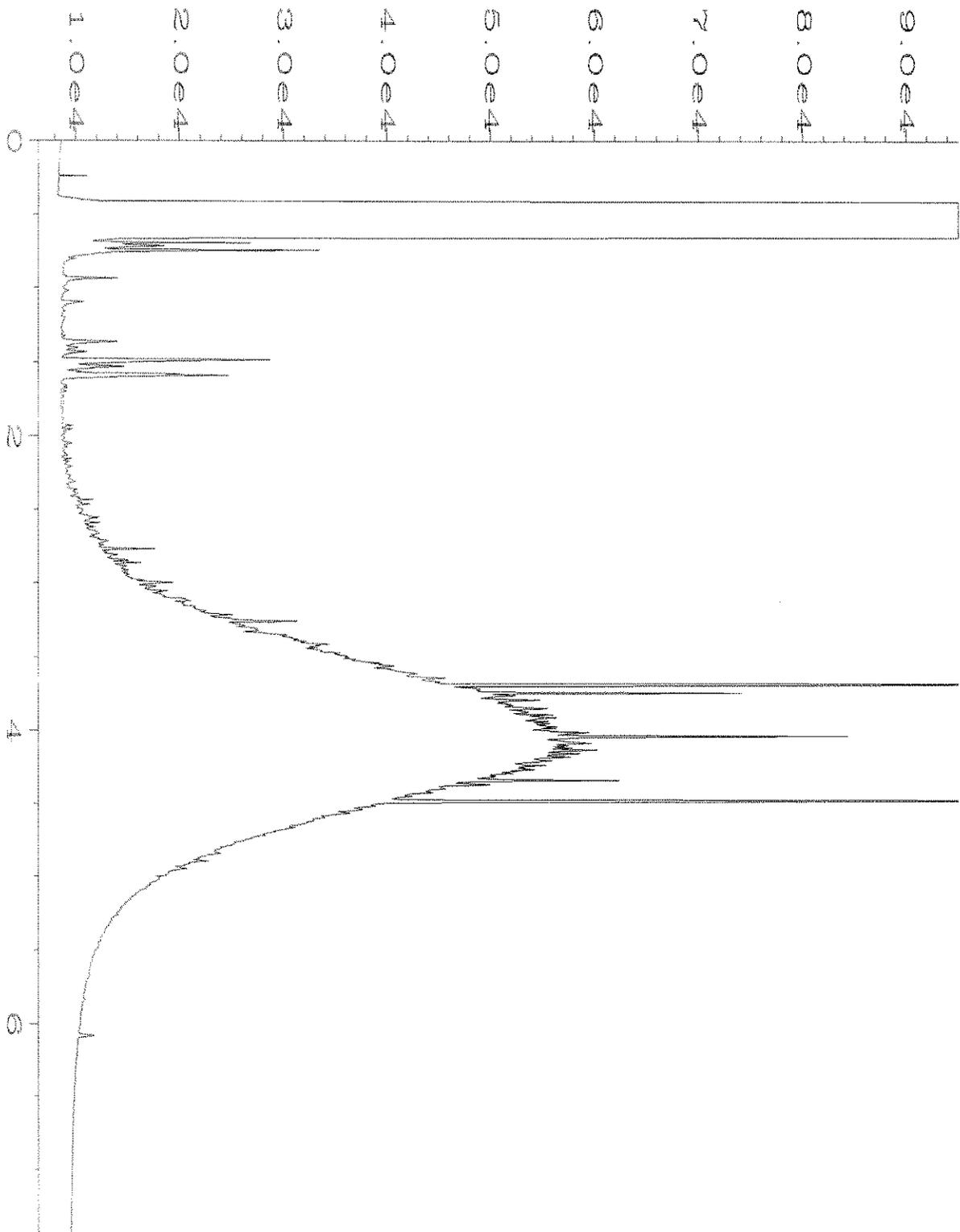
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Sample Name	: 011055-09 rr	Sequence Line	: 5
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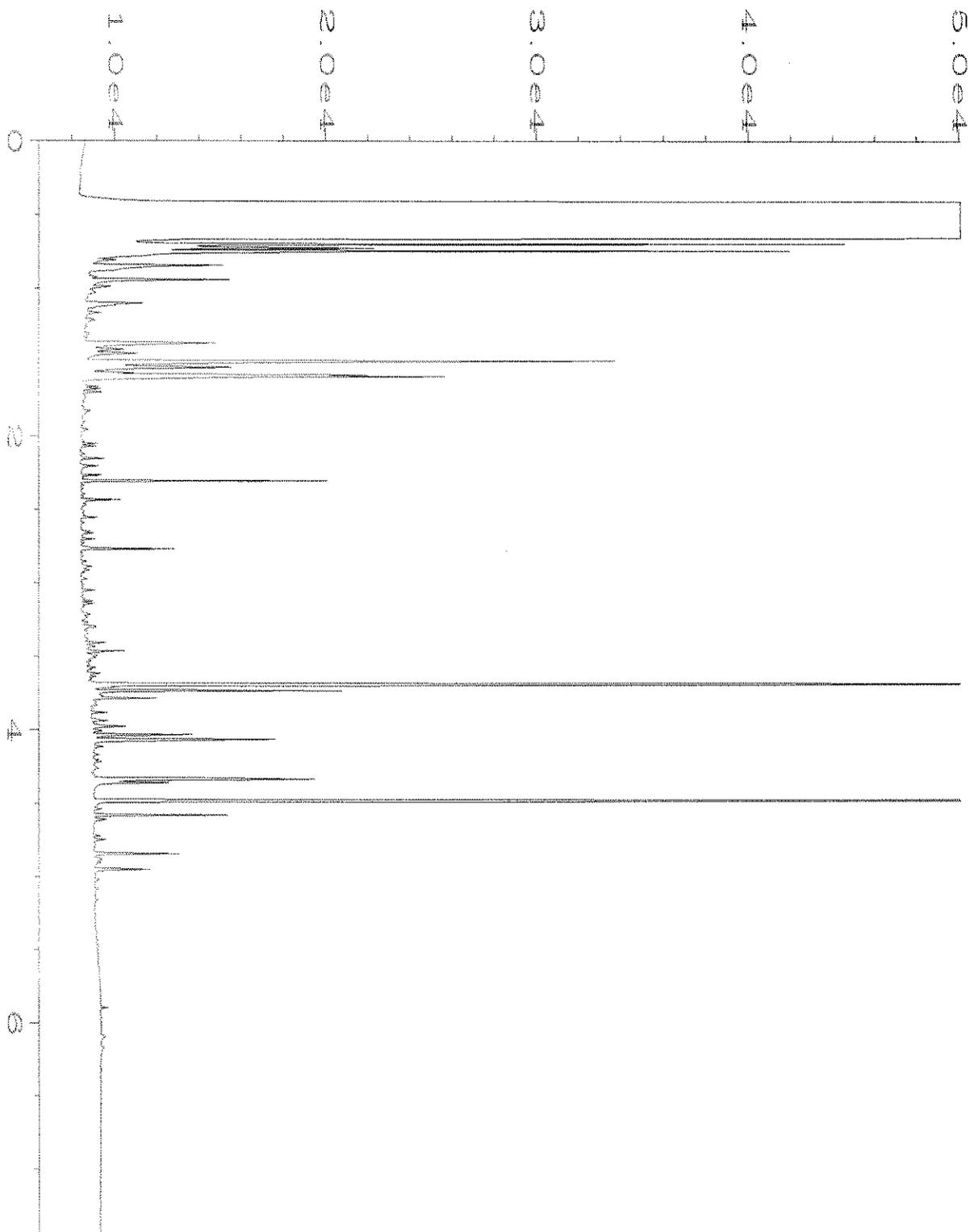
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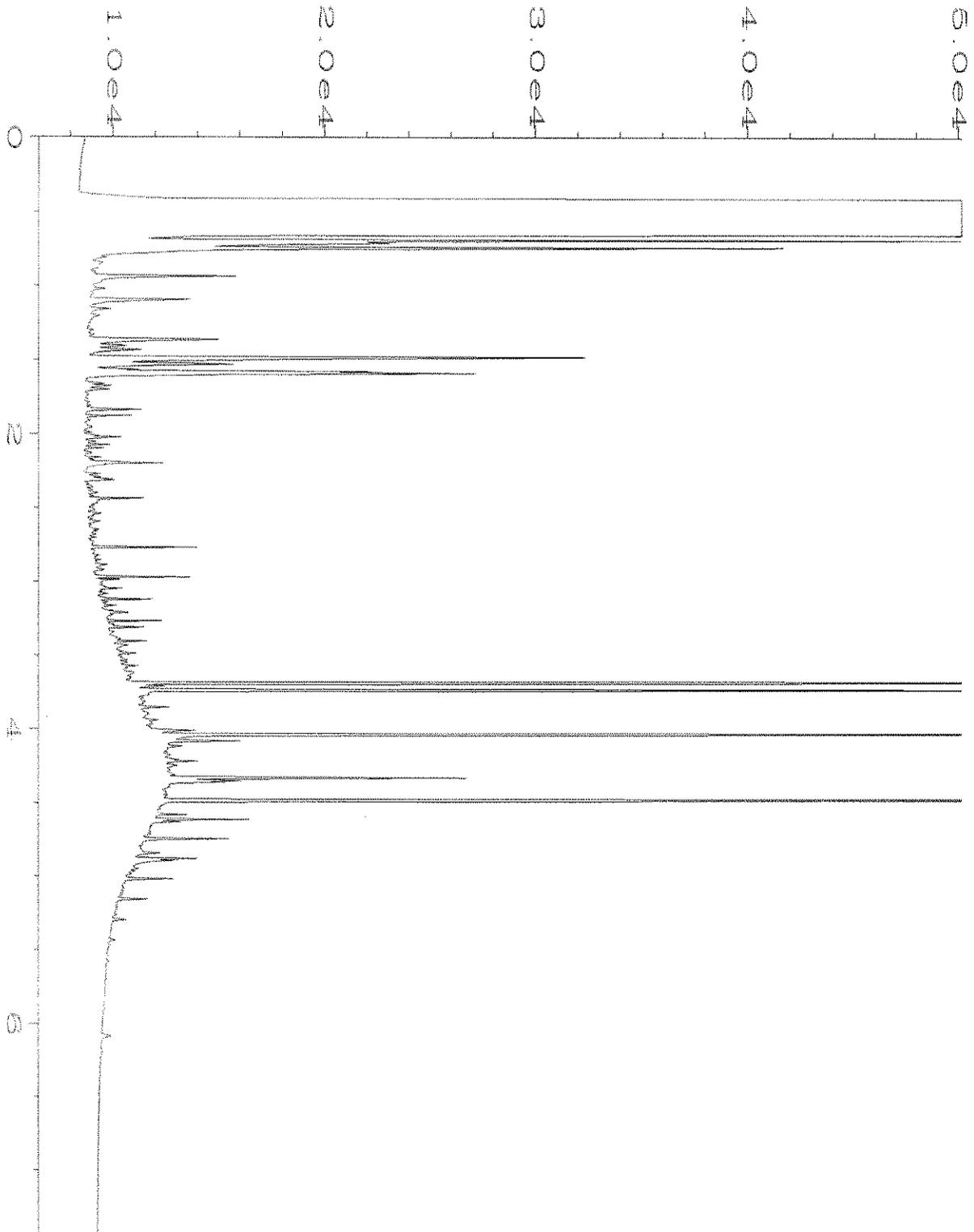
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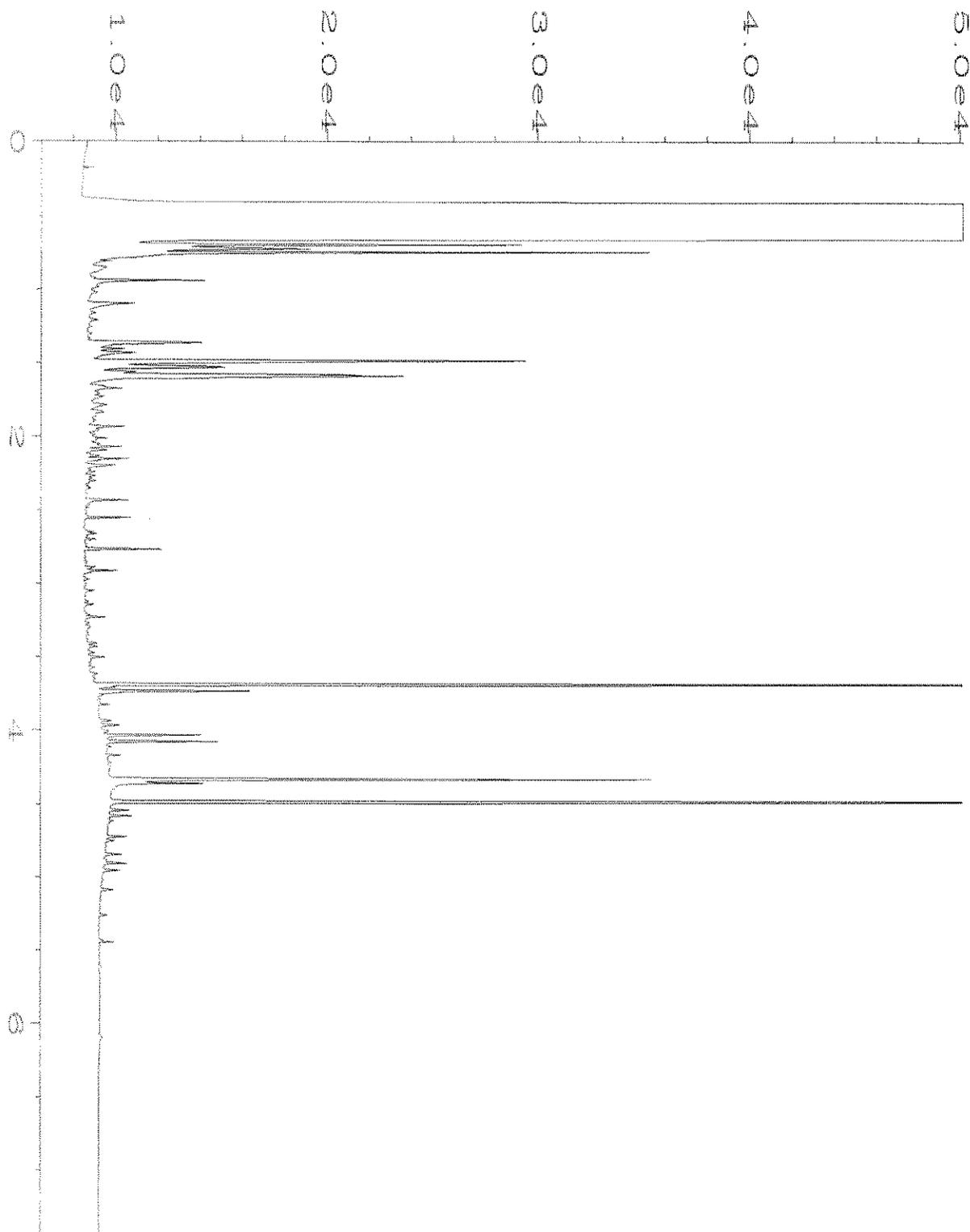
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Acquired on	: 04 Nov 20 06:38 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:21 AM		



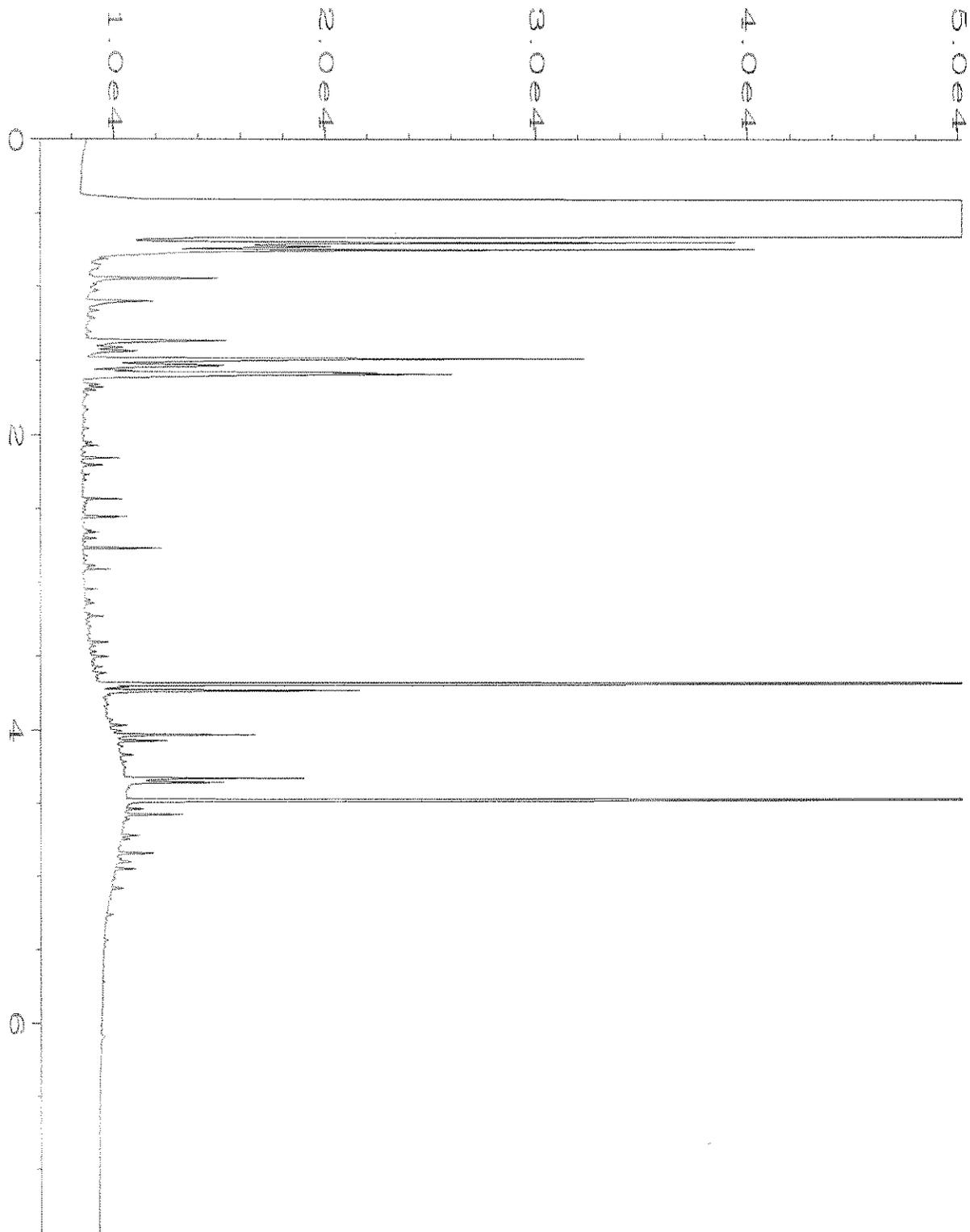
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Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-13	Sequence Line	: 8
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Acquired on	: 04 Nov 20 06:50 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:21 AM		



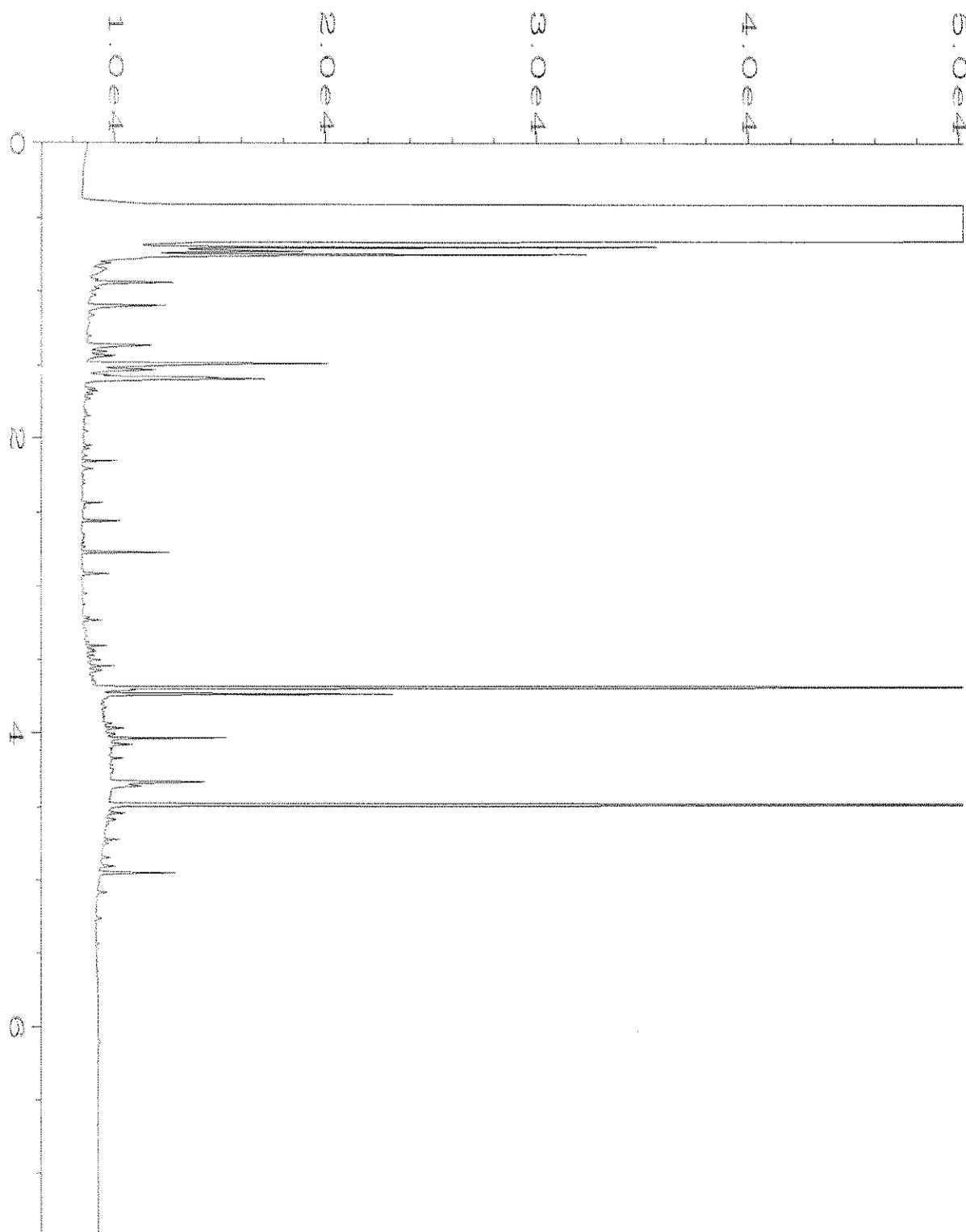
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Instrument	: GC1	Injection Number	: 1
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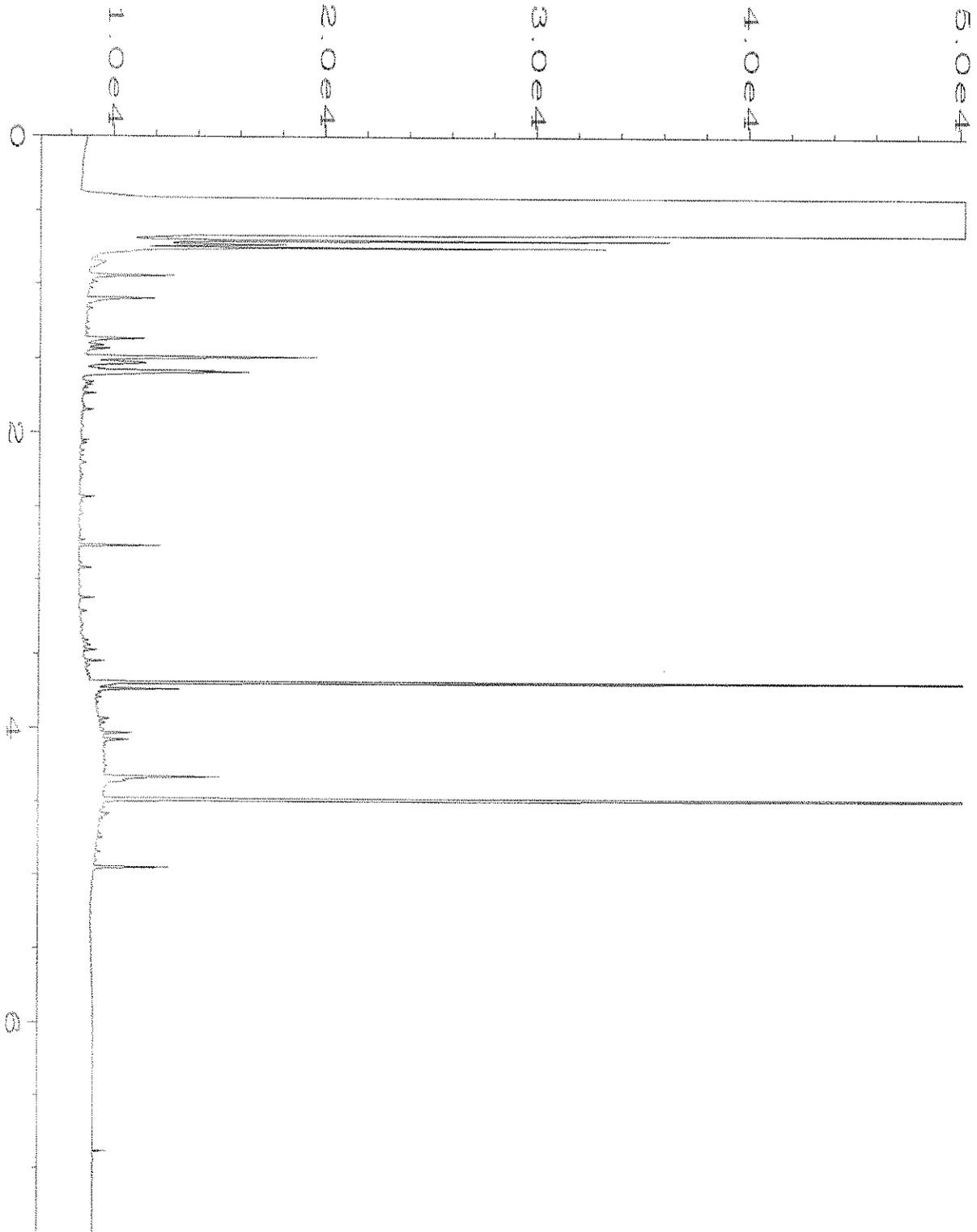
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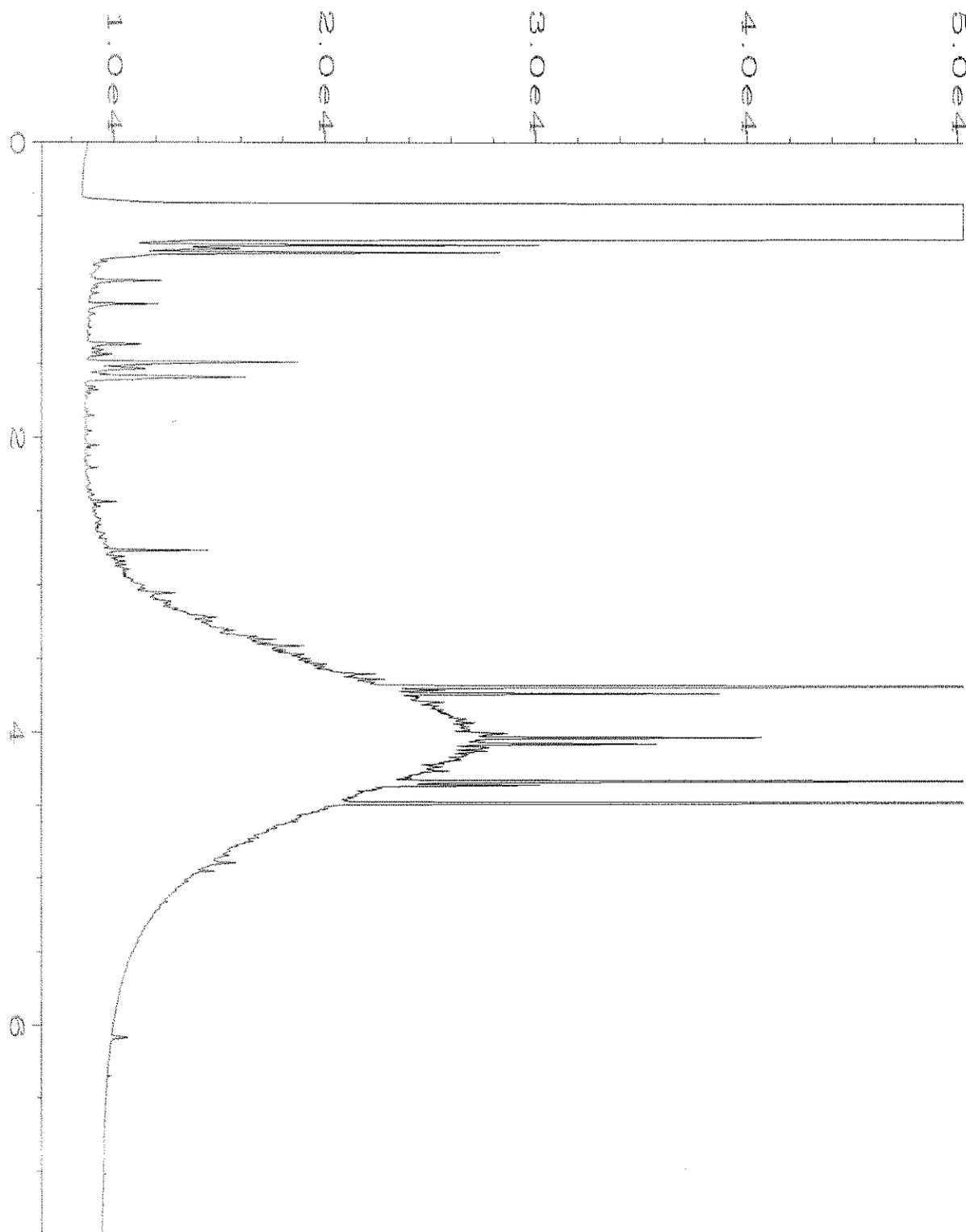
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Operator	: TL	Vial Number	: 42
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-16	Sequence Line	: 8
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 07:48 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:22 AM		



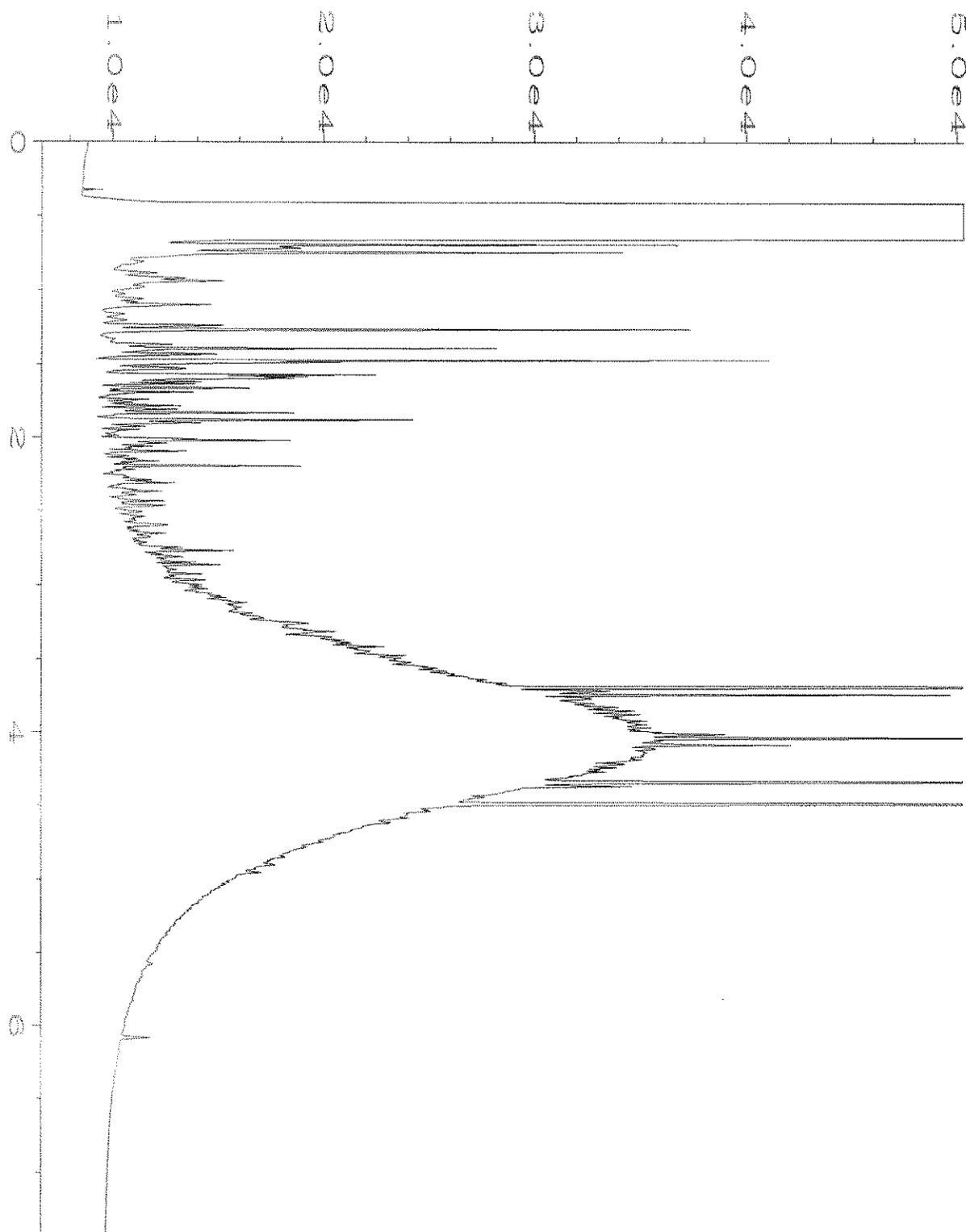
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\043F0801.D	Page Number	: 1
Operator	: TL	Vial Number	: 43
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-17	Sequence Line	: 8
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 08:00 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:22 AM		



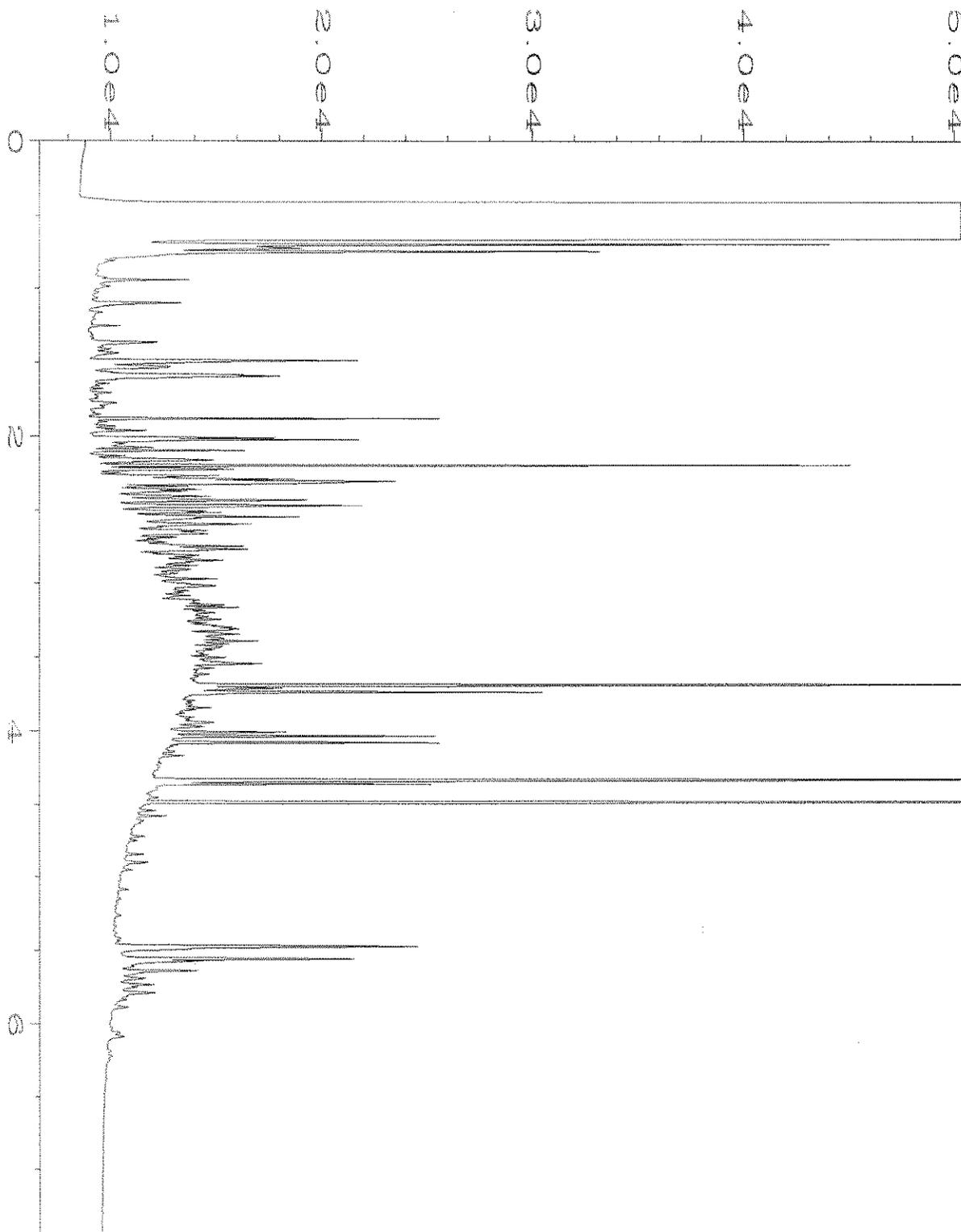
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\044F0801.D	Page Number	: 1
Operator	: TL	Vial Number	: 44
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-18	Sequence Line	: 8
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 08:12 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:22 AM		



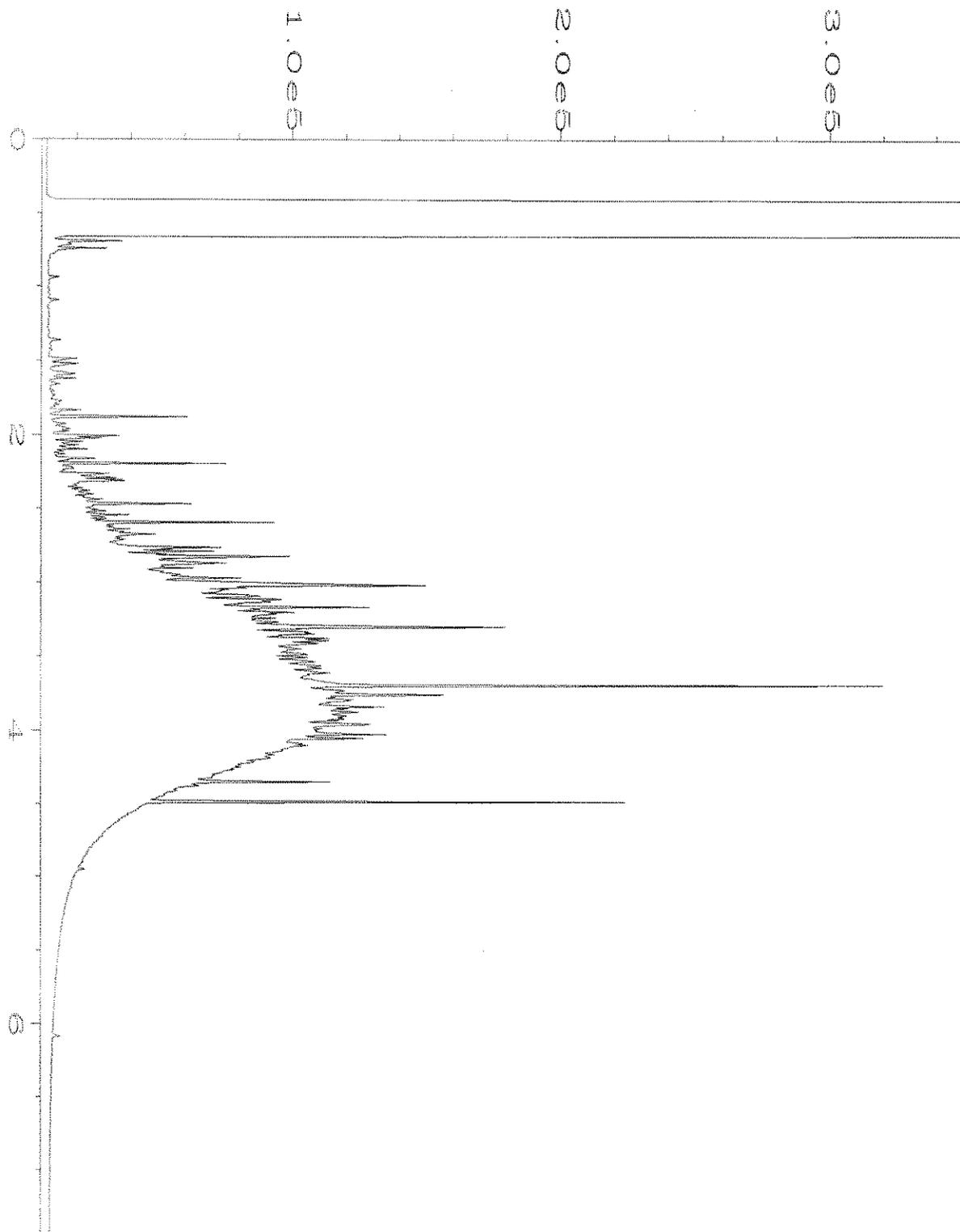
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\045F0801.D	Page Number	: 1
Operator	: TL	Vial Number	: 45
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-19	Sequence Line	: 8
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 08:24 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:22 AM		



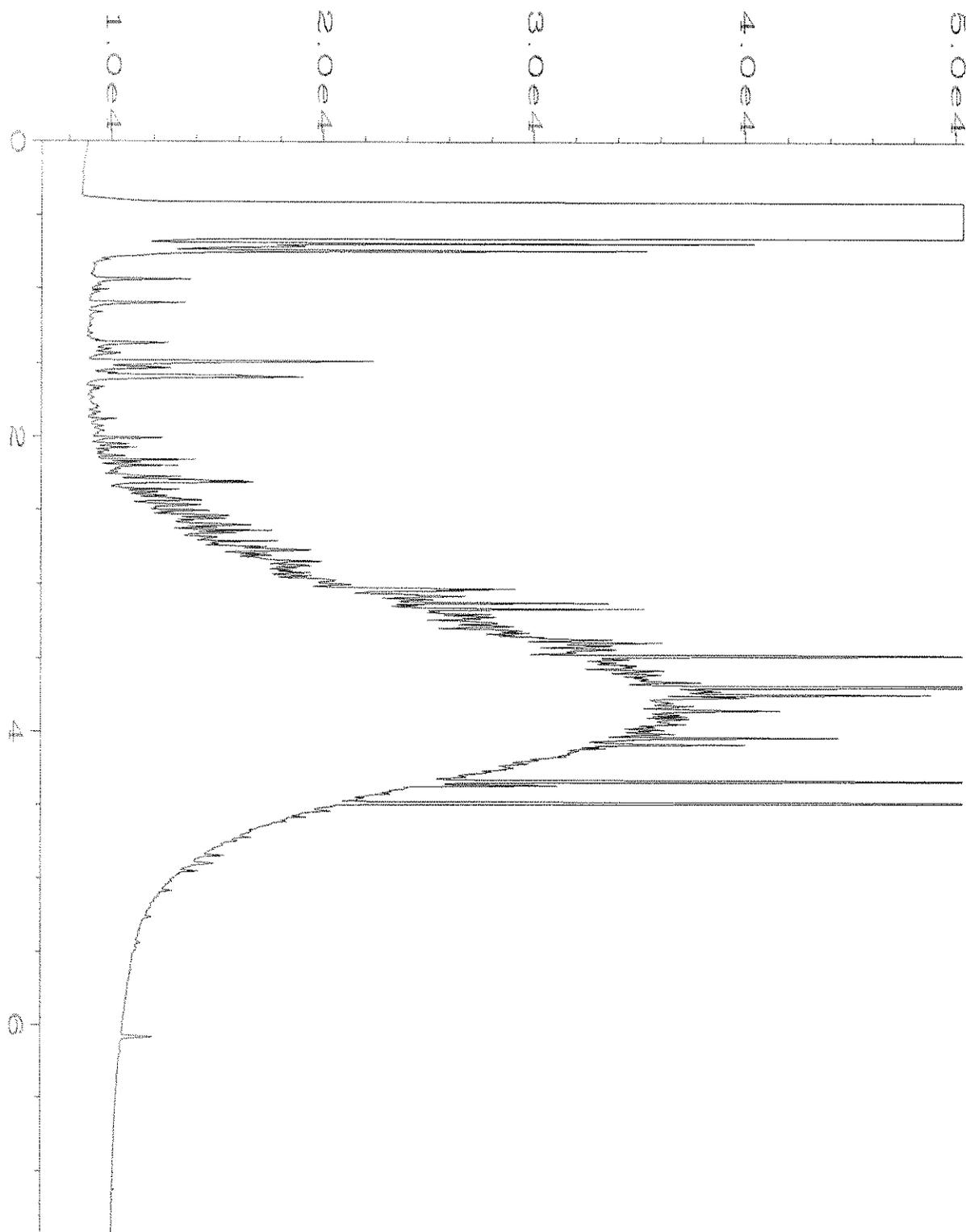
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\046F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 46
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-20	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 08:59 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:22 AM		



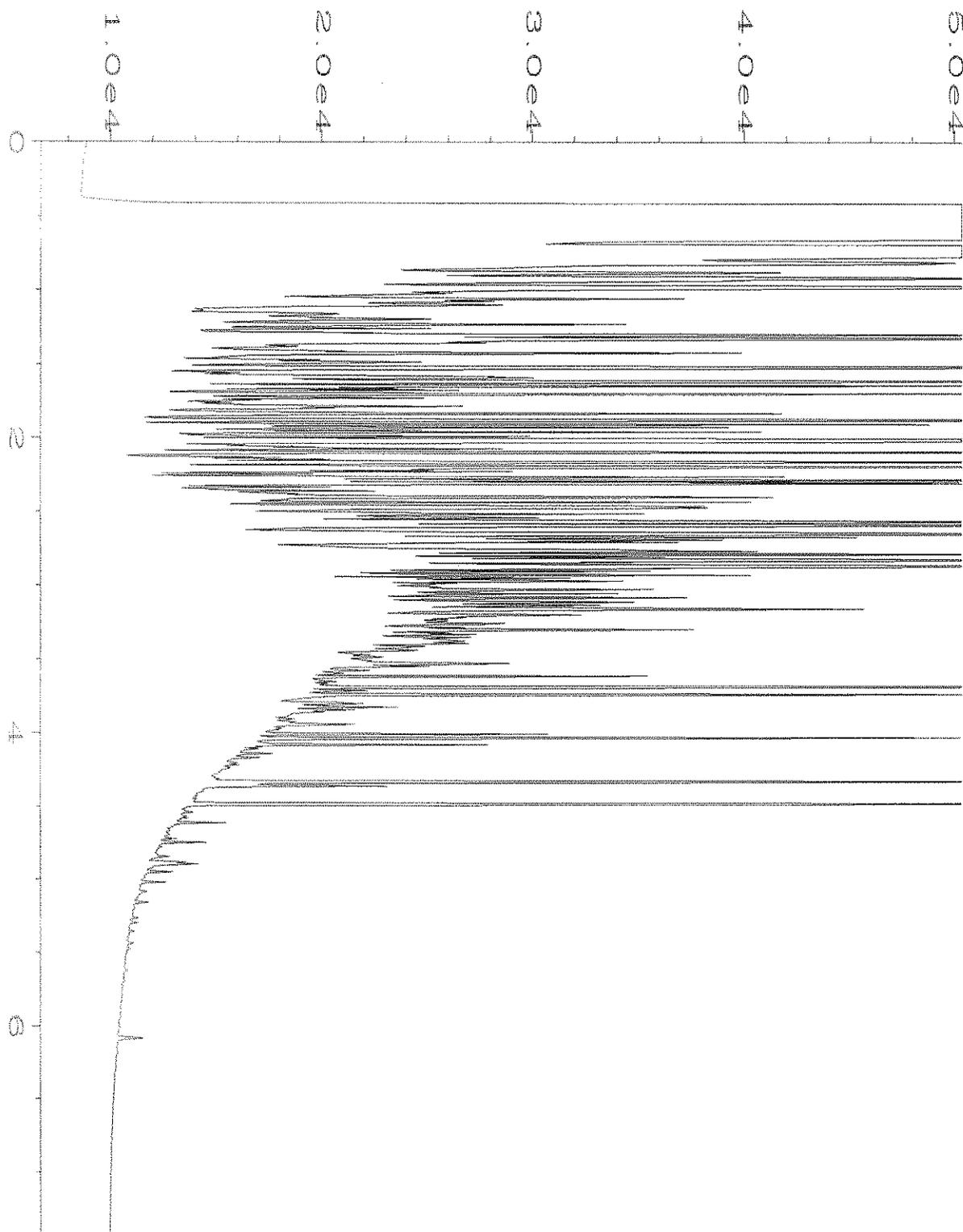
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\047F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 47
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-21	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 09:10 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:22 AM		



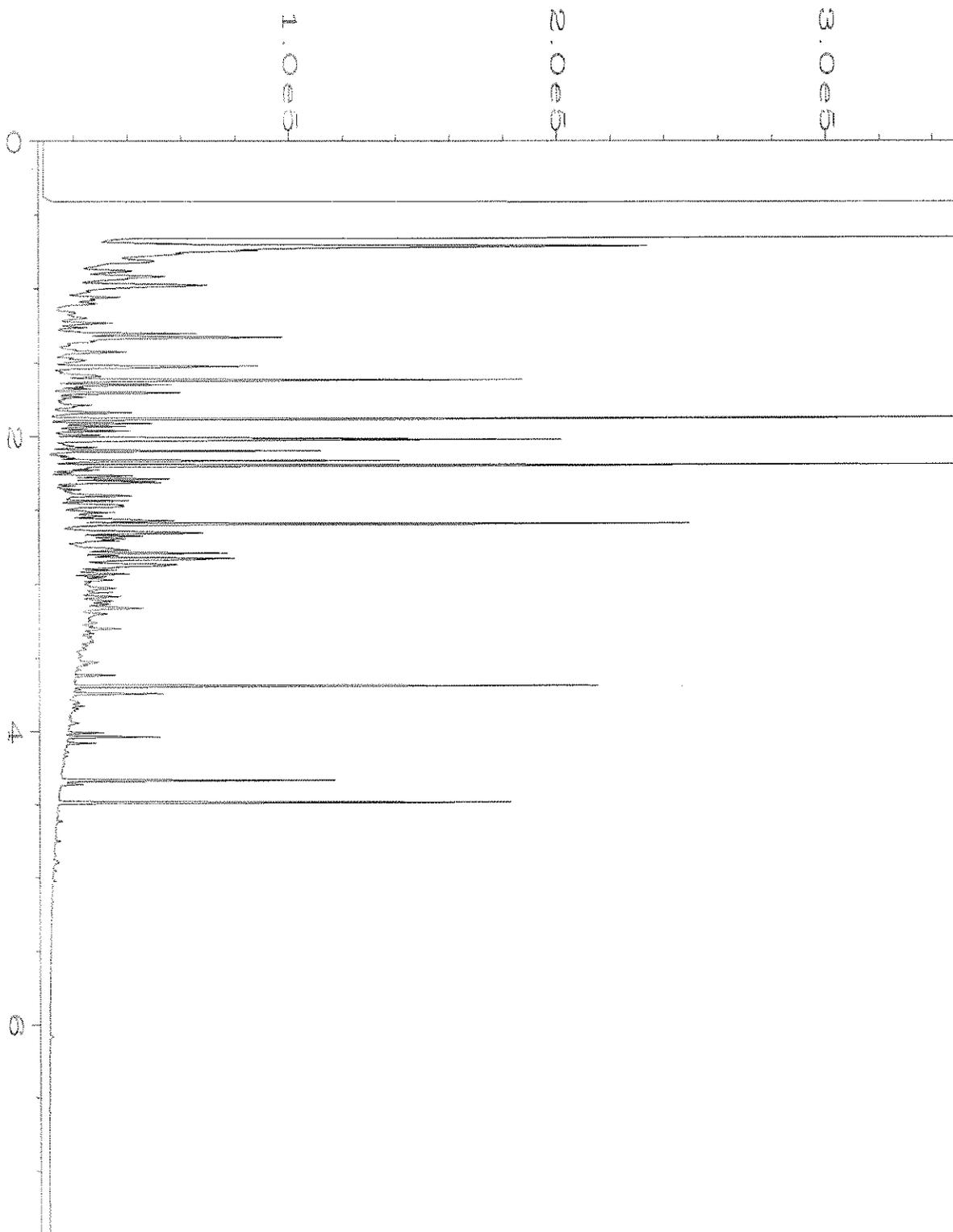
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\048F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 48
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-22	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 09:22 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:23 AM		



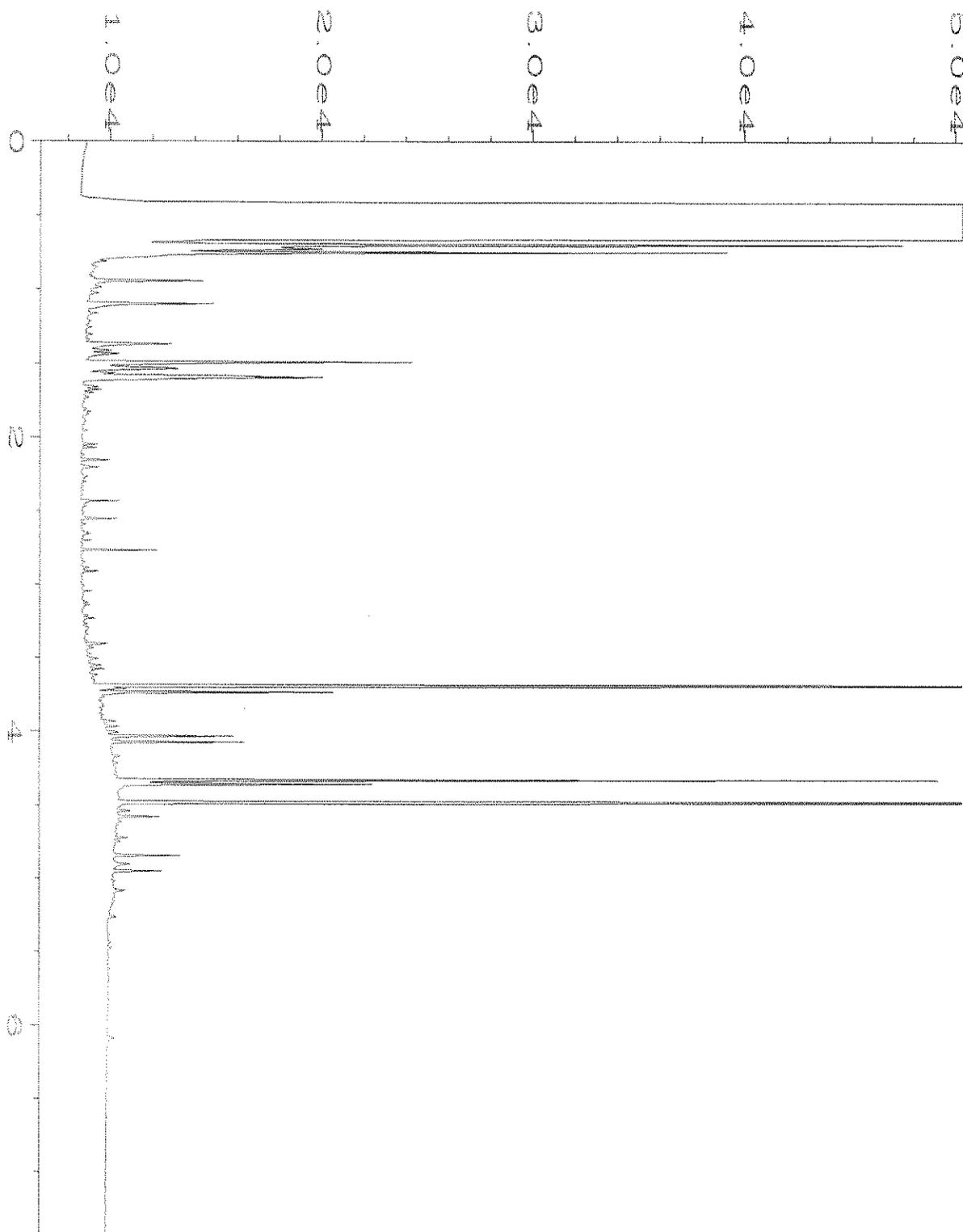
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\049F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 49
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-23	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 09:34 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:23 AM		



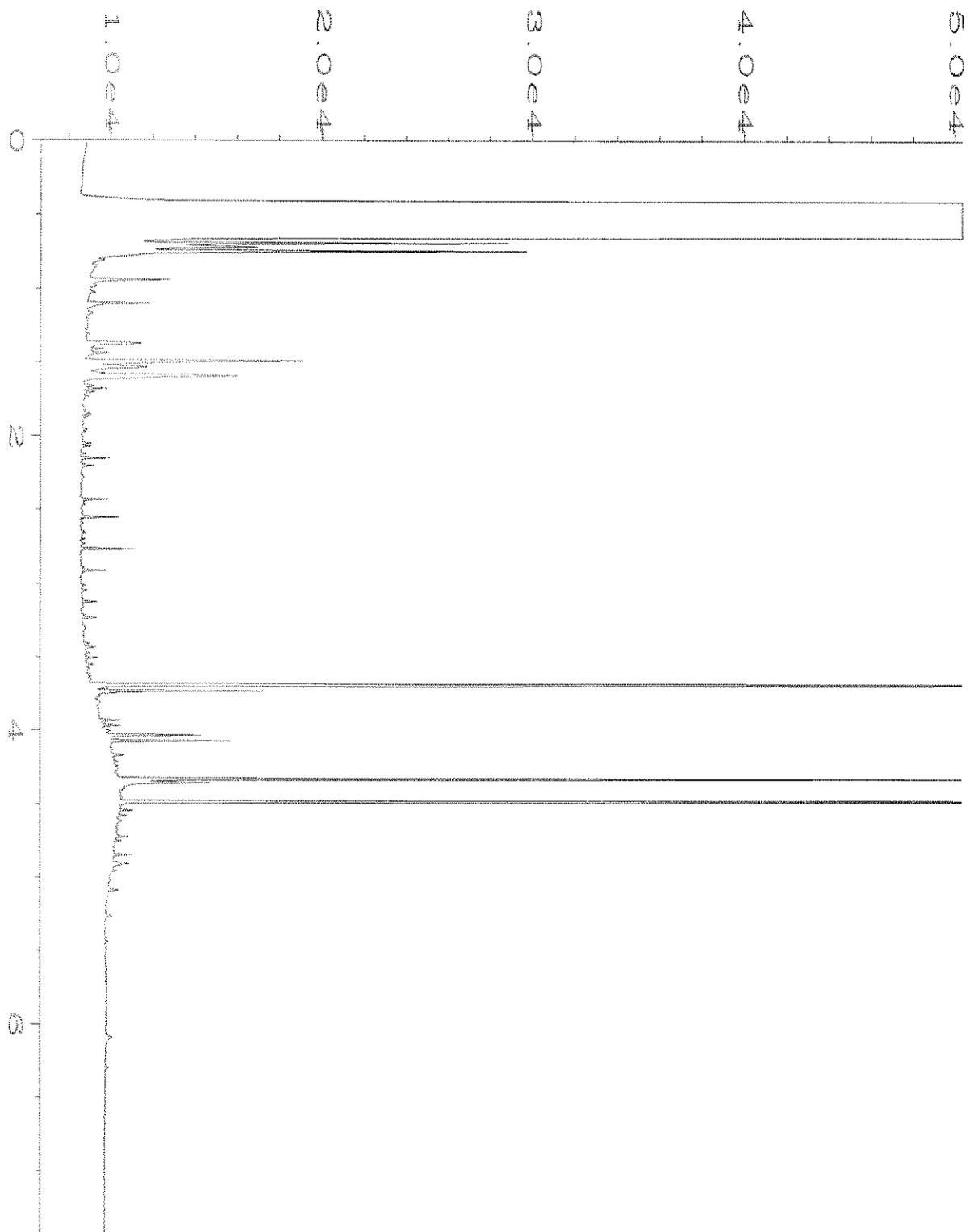
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\050F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 50
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-24	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 09:45 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:23 AM		



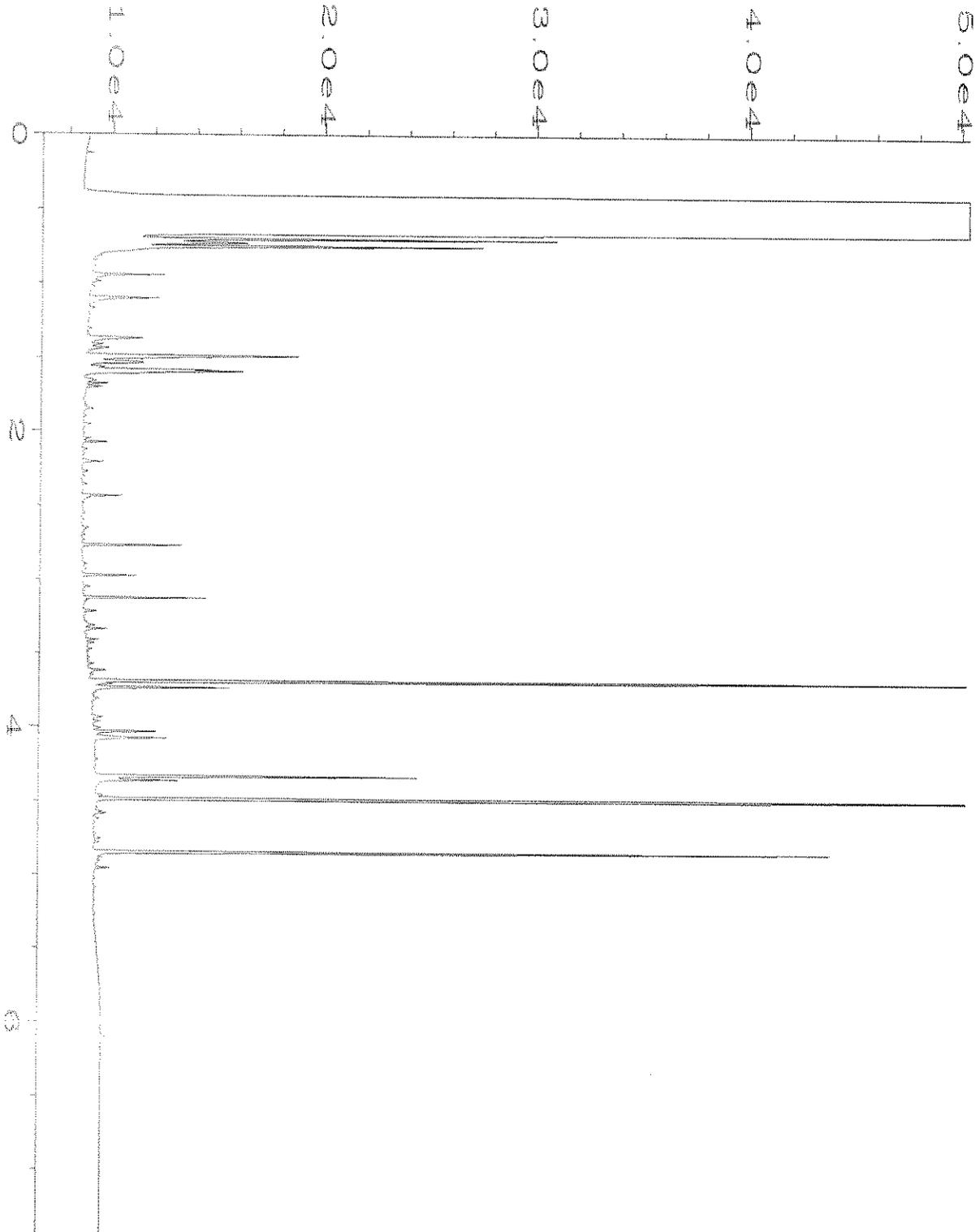
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\050F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 50
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-24	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 09:45 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:24 AM		



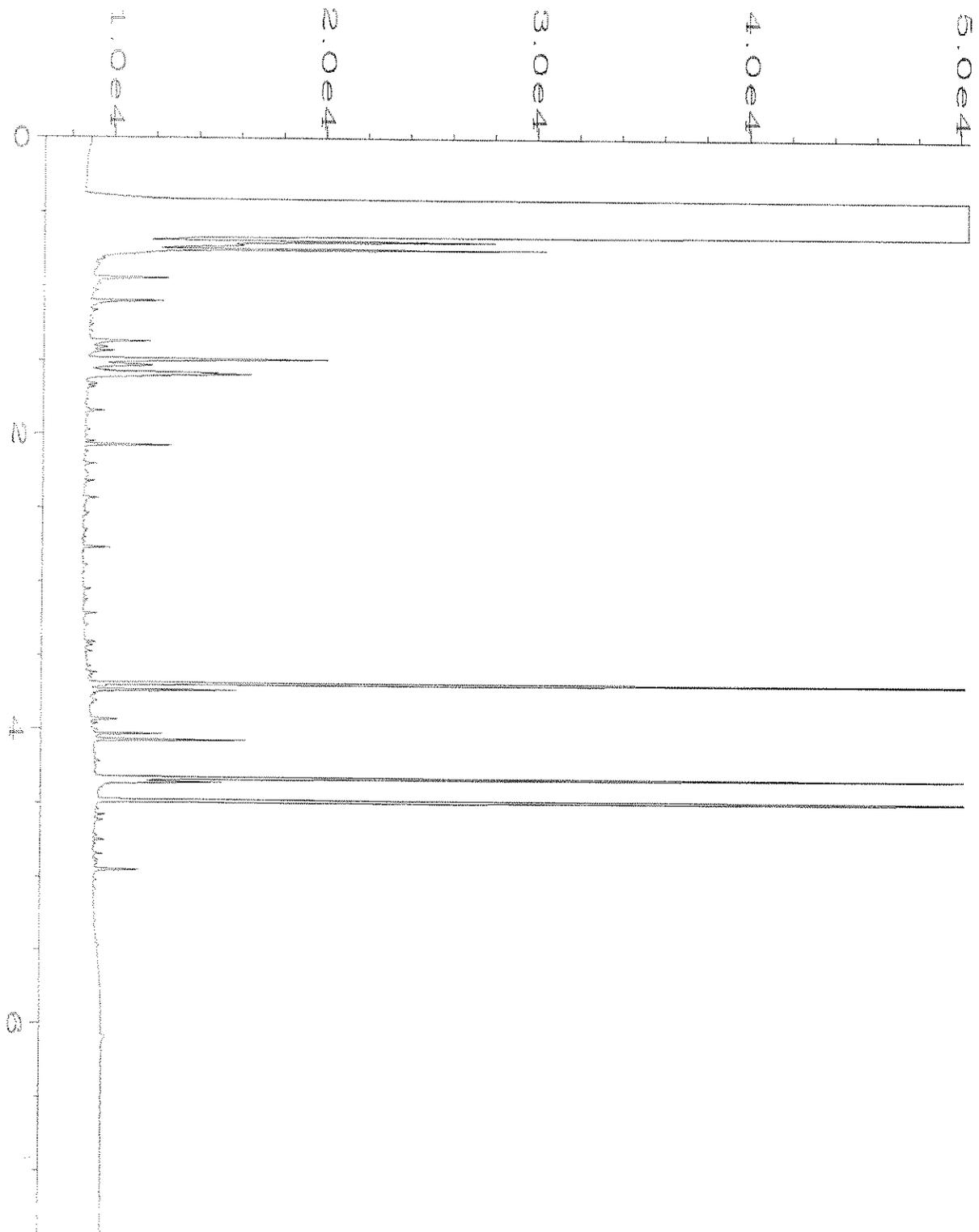
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\051F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 51
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-25	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 09:57 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:24 AM		



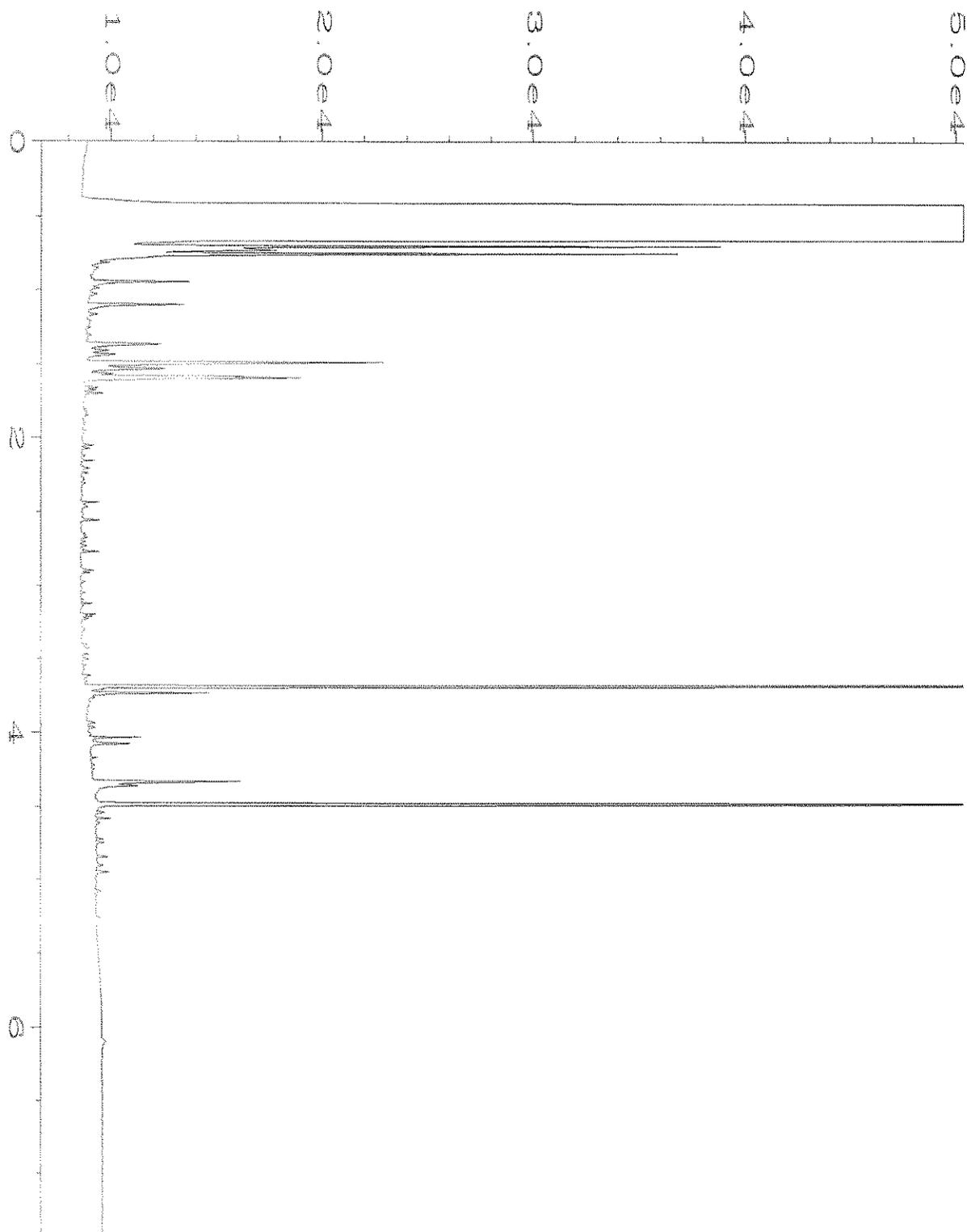
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\052F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 52
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-26	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 10:09 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:24 AM		



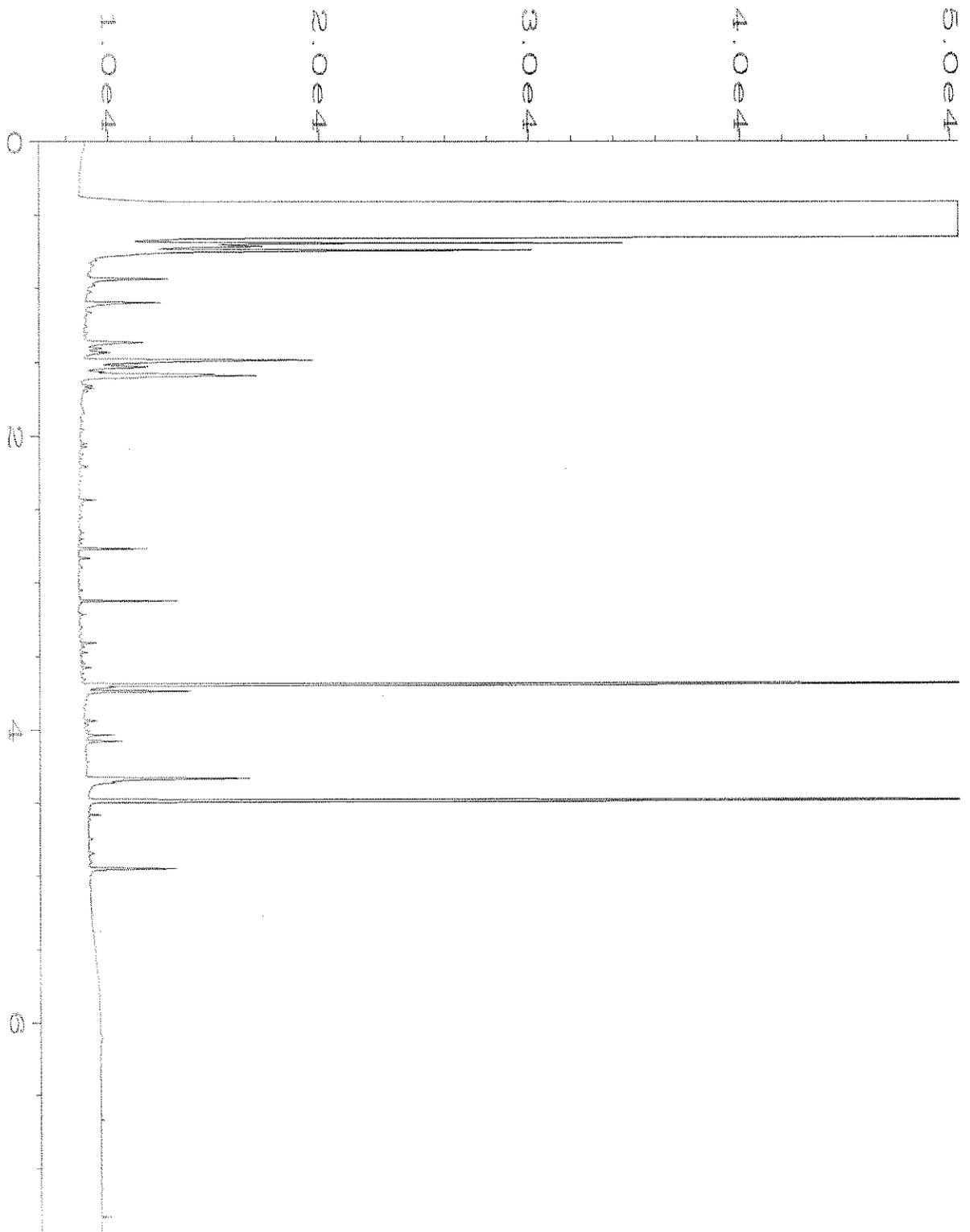
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\053F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 53
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-27	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 10:21 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:24 AM		



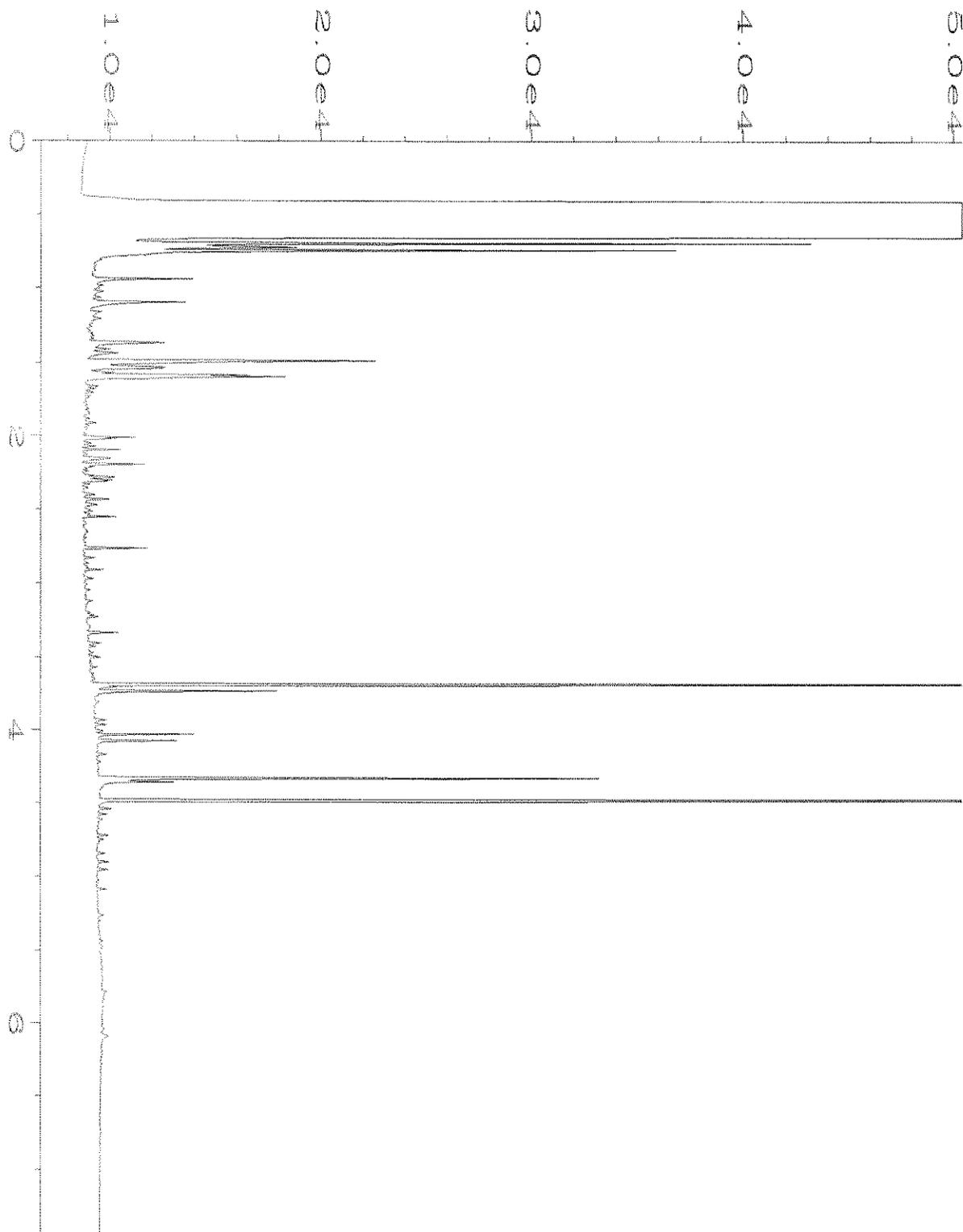
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\054F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 54
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-28	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 10:32 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:24 AM		



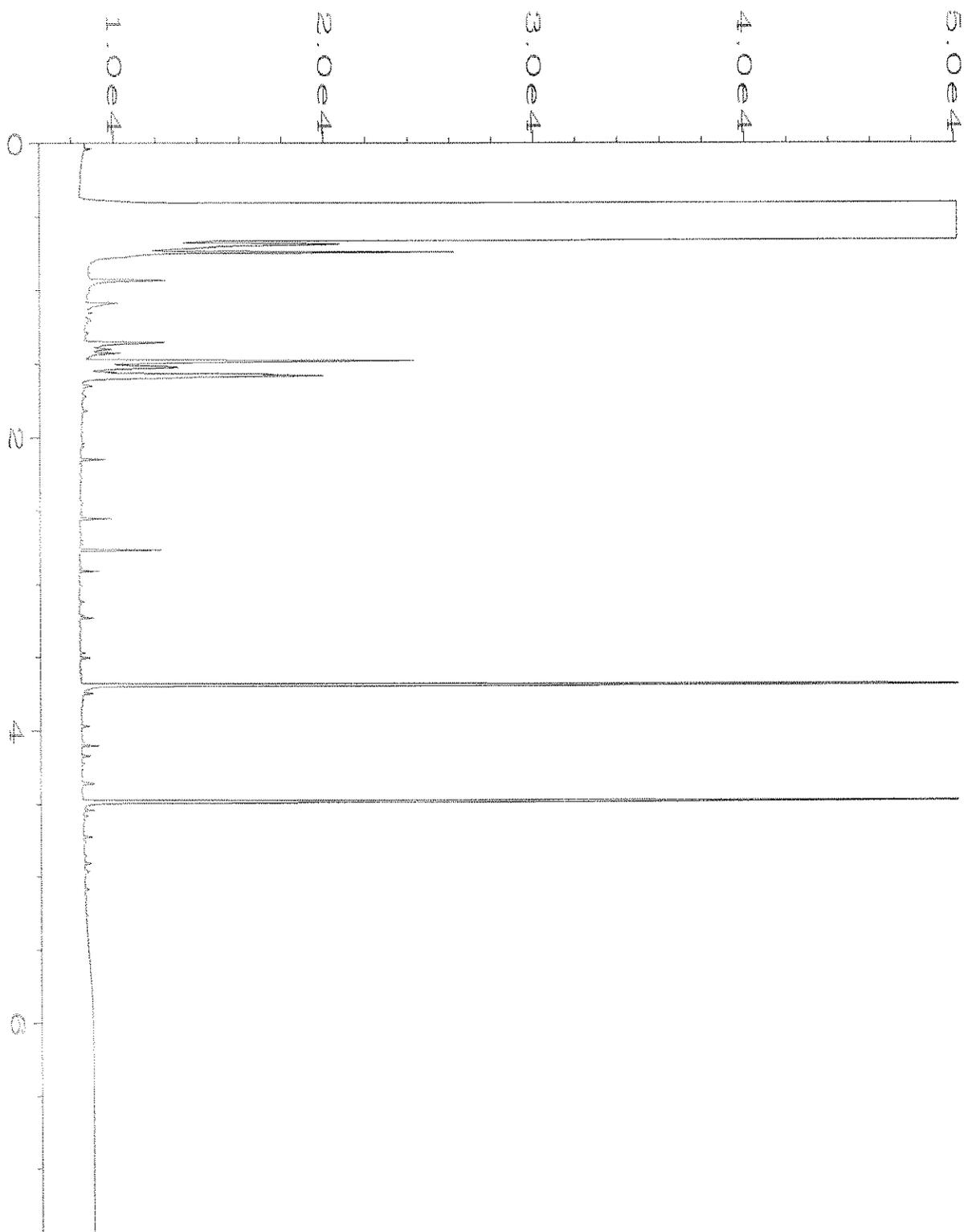
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\055F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 55
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-29	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 10:44 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:24 AM		



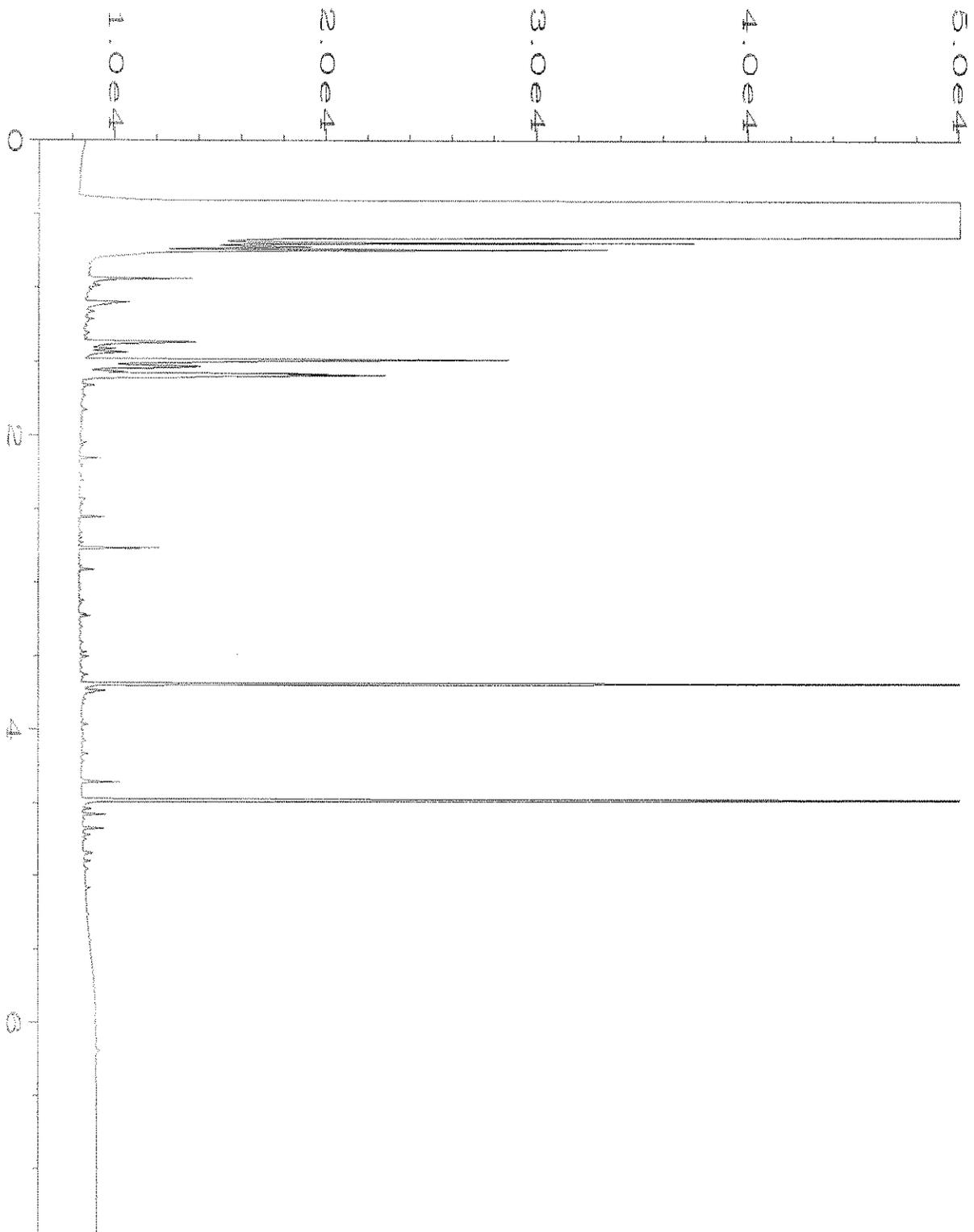
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\056F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 56
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-30	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 10:56 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:25 AM		



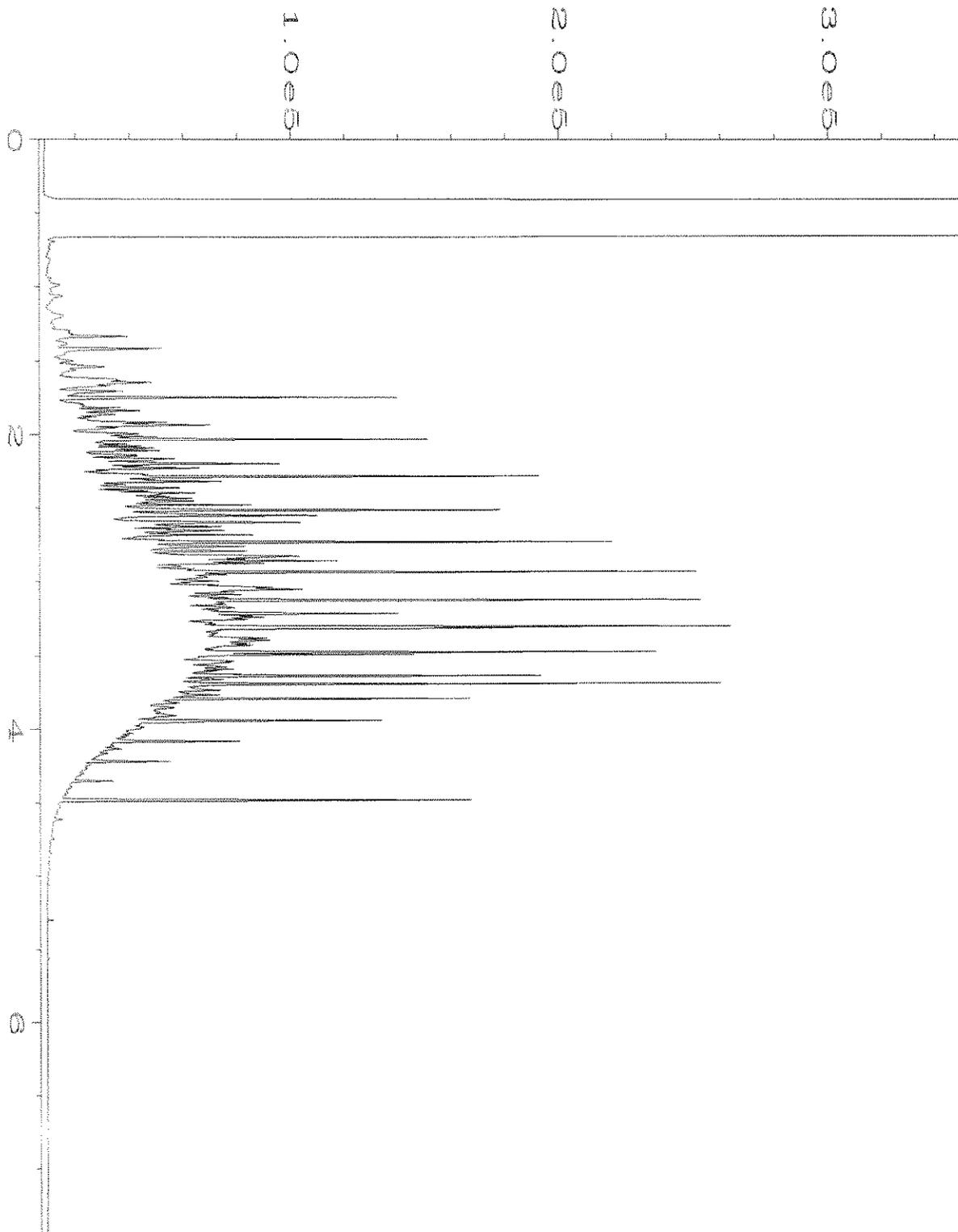
Data File Name	: C:\HPCHEM\1\DATA\11-04-20\057F1001.D	Page Number	: 1
Operator	: TL	Vial Number	: 57
Instrument	: GC1	Injection Number	: 1
Sample Name	: 011055-31	Sequence Line	: 10
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 11:07 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:25 AM		



Data File Name	: C:\HPCHEM\1\DATA\11-04-20\019F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 19
Instrument	: GC1	Injection Number	: 1
Sample Name	: 00-2471 mb	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 02:19 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:25 AM		



Data File Name	: C:\HPCHEM\1\DATA\11-04-20\034F0801.D	Page Number	: 1
Operator	: TL	Vial Number	: 34
Instrument	: GC1	Injection Number	: 1
Sample Name	: 00-2472 mb	Sequence Line	: 8
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 06:15 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:25 AM		



Data File Name	: C:\HPCHEM\1\DATA\11-04-20\005F0501.D	Page Number	: 1
Operator	: TL	Vial Number	: 5
Instrument	: GC1	Injection Number	: 1
Sample Name	: 1000 Dx 61-146C	Sequence Line	: 5
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 04 Nov 20 01:52 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	05 Nov 20 10:18 AM		

011055

SAMPLE CHAIN OF CUSTODY ME 11-03-20 E04/vws

Page # 1 of 4

Report To Megan King & Gabe Cisneros

Company Floyd/Snyder

Address 601 Union St Se 600

City, State, ZIP Seattle, WA

Phone _____ Email _____

SAMPLERS (signature) Sullivan

PROJECT NAME POL-TPH PO # _____

REMARKS _____ INVOICE TO _____

Project specific RLs? - Yes / No

TURNAROUND TIME

Standard turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL

Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED								Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8011	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082				
MW-08-110220	01A-6	11/2	1237	W	7	X	X	X								
MW-10-110220	02	↓	1548	W	7	X	X	X								
MW-31-110220	03	↓	1710	W	7	X	X	X								
MW-35-110220	04	11/3	0820	W	7	X	X	X								
MW-34-110220	05	11/2	1540	W	7	X	X	X								
MW-33-110220	06	↓	1435	W	7	X	X	X								
MW-133-110220	07	↓	1440	W	7	X	X	X								
MW-40-110220	08A-0	↓	1245	W	21	X	X	X								MS/MSD
MW-14-110220	09A-6	↓	1650	W	7	X	X	X								
MW-07-110220	10	↓	1530	W	7	X	X	X								

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>Sullivan</u>	Gabe Cisneros	Floyd/Snyder	11/3	1829
<u>R. J.</u>	BISRA TADDESE	FBI	11/3	1829
Received by:		Samples received at	3 ⁰⁰	

SAMPLE CHAIN OF CUSTODY

ME 11-03-20

EO4/VWS

Report To Megan King & Gabe Cisneros
 Company Floyd/Snyder
 Address 601 Union St. Suite 600
 City, State, ZIP Seattle, WA 98101
 Phone _____ Email gabe.cisneros@floydsnyder.com

SAMPLERS (signature) [Signature]

PROJECT NAME POL-TPH PO # _____

REMARKS Select VOCs include MTBE, EOB, EOC, & Naphth INVOICE TO _____

Page # 2 of 4

TURNAROUND TIME
 Standard Turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Archive Samples
 Other _____

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes		
						TPH-HCID	TPH-Diesel <input checked="" type="checkbox"/>	TPH-Gasoline <input checked="" type="checkbox"/>	BTEX by 8260C	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Total Lead	Lead Dissolved	Lead 6020B		Select VOCs	
MW-26-110220	11A-6	11/2	1458	W	7	/	/	/										
MW-30-110220	12		1641	W	7	/	/	/										
MW-36-110220	13A-		1323	W	21	/	/	/										MS/MSD
MW-37-110220	14A-6		1203	W	7	/	/	/										
MW-38-110220	15		1241	W	7	/	/	/										
T-2-110220	16		1553	W	7	/	/	/										
UST-4-110220	17		1413	W	7	/	/	/										
UST-104-110220	18		1421	W	7	/	/	/										
MW-02-110220	19		1444	W	7	/	/	/										
MW-03-110220	20		1355	W	7	/	/	/										

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Gabe Cisneros	Floyd/Snyder	11/3/20	1829
Received by: <u>[Signature]</u>	Bisrat Tadesse	#31	1	1
Relinquished by:				
Received by:		Samples received at	3	°C

SAMPLE CHAIN OF CUSTODY

ME 11-03 -20 E04/VWS

Report To Megan King & Gabe Cisneros
 Company Floyd/ Snider
 Address 601 Union St. Ste 600
 City, State, ZIP Seattle, WA 98101
 Phone _____ Email _____

SAMPLERS (signature) [Signature]

PROJECT NAME POL-TPH PO # _____

REMARKS Select VOCs include:
MTBE, EDB, EDC, & Naphthalenes INVOICE TO _____

Page # 3 of 4

TURNAROUND TIME
 Standard Turnaround
 RUSH _____
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Archive Samples
 Other _____

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8260B	VOCs by 8260C	SVOCs by 8270D	CPAHs PAHs-8270D SIM	Select VOCs 8260	Total Lead 60008	Dissolved Lead		
MW-15-11022000	21 A-6	11/2	1425	W	7	X	X	X									
MW-39-11022020	22	↓	1250	W	7	X	X	X									
MW-06-11022020	23	↓	1200	W	7	X	X	X									
MW-12-110320	24	11/3/20	1000	GW	7	X	X	X									
MW-17-110320	25		1017		7	X	X	X									
MW-18-110320	26		0918		7	X	X	X									
MW-22-110320	27		0831		7	X	X	X									
MW-23-110320	28		0840		7	X	X	X									
MW-29-110320	29		0933		7	X	X	X									
MW-24-110320	30	↓	0935	↓	7	X	X	X									

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Gabe Cisneros	Floyd/ Snider	11/3	1829
Received by: <u>[Signature]</u>	DISRAT MADASSE	FB1	11/3	1829
Relinquished by:				
Received by:		Samples received at	3	°C

011055

SAMPLE CHAIN OF CUSTODY

ME 11-03-20

EDY/VWS

Report To Megan + Gabe
 Company Floyd Snider
 Address _____
 City, State, ZIP See page 1
 Phone _____ Email _____

SAMPLERS (signature) [Signature]

PROJECT NAME POL-TPH PO # _____

REMARKS _____ INVOICE TO _____

Project specific RLs? - Yes / No _____

Page # 4 of 4

TURNAROUND TIME
 Standard turnaround
 RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
 Archive samples
 Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082						
MW-25-110320	31A-6	11/3/20	1145	GW	7	X	X	X										
[Large diagonal scribble]																		

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>[Signature]</u>	Gabe Cisneros	Floyd Snider	11/3/20	1829
Received by: <u>[Signature]</u>	RISAT JENSEN	FBI	11/3/20	1
Relinquished by: _____	_____	_____	_____	_____
Received by: _____	_____	Samples received at	3	°C



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Floyd | Snider
Gabe Cisneros
601 Union St., Suite 600
Seattle, WA 98101

RE: POL-TPH
Work Order Number: 2011059

November 11, 2020

Attention Gabe Cisneros:

Fremont Analytical, Inc. received 15 sample(s) on 11/4/2020 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Dissolved Metals by EPA Method 200.8
Ion Chromatography by EPA Method 300.0
Total Alkalinity by SM 2320B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

*DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910*

Original



Date: 11/11/2020

CLIENT: Floyd | Snider
Project: POL-TPH
Work Order: 2011059

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2011059-001	MW-30-110220	11/02/2020 4:41 PM	11/04/2020 7:40 AM
2011059-002	MW-10-110220	11/02/2020 3:48 PM	11/04/2020 7:40 AM
2011059-003	MW-31-110220	11/02/2020 5:10 PM	11/04/2020 7:40 AM
2011059-004	MW-35-110220	11/02/2020 5:10 PM	11/04/2020 7:40 AM
2011059-005	MW-14-110220	11/02/2020 4:50 PM	11/04/2020 7:40 AM
2011059-006	MW-12-110320	11/03/2020 10:00 AM	11/04/2020 7:40 AM
2011059-007	MW-17-110320	11/03/2020 10:17 AM	11/04/2020 7:40 AM
2011059-008	MW-18-110320	11/03/2020 9:18 AM	11/04/2020 7:40 AM
2011059-009	MW-22-110320	11/03/2020 8:31 AM	11/04/2020 7:40 AM
2011059-010	MW-23-110320	11/03/2020 8:40 AM	11/04/2020 7:40 AM
2011059-011	MW-123-110320	11/03/2020 9:00 AM	11/04/2020 7:40 AM
2011059-012	MW-24-110320	11/03/2020 9:35 AM	11/04/2020 7:40 AM
2011059-013	MW-25-110320	11/03/2020 11:45 AM	11/04/2020 7:40 AM
2011059-014	MW-29-110320	11/03/2020 9:33 AM	11/04/2020 7:40 AM
2011059-015	Trip Blank	10/26/2020 9:00 AM	11/04/2020 7:40 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Floyd | Snider

Project: POL-TPH

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Floyd | Snider

Collection Date: 11/2/2020 4:41:00 PM

Project: POL-TPH

Lab ID: 2011059-001

Matrix: Groundwater

Client Sample ID: MW-30-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	ND	0.00863		mg/L	1	11/5/2020 3:04:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	57.9	2.50	DH	mg/L	25	11/4/2020 7:25:00 PM
Nitrate (as N)	60.4	1.00	DEQ	mg/L	10	11/4/2020 11:04:00 AM
Sulfate	234	7.50	D	mg/L	25	11/4/2020 7:25:00 PM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

E - Estimated value. The amount exceeds the linear working range of the instrument.

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	492	2.00		µg/L	1	11/5/2020 8:58:14 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO3)	152	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/2/2020 3:48:00 PM

Project: POL-TPH

Lab ID: 2011059-002

Matrix: Groundwater

Client Sample ID: MW-10-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	4.43	0.432	D	mg/L	50	11/5/2020 4:03:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	ND	0.200	DH	mg/L	2	11/4/2020 7:48:00 PM
Nitrate (as N)	ND	1.00	DQ	mg/L	10	11/4/2020 11:27:00 AM
Sulfate	ND	0.600	D	mg/L	2	11/4/2020 7:48:00 PM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria
Diluted due to high levels of non-target analytes.

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	2,340	20.0	D	µg/L	10	11/10/2020 1:24:18 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO3)	132	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/2/2020 5:10:00 PM

Project: POL-TPH

Lab ID: 2011059-003

Matrix: Groundwater

Client Sample ID: MW-31-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	0.0221	0.00863		mg/L	1	11/5/2020 3:06:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	1.51	0.200	DH	mg/L	2	11/4/2020 9:20:00 PM
Nitrate (as N)	1.33	1.00	DQ	mg/L	10	11/4/2020 11:50:00 AM
Sulfate	15.8	0.600	D	mg/L	2	11/4/2020 9:20:00 PM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	2.14	2.00		µg/L	1	11/5/2020 9:09:21 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO ₃)	206	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/2/2020 5:10:00 PM

Project: POL-TPH

Lab ID: 2011059-004

Matrix: Groundwater

Client Sample ID: MW-35-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	0.0167	0.00863		mg/L	1	11/5/2020 3:08:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	5.33	0.500	DH	mg/L	5	11/5/2020 11:31:00 AM
Nitrate (as N)	4.74	1.00	DQ	mg/L	10	11/4/2020 12:13:00 PM
Sulfate	6.67	0.600	D	mg/L	2	11/4/2020 9:43:00 PM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	6.39	2.00		µg/L	1	11/5/2020 9:14:55 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO ₃)	88.2	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/2/2020 4:50:00 PM

Project: POL-TPH

Lab ID: 2011059-005

Matrix: Groundwater

Client Sample ID: MW-14-110220

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	ND	0.00863		mg/L	1	11/5/2020 3:11:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	3.56	0.200	DH	mg/L	2	11/5/2020 12:48:00 AM
Nitrate (as N)	2.87	1.00	DQ	mg/L	10	11/4/2020 12:36:00 PM
Sulfate	28.8	1.50	D	mg/L	5	11/5/2020 11:54:00 AM

NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	18.6	2.00		µg/L	1	11/5/2020 9:20:29 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO ₃)	216	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/3/2020 10:00:00 AM

Project: POL-TPH

Lab ID: 2011059-006

Matrix: Groundwater

Client Sample ID: MW-12-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	10.7	0.863	D	mg/L	100	11/5/2020 4:05:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	ND	0.100		mg/L	1	11/5/2020 1:12:00 AM
Sulfate	0.358	0.300		mg/L	1	11/5/2020 1:12:00 AM

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	19.8	2.00		µg/L	1	11/5/2020 9:26:02 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO ₃)	186	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/3/2020 10:17:00 AM

Project: POL-TPH

Lab ID: 2011059-007

Matrix: Groundwater

Client Sample ID: MW-17-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	ND	0.00863		mg/L	1	11/5/2020 3:17:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	1.98	0.100		mg/L	1	11/5/2020 1:35:00 AM
Sulfate	9.36	0.300		mg/L	1	11/5/2020 1:35:00 AM

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	2.48	2.00		µg/L	1	11/5/2020 9:42:46 PM
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Total Alkalinity by SM 2320B

Batch ID: R63316 Analyst: WF

Alkalinity, Total (As CaCO ₃)	93.1	2.50		mg/L	1	11/9/2020 4:25:33 PM
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Client: Floyd | Snider

Collection Date: 11/3/2020 9:18:00 AM

Project: POL-TPH

Lab ID: 2011059-008

Matrix: Groundwater

Client Sample ID: MW-18-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R63192		Analyst: MS
Methane	0.0185	0.00863		mg/L	1	11/5/2020 3:25:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 30290		Analyst: SS
Nitrate (as N)	1.60	1.00	D	mg/L	10	11/5/2020 2:44:00 AM
Sulfate	7.52	3.00	D	mg/L	10	11/5/2020 2:44:00 AM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 30296		Analyst: CO
Manganese	11.7	2.00		µg/L	1	11/5/2020 9:48:19 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO ₃)	68.6	2.50		mg/L	1	11/11/2020 12:04:59 PM



Client: Floyd | Snider

Collection Date: 11/3/2020 8:31:00 AM

Project: POL-TPH

Lab ID: 2011059-009

Matrix: Groundwater

Client Sample ID: MW-22-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R63192		Analyst: MS
Methane	2.96	0.173	D	mg/L	20	11/5/2020 4:08:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 3:08:00 AM
Nitrate (as N)	ND	0.100	H	mg/L	1	11/5/2020 12:17:00 PM
Sulfate	0.326	0.300		mg/L	1	11/5/2020 12:17:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 30296		Analyst: CO
Manganese	1,090	2.00		µg/L	1	11/5/2020 9:53:53 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO ₃)	157	2.50		mg/L	1	11/11/2020 12:04:59 PM



Client: Floyd | Snider

Collection Date: 11/3/2020 8:40:00 AM

Project: POL-TPH

Lab ID: 2011059-010

Matrix: Groundwater

Client Sample ID: MW-23-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R63192		Analyst: MS
Methane	0.458	0.0863	D	mg/L	10	11/5/2020 3:54:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 3:31:00 AM
Sulfate	13.9	3.00	D	mg/L	10	11/5/2020 3:31:00 AM
NOTES: Diluted due to high levels of non-target analytes.						
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 30296		Analyst: CO
Manganese	3,690	20.0	D	µg/L	10	11/10/2020 1:29:52 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO ₃)	88.2	2.50		mg/L	1	11/11/2020 12:04:59 PM



Client: Floyd | Snider

Collection Date: 11/3/2020 9:00:00 AM

Project: POL-TPH

Lab ID: 2011059-011

Matrix: Groundwater

Client Sample ID: MW-123-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R63192 Analyst: MS

Methane	0.354	0.0863	D	mg/L	10	11/5/2020 3:56:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 30290 Analyst: SS

Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 3:54:00 AM
Sulfate	13.6	3.00	D	mg/L	10	11/5/2020 3:54:00 AM

NOTES:

Diluted due to high levels of non-target analytes.

Dissolved Metals by EPA Method 200.8

Batch ID: 30296 Analyst: CO

Manganese	3,960	20.0	D	µg/L	10	11/10/2020 1:35:26 PM
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Total Alkalinity by SM 2320B

Batch ID: R63317 Analyst: WF

Alkalinity, Total (As CaCO ₃)	103	2.50		mg/L	1	11/11/2020 12:04:59 PM
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Client: Floyd | Snider

Collection Date: 11/3/2020 9:35:00 AM

Project: POL-TPH

Lab ID: 2011059-012

Matrix: Groundwater

Client Sample ID: MW-24-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:35:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 30290		Analyst: SS
Nitrate (as N)	2.29	1.00	D	mg/L	10	11/5/2020 4:17:00 AM
Sulfate	7.63	3.00	D	mg/L	10	11/5/2020 4:17:00 AM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 30296		Analyst: CO
Manganese	3.14	2.00		µg/L	1	11/5/2020 10:10:34 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO ₃)	118	2.50		mg/L	1	11/11/2020 12:04:59 PM



Client: Floyd | Snider

Collection Date: 11/3/2020 11:45:00 AM

Project: POL-TPH

Lab ID: 2011059-013

Matrix: Groundwater

Client Sample ID: MW-25-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R63192		Analyst: MS
Methane	7.33	0.432	D	mg/L	50	11/5/2020 3:59:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 30290		Analyst: SS
Nitrate (as N)	ND	1.00	D	mg/L	10	11/5/2020 4:40:00 AM
Nitrate (as N)	ND	0.100	H	mg/L	1	11/5/2020 12:40:00 PM
Sulfate	0.349	0.300		mg/L	1	11/5/2020 12:40:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 30296		Analyst: CO
Manganese	1,950	2.00		µg/L	1	11/5/2020 10:16:08 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO ₃)	191	2.50		mg/L	1	11/11/2020 12:04:59 PM



Client: Floyd | Snider

Collection Date: 11/3/2020 9:33:00 AM

Project: POL-TPH

Lab ID: 2011059-014

Matrix: Groundwater

Client Sample ID: MW-29-110320

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R63192		Analyst: MS
Methane	ND	0.00863		mg/L	1	11/5/2020 3:41:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 30290		Analyst: SS
Nitrate (as N)	2.06	1.00	D	mg/L	10	11/5/2020 5:03:00 AM
Sulfate	12.9	0.600	D	mg/L	2	11/5/2020 1:03:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 30296		Analyst: CO
Manganese	2.48	2.00		µg/L	1	11/5/2020 10:21:42 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R63317		Analyst: WF
Alkalinity, Total (As CaCO ₃)	63.7	2.50		mg/L	1	11/11/2020 12:04:59 PM

Work Order: 2011059
 CLIENT: Floyd | Snider
 Project: POL-TPH

QC SUMMARY REPORT
Total Alkalinity by SM 2320B

Sample ID: MB-R63316	SampType: MBLK	Units: mg/L	Prep Date: 11/9/2020	RunNo: 63316							
Client ID: MBLKW	Batch ID: R63316		Analysis Date: 11/9/2020	SeqNo: 1270833							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) ND 2.50

Sample ID: LCS-R63316	SampType: LCS	Units: mg/L	Prep Date: 11/9/2020	RunNo: 63316							
Client ID: LCSW	Batch ID: R63316		Analysis Date: 11/9/2020	SeqNo: 1270834							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) 102 2.50 100.0 0 102 99.6 108

Sample ID: 2011059-001CDUP	SampType: DUP	Units: mg/L	Prep Date: 11/9/2020	RunNo: 63316							
Client ID: MW-30-110220	Batch ID: R63316		Analysis Date: 11/9/2020	SeqNo: 1270836							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) 157 2.50 151.9 3.17 20

Sample ID: MB-R63317	SampType: MBLK	Units: mg/L	Prep Date: 11/11/2020	RunNo: 63317							
Client ID: MBLKW	Batch ID: R63317		Analysis Date: 11/11/2020	SeqNo: 1270844							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) ND 2.50

Sample ID: LCS-R63317	SampType: LCS	Units: mg/L	Prep Date: 11/11/2020	RunNo: 63317							
Client ID: LCSW	Batch ID: R63317		Analysis Date: 11/11/2020	SeqNo: 1270845							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) 102 2.50 100.0 0 102 99.6 108

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT
Total Alkalinity by SM 2320B

Sample ID: 2011059-008CDUP	SampType: DUP	Units: mg/L	Prep Date: 11/11/2020	RunNo: 63317							
Client ID: MW-18-110320	Batch ID: R63317	Analysis Date: 11/11/2020	SeqNo: 1270847								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	73.5	2.50						68.60	6.90	20	

Work Order: 2011059
 CLIENT: Floyd | Snider
 Project: POL-TPH

QC SUMMARY REPORT
 Ion Chromatography by EPA Method 300.0

Sample ID: MB-30289	SampType: MBLK	Units: mg/L			Prep Date: 11/4/2020	RunNo: 63239					
Client ID: MBLKW	Batch ID: 30289				Analysis Date: 11/4/2020	SeqNo: 1269089					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	ND	0.100									Q
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NOTES:

Q - Indicates an analyte with a continuing calibration that does not meet established acceptance criteria

Sample ID: LCS-30289	SampType: LCS	Units: mg/L			Prep Date: 11/4/2020	RunNo: 63239					
Client ID: LCSW	Batch ID: 30289				Analysis Date: 11/4/2020	SeqNo: 1269090					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	0.677	0.100	0.7500	0	90.3	90	110				
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Sample ID: LCS-30290	SampType: LCS	Units: mg/L			Prep Date: 11/4/2020	RunNo: 63240					
Client ID: LCSW	Batch ID: 30290				Analysis Date: 11/4/2020	SeqNo: 1269137					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	0.708	0.100	0.7500	0	94.4	90	110				
Sulfate	3.58	0.300	3.750	0	95.4	90	110				

Sample ID: MB-30290	SampType: MBLK	Units: mg/L			Prep Date: 11/4/2020	RunNo: 63240					
Client ID: MBLKW	Batch ID: 30290				Analysis Date: 11/4/2020	SeqNo: 1269139					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	ND	0.100									
Sulfate	ND	0.300									

Sample ID: 2011059-002CDUP	SampType: DUP	Units: mg/L			Prep Date: 11/4/2020	RunNo: 63240					
Client ID: MW-10-110220	Batch ID: 30290				Analysis Date: 11/4/2020	SeqNo: 1269142					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	ND	0.200						0		20	DH
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Work Order: 2011059
 CLIENT: Floyd | Snider
 Project: POL-TPH

QC SUMMARY REPORT
Ion Chromatography by EPA Method 300.0

Sample ID: 2011059-002CDUP	SampType: DUP	Units: mg/L				Prep Date: 11/4/2020	RunNo: 63240					
Client ID: MW-10-110220	Batch ID: 30290					Analysis Date: 11/4/2020	SeqNo: 1269142					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	ND	0.600						0		20	D	

Sample ID: 2011059-002CMS	SampType: MS	Units: mg/L				Prep Date: 11/4/2020	RunNo: 63240					
Client ID: MW-10-110220	Batch ID: 30290					Analysis Date: 11/4/2020	SeqNo: 1269143					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Nitrate (as N)	1.45	0.200	1.500	0	96.4	80	120				DH	
Sulfate	7.15	0.600	7.500	0.5860	87.5	80	120				D	

Sample ID: 2011059-002CMSD	SampType: MSD	Units: mg/L				Prep Date: 11/4/2020	RunNo: 63240					
Client ID: MW-10-110220	Batch ID: 30290					Analysis Date: 11/4/2020	SeqNo: 1269144					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Nitrate (as N)	1.43	0.200	1.500	0	95.6	80	120	1.446	0.833	20	DH	
Sulfate	7.10	0.600	7.500	0.5860	86.9	80	120	7.150	0.645	20	D	

Sample ID: 2011061-002ADUP	SampType: DUP	Units: mg/L				Prep Date: 11/4/2020	RunNo: 63240					
Client ID: BATCH	Batch ID: 30290					Analysis Date: 11/4/2020	SeqNo: 1269151					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Nitrate (as N)	0.224	0.100						0.2270	1.33	20		
Sulfate	2.56	0.300						2.555	0.235	20		

Sample ID: 2011061-002AMS	SampType: MS	Units: mg/L				Prep Date: 11/4/2020	RunNo: 63240					
Client ID: BATCH	Batch ID: 30290					Analysis Date: 11/5/2020	SeqNo: 1269152					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Nitrate (as N)	0.962	0.100	0.7500	0.2270	98.0	80	120					

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT
Ion Chromatography by EPA Method 300.0

Sample ID: 2011061-002AMS	SampType: MS	Units: mg/L	Prep Date: 11/4/2020	RunNo: 63240							
Client ID: BATCH	Batch ID: 30290		Analysis Date: 11/5/2020	SeqNo: 1269152							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	6.64	0.300	3.750	2.555	109	80	120				

Work Order: 2011059
 CLIENT: Floyd | Snider
 Project: POL-TPH

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID: MB-30296	SampType: MBLK	Units: µg/L	Prep Date: 11/5/2020	RunNo: 63216							
Client ID: MBLKW	Batch ID: 30296	Analysis Date: 11/5/2020	SeqNo: 1268588								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese ND 2.00

Sample ID: MB-30280FB	SampType: MBLK	Units: µg/L	Prep Date: 11/5/2020	RunNo: 63216							
Client ID: MBLKW	Batch ID: 30296	Analysis Date: 11/5/2020	SeqNo: 1268590								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese ND 2.00

NOTES:
 Filter Blank

Sample ID: 2011057-001BDUP	SampType: DUP	Units: µg/L	Prep Date: 11/5/2020	RunNo: 63216							
Client ID: BATCH	Batch ID: 30296	Analysis Date: 11/5/2020	SeqNo: 1268592								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese 9.34 2.00 9.420 0.805 30

Sample ID: 2011057-001BMS	SampType: MS	Units: µg/L	Prep Date: 11/5/2020	RunNo: 63216							
Client ID: BATCH	Batch ID: 30296	Analysis Date: 11/5/2020	SeqNo: 1268593								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese 567 2.00 500.0 9.420 112 70 130

Sample ID: 2011057-001BMSD	SampType: MSD	Units: µg/L	Prep Date: 11/5/2020	RunNo: 63216							
Client ID: BATCH	Batch ID: 30296	Analysis Date: 11/5/2020	SeqNo: 1268594								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese 560 2.00 500.0 9.420 110 70 130 567.0 1.26 30

Work Order: 2011059
CLIENT: Floyd | Snider
Project: POL-TPH

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID: LCS-30296	SampType: LCS	Units: µg/L	Prep Date: 11/5/2020	RunNo: 63216							
Client ID: LCSW	Batch ID: 30296		Analysis Date: 11/10/2020	SeqNo: 1269833							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Manganese	103	2.00	100.0	0	103	85	115				

Work Order: 2011059
 CLIENT: Floyd | Snider
 Project: POL-TPH

QC SUMMARY REPORT
Dissolved Gases by RSK-175

Sample ID: LCS-R63192	SampType: LCS	Units: mg/L			Prep Date: 11/5/2020	RunNo: 63192					
Client ID: LCSW	Batch ID: R63192				Analysis Date: 11/5/2020	SeqNo: 1268280					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane 1,060 0.00863 1,000 0 106 70 130

Sample ID: MB-R63192	SampType: MBLK	Units: mg/L			Prep Date: 11/5/2020	RunNo: 63192					
Client ID: MBLKW	Batch ID: R63192				Analysis Date: 11/5/2020	SeqNo: 1268281					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane ND 0.00863

Sample ID: 2011059-002AREP	SampType: REP	Units: mg/L			Prep Date: 11/5/2020	RunNo: 63192					
Client ID: MW-10-110220	Batch ID: R63192				Analysis Date: 11/5/2020	SeqNo: 1268257					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane 6.23 0.00863 6.779 8.47 30 E

NOTES:

E - Estimated value. The amount exceeds the linear working range of the instrument.

Client Name: **FS**
 Logged by: **Clare Griggs**

Work Order Number: **2011059**
 Date Received: **11/4/2020 7:40:00 AM**

Chain of Custody

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

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not Present
 6. Was an attempt made to cool the samples? Yes No NA
 7. Were all items received at a temperature of >2°C to 6°C * Yes No NA
 8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Sample 1	5.2
Sample 2	2.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 11/3/20 Page: 2 of: 2

Laboratory Project No (internal): 2011059

Project Name: POL-TPH

Special Remarks:
Lab Filter dissolved metals
Methane by RSK-175
Alkalinity by SM 2320B

Client: Floyd Snider

Project No:

Address: See Page 1

Collected by:

City, State, Zip:

Location:

Telephone:

Report To (PM): see pag 1

Sample Disposal: Return to client Disposal by lab (after 30 days)

Fax:

PM Email:

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytical Parameters											Comments		
				VOCs (EPA 8260 / 624)	GX/BTEX	<u>Methane</u>	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DHO)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 8020 / 200.8)	Total (T) Dissolved (D)		Anions (IC*** (EPA 8011))	EDB (8011)
1 MW-123-110320	11/3	0900	GW		X							X	D	X	X		4
2 MW-24-110320	↓	0935	↓		X							X	D	X	X		4
3 MW-25-110320	↓	1145	↓		X							X	D	X	X		4
4 MW-29-110320	↓	0933	↓		X							X	D	X	X		4
5																	
6																	
7																	
8																	
9																	
10																	

*Matrix: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

**Metals (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished Date/Time
x Tyler Scott 11/3/20 18:41

Relinquished Date/Time
x

Received Date/Time
x Gavin Anderson 11/4/20 0740

Received Date/Time
x

Turn-around Time:
 Standard
 3 Day
 2 Day
 Next Day
Same Day _____ (specify)

Page 29 of 29

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

March 4, 2021

Megan King, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Ms King:

Included are the results from the testing of material submitted on February 24, 2021 from the POL-TPH, F&BI 102393 project. There are 57 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Gabriel Cisneros
FDS0304R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on February 24, 2020 by Friedman & Bruya, Inc. from the Floyd-Snider POL-TPH, F&BI 102393 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Floyd-Snider</u>
102393 -01	MW-37-022321
102393 -02	MW-38-022321
102393 -03	MW-36-022321
102393 -04	UST-04-022321
102393 -05	MW-26-022321
102393 -06	MW-24-022321
102393 -07	MW-06-022321
102393 -08	MW-39-022321
102393 -09	MW-25-022321
102393 -10	MW-20-022321
102393 -11	MW-10-022321
102393 -12	MW-03-022321
102393 -13	MW-103-022321
102393 -14	T-2-022321
102393 -15	MW-31-022321
102393 -16	MW-15-022321
102393 -17	MW-02-022321
102393 -18	MW-08-022321
102393 -19	MW-12-022321
102393 -20	MW-04-022421
102393 -21	MW-35-022421
102393 -22	MW-28-022421
102393 -23	MW-07-022421
102393 -24	MW-135-022421
102393 -25	MW-30-022421
102393 -26	MW-18-022421
102393 -27	MW-40-022421
102393 -28	MW-23-022421
102393 -29	MW-22-022421
102393 -30	MW-17-022421
102393 -31	MW-29-022421
102393 -32	MW-34-022421
102393 -33	MW-14-022421
102393 -34	MW-33-022421
102393 -35	MW-05-022421

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
MW-37-022321 102393-01	260	97
MW-38-022321 102393-02	<100	95
MW-36-022321 102393-03	<100	89
UST-04-022321 102393-04	<100	91
MW-26-022321 102393-05	<100	90
MW-24-022321 102393-06	<100	89
MW-06-022321 102393-07	<100	88
MW-39-022321 102393-08	500	100
MW-25-022321 102393-09	<100	92
MW-20-022321 102393-10	2,600	125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-G_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
MW-10-022321 102393-11	5,800	100
MW-03-022321 102393-12	950	95
MW-103-022321 102393-13	870	93
T-2-022321 102393-14	<100	90
MW-31-022321 102393-15	<100	90
MW-15-022321 102393-16	<100	89
MW-02-022321 102393-17	<100	92
MW-08-022321 102393-18	2,900	87
MW-12-022321 102393-19	4,900	89
MW-04-022421 102393-20	<100	90

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-G_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
MW-35-022421 102393-21	<100	91
MW-28-022421 102393-22	<100	88
MW-07-022421 102393-23	490	100
MW-135-022421 102393-24	<100	91
MW-30-022421 102393-25	<100	90
MW-18-022421 102393-26	<100	90
MW-40-022421 102393-27	2,300	85
MW-23-022421 102393-28	<100	91
MW-22-022421 102393-29	<100	91
MW-17-022421 102393-30	<100	91

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21
Date Analyzed: 02/26/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-G_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
MW-29-022421 102393-31	<100	90
MW-34-022421 102393-32	<100	94
MW-14-022421 102393-33	<100	90
MW-33-022421 102393-34	190	91
MW-05-022421 102393-35	<100	91
Method Blank 01-350 MB	<100	89
Method Blank 01-351 MB	<100	89

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
 Date Received: 02/24/21
 Project: POL-TPH, F&BI 102393
 Date Extracted: 02/25/21 and 03/01/21
 Date Analyzed: 02/25/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
 FOR TOTAL PETROLEUM HYDROCARBONS AS
 DIESEL AND MOTOR OIL
 USING METHOD NWTPH-D_x
 Results Reported as ug/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
MW-37-022321 102393-01	63 x	<250	55
MW-38-022321 102393-02	<50	<250	110
MW-36-022321 102393-03	<50	<250	101
UST-04-022321 102393-04	87 x	290 x	100
MW-26-022321 102393-05	<50	<250	108
MW-24-022321 102393-06	<50	<250	100
MW-06-022321 102393-07	630 x	<250	110
MW-39-022321 102393-08	4,800 x	800 x	97
MW-25-022321 102393-09	<50	<250	98
MW-20-022321 102393-10	1,000 x	490 x	98

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
MW-10-022321 102393-11	1,600 x	<250	92
MW-03-022321 102393-12	1,200 x	550 x	92
MW-103-022321 102393-13	1,200 x	550 x	99
T-2-022321 102393-14	54 x	<250	104
MW-31-022321 102393-15	<50	<250	102
MW-15-022321 102393-16	54 x	<250	82
MW-02-022321 102393-17	110 x	<250	102
MW-08-022321 102393-18	2,200 x	480 x	105
MW-12-022321 102393-19	1,100 x	<250	111
MW-04-022421 102393-20	520 x	440 x	112

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
MW-35-022421 102393-21	470 x	<250	92
MW-28-022421 102393-22	1,200 x	680 x	94
MW-07-022421 102393-23	590	<250	96
MW-135-022421 102393-24	520 x	270 x	103
MW-30-022421 102393-25	940 x	550 x	110
MW-18-022421 102393-26	<50	<250	104
MW-40-022421 102393-27	2,500	290 x	108
MW-23-022421 102393-28	<50	<250	104
MW-22-022421 102393-29	<50	<250	104
MW-17-022421 102393-30	53 x	<250	106

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21
Date Received: 02/24/21
Project: POL-TPH, F&BI 102393
Date Extracted: 02/25/21 and 03/01/21
Date Analyzed: 02/25/21 and 03/01/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Diesel Range</u> (C ₁₀ -C ₂₅)	<u>Motor Oil Range</u> (C ₂₅ -C ₃₆)	<u>Surrogate</u> (% Recovery) (Limit 41-152)
MW-29-022421 102393-31	<50	<250	111
MW-34-022421 102393-32	1,500 x	310 x	109
MW-14-022421 102393-33	<50	<250	84
MW-33-022421 102393-34	830 x	<220	92
MW-05-022421 102393-35	790 x	520 x	94
Method Blank 01-498 MB	<50	<250	96
Method Blank 01-499 MB	<50	<250	103
Method Blank 01-512 MB	<50	<250	106

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-37-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-01
Date Analyzed:	02/25/21	Data File:	022510.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	3.7
m,p-Xylene	2.7
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-38-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-02
Date Analyzed:	02/25/21	Data File:	022511.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-36-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-03
Date Analyzed:	02/25/21	Data File:	022512.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	UST-04-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-04
Date Analyzed:	02/25/21	Data File:	022513.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	99	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-26-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-05
Date Analyzed:	02/25/21	Data File:	022515.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	94	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-24-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-06
Date Analyzed:	02/25/21	Data File:	022516.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-06-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-07
Date Analyzed:	02/25/21	Data File:	022517.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-39-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-08
Date Analyzed:	02/25/21	Data File:	022518.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-25-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-09
Date Analyzed:	02/25/21	Data File:	022519.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-20-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-10
Date Analyzed:	02/25/21	Data File:	022520.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	109	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	0.86
Toluene	1.8
Ethylbenzene	4.3
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-11
Date Analyzed:	02/26/21	Data File:	022611.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	106	88	114
4-Bromofluorobenzene	107	88	112

Compounds:	Concentration ug/L (ppb)
Toluene	31
Ethylbenzene	68
m,p-Xylene	45
o-Xylene	1.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-10-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-11 1/10
Date Analyzed:	02/25/21	Data File:	022521.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	180

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-03-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-12
Date Analyzed:	02/25/21	Data File:	022522.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	0.88
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-103-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-13
Date Analyzed:	02/25/21	Data File:	022523.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	0.89
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	T-2-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-14
Date Analyzed:	02/25/21	Data File:	022524.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-31-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-15
Date Analyzed:	02/25/21	Data File:	022525.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-15-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-16
Date Analyzed:	02/25/21	Data File:	022540.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-02-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-17
Date Analyzed:	02/25/21	Data File:	022541.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-08-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-18
Date Analyzed:	02/25/21	Data File:	022542.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	109	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	1.1
Toluene	1.9
Ethylbenzene	<1
m,p-Xylene	2.3
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-19
Date Analyzed:	02/26/21	Data File:	022612.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	104	88	114
4-Bromofluorobenzene	103	88	112

Compounds:	Concentration ug/L (ppb)
Toluene	23
Ethylbenzene	36
m,p-Xylene	38
o-Xylene	1.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-12-022321	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-19 1/10
Date Analyzed:	02/25/21	Data File:	022543.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	180

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-04-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-20
Date Analyzed:	02/25/21	Data File:	022544.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-35-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-21
Date Analyzed:	02/25/21	Data File:	022545.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-28-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-22
Date Analyzed:	02/26/21	Data File:	022546.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-07-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-23
Date Analyzed:	02/26/21	Data File:	022547.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	100	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-135-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-24
Date Analyzed:	02/26/21	Data File:	022548.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-30-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-25
Date Analyzed:	02/26/21	Data File:	022549.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-18-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-26
Date Analyzed:	02/26/21	Data File:	022550.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-27
Date Analyzed:	02/26/21	Data File:	022613.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Toluene	9.7
Ethylbenzene	2.6
m,p-Xylene	4.5
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-40-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-27 1/10
Date Analyzed:	02/26/21	Data File:	022551.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	96	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	200

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-23-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/26/21	Lab ID:	102393-28
Date Analyzed:	02/26/21	Data File:	022614.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	102	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-22-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-29
Date Analyzed:	02/26/21	Data File:	022553.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	95	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-17-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-30
Date Analyzed:	02/26/21	Data File:	022554.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-29-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-31
Date Analyzed:	02/26/21	Data File:	022555.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-34-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-32
Date Analyzed:	02/26/21	Data File:	022556.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-14-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-33
Date Analyzed:	02/26/21	Data File:	022557.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	99	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-33-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-34
Date Analyzed:	02/26/21	Data File:	022558.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	98	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	MW-05-022421	Client:	Floyd-Snider
Date Received:	02/24/21	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	102393-35
Date Analyzed:	02/26/21	Data File:	022559.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	86	113
Toluene-d8	103	88	114
4-Bromofluorobenzene	94	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	01-435 mb
Date Analyzed:	02/25/21	Data File:	022508.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	86	113
Toluene-d8	100	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	POL-TPH, F&BI 102393
Date Extracted:	02/25/21	Lab ID:	01-441 mb
Date Analyzed:	02/25/21	Data File:	022539.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	86	113
Toluene-d8	101	88	114
4-Bromofluorobenzene	97	88	112

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-Gx**

Laboratory Code: 102393-17 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	91	99	53-117	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	104	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TPH AS GASOLINE
USING METHOD NWTPH-G_x**

Laboratory Code: 102393-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Gasoline	ug/L (ppb)	1,000	<100	94	97	53-117	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	97	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 102393-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	300	87	98	50-150	12

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	106	63-142

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: 102393-17 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	<50	89	88	50-150	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	ug/L (ppb)	2,500	93	63-142

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL EXTENDED USING METHOD NWTPH-D_x**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	82	82	63-142	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 102393-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	102	99	57-135	3
Toluene	ug/L (ppb)	10	<1	98	97	50-137	1
Ethylbenzene	ug/L (ppb)	10	<1	99	97	60-133	2
m,p-Xylene	ug/L (ppb)	20	<2	101	99	69-135	2
o-Xylene	ug/L (ppb)	10	<1	101	97	60-140	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	96	99	69-134	3
Toluene	ug/L (ppb)	10	93	97	72-122	4
Ethylbenzene	ug/L (ppb)	10	93	96	77-124	3
m,p-Xylene	ug/L (ppb)	20	95	98	81-112	3
o-Xylene	ug/L (ppb)	10	96	98	81-121	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/04/21

Date Received: 02/24/21

Project: POL-TPH, F&BI 102393

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 102393-17 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	<0.35	100	99	57-135	1
Toluene	ug/L (ppb)	10	<1	96	95	50-137	1
Ethylbenzene	ug/L (ppb)	10	<1	95	95	60-133	0
m,p-Xylene	ug/L (ppb)	20	<2	97	98	69-135	1
o-Xylene	ug/L (ppb)	10	<1	97	98	60-140	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	ug/L (ppb)	10	94	93	69-134	1
Toluene	ug/L (ppb)	10	93	93	72-122	0
Ethylbenzene	ug/L (ppb)	10	93	92	77-124	1
m,p-Xylene	ug/L (ppb)	20	94	94	81-112	0
o-Xylene	ug/L (ppb)	10	94	92	81-121	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

- a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.
- b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.
- ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
- c - The presence of the analyte may be due to carryover from previous sample injections.
- cf - The sample was centrifuged prior to analysis.
- d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.
- dv - Insufficient sample volume was available to achieve normal reporting limits.
- f - The sample was laboratory filtered prior to analysis.
- fb - The analyte was detected in the method blank.
- fc - The analyte is a common laboratory and field contaminant.
- hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.
- hs - Headspace was present in the container used for analysis.
- ht - The analysis was performed outside the method or client-specified holding time requirement.
- ip - Recovery fell outside of control limits due to sample matrix effects.
- j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.
- J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
- jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
- js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.
- lc - The presence of the analyte is likely due to laboratory contamination.
- L - The reported concentration was generated from a library search.
- nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.
- pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.
- ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
- vo - The value reported fell outside the control limits established for this analyte.
- x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

102393

SAMPLE CHAIN OF CUSTODY

ME 02-24-21

VWS/ 2 E04 4
Page # 2 of 4

Report To Megan King / Gabe Cisneros
Company 601 Union St. Suite 600
Address Floyd/Snyder
City, State, ZIP Seattle, WA
Phone 206-292-2078 Email _____

SAMPLERS (signature)	
PROJECT NAME <u>POL-TPH</u>	PO #
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME	
<input checked="" type="checkbox"/> Standard turnaround	
<input type="checkbox"/> RUSH	
Rush charges authorized by: _____	
SAMPLE DISPOSAL	
<input type="checkbox"/> Archive samples	
<input type="checkbox"/> Other _____	
Default: Dispose after 30 days	

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes		
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8260	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCEs EPA 8082						
MW-10-022321	11 A-G	2/23	1535	W	7	X	X	X										
MW-03-022321	12		1430	W	7	X	X	X										
MW-103-022321	13		1440	W	7	X	X	X										
T-2-022321	14		1300	W	7	X	X	X										
MW-31-022321	15		1510	W	7	X	X	X										
MW-15-022321	16		1650	W	7	X	X	X										
MW-02-022321	17 A-U		1300	W	7	X	X	X										21 Jars for MS/MSD
MW-08-022321	18 A-G		1630	W	7	X	X	X										
MW-12-022321	19	2/23/21	1659	W	7	X	X	X										
MW-04-022421	20	2/24/21	0817	W	7	X	X	X										

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Nathan Shuchman	Floyd/Snyder	2/24/21	1542
Received by:	Khori Hoang	FBI	2/24/21	1542
Relinquished by:				
Received by:		Samples received at <u>3°C</u>		

SAMPLE CHAIN OF CUSTODY ¹⁰⁰⁰ ME 02-24-21 VWS/E04

Page # 3 of 4

102893
 Report To Megan King/Gabe Cisneros
 Company 601 Union St. Suite 600
 Address Floyd/Snyder
 City, State, ZIP Seattle WA
 Phone 206-292-2028 Email _____

SAMPLERS (signature)	
PROJECT NAME <u>POL-TPH</u>	PO #
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME <input checked="" type="checkbox"/> Standard turnaround <input type="checkbox"/> RUSH Rush charges authorized by: _____
SAMPLE DISPOSAL <input type="checkbox"/> Archive samples <input type="checkbox"/> Other <input checked="" type="checkbox"/> <u>Default</u> Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8082	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082					
MW-35-022421	21 A-9	2/24/21	0825	Water	7	X	X	X									
MW-28-022421	22	2/24/21	0830		7	X	X	X									
MW-07-022421	23	2/24/21	0835		7	X	X	X									
MW-135-022421	24	2/24/21	0835		7	X	X	X									
MW-30-022421	25	2/24/21	0857		7	X	X	X									
MW-18-022421	26	2/24/21	0931		7	X	X	X									
MW-40-022421	27	2/24/21	0935		7	X	X	X									
MW-23-022421	28	2/24/21	0950		7	X	X	X									
MW-22-022421	29	2/24/21	0955		7	X	X	X									
MW-17-022421	30 ↓	2/24/21	1043		7	X	X	X									

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Nathan Schuchman	Floyd/Snyder	2/24/21	1542
Received by:	Khoi Hoang	FBI	2/24/21	1542
Relinquished by:				
Received by:		Samples received at <u>3</u> °C		

102393

SAMPLE CHAIN OF CUSTODY 02-24-21

vw5/604 Page # 4 of 4

Report To Megan King/Gabe Cisneros
Company Floyd/Snyder
Address 601 Union St. Suite 600
City, State, ZIP Seattle, WA
Phone 206-292-2078 Email

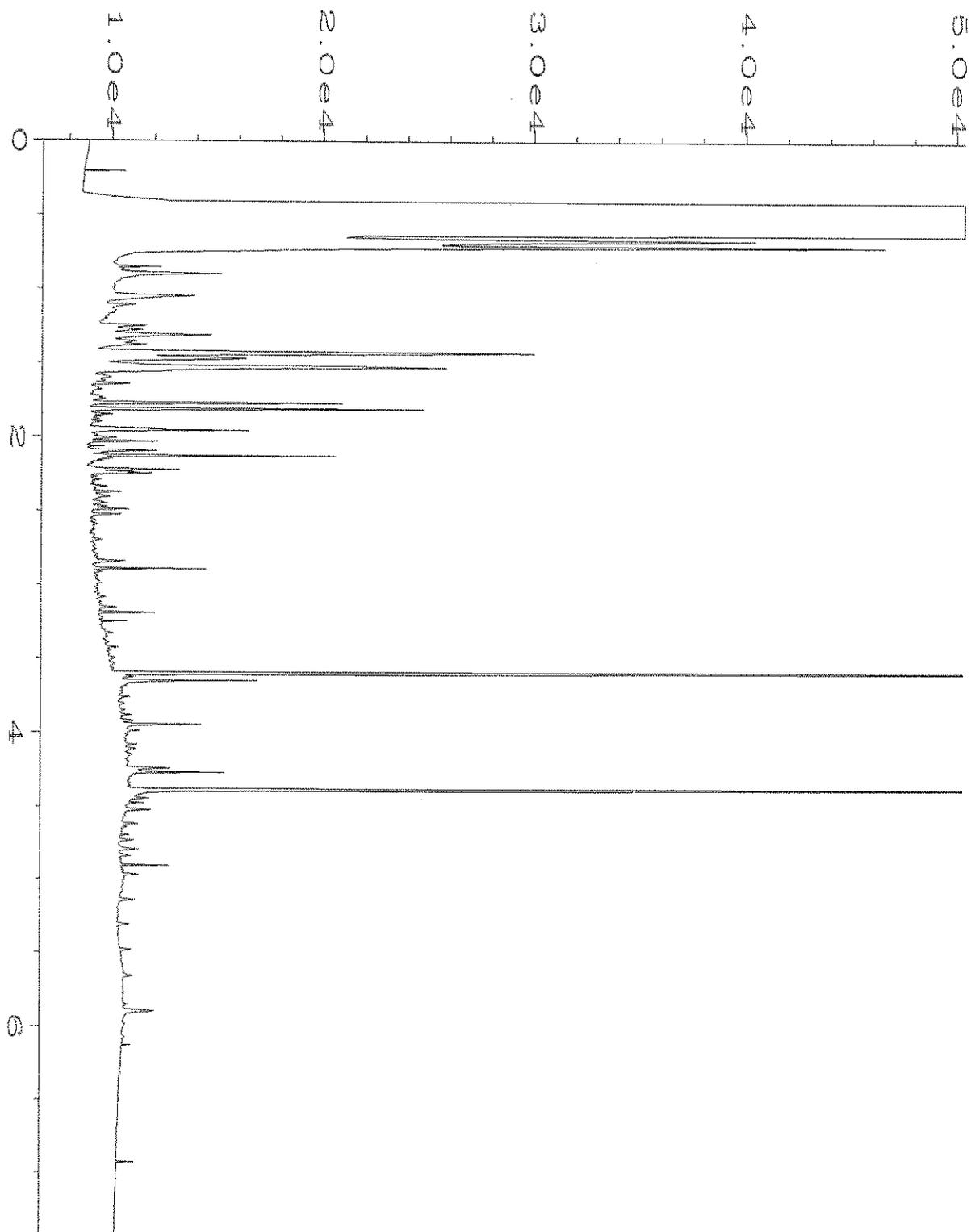
SAMPLERS (signature)	
PROJECT NAME POL-TPH	PO #
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME	
<input checked="" type="checkbox"/> Standard turnaround	
<input type="checkbox"/> RUSH	
Rush charges authorized by:	
SAMPLE DISPOSAL	
<input type="checkbox"/> Archive samples	
<input type="checkbox"/> Other	
<input checked="" type="checkbox"/> Default	Dispose after 30 days

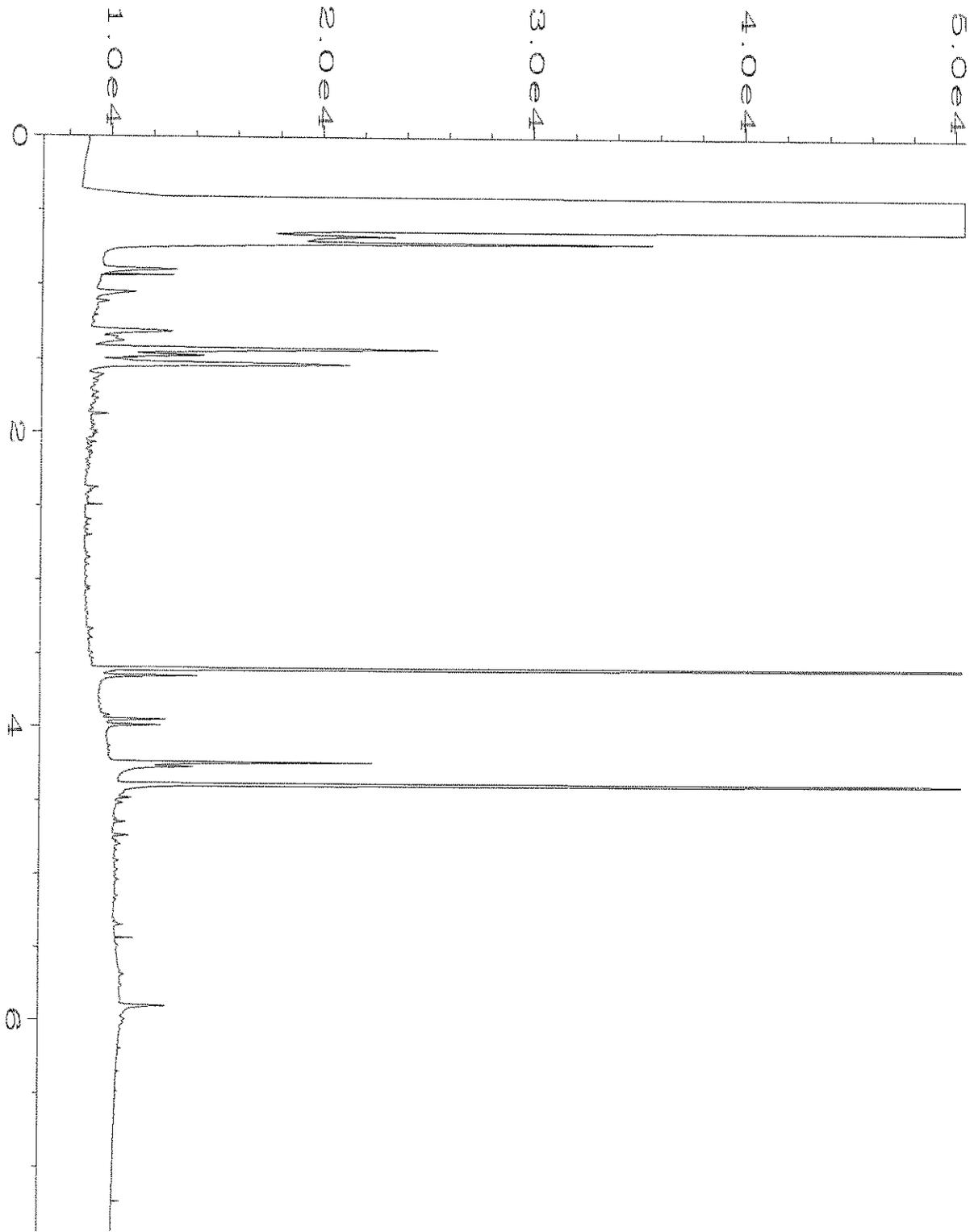
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED							Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA-8081	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082		
MW-29-022421	31 A-b	2/24/21	1051	Water	7	X	X	X						
MW-34-022421	32	2/24/21	1100		7	X	X	X						
MW-14-022421	33	2/24/21	1140		7	X	X	X						
MW-33-022421	34	2/24/21	1142		7	X	X	X						
MW-05-022421	35 v	2/24/21	1155	v	7	X	X	X						

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

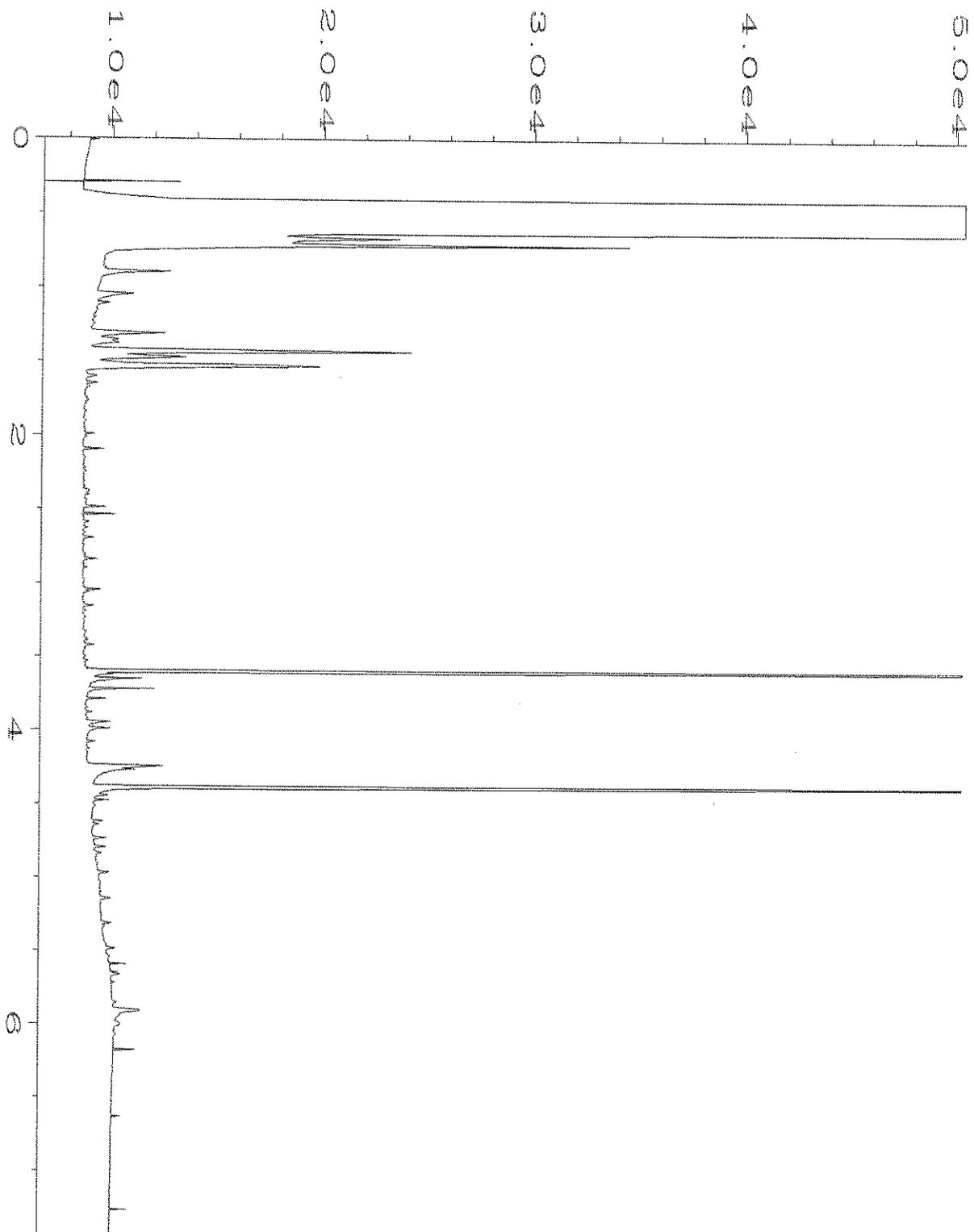
SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
	Nathan Schachtman	Floyd/Snyder	2/24/21	1542
	Khoi Hoang	FBI	2/24/21	1542
Relinquished by:				
Received by:				
Relinquished by:				
Received by:		Samples received at	3°C	



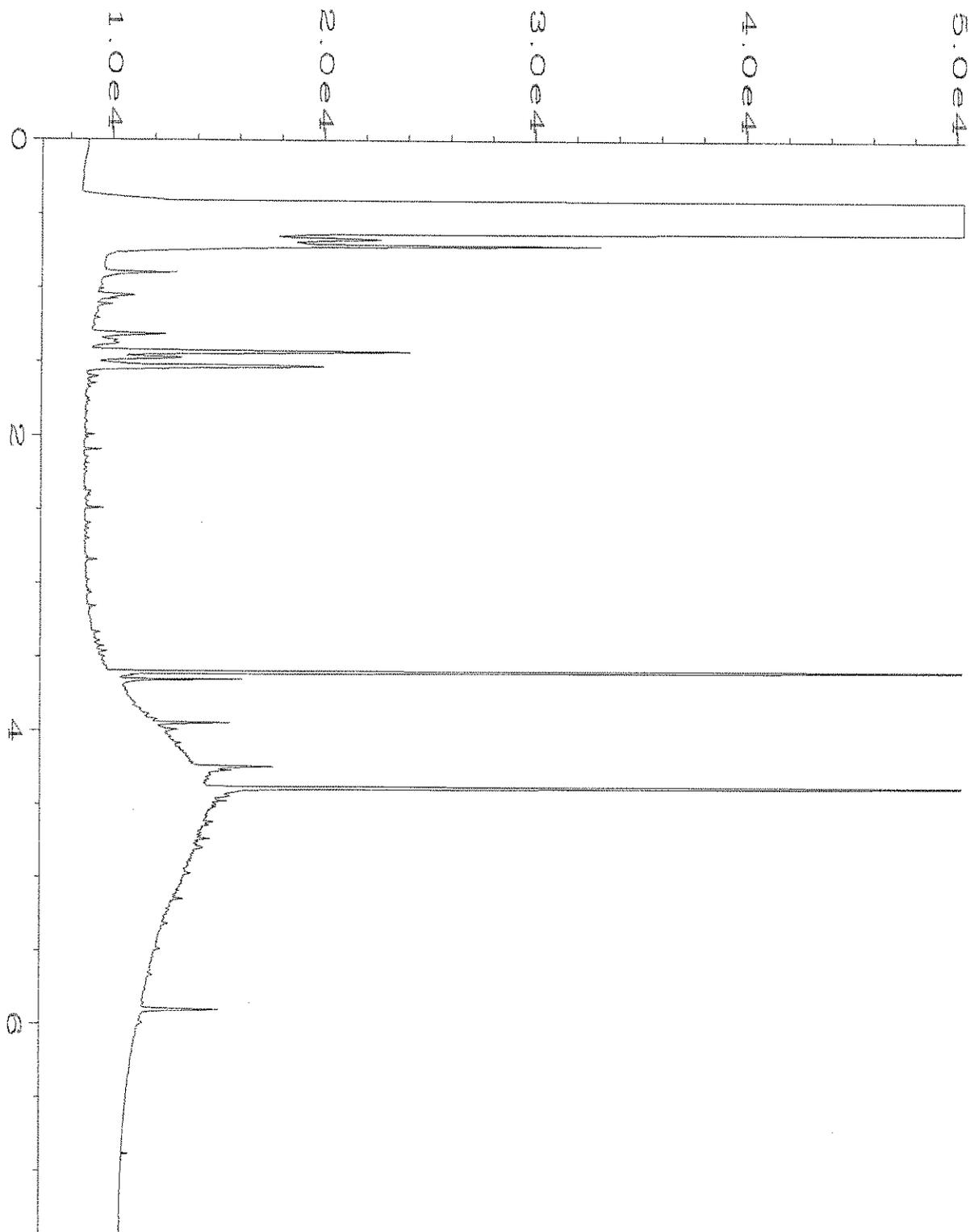
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Acquired on	: 25 Feb 21 02:49 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:00 AM		



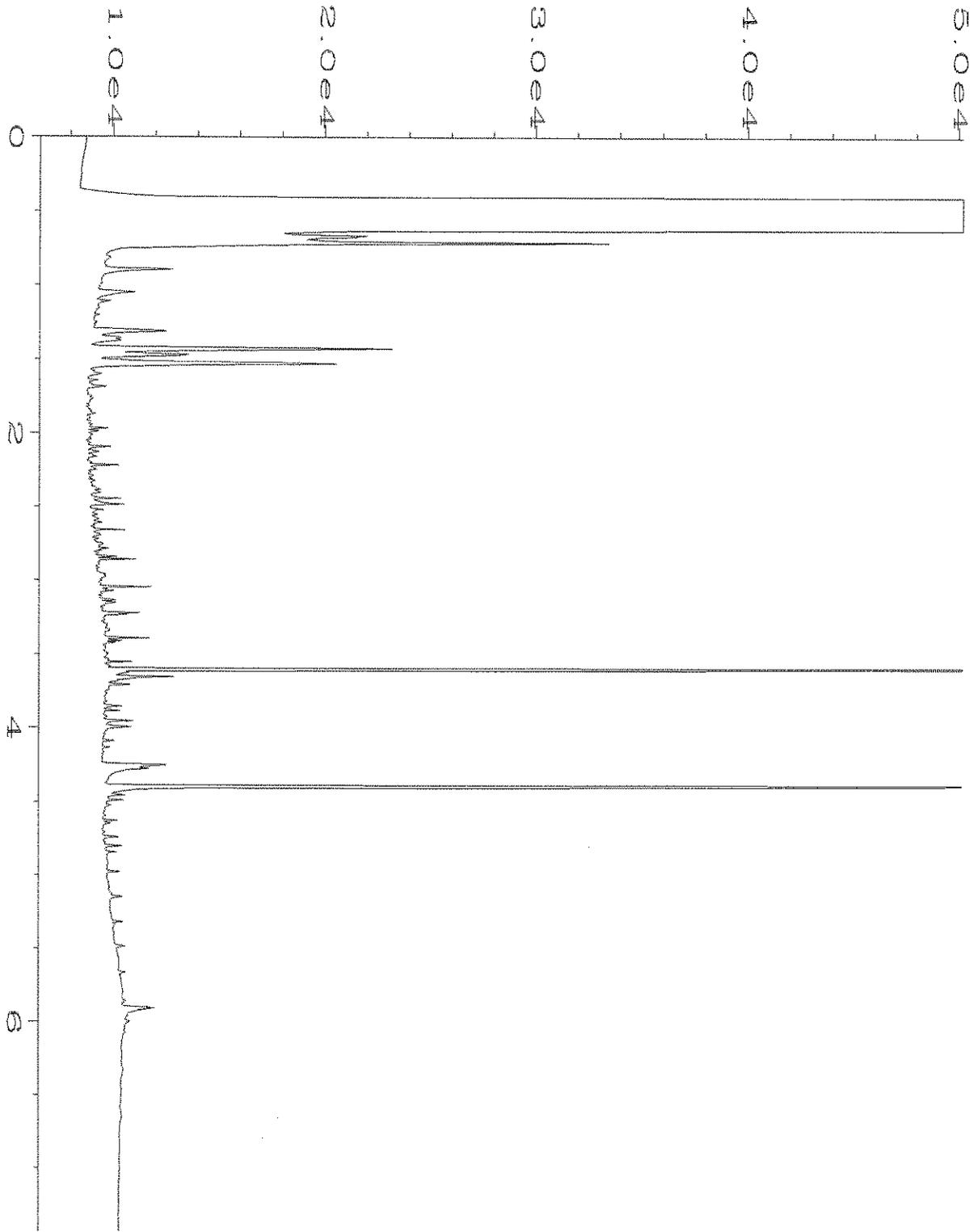
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Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-02	Sequence Line	: 11
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Acquired on	: 25 Feb 21 03:00 PM	Analysis Method	: COND.MTH
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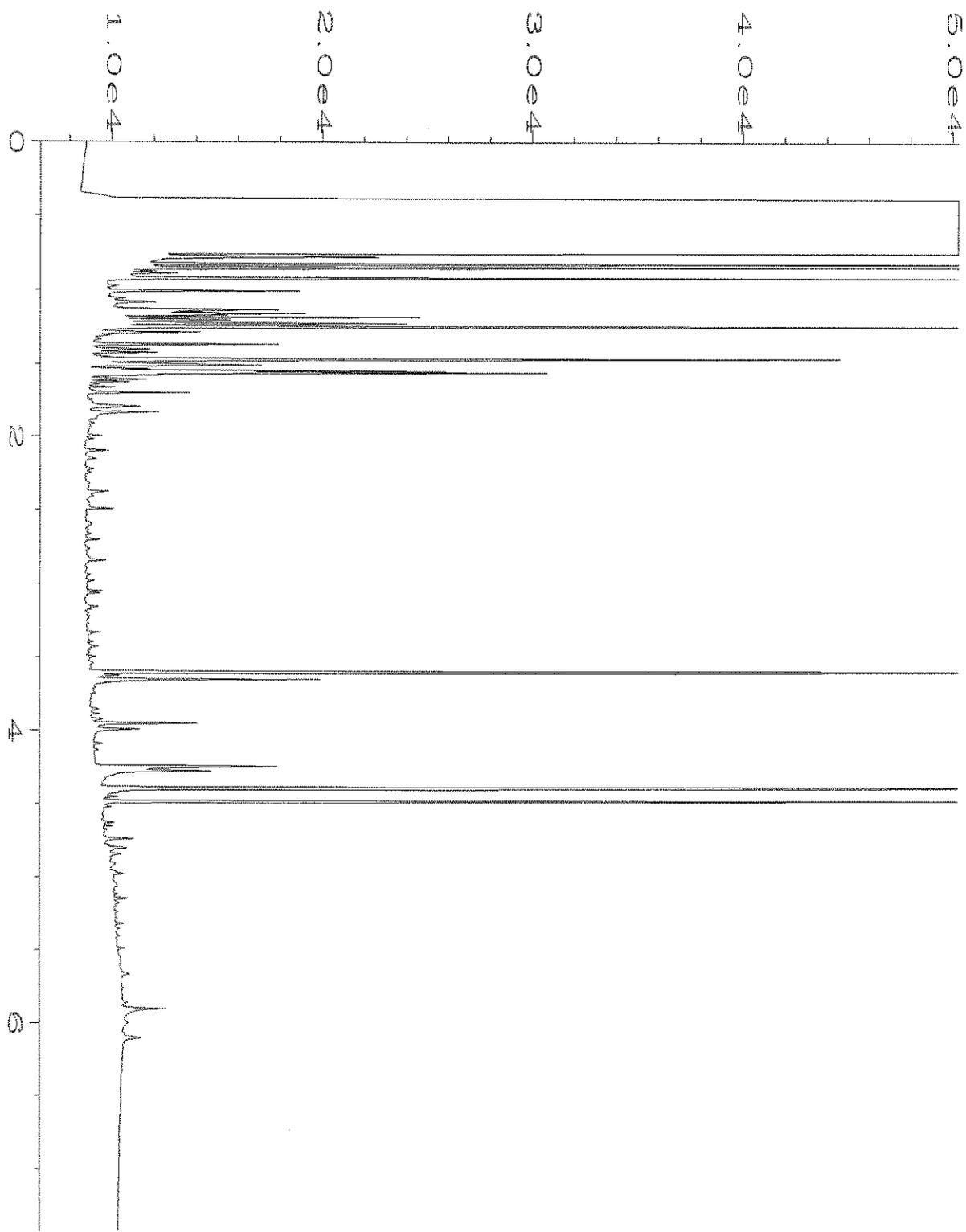
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Instrument	: GC1	Injection Number	: 1
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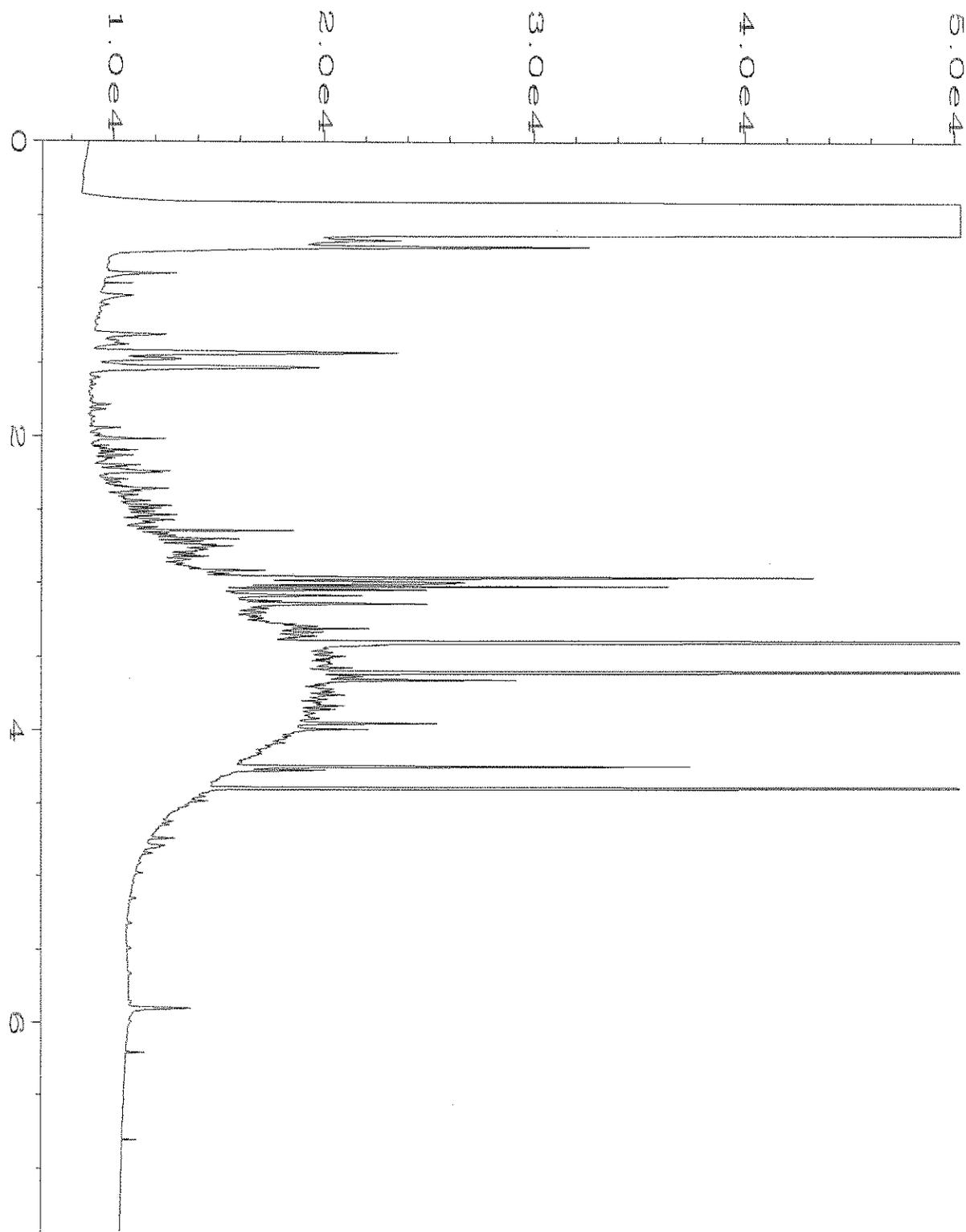
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Instrument	: GC1	Injection Number	: 1
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Acquired on	: 25 Feb 21 03:22 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:02 AM		



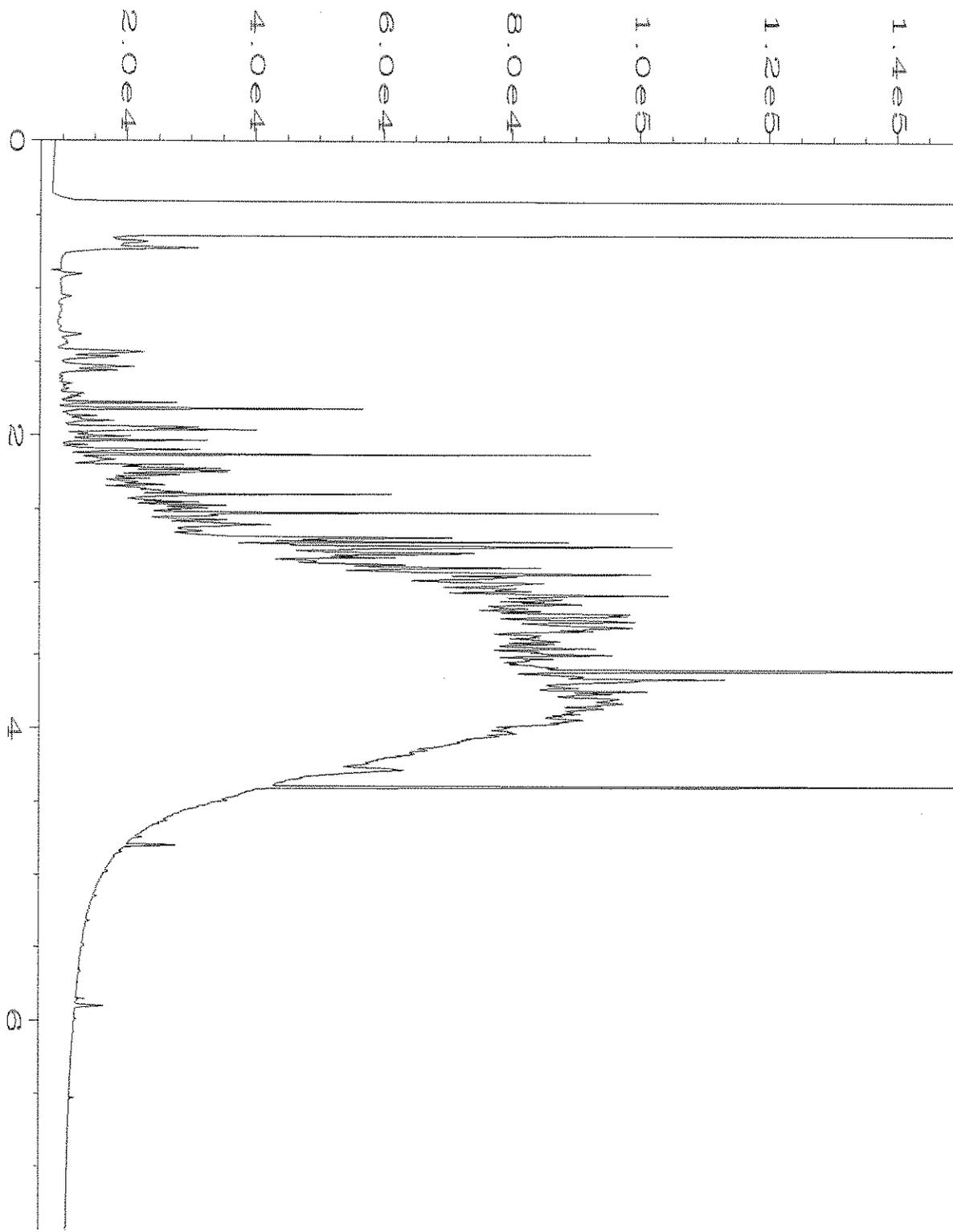
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Report Created on:	26 Feb 21 10:03 AM		



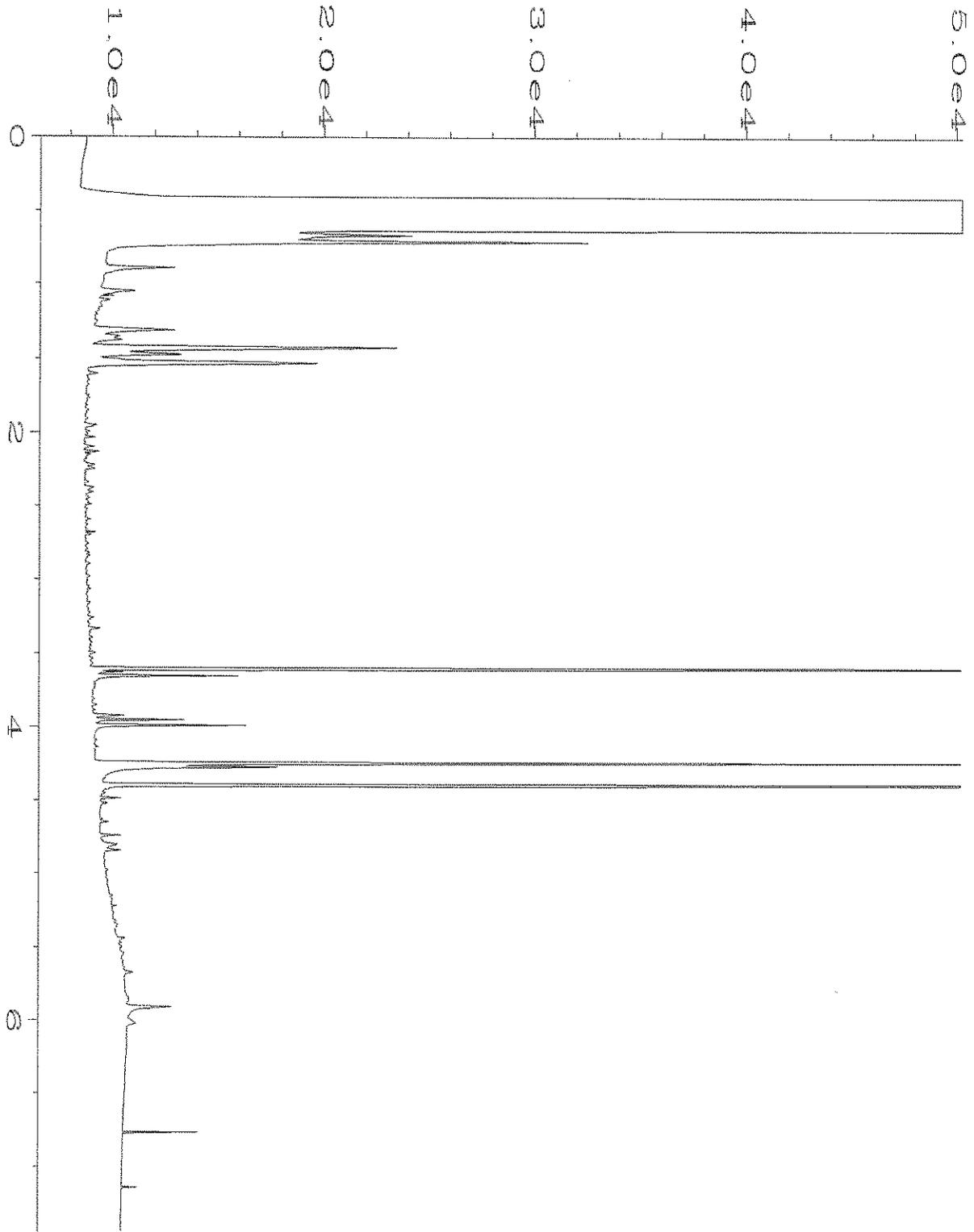
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Instrument	: GC1	Injection Number	: 1
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Report Created on:	26 Feb 21 10:03 AM		



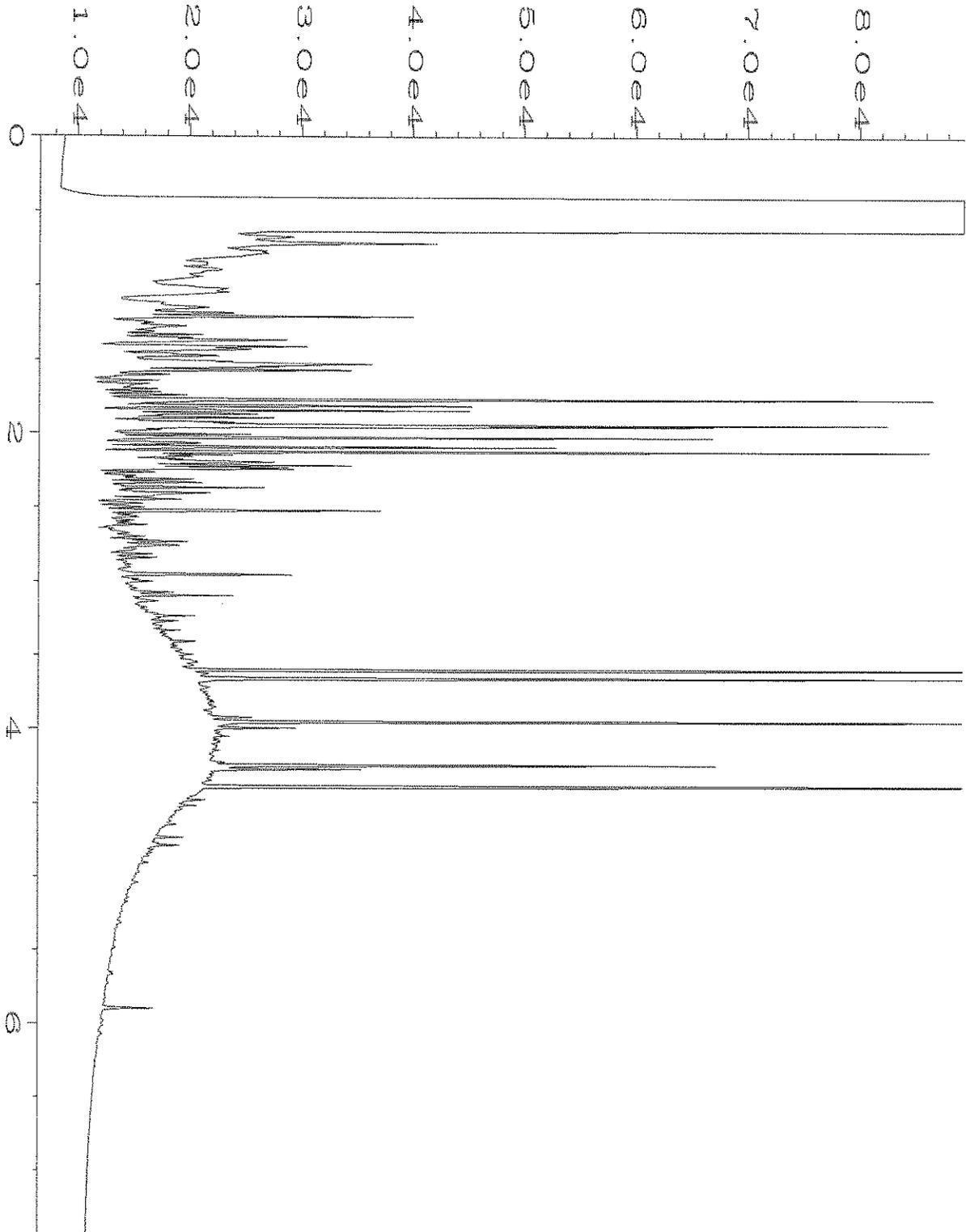
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Instrument	: GC1	Injection Number	: 1
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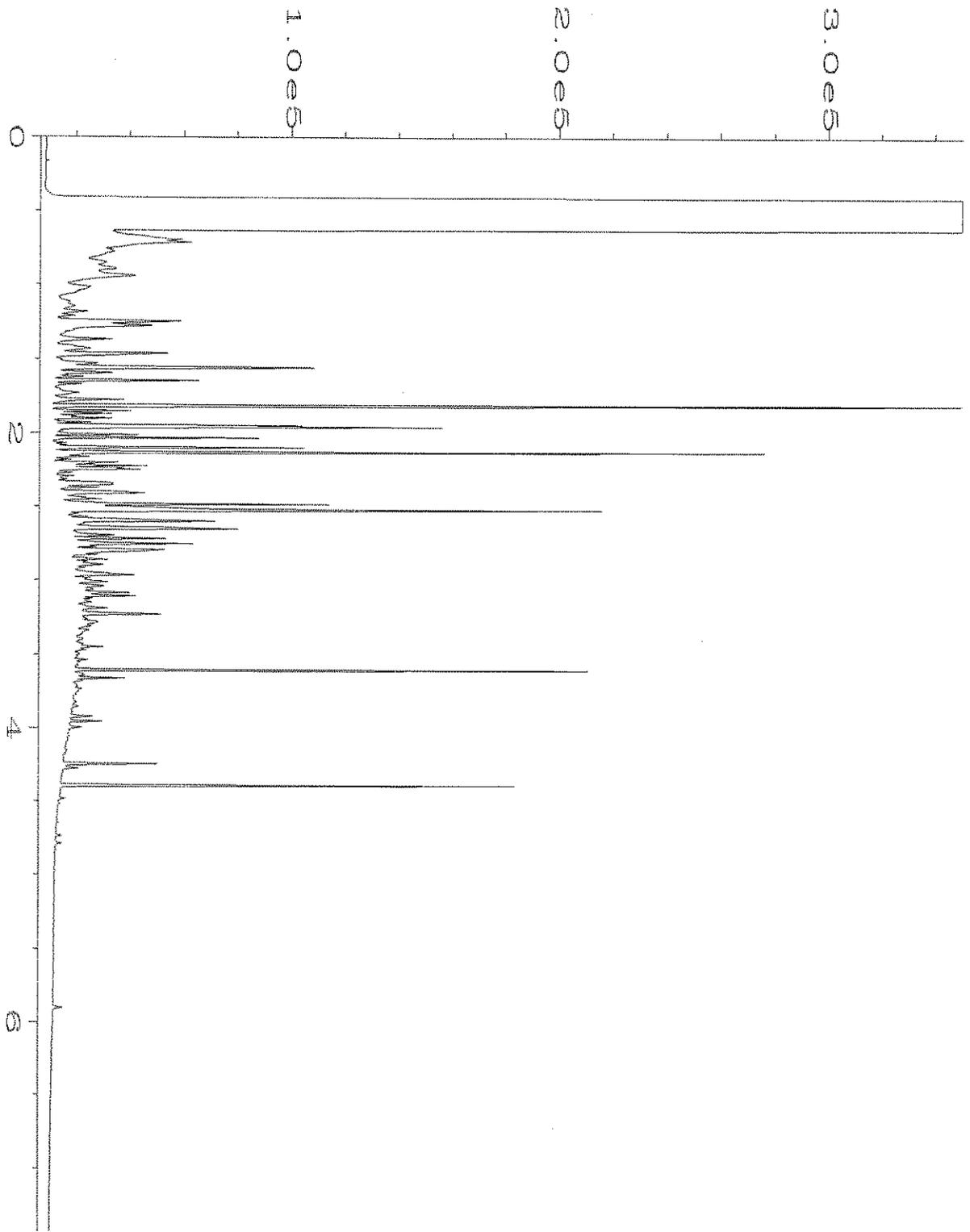
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Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-08	Sequence Line	: 13
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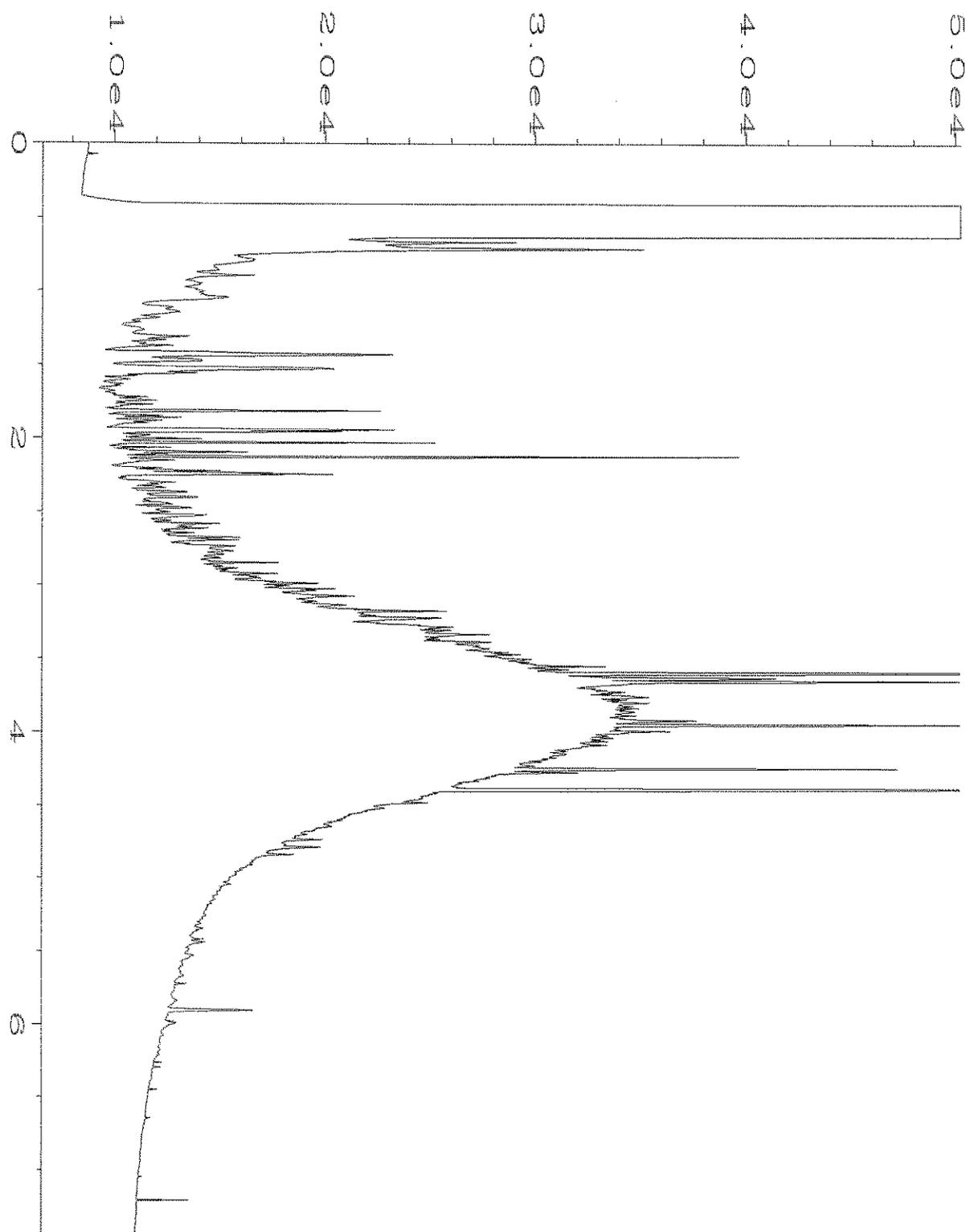
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Operator	: TL	Vial Number	: 25
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-09	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:05 AM		



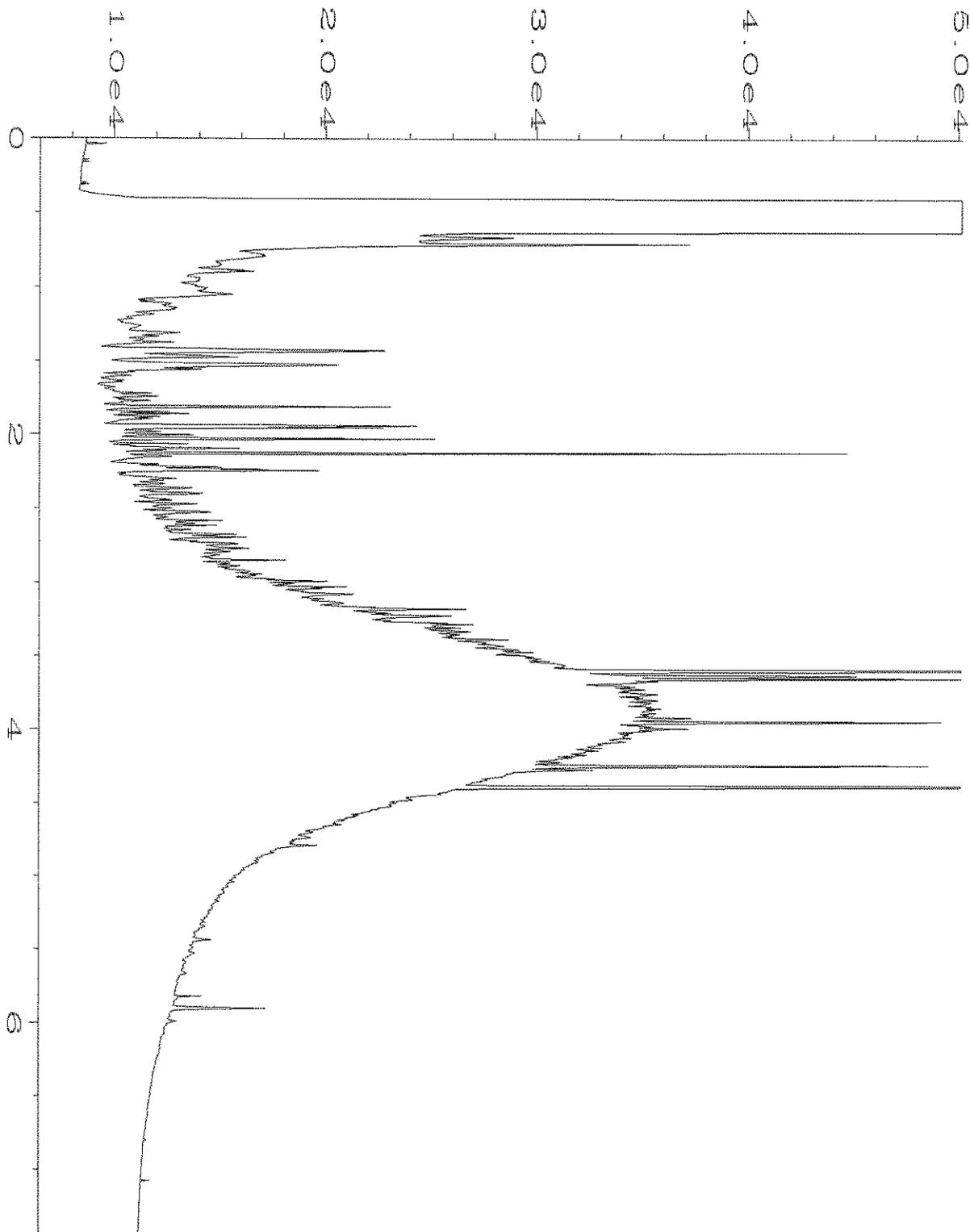
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Operator	: TL	Vial Number	: 26
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-10	Sequence Line	: 13
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 05:19 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:06 AM		



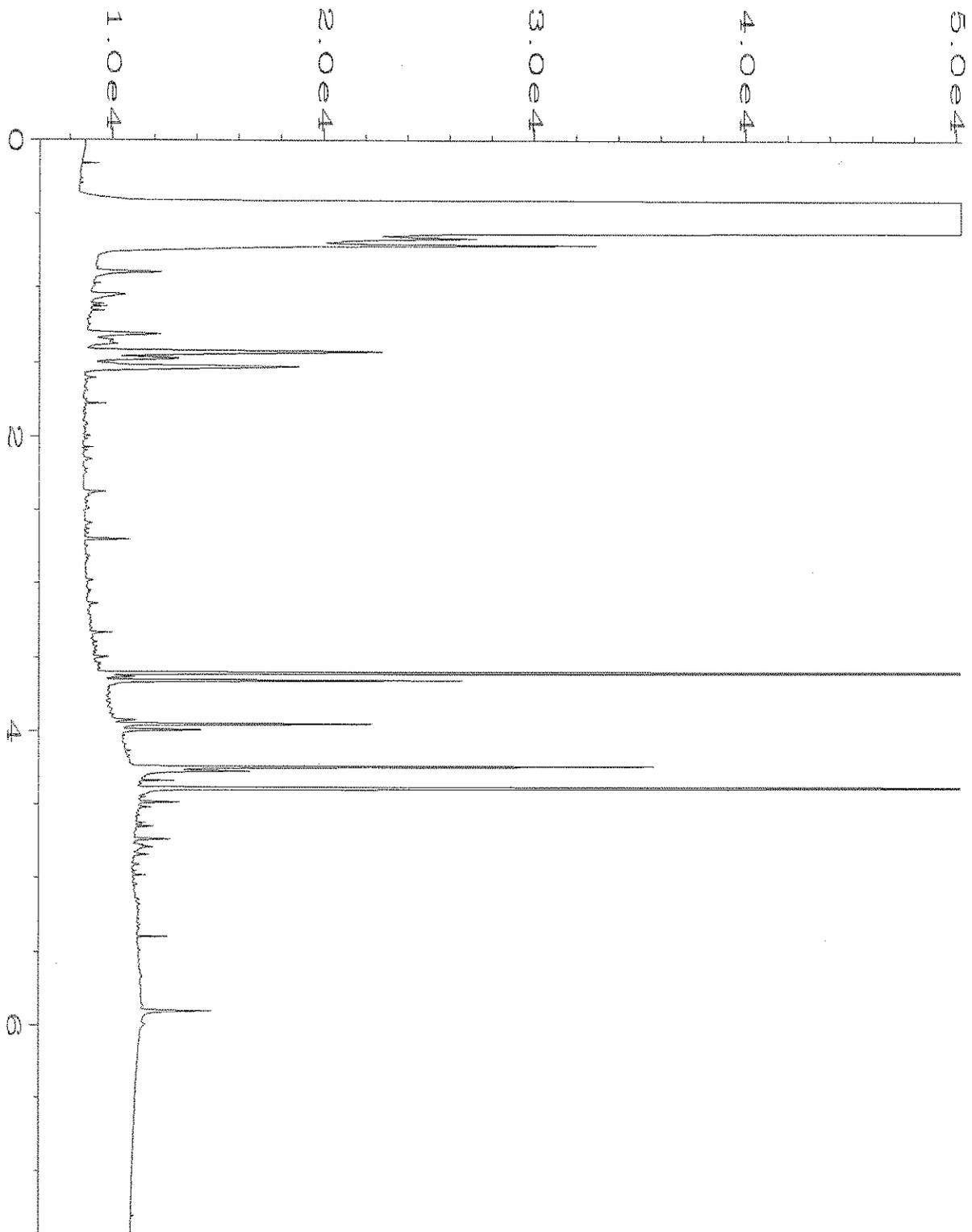
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Operator	: TL	Vial Number	: 27
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-11	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:07 AM		



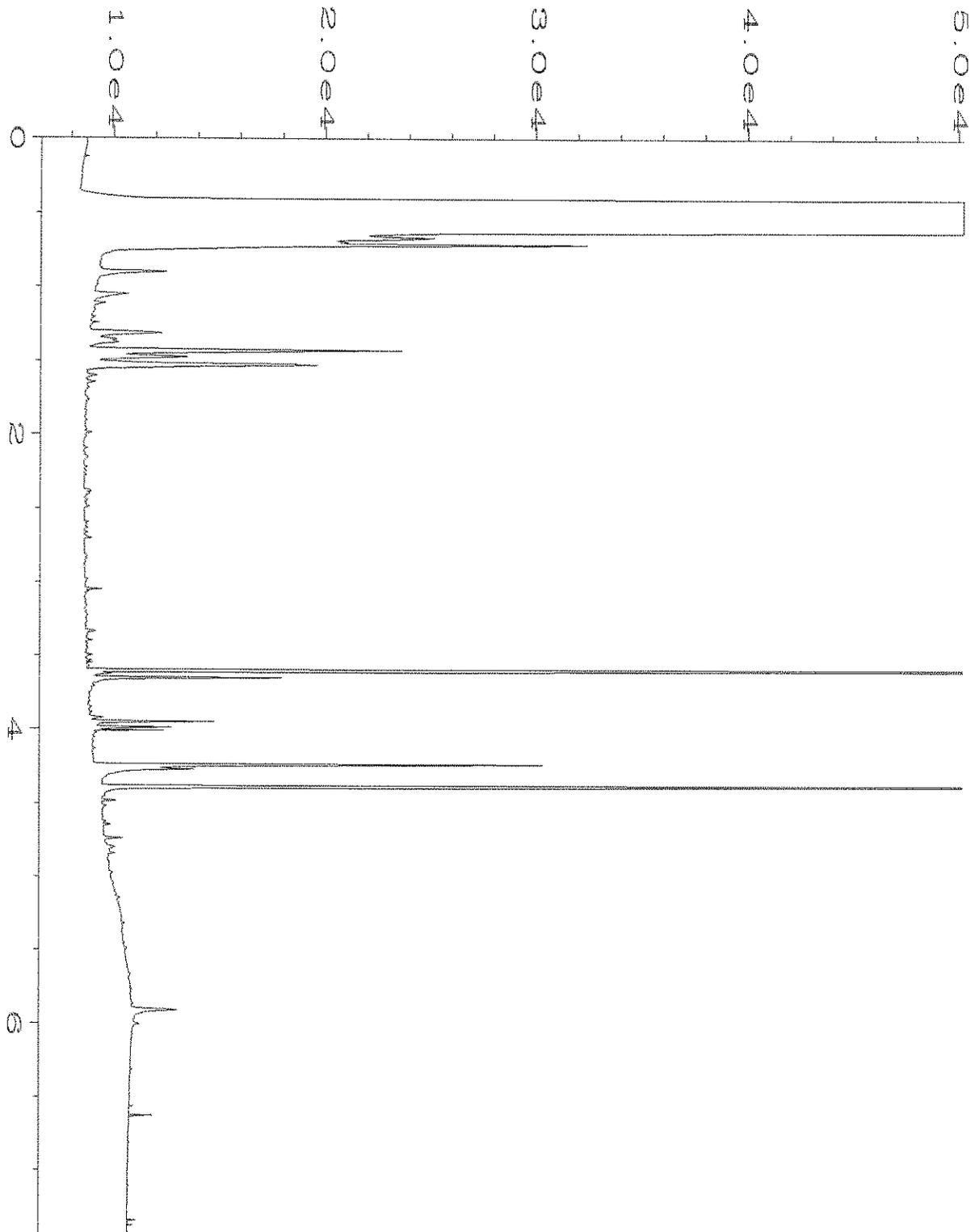
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Operator	: TL	Vial Number	: 28
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-12	Sequence Line	: 13
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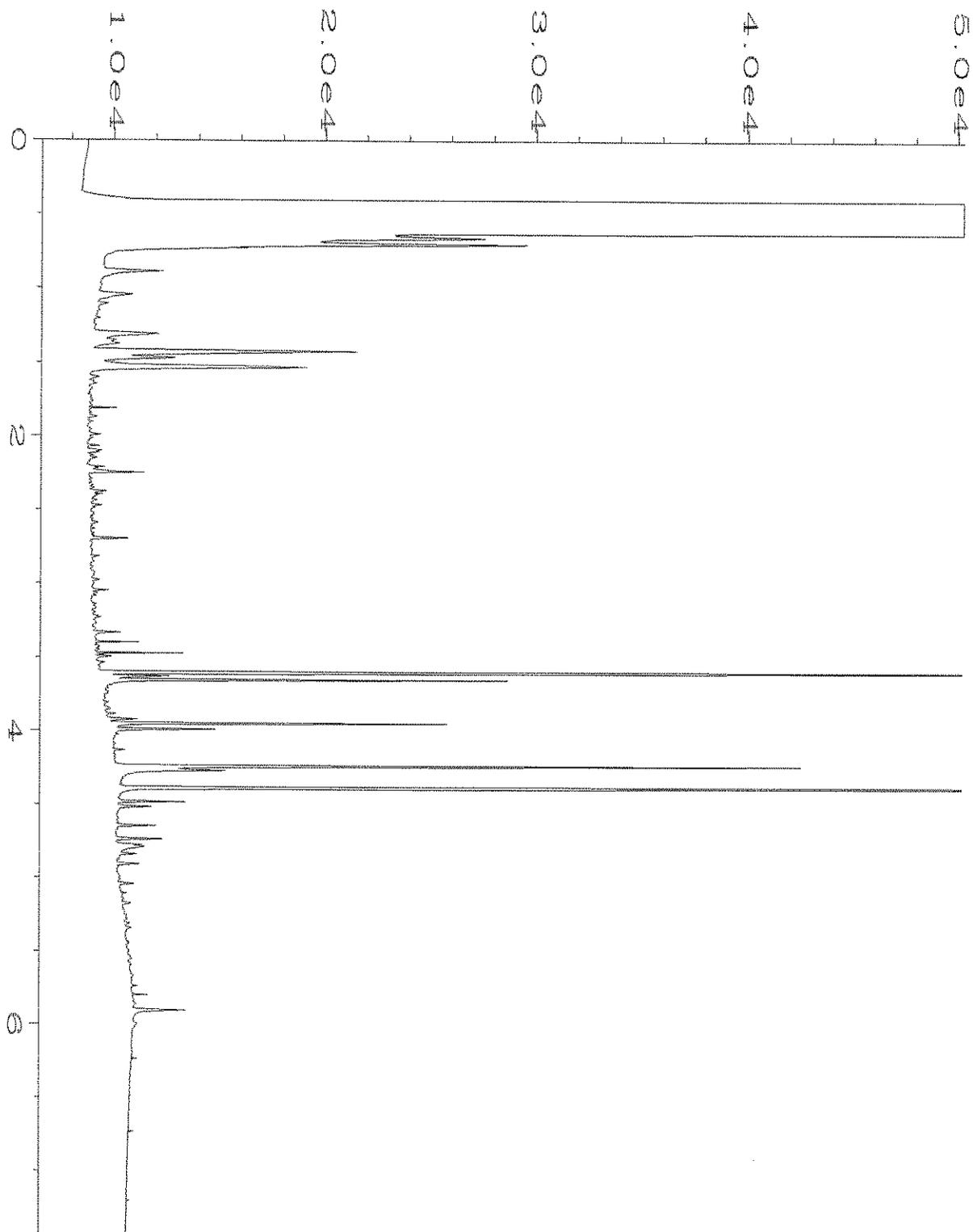
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Operator	: TL	Vial Number	: 29
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-13	Sequence Line	: 13
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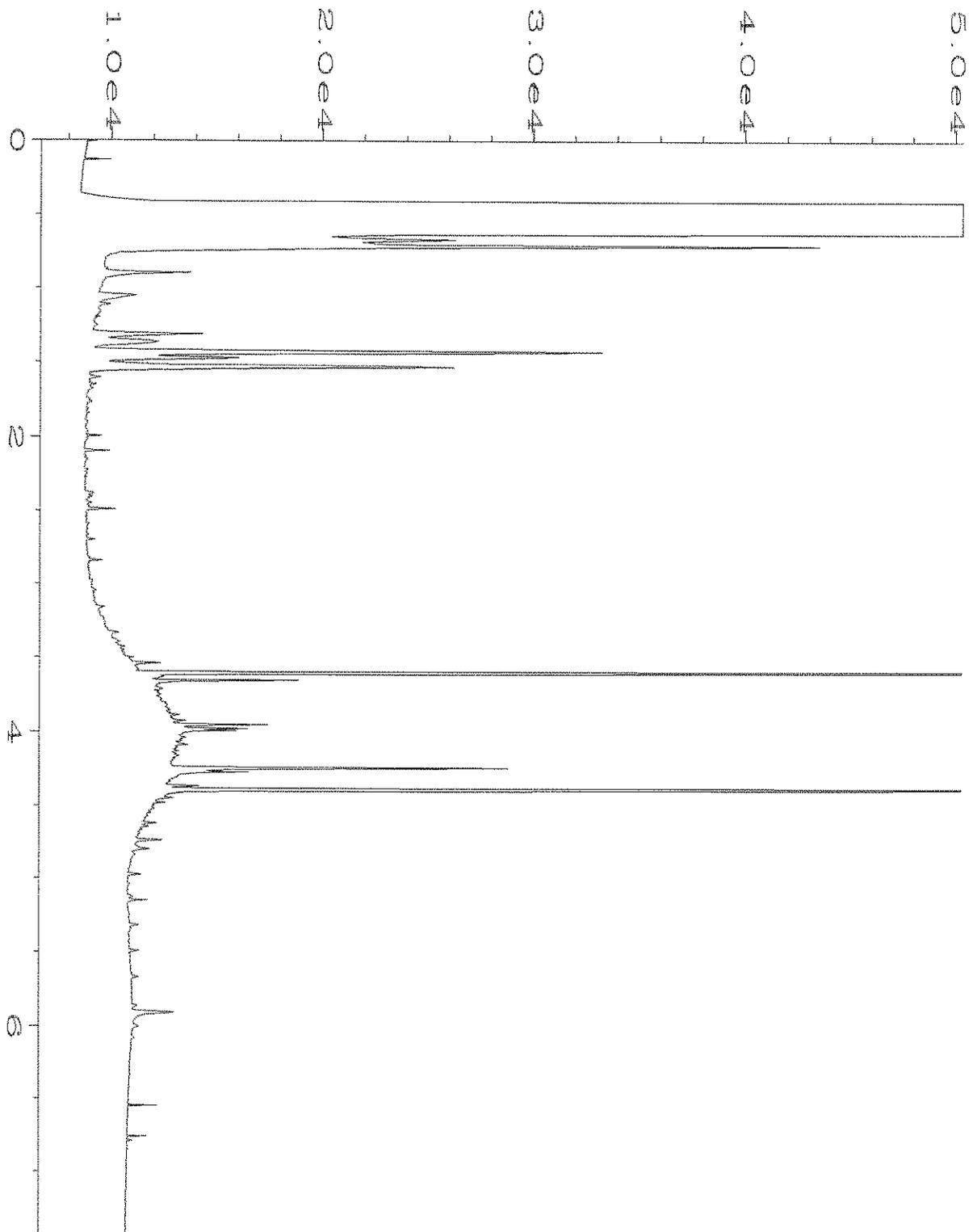
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Operator	: TL	Vial Number	: 30
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-14	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:09 AM		



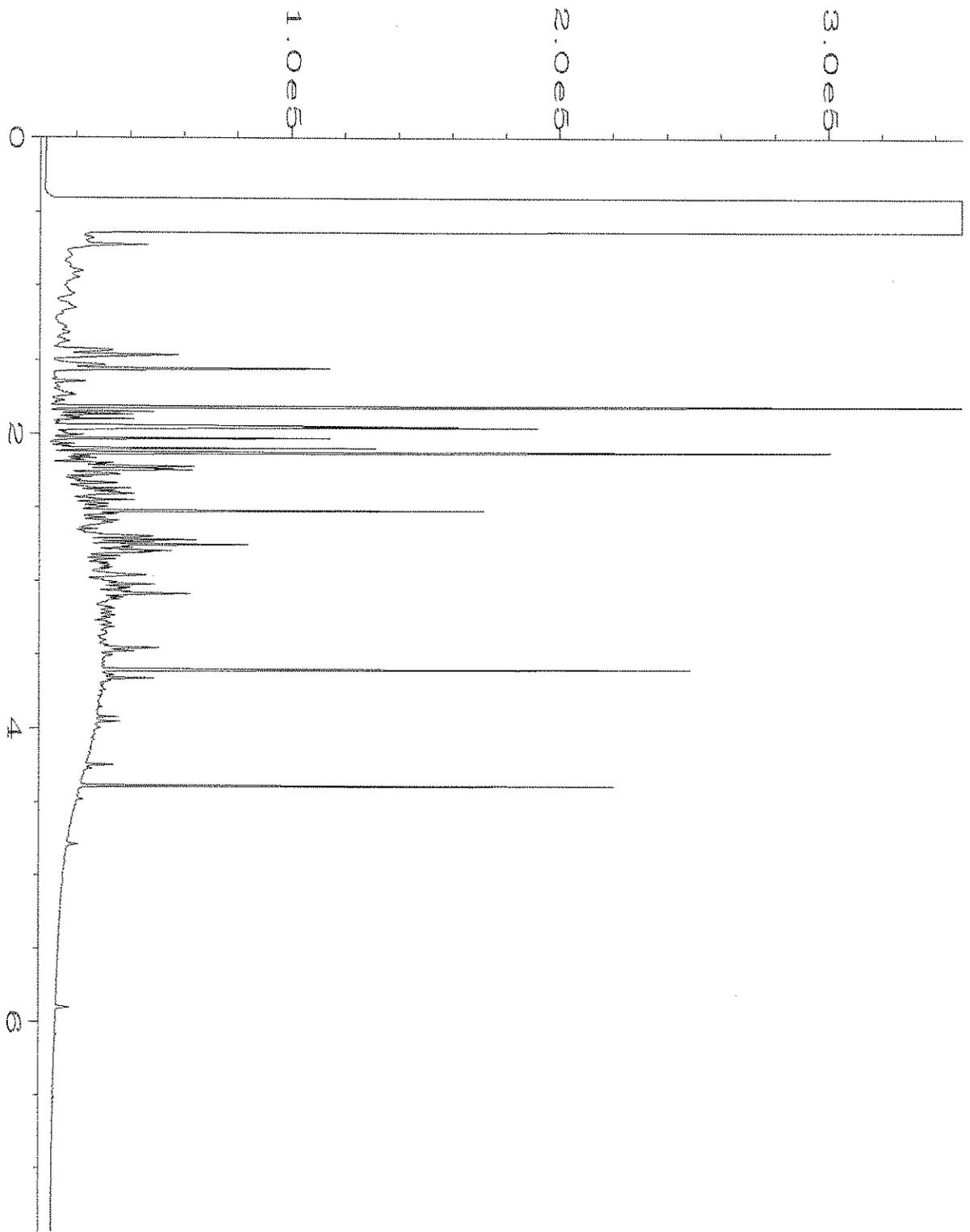
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Operator	: TL	Vial Number	: 31
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-15	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:09 AM		



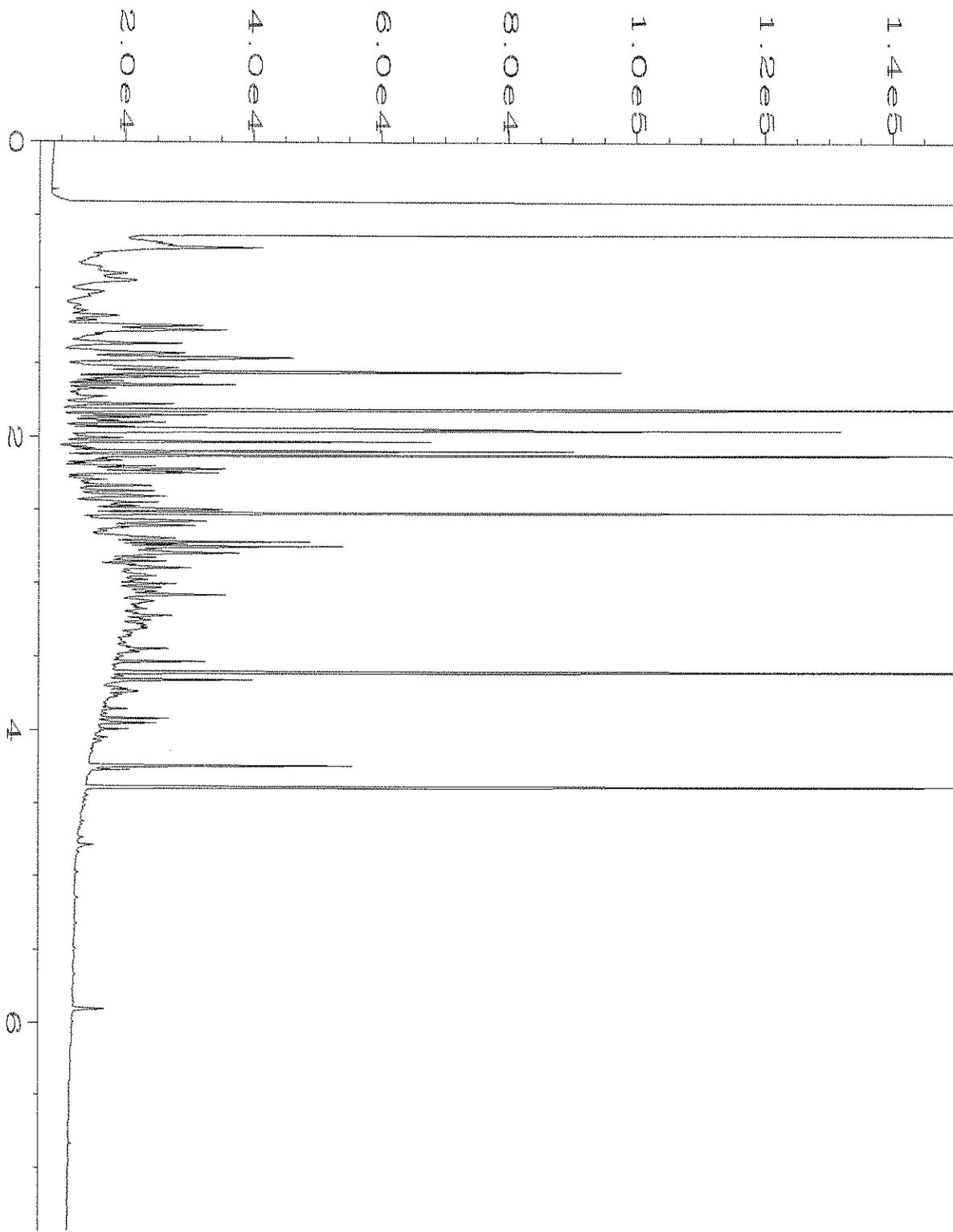
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Operator	: TL	Vial Number	: 32
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-16	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:09 AM		



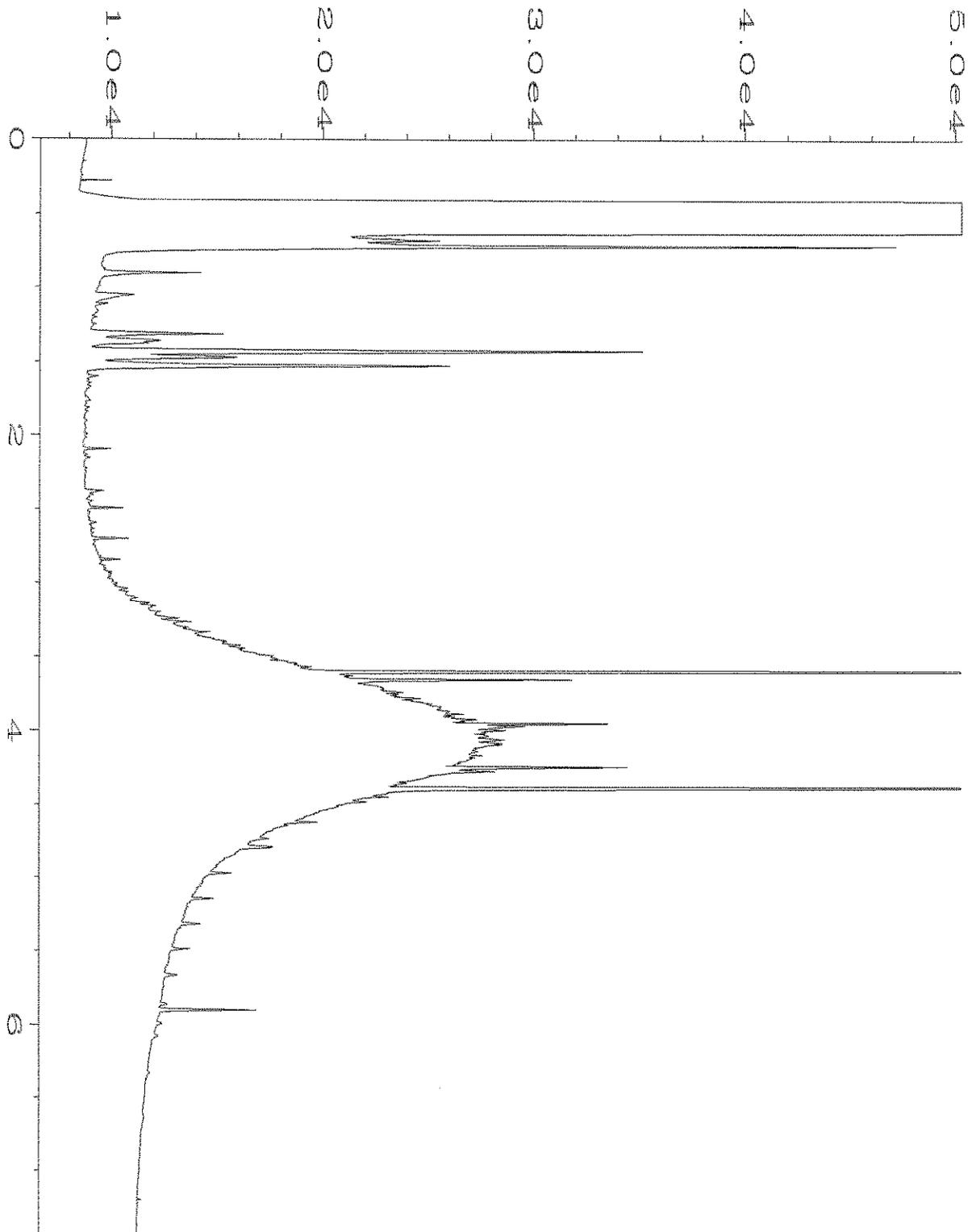
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Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-17	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:10 AM		



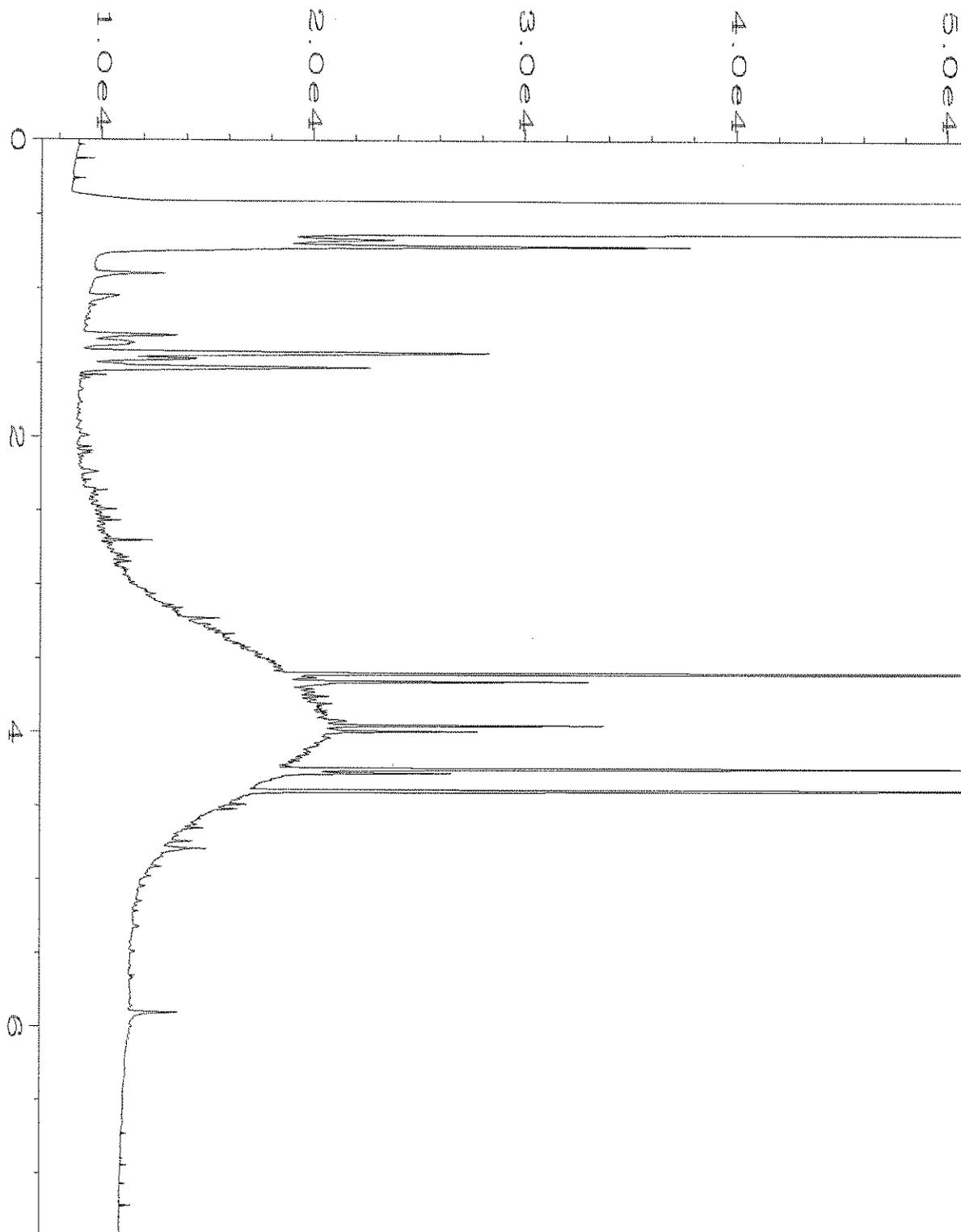
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Operator	: TL	Vial Number	: 33
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-18	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:09 AM		



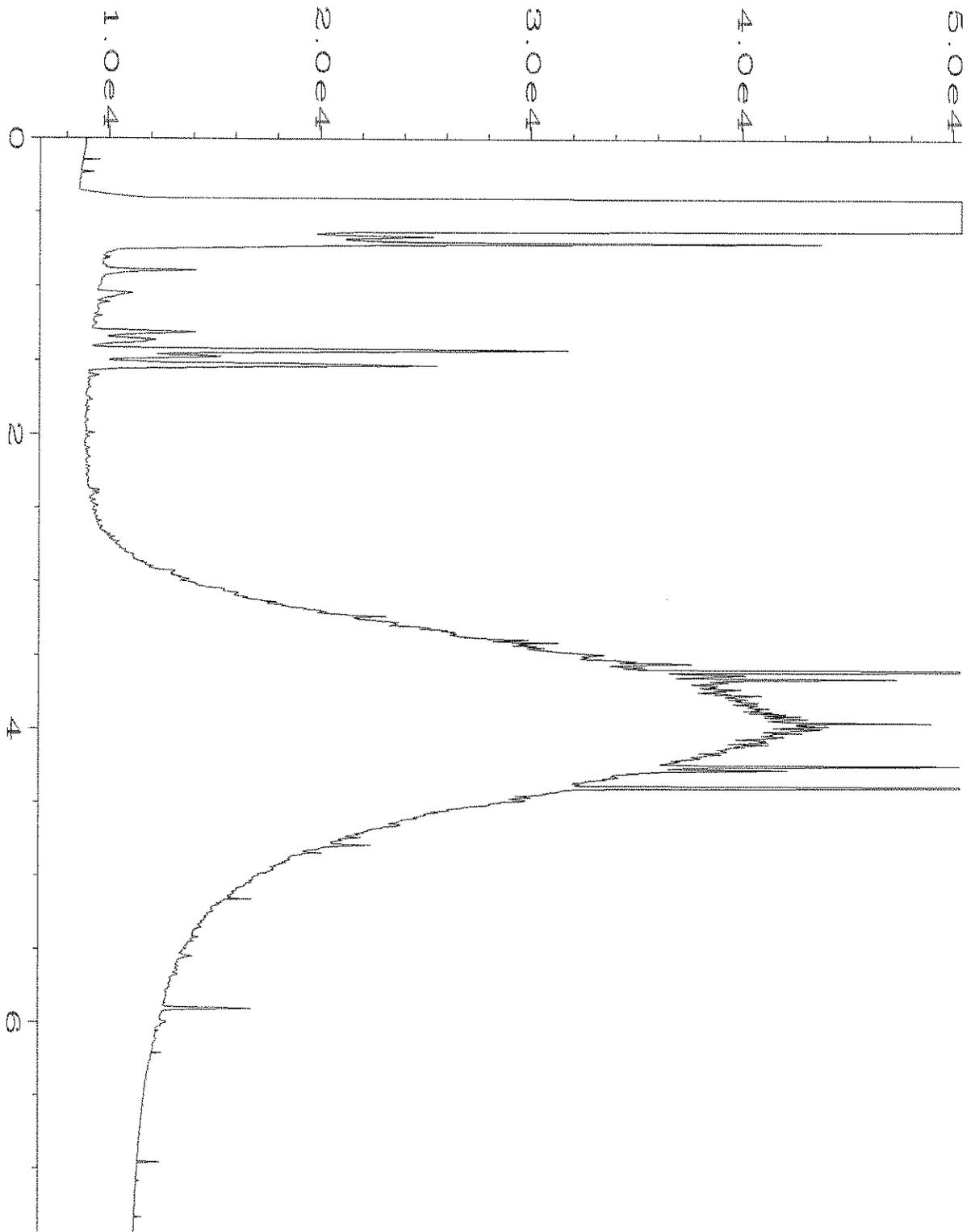
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Operator	: TL	Vial Number	: 34
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-19	Sequence Line	: 13
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Report Created on:	26 Feb 21 10:09 AM		



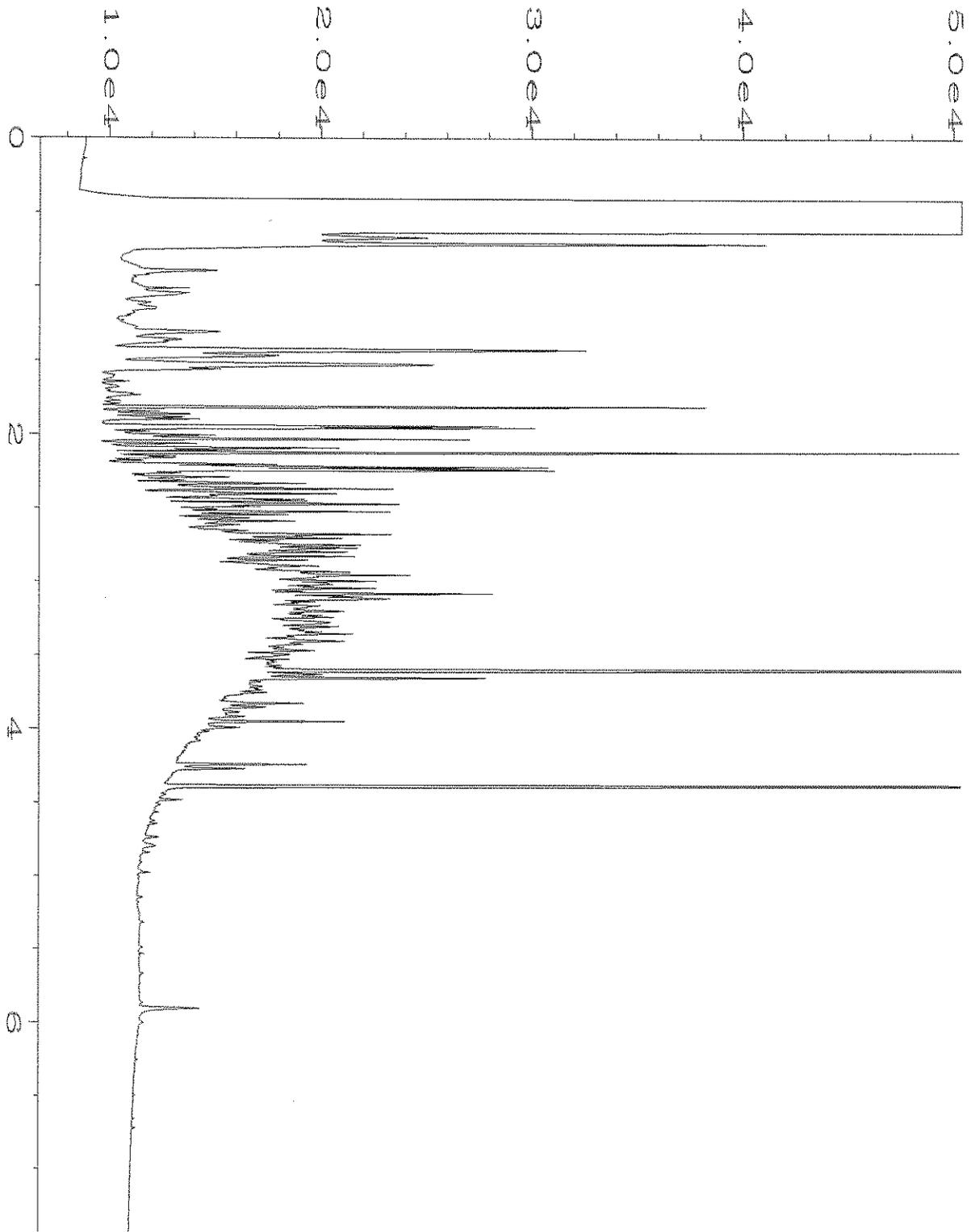
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Operator	: TL	Vial Number	: 35
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-20	Sequence Line	: 13
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Acquired on	: 25 Feb 21 07:00 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:10 AM		



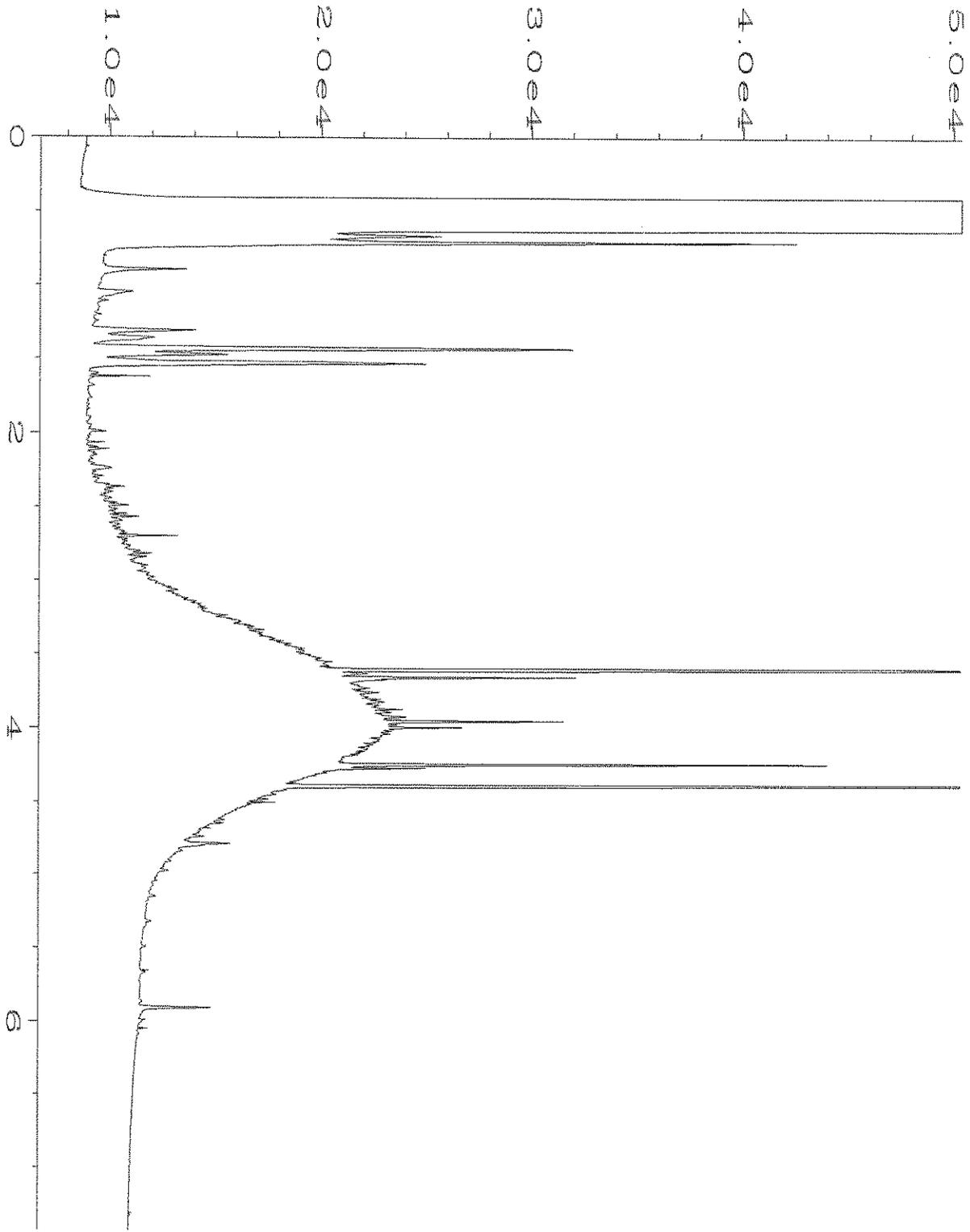
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Operator	: TL	Vial Number	: 41
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-21	Sequence Line	: 15
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 08:31 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:11 AM		



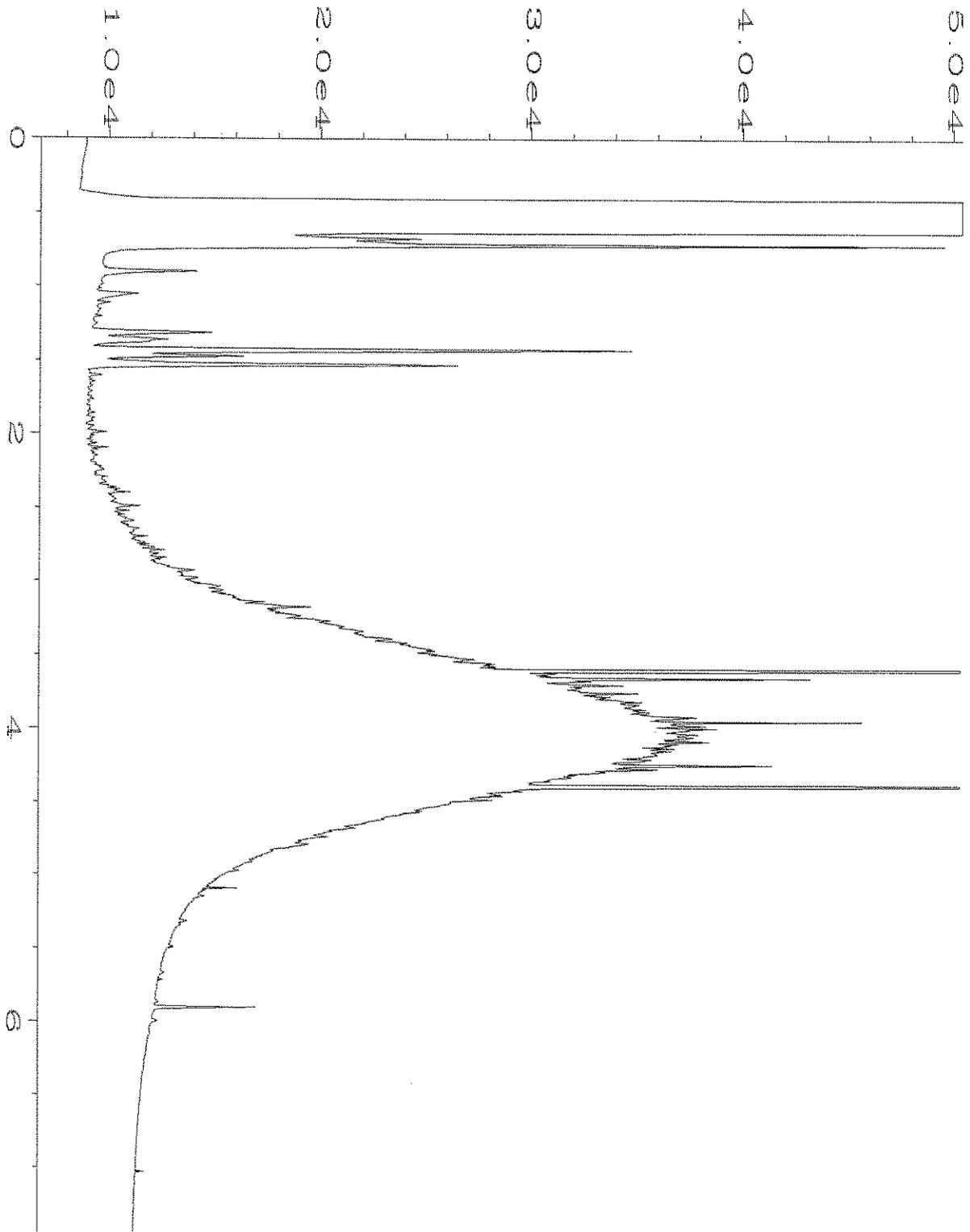
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Operator	: TL	Vial Number	: 42
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-22	Sequence Line	: 15
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Report Created on:	26 Feb 21 10:11 AM		



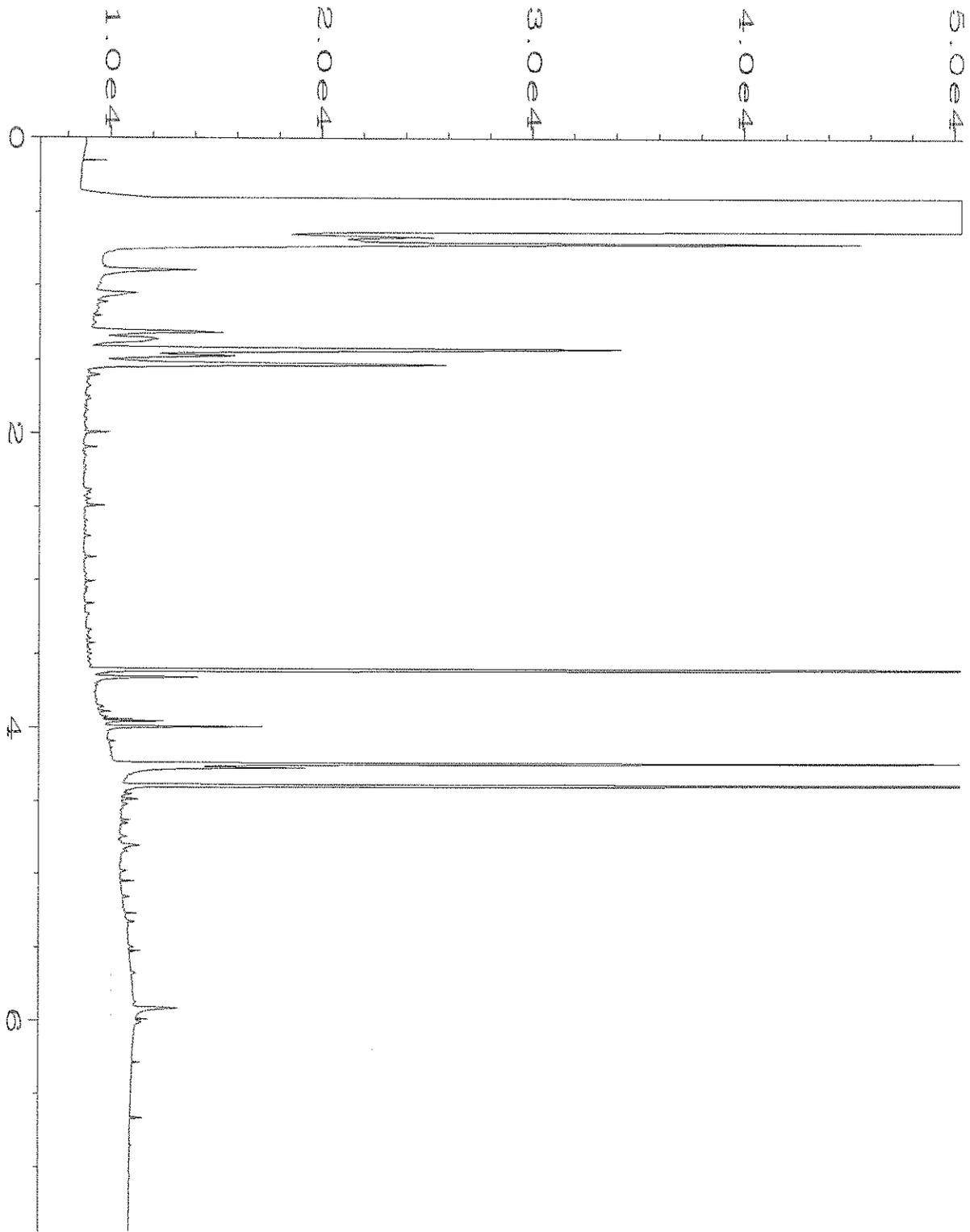
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Operator	: TL	Vial Number	: 43
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-23	Sequence Line	: 15
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 08:53 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:11 AM		



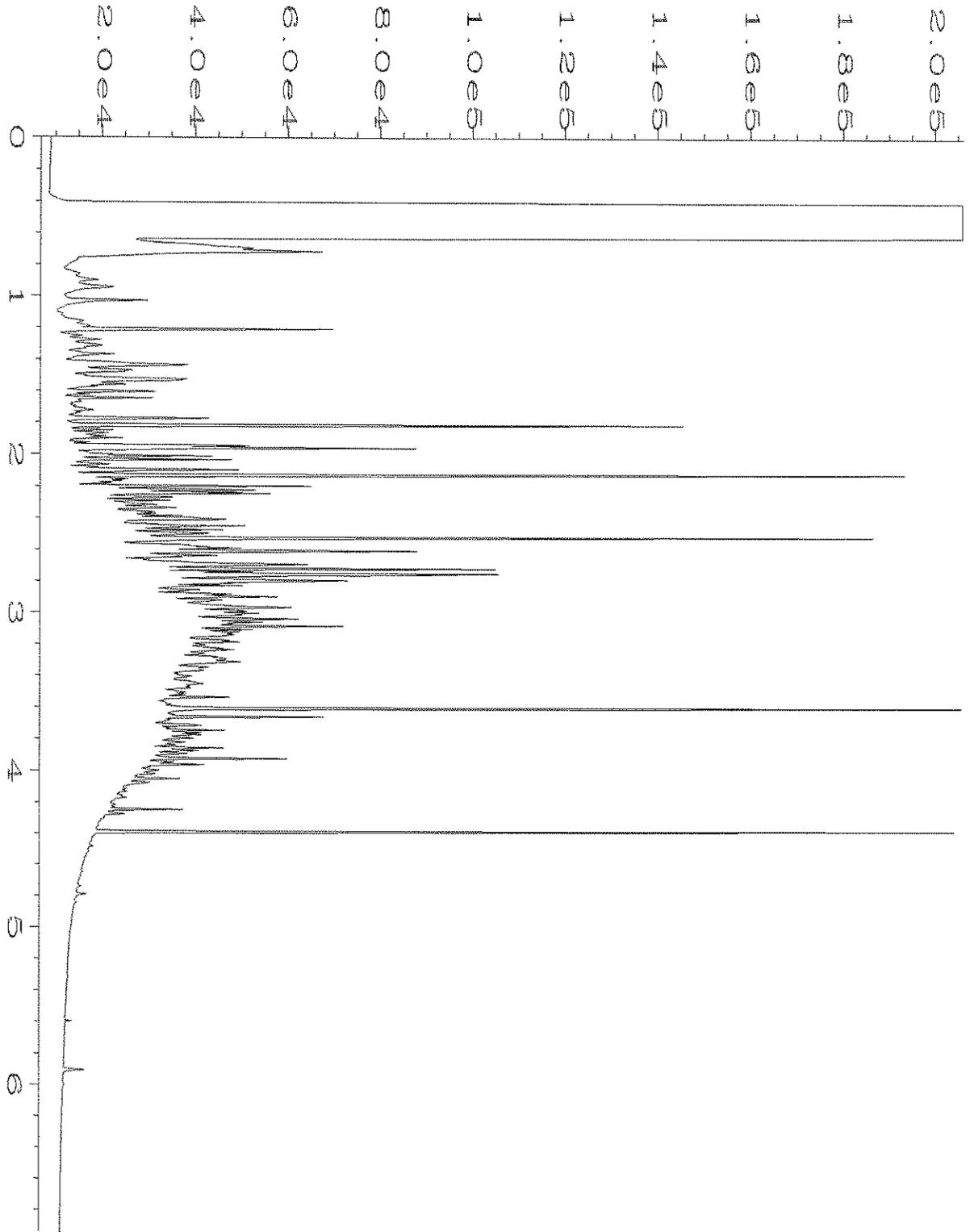
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Operator	: TL	Vial Number	: 44
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-24	Sequence Line	: 15
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Acquired on	: 25 Feb 21 09:04 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:11 AM		



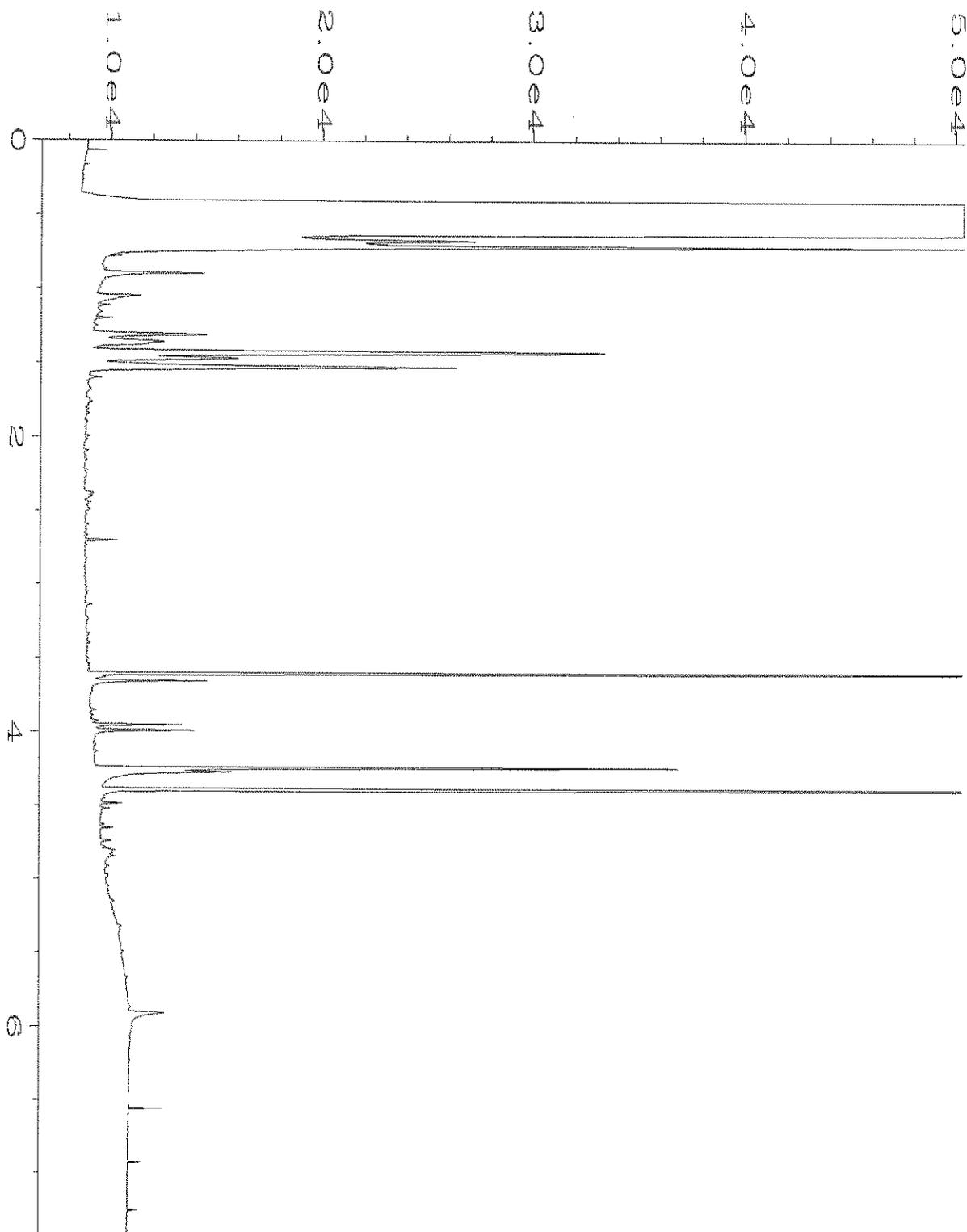
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Operator	: TL	Vial Number	: 45
Instrument	: GC1	Injection Number	: 1
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Report Created on:	26 Feb 21 10:11 AM		



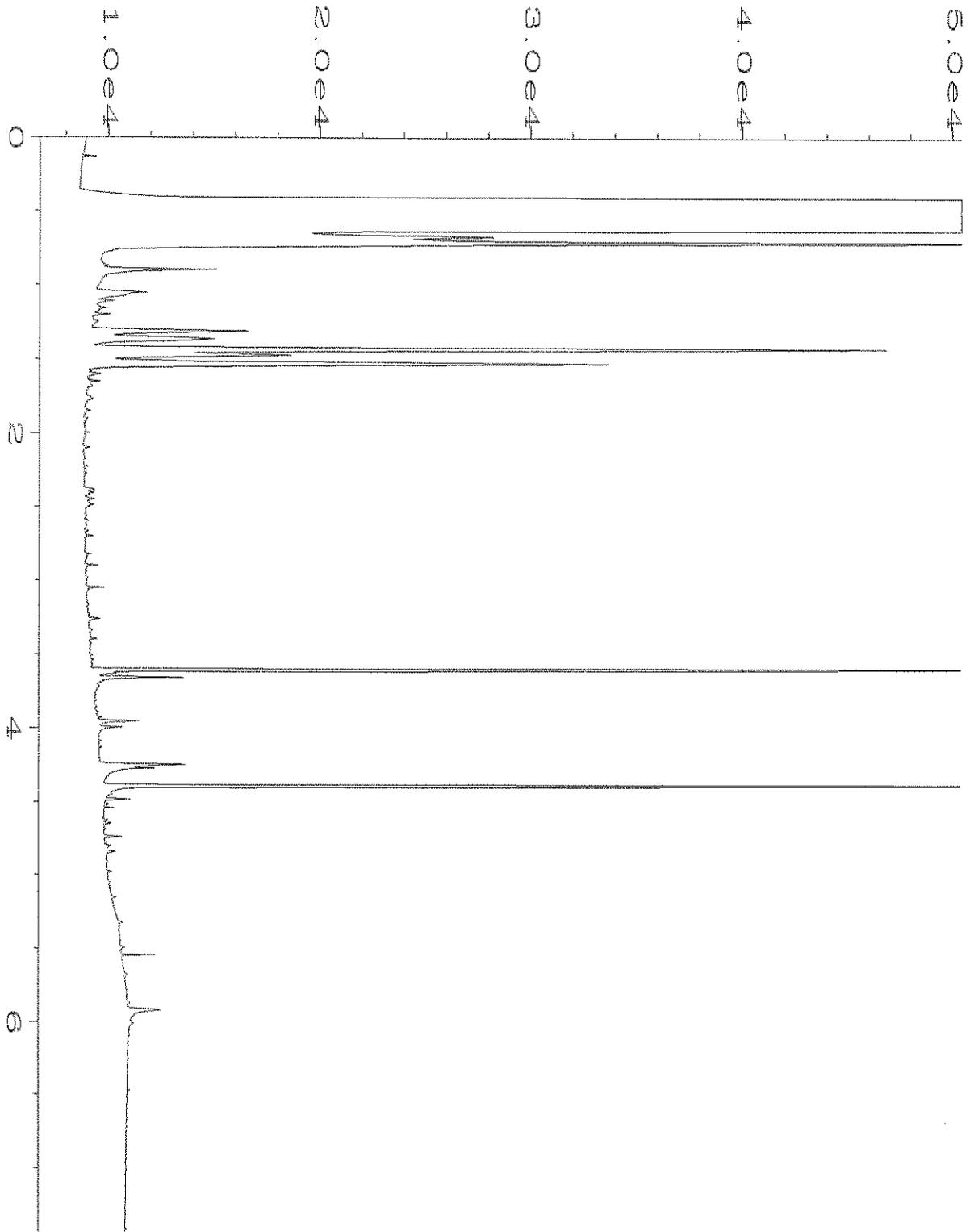
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Operator	: TL	Vial Number	: 46
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-26	Sequence Line	: 15
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Acquired on	: 25 Feb 21 09:27 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:11 AM		



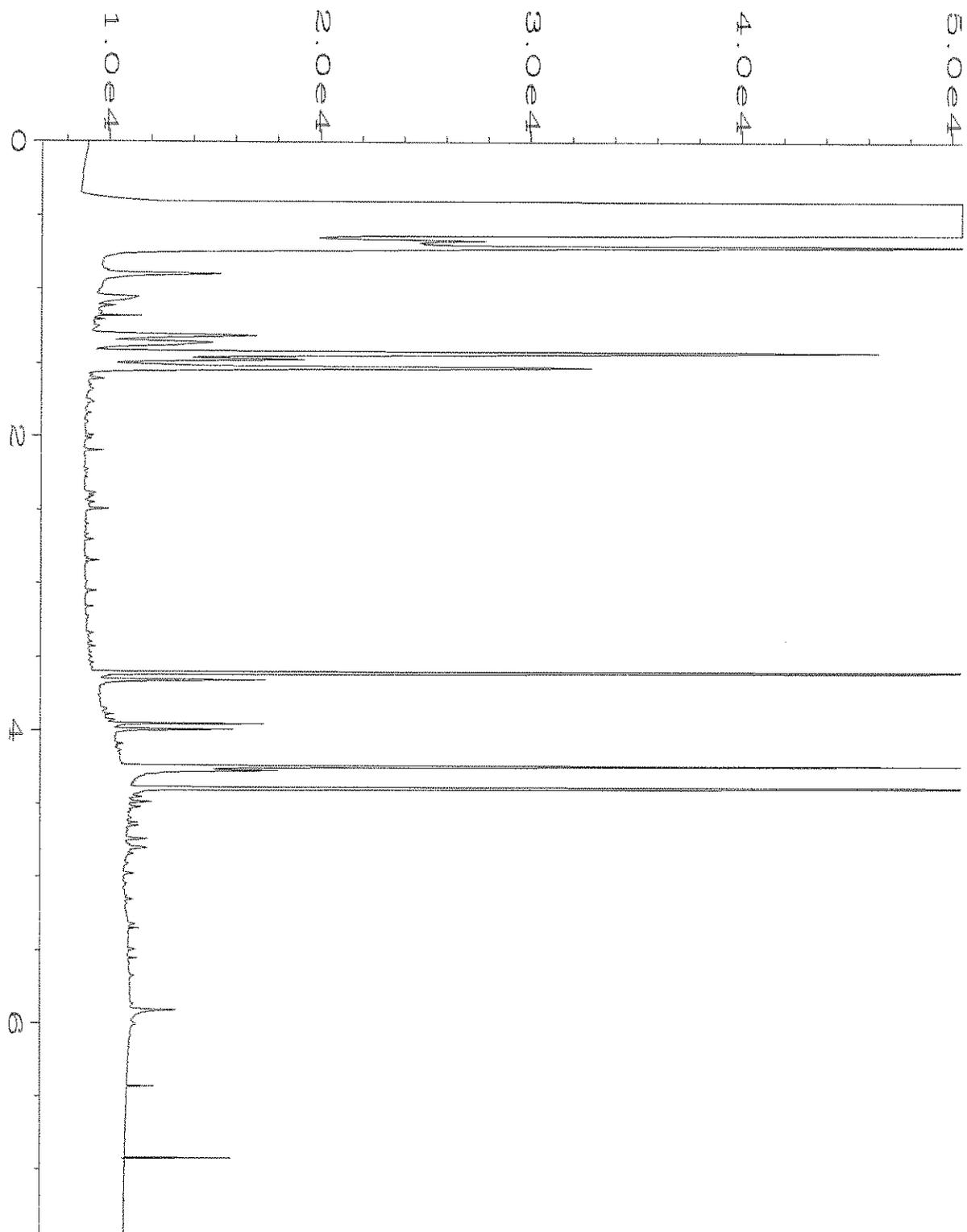
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Operator	: TL	Vial Number	: 47
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-27	Sequence Line	: 15
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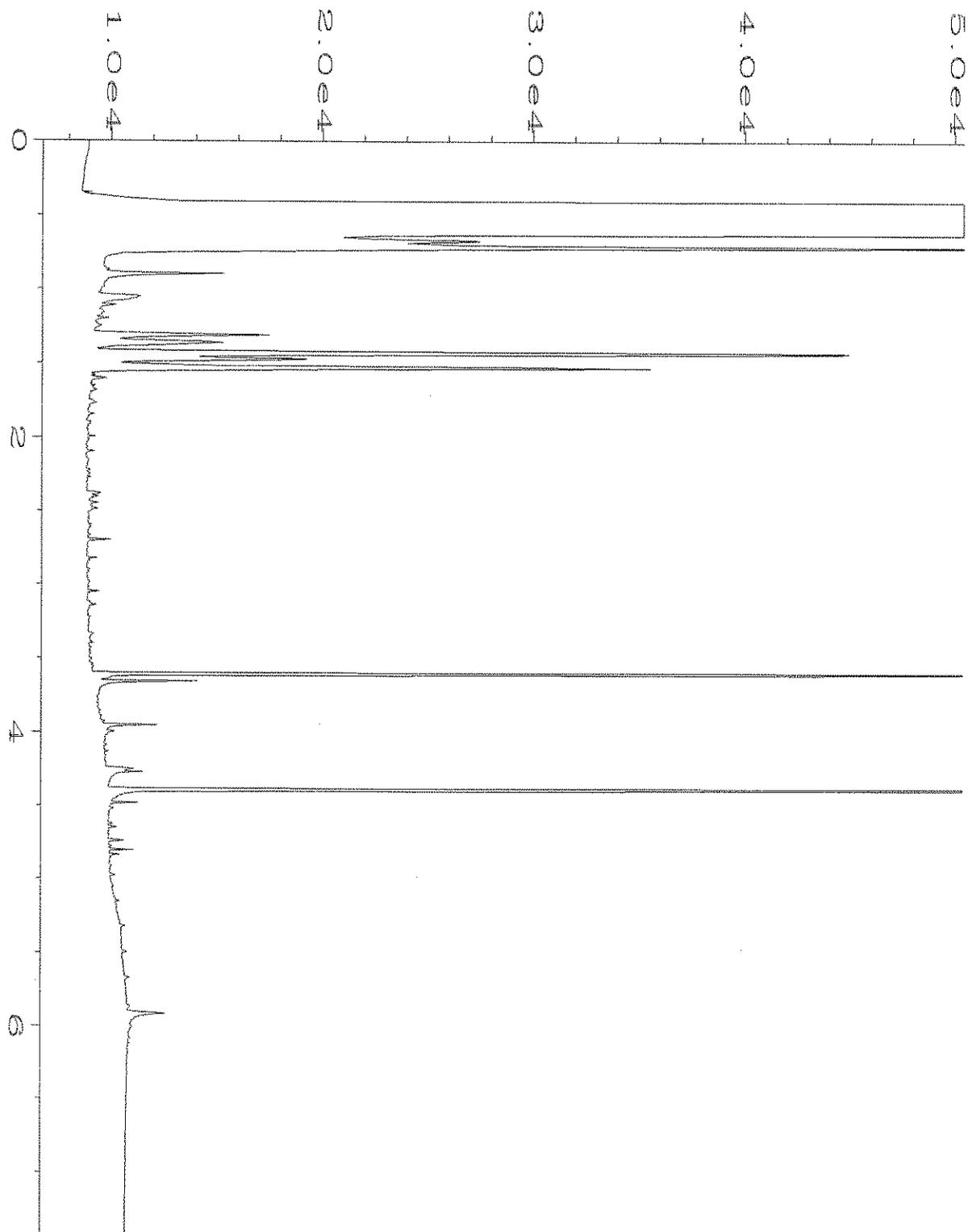
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Operator	: TL	Vial Number	: 48
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-28	Sequence Line	: 15
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Acquired on	: 25 Feb 21 09:49 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:12 AM		



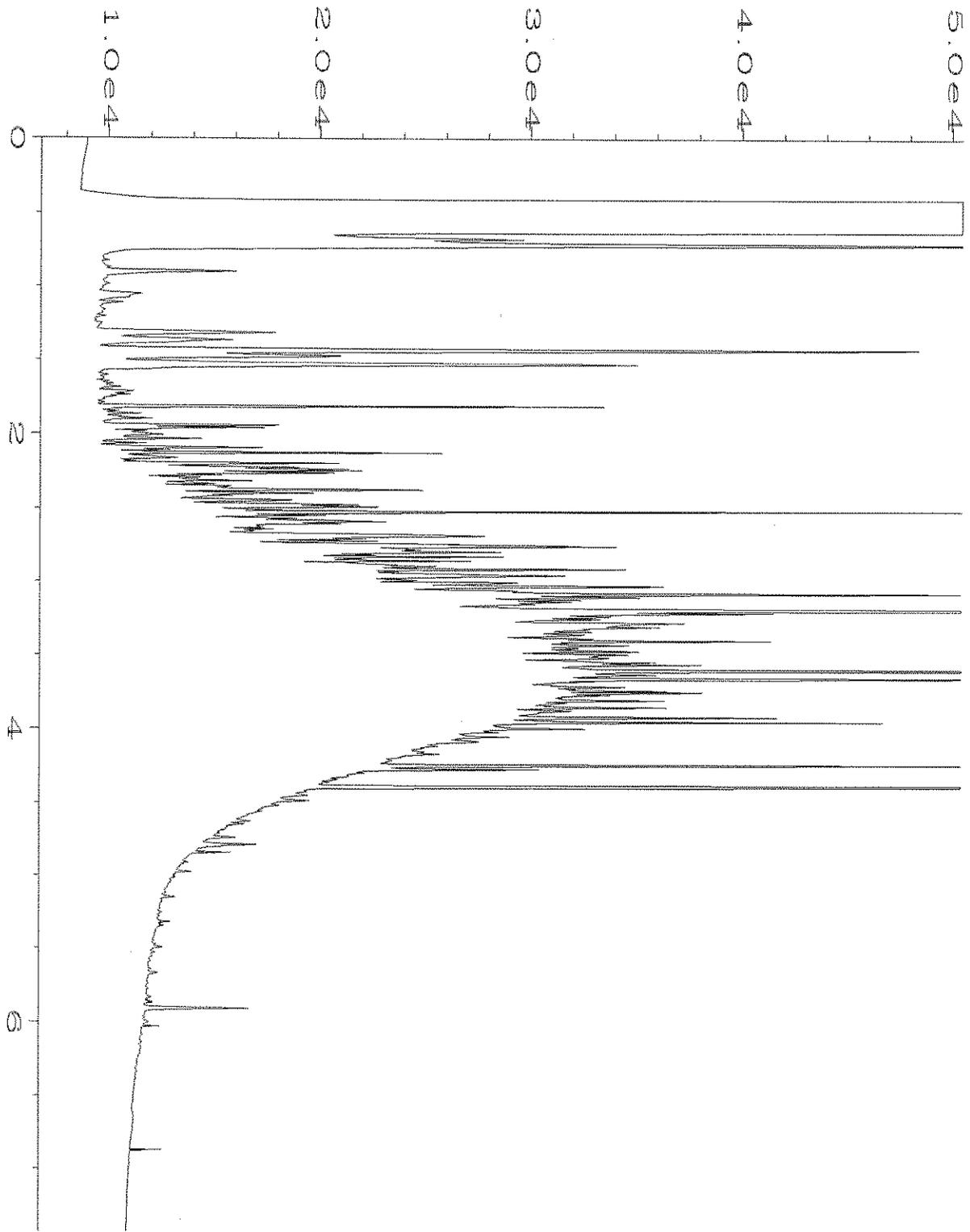
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Operator	: TL	Vial Number	: 49
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-29	Sequence Line	: 15
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Acquired on	: 25 Feb 21 10:01 PM	Analysis Method	: COND.MTH
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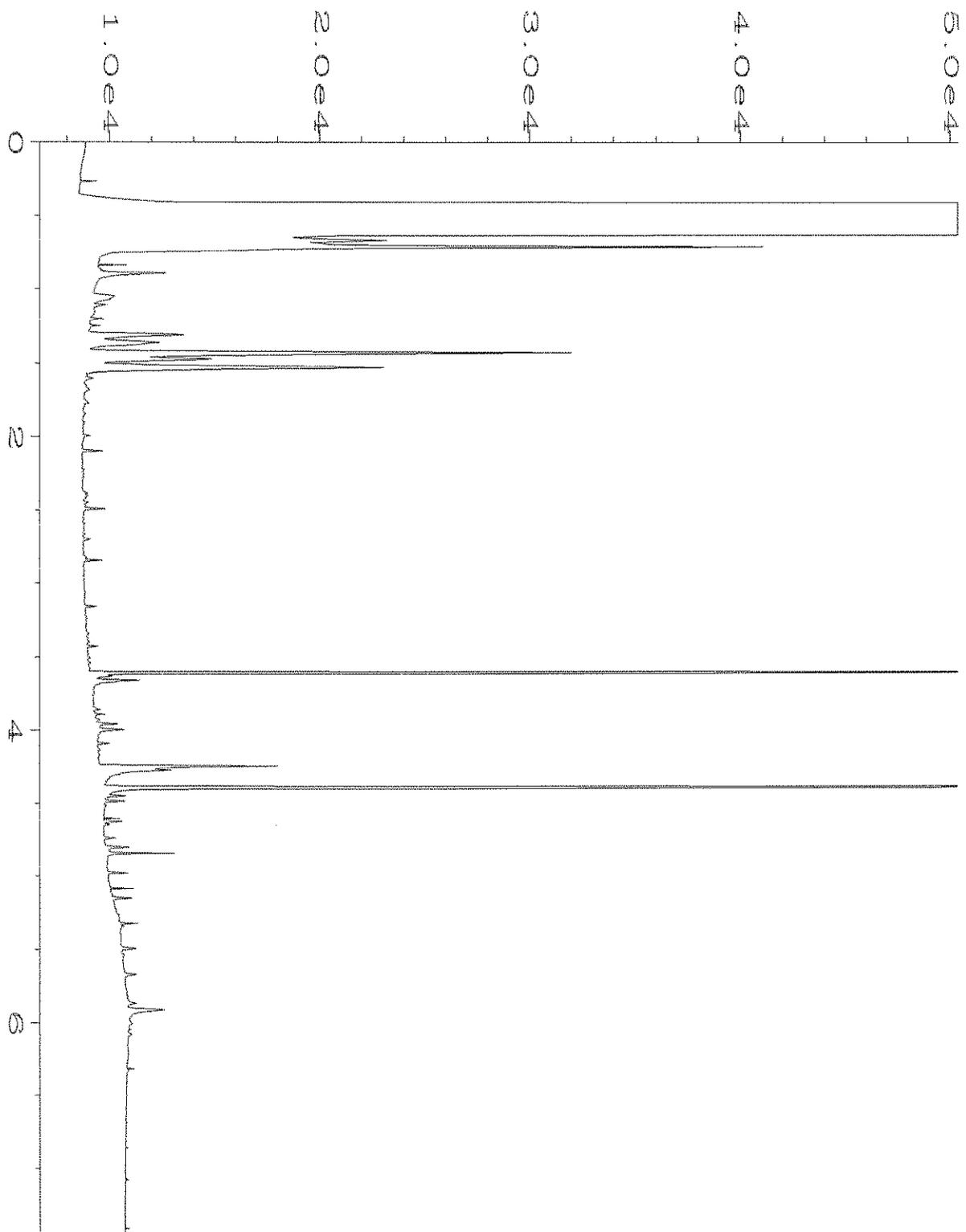
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Operator	: TL	Vial Number	: 50
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-30	Sequence Line	: 15
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Acquired on	: 25 Feb 21 10:12 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:12 AM		



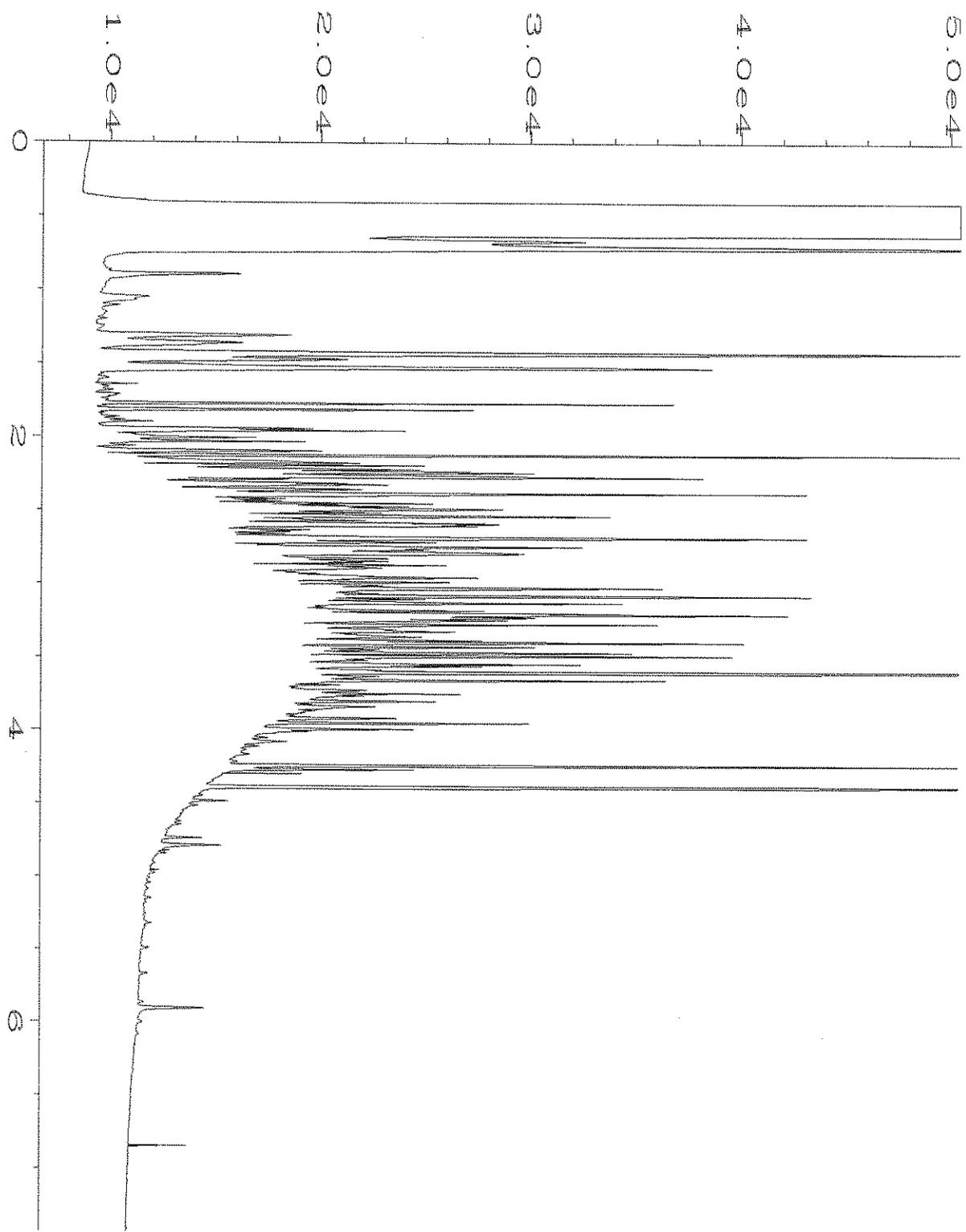
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Operator	: TL	Vial Number	: 51
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-31	Sequence Line	: 15
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 10:23 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:13 AM		



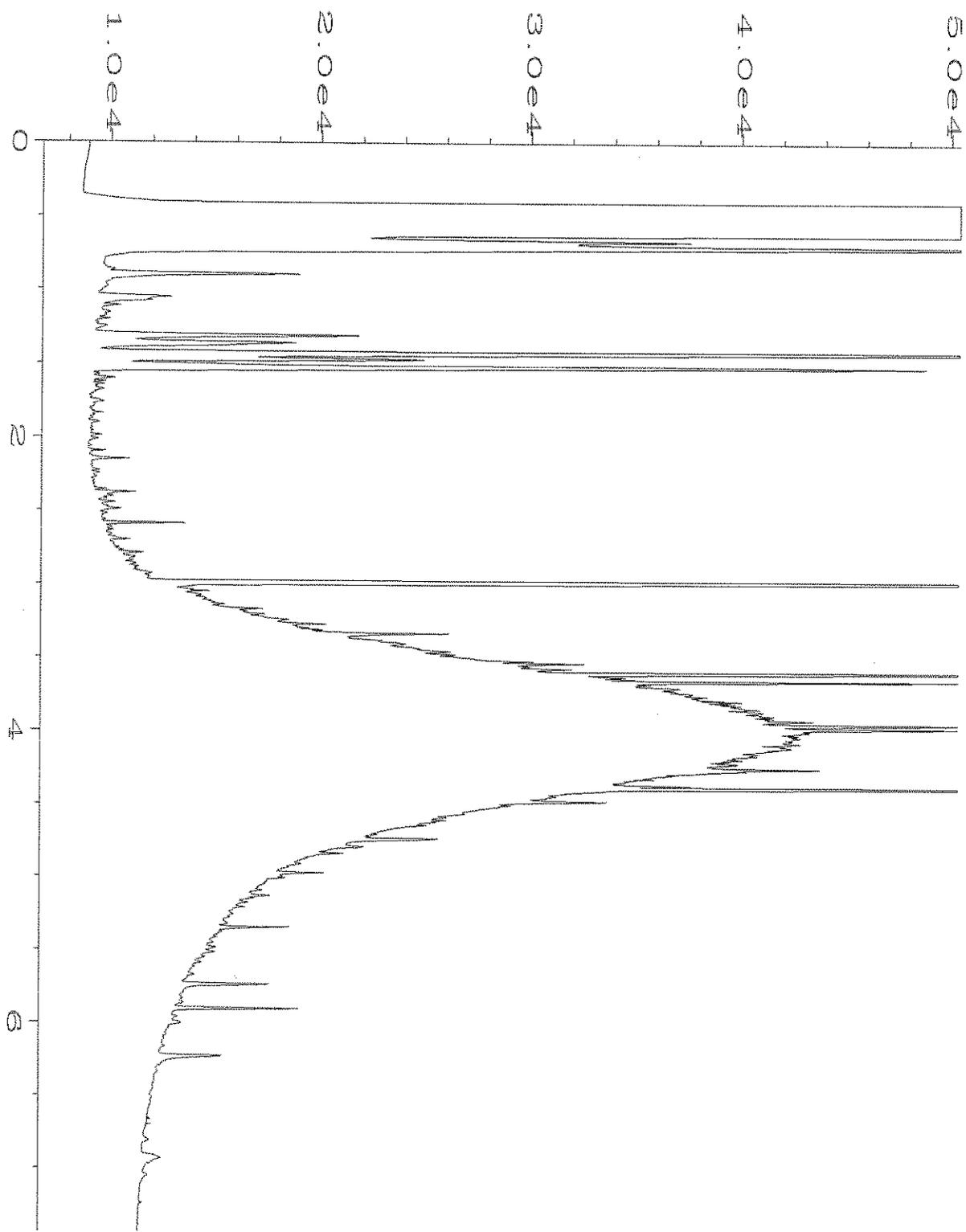
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Operator	: TL	Vial Number	: 52
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-32	Sequence Line	: 15
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Report Created on:	26 Feb 21 10:13 AM		



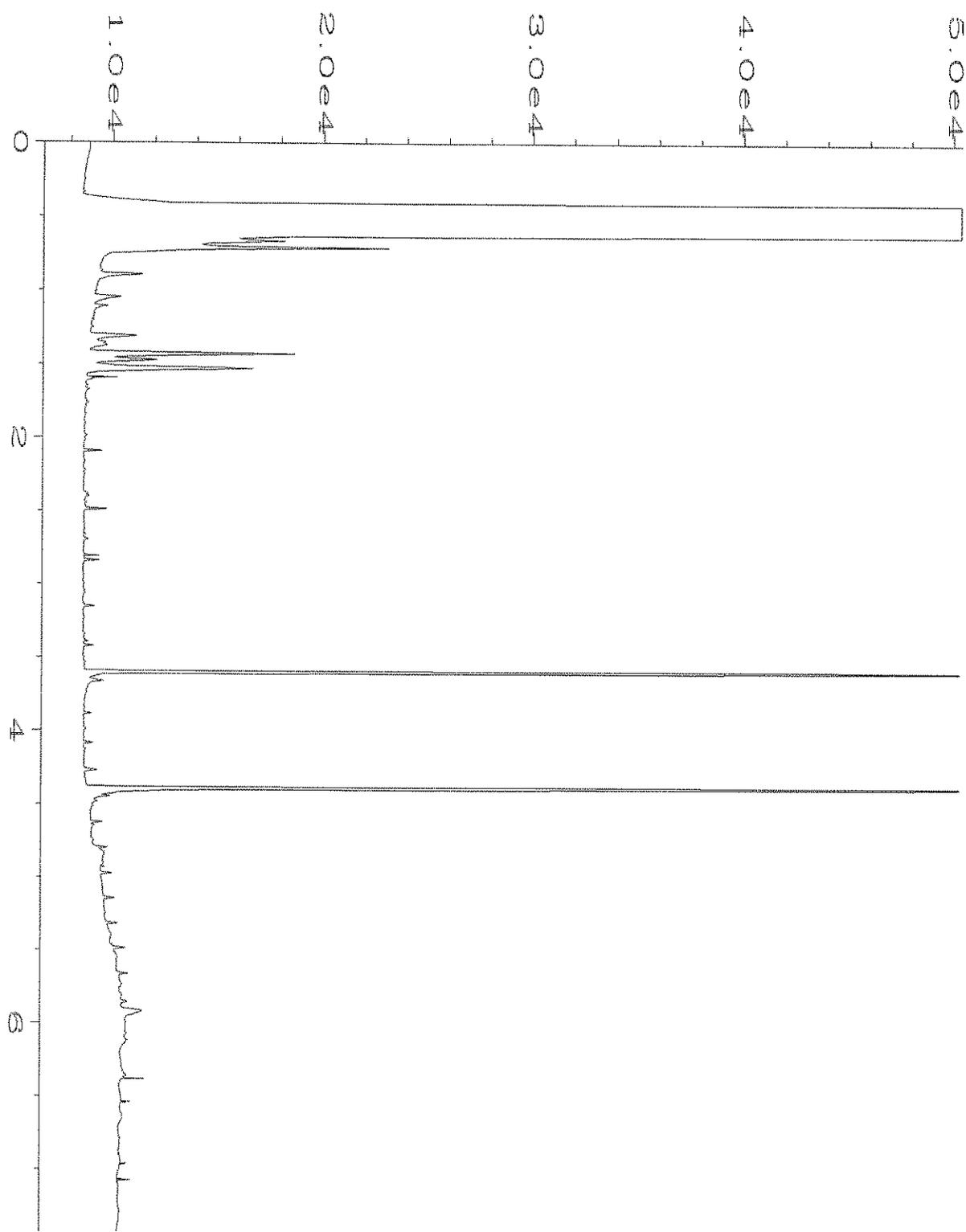
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Operator	: TL	Vial Number	: 53
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-33	Sequence Line	: 15
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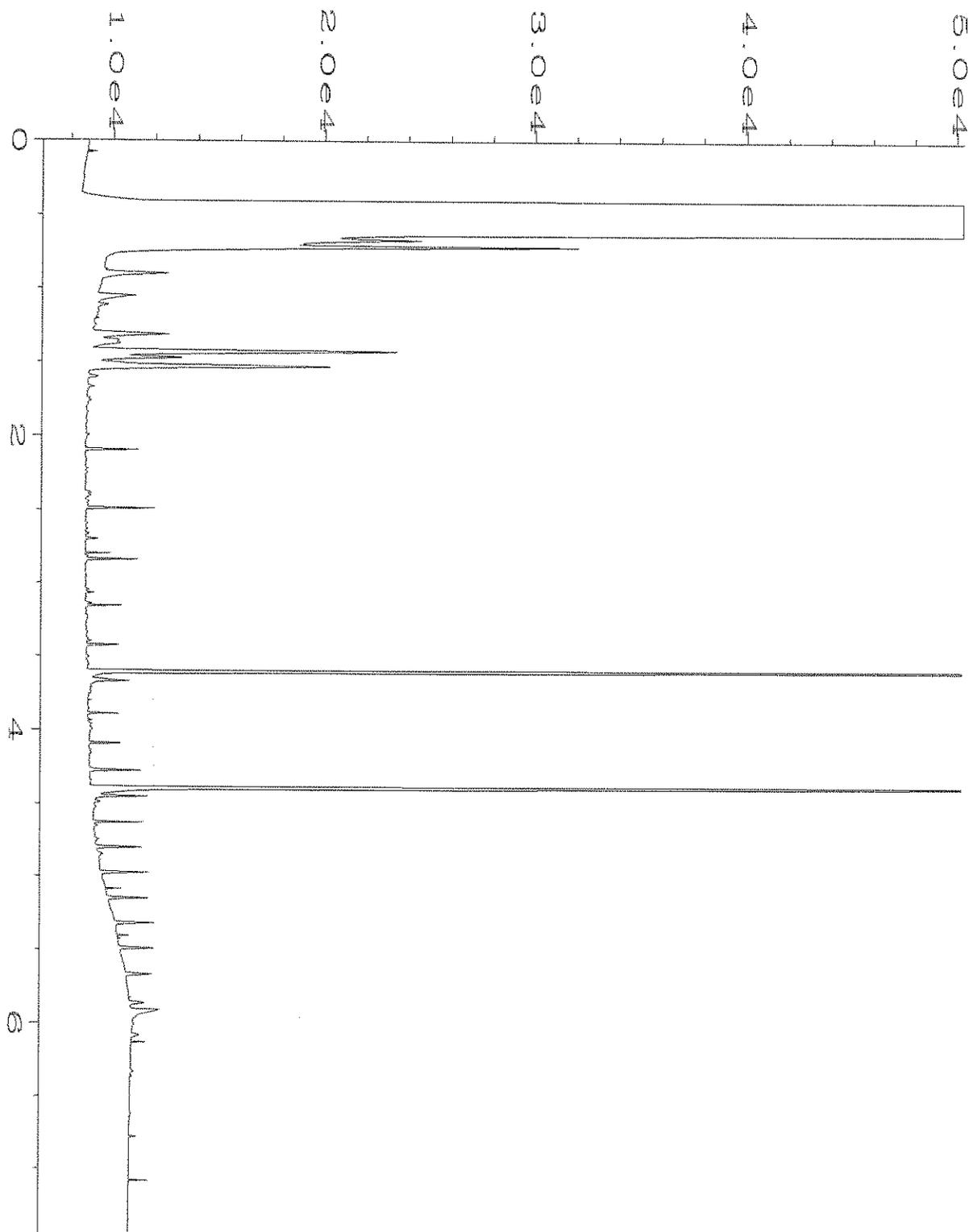
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Operator	: TL	Vial Number	: 54
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-34	Sequence Line	: 15
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Report Created on:	26 Feb 21 10:13 AM		



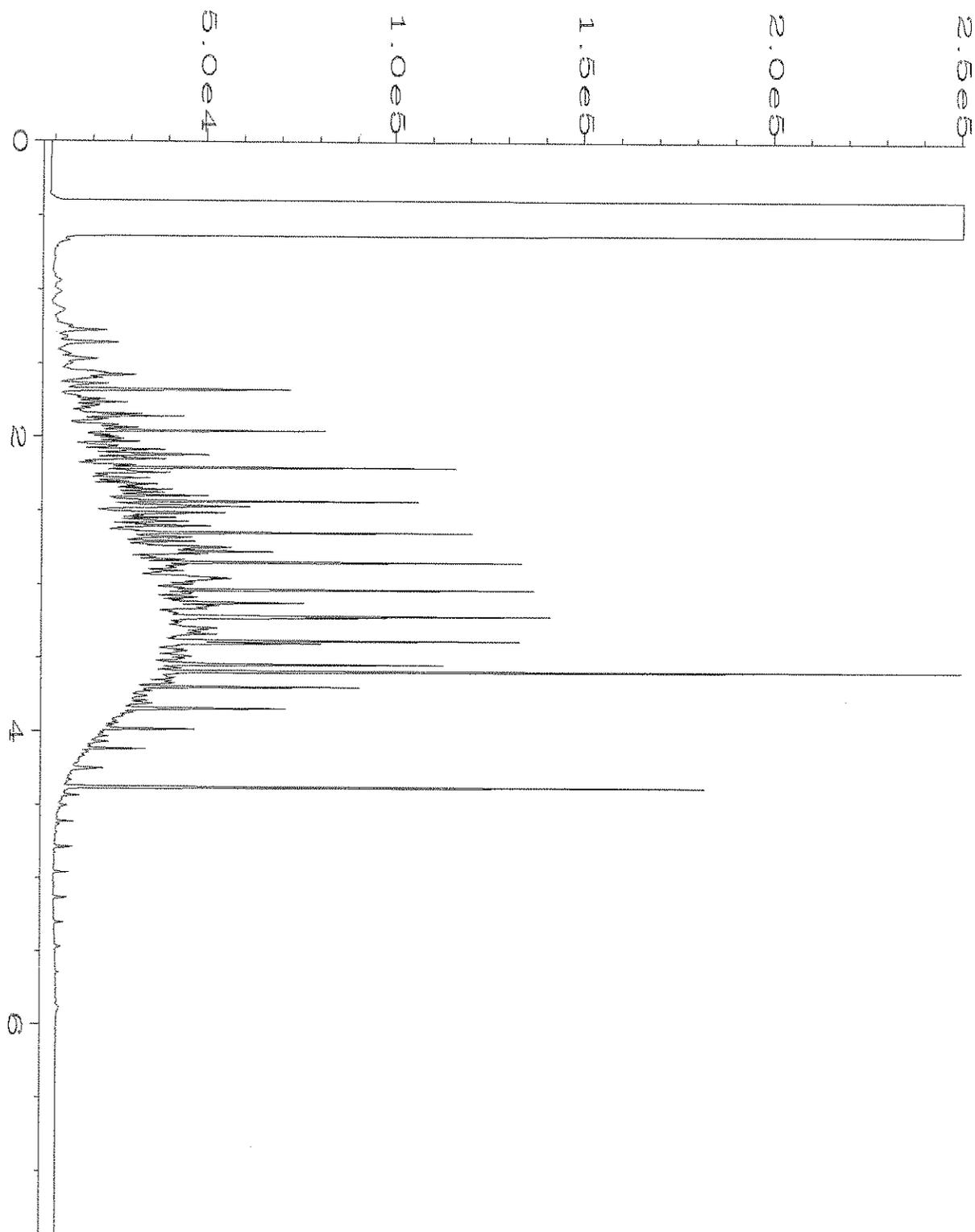
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Operator	: TL	Vial Number	: 55
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-35	Sequence Line	: 15
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Report Created on:	26 Feb 21 10:13 AM		



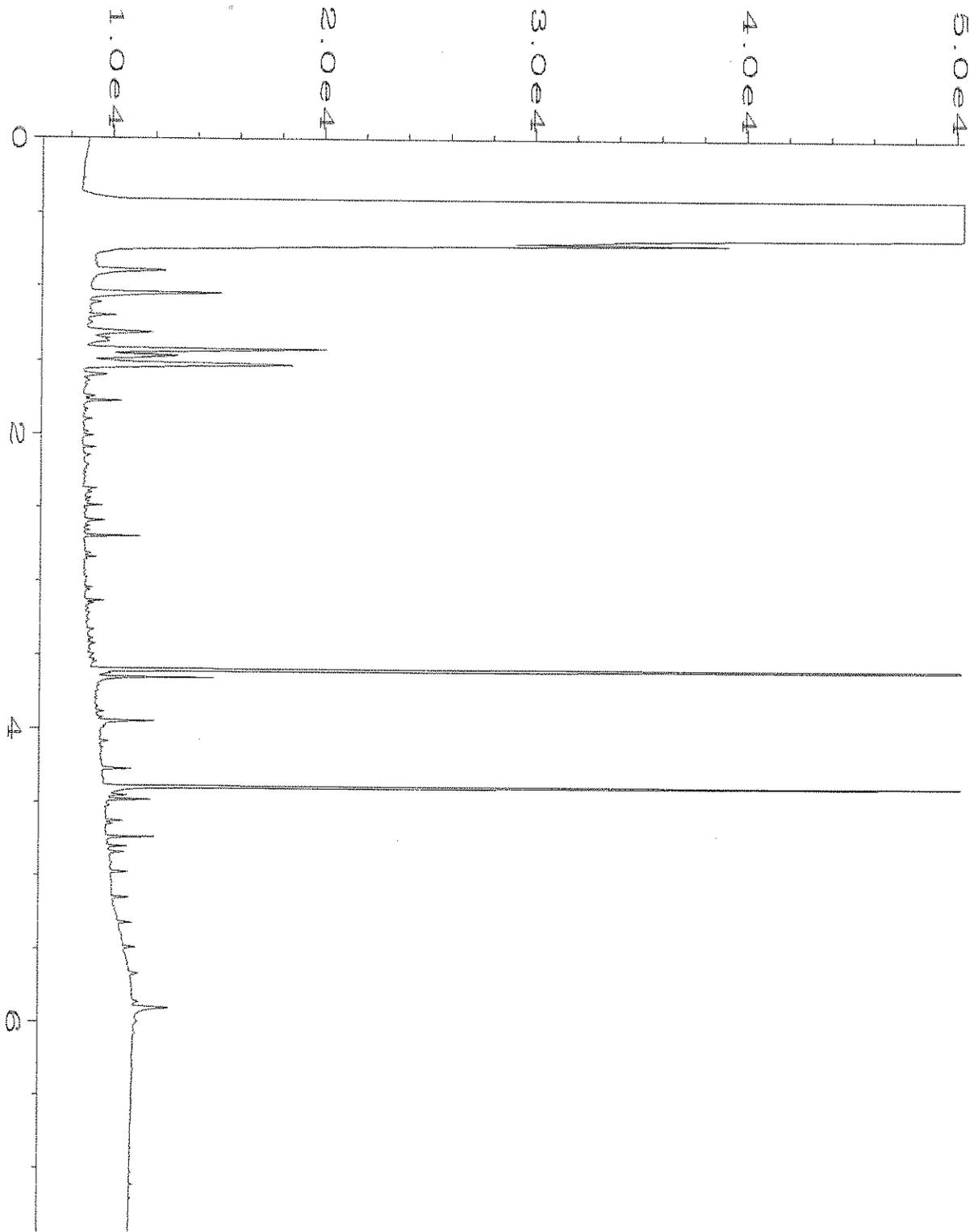
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Operator	: TL	Vial Number	: 13
Instrument	: GC1	Injection Number	: 1
Sample Name	: 01-498 mb	Sequence Line	: 11
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 02:26 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:16 AM		



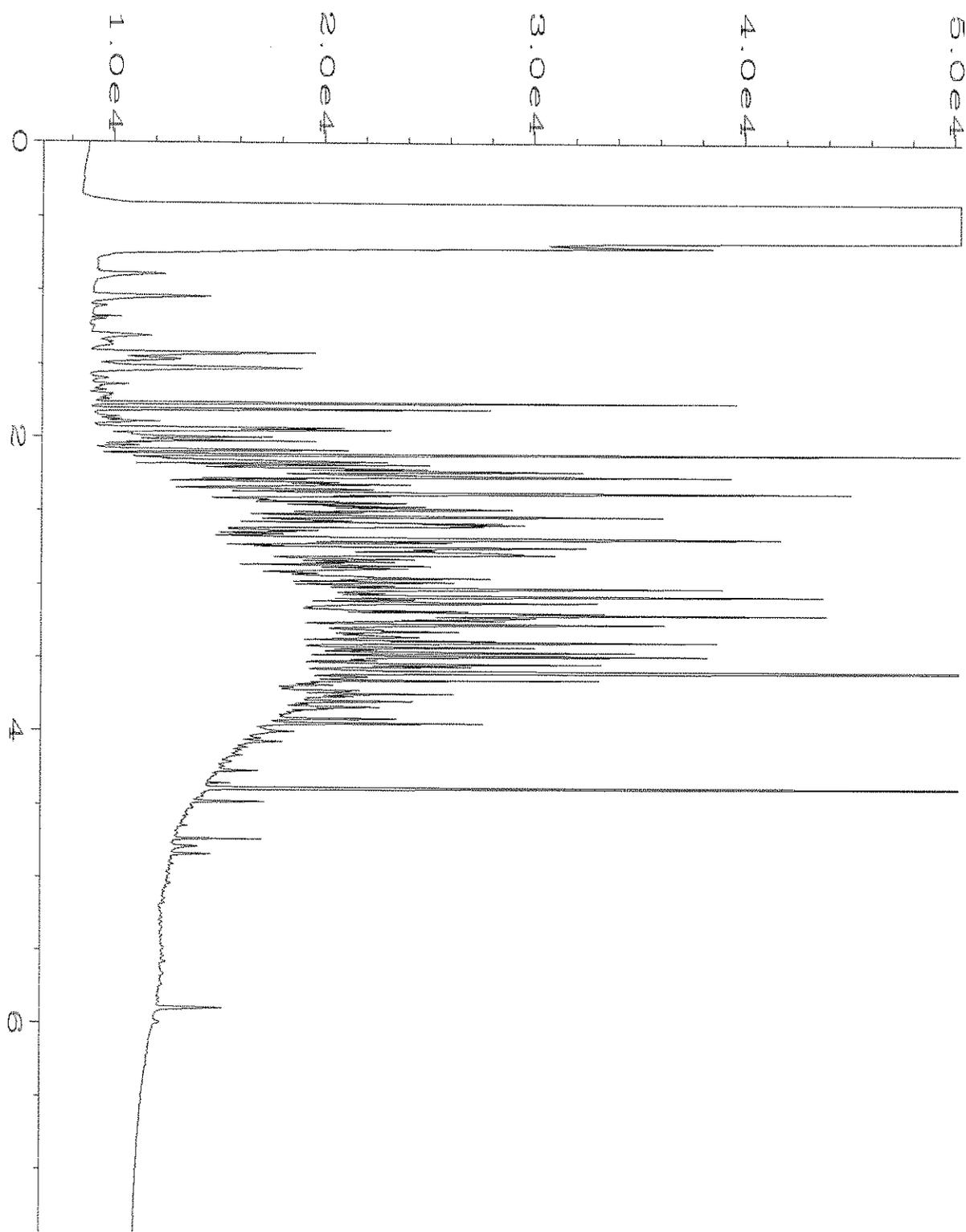
Data File Name	: C:\HPCHEM\1\DATA\02-25-21\036F1301.D	Page Number	: 1
Operator	: TL	Vial Number	: 36
Instrument	: GC1	Injection Number	: 1
Sample Name	: 01-499 mb	Sequence Line	: 13
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 07:12 PM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:16 AM		



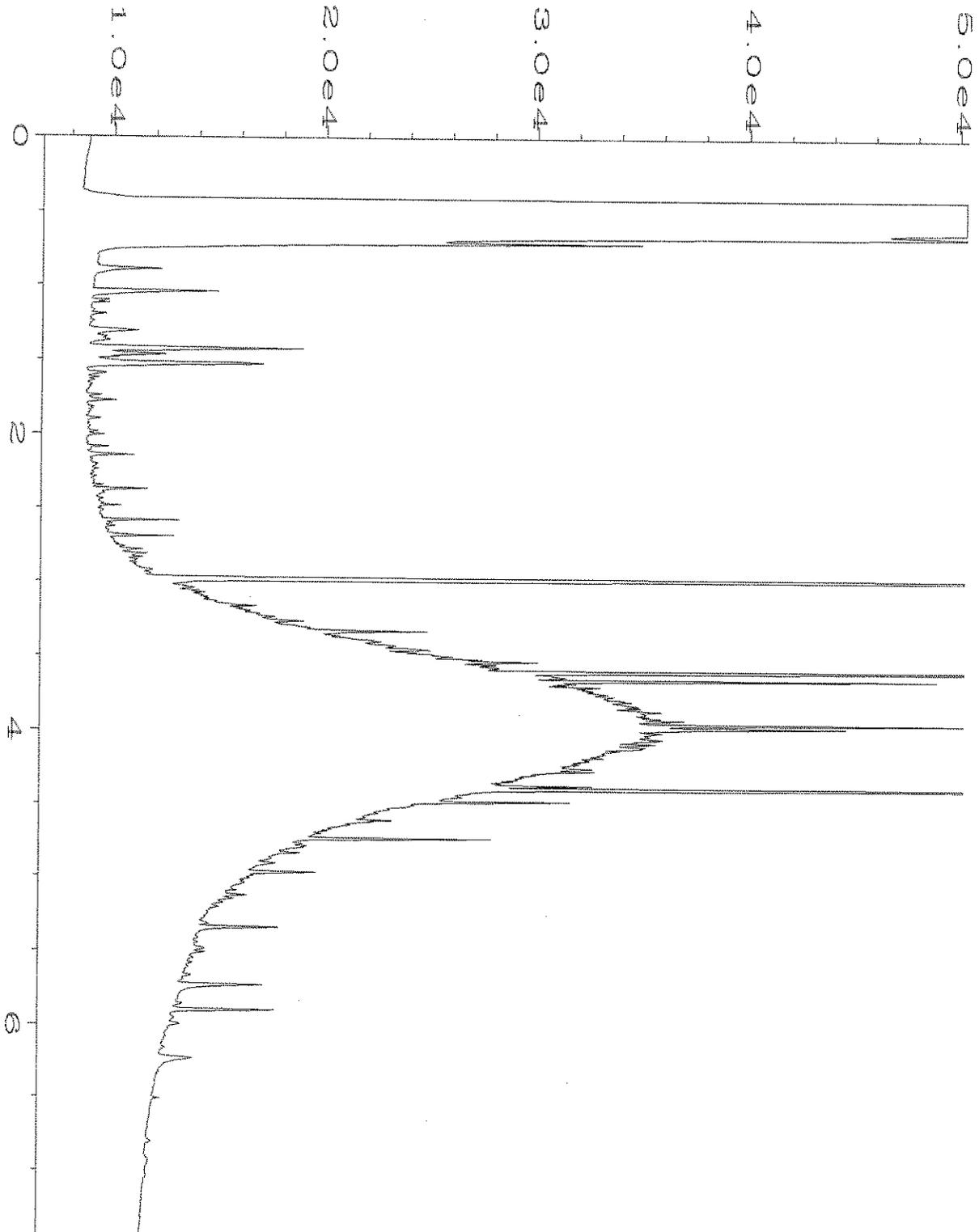
Data File Name	: C:\HPCHEM\1\DATA\02-25-21\003F0201.D	Page Number	: 1
Operator	: TL	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 Dx 61-146D	Sequence Line	: 2
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 25 Feb 21 05:47 AM	Analysis Method	: COND.MTH
Report Created on:	26 Feb 21 10:16 AM		



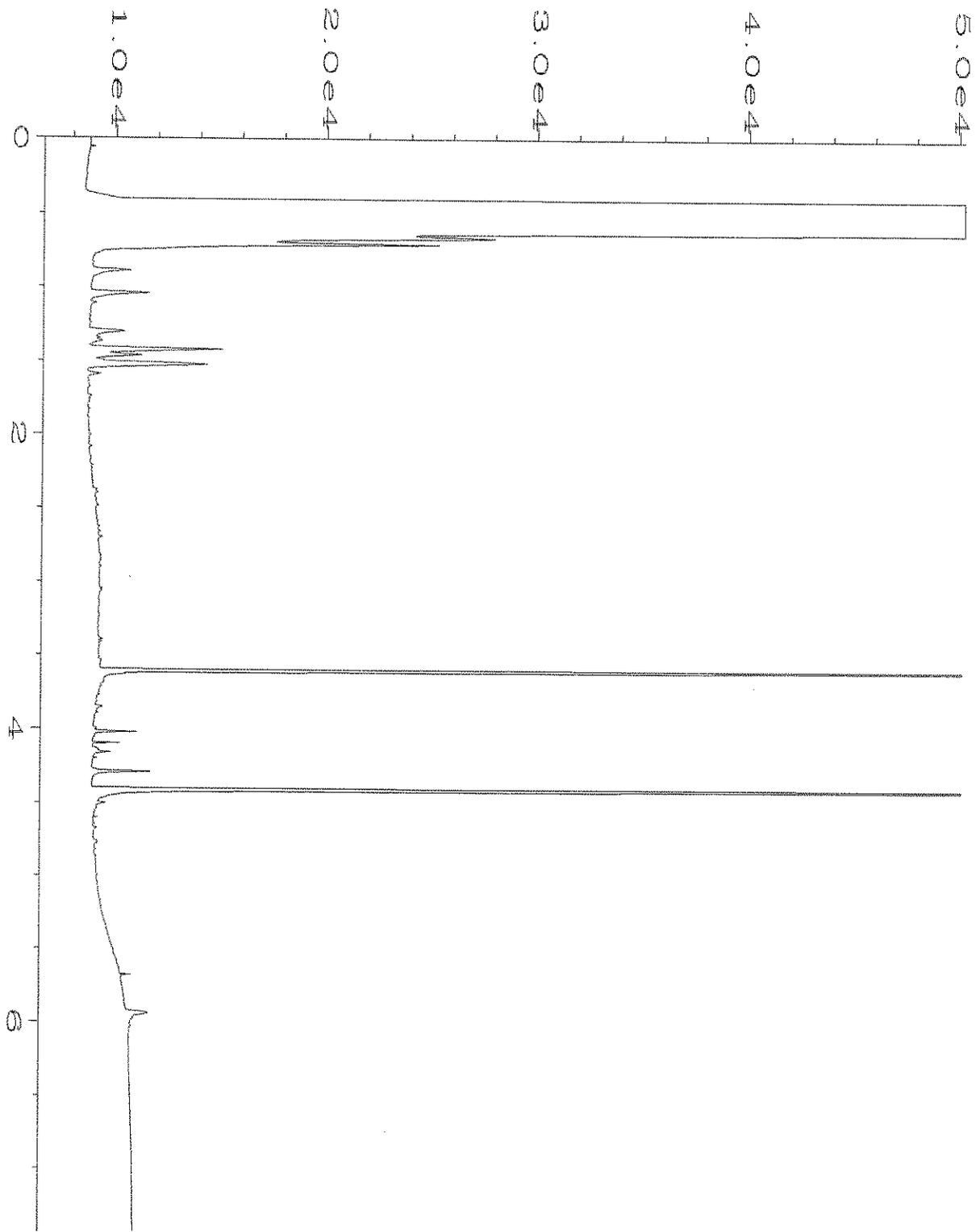
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Operator	: TL	Vial Number	: 24
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-33 rx	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 01 Mar 21 06:06 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	02 Mar 21 10:44 AM		



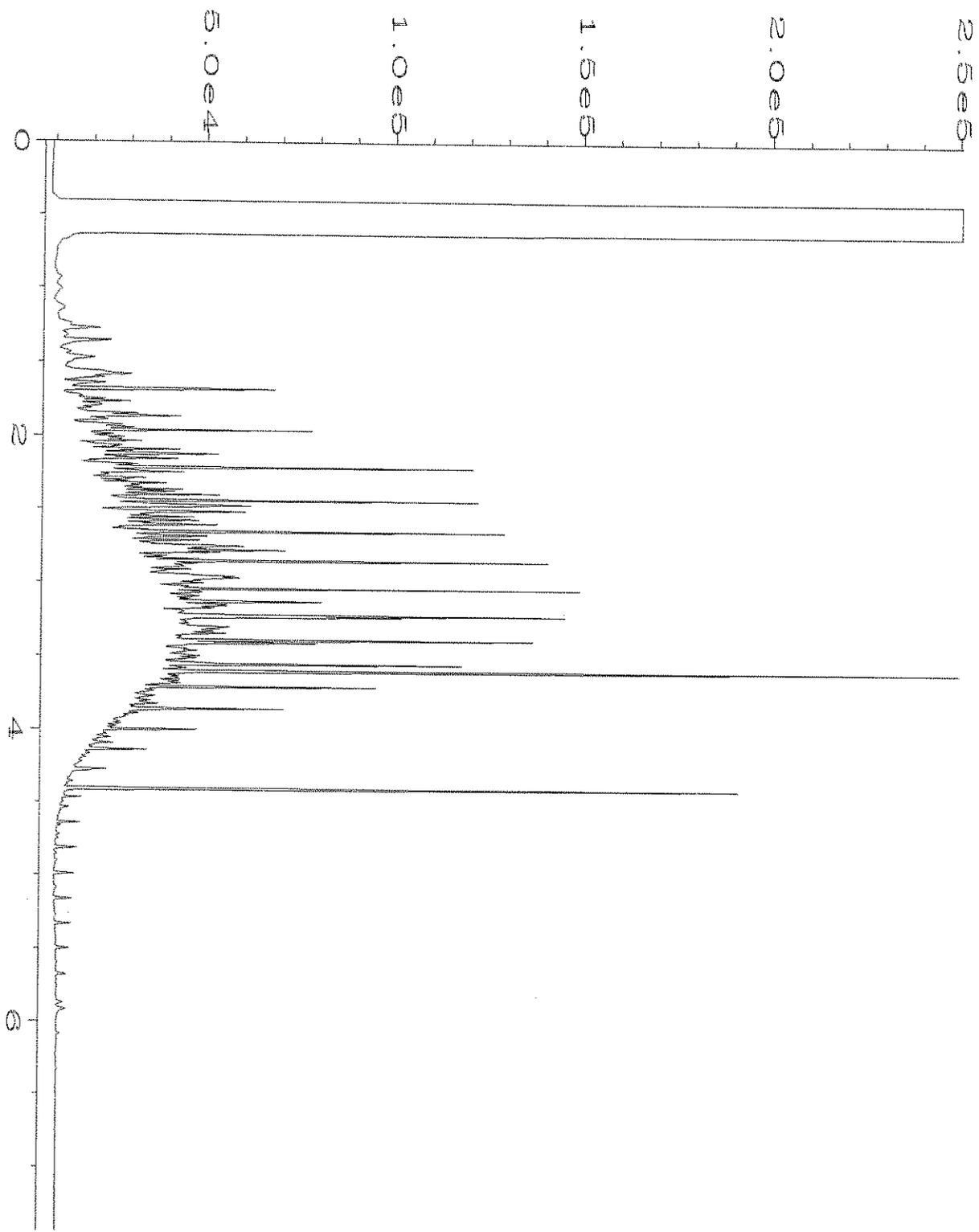
Data File Name	: C:\HPCHEM\1\DATA\03-01-21\025F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 25
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-34 rx	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 01 Mar 21 06:17 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	02 Mar 21 10:44 AM		



Data File Name	: C:\HPCHEM\1\DATA\03-01-21\026F0601.D	Page Number	: 1
Operator	: TL	Vial Number	: 26
Instrument	: GC1	Injection Number	: 1
Sample Name	: 102393-35 rx	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 01 Mar 21 06:29 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	02 Mar 21 10:44 AM		



Data File Name	: C:\HPCHEM\1\DATA\03-01-21\007F0401.D	Page Number	: 1
Operator	: TL	Vial Number	: 7
Instrument	: GC1	Injection Number	: 1
Sample Name	: 01-512 mb	Sequence Line	: 4
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 01 Mar 21 02:26 PM	Analysis Method	: DEFAULT.MTH
Report Created on:	02 Mar 21 10:43 AM		



Data File Name	: C:\HPCHEM\1\DATA\03-01-21\003F0201.D	Page Number	: 1
Operator	: TL	Vial Number	: 3
Instrument	: GC1	Injection Number	: 1
Sample Name	: 500 Dx 61-146D	Sequence Line	: 2
Run Time Bar Code:		Instrument Method:	DX.MTH
Acquired on	: 01 Mar 21 05:45 AM	Analysis Method	: DEFAULT.MTH
Report Created on:	02 Mar 21 10:44 AM		



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Floyd | Snider
Megan King
601 Union St., Suite 600
Seattle, WA 98101

RE: POL - TPH
Work Order Number: 2102384

March 03, 2021

Attention Megan King:

Fremont Analytical, Inc. received 17 sample(s) on 2/24/2021 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Dissolved Metals by EPA Method 200.8
Ion Chromatography by EPA Method 300.0
Total Alkalinity by SM 2320B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

CC:
Adia Jumper
Gabe Cisneros

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original



Date: 03/03/2021

CLIENT: Floyd | Snider
Project: POL - TPH
Work Order: 2102384

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2102384-001	MW-24-022321	02/23/2021 4:10 PM	02/24/2021 3:56 PM
2102384-002	MW-25-022321	02/23/2021 3:51 PM	02/24/2021 3:56 PM
2102384-003	MW-20-022321	02/23/2021 2:46 PM	02/24/2021 3:56 PM
2102384-004	MW-10-022321	02/23/2021 3:35 PM	02/24/2021 3:56 PM
2102384-005	MW-31-022321	02/23/2021 3:10 PM	02/24/2021 3:56 PM
2102384-006	MW-12-022321	02/23/2021 4:59 PM	02/24/2021 3:56 PM
2102384-007	MW-28-022421	02/24/2021 8:30 AM	02/24/2021 3:56 PM
2102384-008	MW-35-022421	02/24/2021 8:25 AM	02/24/2021 3:56 PM
2102384-009	MW-135-022421	02/24/2021 8:35 AM	02/24/2021 3:56 PM
2102384-010	MW-30-022421	02/24/2021 8:57 AM	02/24/2021 3:56 PM
2102384-011	MW-18-022421	02/24/2021 9:31 AM	02/24/2021 3:56 PM
2102384-012	MW-23-022421	02/24/2021 9:50 AM	02/24/2021 3:56 PM
2102384-013	MW-22-022421	02/24/2021 9:55 AM	02/24/2021 3:56 PM
2102384-014	MW-17-022421	02/24/2021 10:43 AM	02/24/2021 3:56 PM
2102384-015	MW-29-022421	02/24/2021 10:51 AM	02/24/2021 3:56 PM
2102384-016	MW-14-022421	02/24/2021 11:40 AM	02/24/2021 3:56 PM
2102384-017	Trip Blank	02/10/2021 3:31 PM	02/24/2021 3:56 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Floyd | Snider

Project: POL - TPH

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Client: Floyd | Snider

Collection Date: 2/23/2021 4:10:00 PM

Project: POL - TPH

Lab ID: 2102384-001

Matrix: Water

Client Sample ID: MW-24-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 10:26:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	1.34	0.200	D	mg/L	2	2/24/2021 6:02:00 PM
Sulfate	5.94	1.20	D	mg/L	2	2/24/2021 6:02:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	2.86	1.80		µg/L	1	2/26/2021 10:20:31 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO ₃)	89.1	2.50		mg/L	1	3/1/2021 11:15:00 AM



Client: Floyd | Snider

Collection Date: 2/23/2021 3:51:00 PM

Project: POL - TPH

Lab ID: 2102384-002

Matrix: Water

Client Sample ID: MW-25-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R65593 Analyst: MS

Methane	5.09	0.135	D	mg/L	20	2/26/2021 1:01:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 31485 Analyst: SS

Nitrate (as N)	ND	0.100		mg/L	1	2/24/2021 6:25:00 PM
Sulfate	4.50	0.600		mg/L	1	2/24/2021 6:25:00 PM

Dissolved Metals by EPA Method 200.8

Batch ID: 31499 Analyst: CO

Manganese	1,020	1.80		µg/L	1	2/26/2021 10:26:04 PM
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Total Alkalinity by SM 2320B

Batch ID: R65584 Analyst: WF

Alkalinity, Total (As CaCO ₃)	282	2.50		mg/L	1	3/1/2021 11:15:00 AM
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Client: Floyd | Snider

Collection Date: 2/23/2021 2:46:00 PM

Project: POL - TPH

Lab ID: 2102384-003

Matrix: Water

Client Sample ID: MW-20-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R65593 Analyst: MS

Methane	9.15	0.270	D	mg/L	40	2/26/2021 12:50:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 31485 Analyst: SS

Nitrate (as N)	ND	0.100		mg/L	1	2/25/2021 9:56:00 AM
Sulfate	ND	0.600		mg/L	1	2/25/2021 9:56:00 AM

Dissolved Metals by EPA Method 200.8

Batch ID: 31499 Analyst: CO

Manganese	2,790	18.0	D	µg/L	10	3/2/2021 1:24:28 PM
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Total Alkalinity by SM 2320B

Batch ID: R65584 Analyst: WF

Alkalinity, Total (As CaCO ₃)	425	2.50		mg/L	1	3/1/2021 11:15:00 AM
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Client: Floyd | Snider

Collection Date: 2/23/2021 3:35:00 PM

Project: POL - TPH

Lab ID: 2102384-004

Matrix: Water

Client Sample ID: MW-10-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	3.33	0.270	D	mg/L	40	2/26/2021 12:53:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.200	D	mg/L	2	2/24/2021 8:20:00 PM
Sulfate	ND	1.20	D	mg/L	2	2/24/2021 8:20:00 PM
NOTES: Diluted due to high levels of non-target analytes.						
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	2,520	18.0	D	µg/L	10	3/2/2021 1:30:01 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO ₃)	153	2.50		mg/L	1	3/1/2021 11:15:00 AM



Client: Floyd | Snider

Collection Date: 2/23/2021 3:10:00 PM

Project: POL - TPH

Lab ID: 2102384-005

Matrix: Water

Client Sample ID: MW-31-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	0.0432	0.00675		mg/L	1	2/26/2021 11:38:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	5.14	0.400	D	mg/L	4	2/25/2021 10:19:00 AM
Sulfate	13.0	1.20	D	mg/L	2	2/24/2021 9:30:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	9.22	1.80		µg/L	1	2/26/2021 10:42:47 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO ₃)	194	2.50		mg/L	1	3/1/2021 11:15:00 AM



Client: Floyd | Snider

Collection Date: 2/23/2021 4:59:00 PM

Project: POL - TPH

Lab ID: 2102384-006

Matrix: Water

Client Sample ID: MW-12-022321

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	7.10	0.270	D	mg/L	40	2/26/2021 12:55:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	2/24/2021 9:53:00 PM
Sulfate	ND	0.600		mg/L	1	2/24/2021 9:53:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	1,940	1.80		µg/L	1	2/26/2021 10:48:21 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO ₃)	186	2.50		mg/L	1	3/1/2021 11:15:00 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 8:30:00 AM

Project: POL - TPH

Lab ID: 2102384-007

Matrix: Water

Client Sample ID: MW-28-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	0.0516	0.00675		mg/L	1	2/26/2021 11:43:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	1.36	0.200	D	mg/L	2	2/24/2021 10:16:00 PM
Sulfate	4.24	1.20	D	mg/L	2	2/24/2021 10:16:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	9.98	1.80		µg/L	1	2/26/2021 10:53:55 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO ₃)	41.4	2.50		mg/L	1	3/1/2021 11:15:00 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 8:25:00 AM

Project: POL - TPH

Lab ID: 2102384-008

Matrix: Water

Client Sample ID: MW-35-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:49:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	9.28	0.400	D	mg/L	4	2/24/2021 10:39:00 PM
Sulfate	15.2	2.40	D	mg/L	4	2/24/2021 10:39:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	9.09	1.80		µg/L	1	2/26/2021 11:10:39 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65584		Analyst: WF
Alkalinity, Total (As CaCO ₃)	86.0	2.50		mg/L	1	3/1/2021 11:15:00 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 8:35:00 AM

Project: POL - TPH

Lab ID: 2102384-009

Matrix: Water

Client Sample ID: MW-135-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:51:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	9.33	1.00	D	mg/L	10	2/24/2021 11:02:00 PM
Sulfate	16.4	6.00	D	mg/L	10	2/24/2021 11:02:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	9.06	1.80		µg/L	1	2/26/2021 11:16:13 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	89.1	2.50		mg/L	1	3/2/2021 10:50:03 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 8:57:00 AM

Project: POL - TPH

Lab ID: 2102384-010

Matrix: Water

Client Sample ID: MW-30-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:54:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	23.8	2.00	D	mg/L	20	2/24/2021 11:25:00 PM
Sulfate	96.5	12.0	D	mg/L	20	2/24/2021 11:25:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	179	1.80		µg/L	1	2/26/2021 11:21:47 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	143	2.50		mg/L	1	3/2/2021 10:50:03 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 9:31:00 AM

Project: POL - TPH

Lab ID: 2102384-011

Matrix: Water

Client Sample ID: MW-18-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 11:58:00 AM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	2.77	0.200	D	mg/L	2	2/25/2021 10:42:00 AM
Sulfate	6.76	0.600		mg/L	1	2/24/2021 11:48:00 PM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	ND	1.80		µg/L	1	2/26/2021 11:27:21 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	62.1	2.50		mg/L	1	3/2/2021 10:50:03 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 9:50:00 AM

Project: POL - TPH

Lab ID: 2102384-012

Matrix: Water

Client Sample ID: MW-23-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R65593 Analyst: MS

Methane	0.938	0.0675	D	mg/L	10	2/26/2021 12:57:00 PM
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Ion Chromatography by EPA Method 300.0

Batch ID: 31485 Analyst: SS

Nitrate (as N)	ND	1.00	D	mg/L	10	2/25/2021 11:05:00 AM
Sulfate	13.6	6.00	D	mg/L	10	2/25/2021 11:05:00 AM

NOTES:

Diluted due to high levels of non-target analytes.

Dissolved Metals by EPA Method 200.8

Batch ID: 31499 Analyst: CO

Manganese	1,600	1.80		µg/L	1	2/26/2021 11:32:55 PM
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Total Alkalinity by SM 2320B

Batch ID: R65587 Analyst: WF

Alkalinity, Total (As CaCO3)	82.8	2.50		mg/L	1	3/2/2021 10:50:03 AM
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Client: Floyd | Snider

Collection Date: 2/24/2021 9:55:00 AM

Project: POL - TPH

Lab ID: 2102384-013

Matrix: Water

Client Sample ID: MW-22-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	2.63	0.135	D	mg/L	20	2/26/2021 12:59:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	ND	0.100		mg/L	1	2/25/2021 1:21:00 AM
Sulfate	2.30	0.600		mg/L	1	2/25/2021 1:21:00 AM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	871	1.80		µg/L	1	2/26/2021 11:38:29 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	134	2.50		mg/L	1	3/2/2021 10:50:03 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 10:43:00 AM

Project: POL - TPH

Lab ID: 2102384-014

Matrix: Water

Client Sample ID: MW-17-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	0.00810	0.00675		mg/L	1	2/26/2021 12:12:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	2.01	0.100		mg/L	1	2/25/2021 1:44:00 AM
Sulfate	5.92	0.600		mg/L	1	2/25/2021 1:44:00 AM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	2.51	1.80		µg/L	1	2/26/2021 11:44:03 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	167	2.50		mg/L	1	3/2/2021 10:50:03 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 10:51:00 AM

Project: POL - TPH

Lab ID: 2102384-015

Matrix: Water

Client Sample ID: MW-29-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	ND	0.00675		mg/L	1	2/26/2021 12:14:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	0.868	0.100		mg/L	1	2/25/2021 2:53:00 AM
Sulfate	1.30	0.600		mg/L	1	2/25/2021 2:53:00 AM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	ND	1.80		µg/L	1	2/26/2021 11:49:37 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	44.6	2.50		mg/L	1	3/2/2021 10:50:03 AM



Client: Floyd | Snider

Collection Date: 2/24/2021 11:40:00 AM

Project: POL - TPH

Lab ID: 2102384-016

Matrix: Water

Client Sample ID: MW-14-022421

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Gases by RSK-175</u>				Batch ID: R65593		Analyst: MS
Methane	0.00701	0.00675		mg/L	1	2/26/2021 12:16:00 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: 31485		Analyst: SS
Nitrate (as N)	2.81	0.200	D	mg/L	2	2/25/2021 3:16:00 AM
Sulfate	1.64	1.20	D	mg/L	2	2/25/2021 3:16:00 AM
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 31499		Analyst: CO
Manganese	1.90	1.80		µg/L	1	2/26/2021 11:55:11 PM
<u>Total Alkalinity by SM 2320B</u>				Batch ID: R65587		Analyst: WF
Alkalinity, Total (As CaCO ₃)	181	2.50		mg/L	1	3/2/2021 10:50:03 AM

Work Order: 2102384
 CLIENT: Floyd | Snider
 Project: POL - TPH

QC SUMMARY REPORT
Total Alkalinity by SM 2320B

Sample ID: MB-R65584	SampType: MBLK	Units: mg/L	Prep Date: 3/1/2021	RunNo: 65584							
Client ID: MBLKW	Batch ID: R65584		Analysis Date: 3/1/2021	SeqNo: 1319245							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) ND 2.50

Sample ID: LCS-R65584	SampType: LCS	Units: mg/L	Prep Date: 3/1/2021	RunNo: 65584							
Client ID: LCSW	Batch ID: R65584		Analysis Date: 3/1/2021	SeqNo: 1319246							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) 100 2.50 100.0 0 100 99.6 108

Sample ID: 2102384-005CDUP	SampType: DUP	Units: mg/L	Prep Date: 3/1/2021	RunNo: 65584							
Client ID: MW-31-022321	Batch ID: R65584		Analysis Date: 3/1/2021	SeqNo: 1319248							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) 191 2.50 194.2 1.65 20

Sample ID: MB-R65587	SampType: MBLK	Units: mg/L	Prep Date: 3/2/2021	RunNo: 65587							
Client ID: MBLKW	Batch ID: R65587		Analysis Date: 3/2/2021	SeqNo: 1319287							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) ND 2.50

Sample ID: LCS-R65587	SampType: LCS	Units: mg/L	Prep Date: 3/2/2021	RunNo: 65587							
Client ID: LCSW	Batch ID: R65587		Analysis Date: 3/2/2021	SeqNo: 1319288							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Alkalinity, Total (As CaCO3) 101 2.50 100.0 0 101 99.6 108

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT
Total Alkalinity by SM 2320B

Sample ID: 2102384-009CDUP	SampType: DUP	Units: mg/L	Prep Date: 3/2/2021	RunNo: 65587							
Client ID: MW-135-022421	Batch ID: R65587	Analysis Date: 3/2/2021	SeqNo: 1319290								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	86.0	2.50						89.13	3.64	20	

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT
Ion Chromatography by EPA Method 300.0

Sample ID: MB-31485	SampType: MBLK	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: MBLKW	Batch ID: 31485				Analysis Date: 2/24/2021	SeqNo: 1317986					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	ND	0.100									
Sulfate	ND	0.600									

Sample ID: LCS-31485	SampType: LCS	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: LCSW	Batch ID: 31485				Analysis Date: 2/24/2021	SeqNo: 1317987					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	0.704	0.100	0.7500	0	93.9	90	110				
Sulfate	3.60	0.600	3.750	0	95.9	90	110				

Sample ID: 2102384-002CDUP	SampType: DUP	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: MW-25-022321	Batch ID: 31485				Analysis Date: 2/24/2021	SeqNo: 1317990					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	ND	0.100						0		20	
Sulfate	4.49	0.600						4.501	0.200	20	

Sample ID: 2102384-002CMS	SampType: MS	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: MW-25-022321	Batch ID: 31485				Analysis Date: 2/24/2021	SeqNo: 1317991					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	0.734	0.100	0.7500	0	97.9	80	120				
Sulfate	8.40	0.600	3.750	4.501	104	80	120				

Work Order: 2102384
 CLIENT: Floyd | Snider
 Project: POL - TPH

QC SUMMARY REPORT
Ion Chromatography by EPA Method 300.0

Sample ID: 2102384-002CMSD	SampType: MSD	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: MW-25-022321	Batch ID: 31485				Analysis Date: 2/24/2021	SeqNo: 1317992					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	0.743	0.100	0.7500	0	99.1	80	120	0.7340	1.22	20	
Sulfate	8.46	0.600	3.750	4.501	105	80	120	8.396	0.712	20	

Sample ID: 2102384-014CDUP	SampType: DUP	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: MW-17-022421	Batch ID: 31485				Analysis Date: 2/25/2021	SeqNo: 1318014					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	2.00	0.100						2.006	0.200	20	
Sulfate	5.92	0.600						5.921	0.0676	20	

Sample ID: 2102384-014CMS	SampType: MS	Units: mg/L			Prep Date: 2/24/2021	RunNo: 65527					
Client ID: MW-17-022421	Batch ID: 31485				Analysis Date: 2/25/2021	SeqNo: 1318015					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate (as N)	2.83	0.100	0.7500	2.006	110	80	120				E
Sulfate	10.1	0.600	3.750	5.921	113	80	120				

Work Order: 2102384
 CLIENT: Floyd | Snider
 Project: POL - TPH

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID: MB-31499	SampType: MBLK	Units: µg/L	Prep Date: 2/26/2021	RunNo: 65561							
Client ID: MBLKW	Batch ID: 31499		Analysis Date: 2/26/2021	SeqNo: 1318673							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese ND 1.80

Sample ID: LCS-31499	SampType: LCS	Units: µg/L	Prep Date: 2/26/2021	RunNo: 65561							
Client ID: LCSW	Batch ID: 31499		Analysis Date: 2/26/2021	SeqNo: 1318674							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese 110 1.80 100.0 0 110 85 115

Sample ID: 2102341-001ADUP	SampType: DUP	Units: µg/L	Prep Date: 2/26/2021	RunNo: 65561							
Client ID: BATCH	Batch ID: 31499		Analysis Date: 2/26/2021	SeqNo: 1318676							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese ND 1.80 3.509 73.8 30 R

NOTES:

R - High RPD observed due to analyte concentration near the reporting limit.

Sample ID: 2102341-001AMS	SampType: MS	Units: µg/L	Prep Date: 2/26/2021	RunNo: 65561							
Client ID: BATCH	Batch ID: 31499		Analysis Date: 2/26/2021	SeqNo: 1318677							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese 546 1.80 500.0 3.509 108 70 130

Sample ID: 2102341-001AMSD	SampType: MSD	Units: µg/L	Prep Date: 2/26/2021	RunNo: 65561							
Client ID: BATCH	Batch ID: 31499		Analysis Date: 2/26/2021	SeqNo: 1318678							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese 551 1.80 500.0 3.509 110 70 130 545.8 0.978 30

Work Order: 2102384
CLIENT: Floyd | Snider
Project: POL - TPH

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID: MB-31499FB	SampType: MBLK	Units: µg/L	Prep Date: 2/26/2021	RunNo: 65561							
Client ID: MBLKW	Batch ID: 31499		Analysis Date: 3/1/2021	SeqNo: 1319065							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Manganese	ND	1.80									
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NOTES:
 Filter Blank

Work Order: 2102384
 CLIENT: Floyd | Snider
 Project: POL - TPH

QC SUMMARY REPORT
Dissolved Gases by RSK-175

Sample ID: LCS-R65593	SampType: LCS	Units: mg/L			Prep Date: 2/26/2021	RunNo: 65593					
Client ID: LCSW	Batch ID: R65593				Analysis Date: 2/26/2021	SeqNo: 1319442					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane 992 0.00675 1,000 0 99.2 70 130

Sample ID: MB-R65593	SampType: MBLK	Units: mg/L			Prep Date: 2/26/2021	RunNo: 65593					
Client ID: MBLKW	Batch ID: R65593				Analysis Date: 2/26/2021	SeqNo: 1319443					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane ND 0.00675

Sample ID: 2102384-001AREP	SampType: REP	Units: mg/L			Prep Date: 2/26/2021	RunNo: 65593					
Client ID: MW-24-022321	Batch ID: R65593				Analysis Date: 2/26/2021	SeqNo: 1319410					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane ND 0.00675 0 30

Client Name: **FS**
 Logged by: **Clare Griggs**

Work Order Number: **2102384**
 Date Received: **2/24/2021 3:56:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not Present
 6. Was an attempt made to cool the samples? Yes No NA
 7. Were all items received at a temperature of >2°C to 6°C * Yes No NA
 8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes No NA

Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Sample	4.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix F Aquifer Testing Report

Memorandum

To: POL-TPH Site PLP Group
From: Brett Beaulieu, LHG, and Nathan Schachtman, Floyd|Snider
Date: June 1, 2021
Project No: POL-TPH
Re: **Aquifer Testing Results**

INTRODUCTION

Previous environmental and hydrogeologic investigations at the Port of Longview (Port) Total Petroleum Hydrocarbons (TPH) Site (Site) is in Longview, Washington, have characterized two water-bearing zones at the Site: a discontinuous zone of perched groundwater (perched zone), which occurs primarily in shallow fill deposits, and a deeper alluvial aquifer, which sits in native sand deposits. The two water-bearing zones have been described as hydraulically isolated, separated by low permeability silt lenses (Golder 2000).

In accordance with the Remedial Investigation Work Plan (RIWP; Floyd|Snider 2019) and ASTM Method D4050, Floyd|Snider conducted aquifer testing at the Site on November 4, 2020. Constant-rate aquifer tests were conducted at two locations, MW-17 and MW-33, screened in the perched zone and alluvial aquifer, respectively. Constant-rate aquifer tests consist of drawdown and recovery periods, which are preceded by an initial preliminary test to determine optimal pumping rate. During drawdown, water is evacuated from the well using a pump while the amount of drawdown is recorded over time. The recovery period follows the cessation of pumping, in which the increase or recovery of water levels in the well is recorded over time. The objectives of the constant-rate aquifer tests at the Site were to: (1) determine if the perched zone is a substantial water-bearing unit; (2) determine if the perched zone and alluvial aquifer are hydraulically isolated; and (3) to collect sufficient data to estimate aquifer parameters.

This report provides a description of the testing methodologies as well as a summary and interpretation of results derived from the two aquifer tests.

TESTING METHODOLOGY

The aquifer tests were implemented in general accordance with the RIWP and ASTM Method D4050, as summarized in this section, except when noted. Floyd|Snider conducted constant-rate aquifer tests on pumping wells MW-33, screened in the alluvial aquifer (18 to 28 feet below ground surface [bgs]), and MW-17, screened in the perched zone (7.5 to 17.5 feet bgs). MW-33

was pumped with a submersible Grundfos Redi-Flo 2 powered by a Honda EU2000 generator. A peristaltic pump was used to pump MW-17 because the well yield was deemed too low for the Redi-Flo 2 pump operating range. Pumping rates were measured using an in-line flow gauge (calibrated by hand measurements using a graduated bucket). Water levels were measured in the pumping well and three nearby observation wells using Solinst Levellogger transducers and manual water level meter. Water was pumped into 55-gallon drums and transferred throughout the test to a vacuum truck present on site.

Data from a preliminary yield test was used to select the pumping rate at MW-33. A pumping rate of approximately 4.7 gallons per minute (gpm) was selected. This rate was the maximum flow rate able to be produced from the Redi-Flo 2 at this location. Due to expected slow recharge rates in the perched aquifer zone, a pumping rate of 250 milliliters per minute (mL/min) was selected for MW-17 using drawdown observations from prior low-flow groundwater sampling. After 14 minutes of pumping, the flow rate was increased to 360 mL/min for the duration of the test.

The constant-rate aquifer tests at MW-33 and MW-17 were conducted for a total of 126 and 116 minutes, respectively. MW-33 was pumped for a total of 102 minutes, and pumping at MW-17 was discontinued after 78 minutes due to a stabilization in the drawdown rate. Following the cessation of pumping, water levels at MW-33 recovered to pre-test levels in 24 minutes. Water levels at MW-17 recovered only approximately 3% of the total drawdown observed during the test after 38 minutes of recovery. Field forms with field observations and measurements are provided as Attachment 1.

AQUIFER TESTING RESULTS

After the two aquifer tests were complete, transducers were pulled from the pumping and observation wells, and all data were downloaded. All data were compensated for atmospheric pressure with data collected from a Solinst Barologger located on-site. The results of both aquifer tests are summarized as follows.

Perched Water-Bearing Zone

Figure 1 shows water levels in MW-17 and observation wells MW-11, MW-13, and MW-33 through the duration of the perched zone test. None of the three observation wells had observed drawdown in response to pumping and therefore were not included in the analysis.

MW-17 water levels showed a linear response of approximately 0.09 feet of drawdown per minute at a rate of 360 mL/min (Figure 1). The recovery response to the cessation of pumping was also linear at approximately 0.01 feet of recovery per minute. Drawdown and recovery data from MW-17 were not suitable for analysis using curve-fitting techniques due to the linear response curve, which did not suggest a typical cone of depression, a key assumption of aquifer test solutions, at a scale suitable for analysis. The observed linear drawdown and recovery responses to pumping at MW-17 as well as low sustainable yield indicates low-permeability of

the surrounding geology and/or limited hydraulic connection between the well and the surrounding water-bearing zone.

Alluvial Aquifer

Figure 2 shows water levels in MW-33 and observation wells MW-11, MW-13, and MW-17 through the duration of the alluvial aquifer test. Throughout the 102-minute duration of the aquifer test, the three observation wells showed no significant influence from the pumping at MW-33, and therefore were not included in the analysis of pumping test results.

Drawdown and recovery data from MW-33 were loaded into *Aqtesolv* and analyzed using six different curve-matching techniques suitable for unconfined, leaky-confined, and/or confined aquifer types. The conceptual site model of the Site is most consistent with leaky-confined analysis, in which the perched zone acts as an overlying aquifer that transmits water through a low permeability aquitard unit at a relatively low rate compared to the horizontal flow in both the perched zone and alluvial aquifer. A range of solutions was applied to add robustness to the analysis, and account for variability in the aquitard and the potential for the aquitard to be so low in hydraulic conductivity as to act as a confining layer, or so high in hydraulic conductivity as to not impede flow. Table 1 summarizes the results of the analysis, and Figures 3 through 8 summarize the *Aqtesolv* outputs. Each solution accounted for the effects of partial penetration of the well screen and assumed a saturated thickness of 85 feet, based on a deep well log at the Port (KJC 2010). Each solution also assumed an anisotropy ratio of 0.1. The hydraulic conductivity result of the leaky-confined aquifer solution (Hantush-Jacob) was approximately 49 feet per day (ft/day) or 1.7×10^{-2} centimeters per second (cm/s; Figure 6). Calculated hydraulic conductivities for the alluvial aquifer ranged from approximately 12 to 107 feet per day (ft/day) or 4.2×10^{-3} to 3.8×10^{-2} cm/s which are within the range of expected values for sandy aquifers (Table 1).

Notably, no indications of induced flux between the alluvial aquifer and the perched zone were observed during the pumping test. Water levels in perched zone well MW-17, which is located approximately 5 feet away from MW-33 so that the two wells constitute a pair, and other nearby perched zone observation wells MW-11 and MW-13, remained essentially constant throughout the duration of the alluvial test. This indicates no measurable induced leakage through the aquitard by the reduction in head in the alluvial aquifer and the associated increased vertical gradients under test conditions. Although transmission of small quantities of water through aquitards may be imperceptible during relatively low stress or short duration tests, the lack of a measurable response in the observation wells is consistent with the conceptual site model of negligible transmissivity across the aquitard under normal conditions.

REFERENCES

Floyd|Snider. 2019. *Port of Longview TPH Site Remedial Investigation Work Plan*. October.

Golder Associates, Inc. (Golder). 2000. *Port of Longview Historic Site Investigation and Remediation Summary Report*. October.

Kennedy/Jenks Consultants (KJC). 2010. *City of Longview Mint Farm Regional Water Treatment Plant Preliminary Design Report Part 2A: Hydrogeologic Characterization*. March.

LIST OF ATTACHMENTS

Table 1 Aquifer Test Solution Summary

Figure 1 Pumping and Observation Well Water Levels (Perched Test)

Figure 2 Pumping and Observation Well Water Levels (Alluvial Test)

Figure 3 MW-33 Theis Solution (unconfined)

Figure 4 MW-33 Neuman Solution (unconfined)

Figure 5 MW-33 Moench Solution (unconfined)

Figure 6 MW-33 Hantush-Jacob Solution (leaky-confined)

Figure 7 MW-33 Theis Solution (confined)

Figure 8 MW-33 Dougherty Badu Solution (confined)

Attachment 1 Field Forms



Brett Beaulieu, LHG
Senior Hydrogeologist
Floyd|Snider

June 1, 2021

Table

Table 1
Aquifer Test Solution Summary

Pumping Test Parameters							Curve Fitting Analyses					
Pumping Well	Screen Interval (ft bgs)	Site Water-Bearing Zone	Pumping Rate	Pumping Duration (min)	Recovery Duration (min)	Maximum Drawdown (ft)	Observation Wells	Saturated Aquifer Thickness (ft)	Transmissivity (ft ² /day)	Storativity	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (cm/s)
MW-17	7.5-17.5	Perched	250-360 mL/min	78	38 ⁽¹⁾	5.61	MW-11, MW-13, and MW-33	-- ⁽²⁾	-- ⁽²⁾	-- ⁽²⁾	-- ⁽²⁾	-- ⁽²⁾
MW-33	18-28	Alluvial Aquifer	4.7 gpm	102	24	0.85	MW-11, MW-13, and MW-17	85	1051.7 to 9123.4	1.8 X 10 ⁻⁵ to 1.5 X 10 ⁻⁴	12.4 to 107.3	4.2 X 10 ⁻³ to 3.8 x 10 ⁻²

Notes:

Pumping tests were conducted on November 4, 2020.

Curve fitting results are shown as a range of solutions calculated using Theis (1935 and Hantush modification), Neuman (1974), Moench (1997), Hantush-Jacob (1955), and Dougherty-Babu (1984) methods.

-- Not applicable/not analyzed.

1 Recovery observations were stopped after 38 minutes at MW-17 due to a slow recharge rate.

2 Data from the MW-17 test were not suitable for analysis.

Abbreviations:

bgs Below ground surface

cm/s Centimeters per second

ft Feet

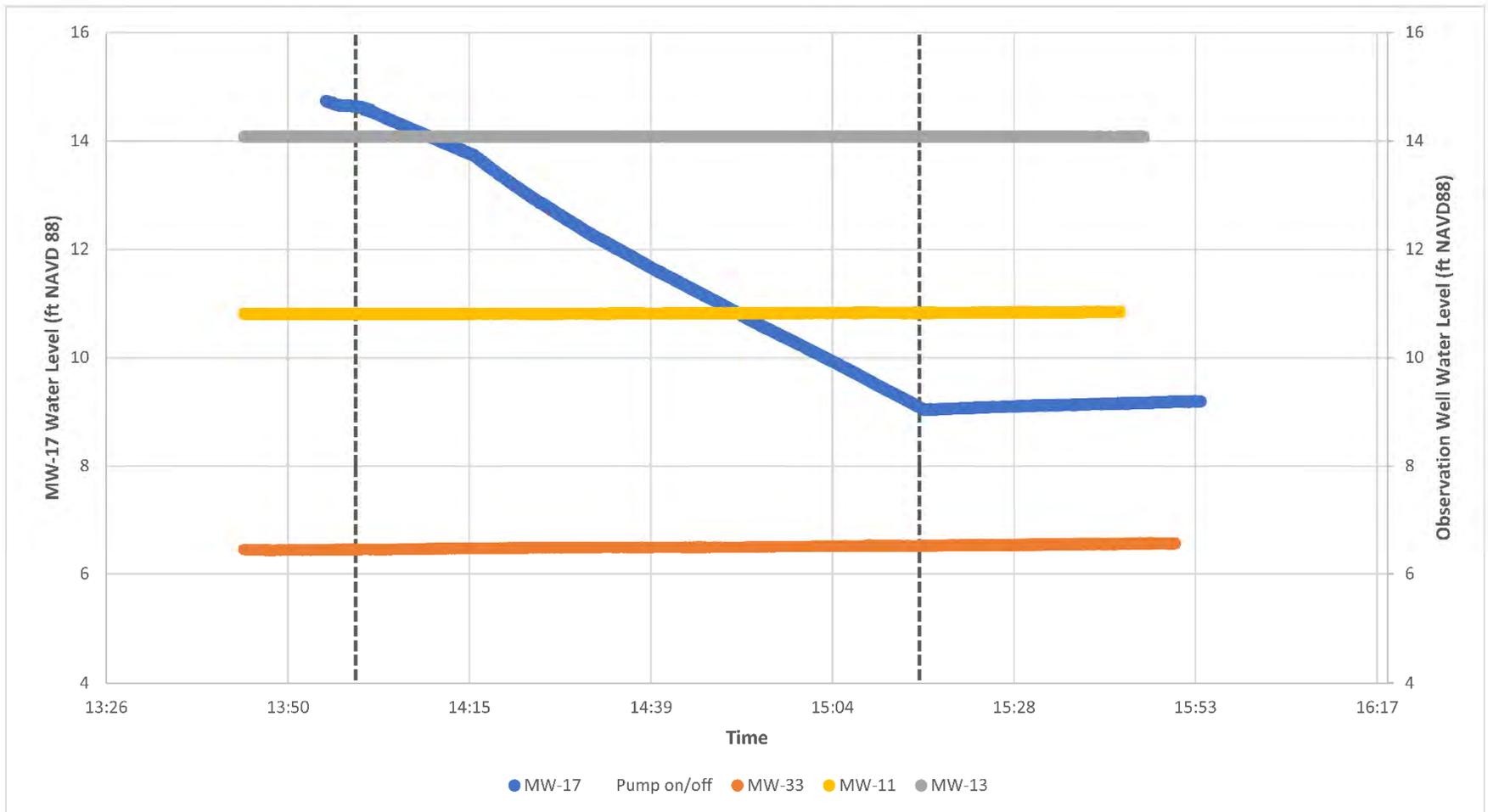
ft/day Feet per day

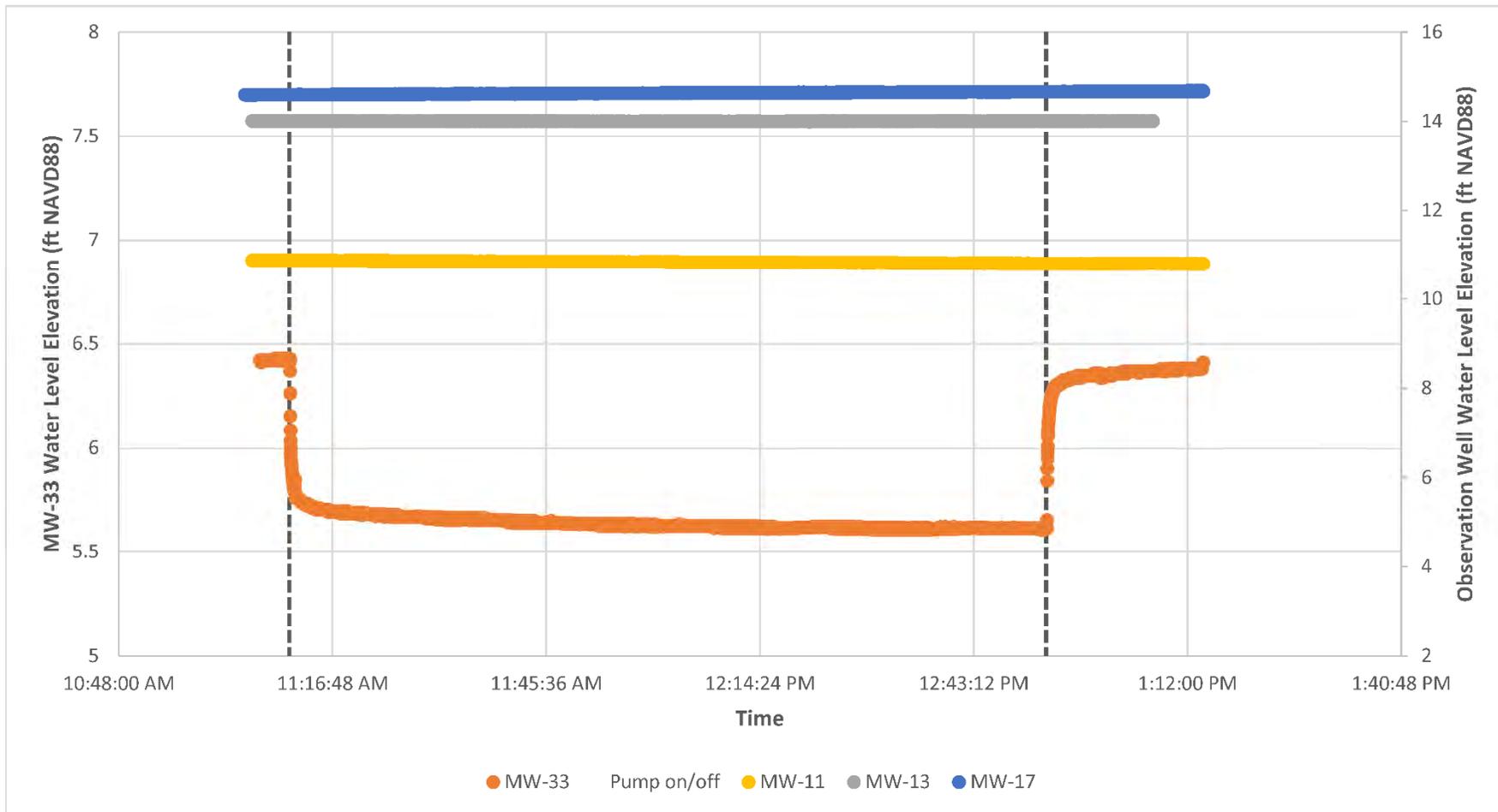
gpm Gallons per minute

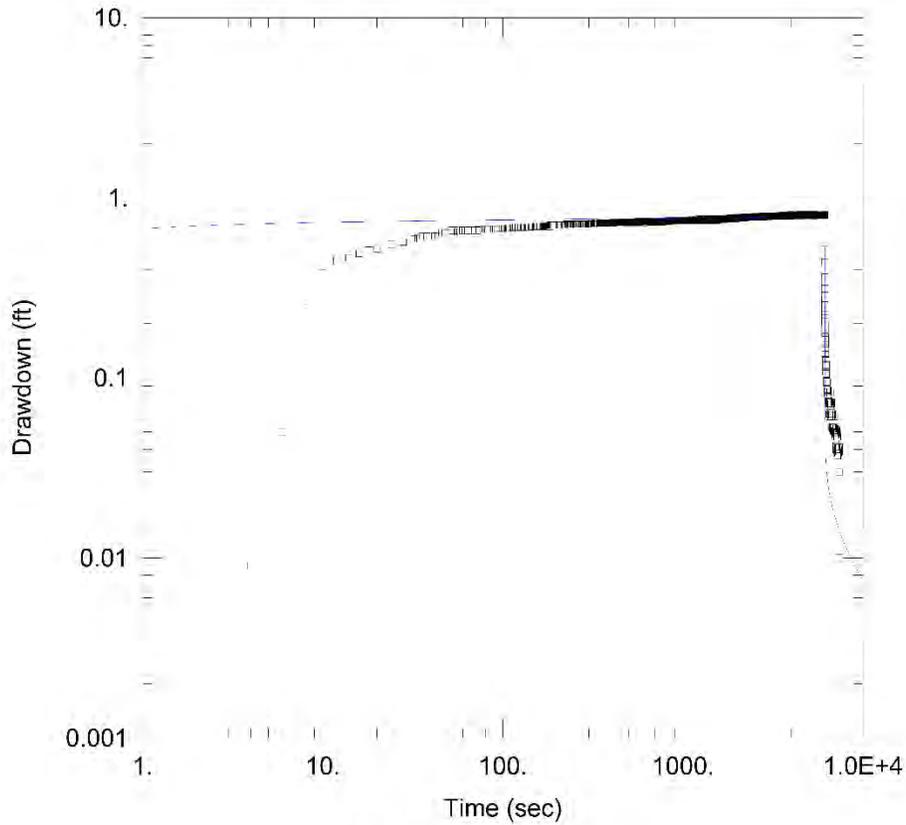
min Minutes

mL/min Milliliters per minute

Figures







WELL TEST ANALYSIS

Data Set: C:\Users\NathanS\OneDrive - Floyd Snider\Desktop\POL-TPH\Alluvial Test\MW33.aqt
 Date: 02/05/21 Time: 09:23:42

PROJECT INFORMATION

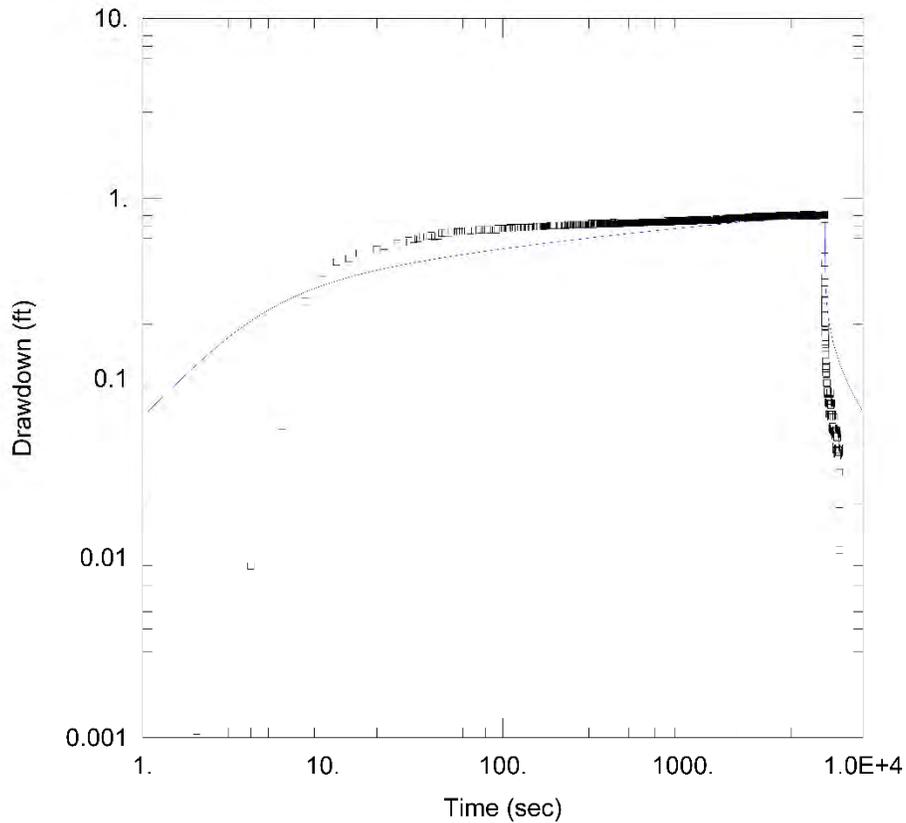
Project: POL-TPH
 Location: Longview, WA
 Test Well: MW-33
 Test Date: 11/4/2020

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Theis
 T = 9123.4 ft²/day S = 0.0001467
 Kz/Kr = 0.1 b = 85. ft



WELL TEST ANALYSIS

Data Set: C:\Users\NathanS\OneDrive - Floyd Snider\Desktop\POL-TPH\Alluvial Test\MW33.aqt
 Date: 02/05/21 Time: 09:26:19

PROJECT INFORMATION

Project: POL-TPH
 Location: Longview, WA
 Test Well: MW-33
 Test Date: 11/4/2020

AQUIFER DATA

Saturated Thickness: 85. ft

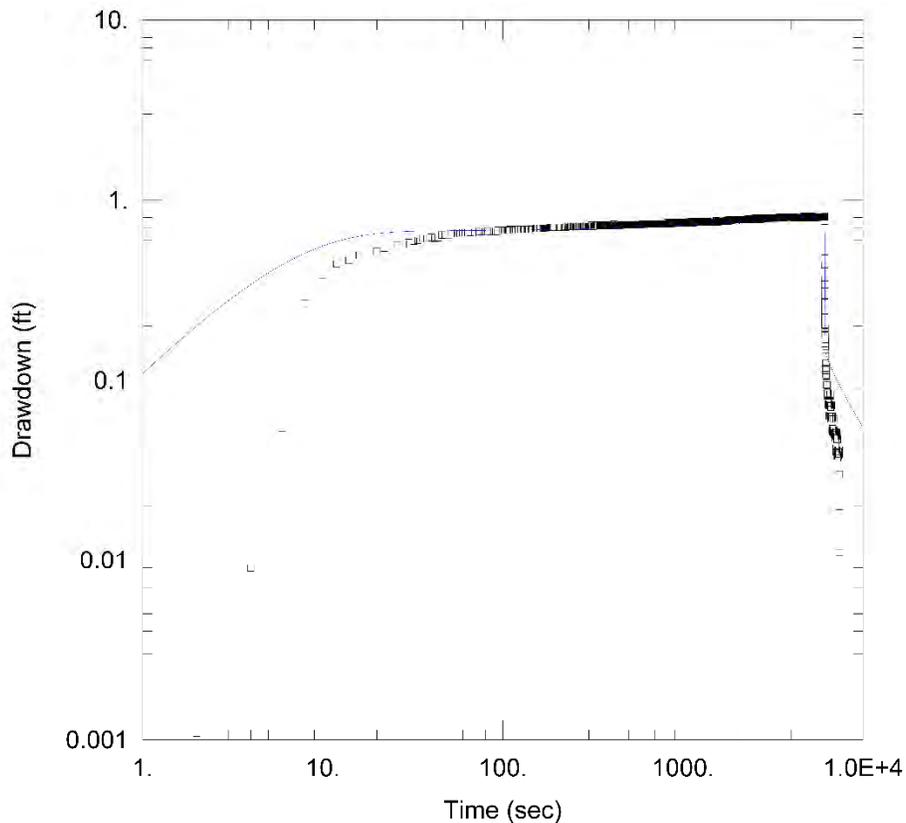
WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Unconfined
 $T = 1051.7 \text{ ft}^2/\text{day}$
 $S_y = 0.1$

Solution Method: Neuman
 $S = 1.816E-5$
 $\beta = 0.1$



WELL TEST ANALYSIS

Data Set: C:\Users\NathanS\OneDrive - Floyd Snider\Desktop\POL-TPH\Alluvial Test\MW33.aqt
 Date: 02/05/21 Time: 09:29:05

PROJECT INFORMATION

Project: POL-TPH
 Location: Longview, WA
 Test Well: MW-33
 Test Date: 11/4/2020

AQUIFER DATA

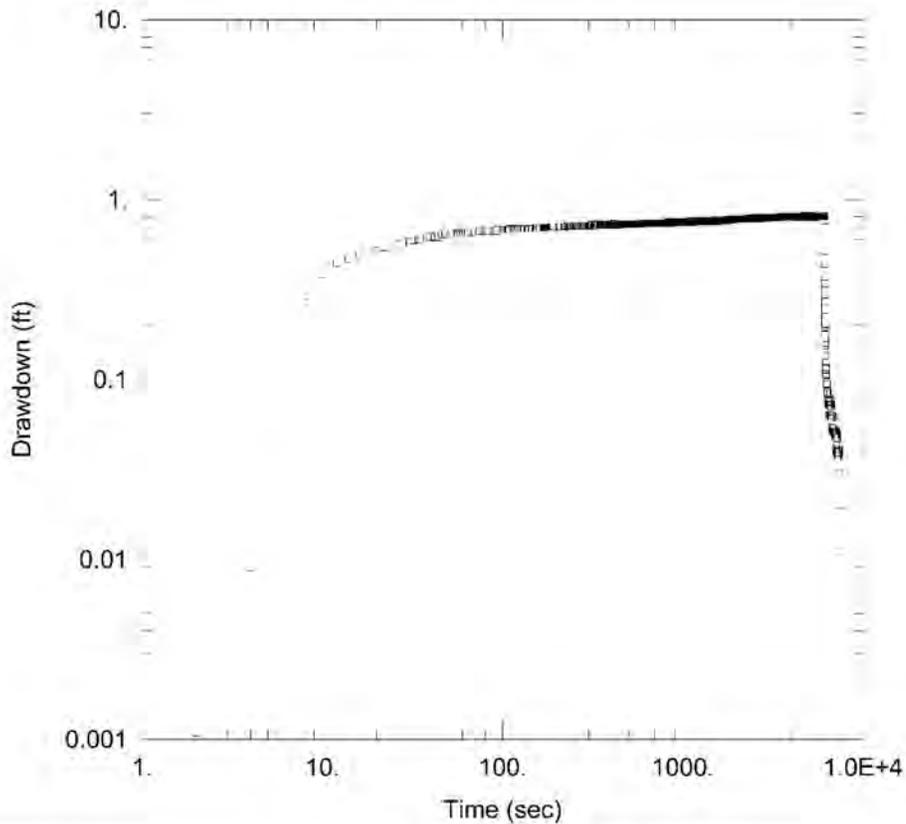
Saturated Thickness: 85. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Moench
 T = 7371.6 ft²/day S = 0.0001291
 Sy = 0.1 β = 1.507E-6
 Sw = 0. r(w) = 0.33 ft
 r(c) = 0.167 ft alpha = 1.0E+30 sec⁻¹



WELL TEST ANALYSIS

Data Set: C:\...MW33 (confined).aqt
 Date: 02/05/21

Time: 09:37:59

PROJECT INFORMATION

Project: POL-TPH
 Location: Longview, WA
 Test Well: MW-33
 Test Date: 11/4/2020

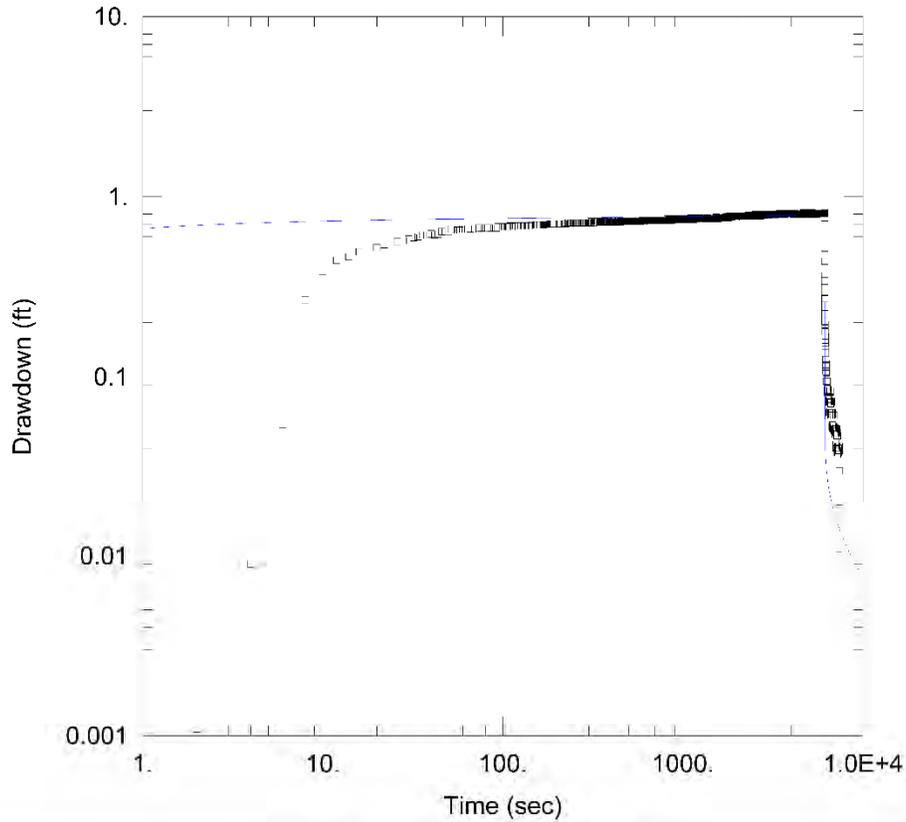
WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Leaky
 T = 4174.2 ft²/day
 r/B = 0.1138
 b = 85. ft

Solution Method: Hantush-Jacob
 S = 9.191E-5
 Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: C:\...MW33 (confined).aqt
 Date: 02/05/21

Time: 09:37:07

PROJECT INFORMATION

Project: POL-TPH
 Location: Longview, WA
 Test Well: MW-33
 Test Date: 11/4/2020

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Confined

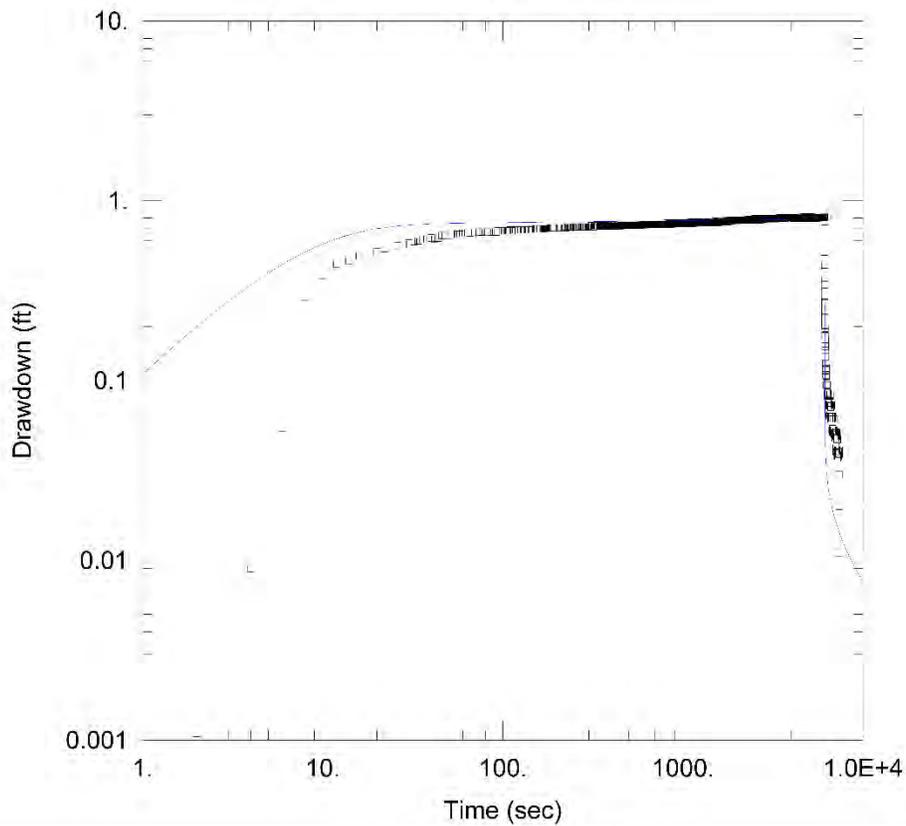
Solution Method: Theis

$T = 9044 \text{ ft}^2/\text{day}$

$S = 0.0002037$

$Kz/Kr = 0.1$

$b = 85 \text{ ft}$



WELL TEST ANALYSIS

Data Set: C:\...MW33 (confined).aqt
 Date: 02/05/21

Time: 09:47:27

PROJECT INFORMATION

Project: POL-TPH
 Location: Longview, WA
 Test Well: MW-33
 Test Date: 11/4/2020

AQUIFER DATA

Saturated Thickness: 85. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X (ft)	Y (ft)	Well Name	X (ft)	Y (ft)
MW-33	0	0	MW-33	0	0

SOLUTION

Aquifer Model: Confined

Solution Method: Dougherty-Babu

T = 9045.6 ft²/day

S = 0.0002037

Kz/Kr = 0.1

Sw = 0.

r(w) = 0.33 ft

r(c) = 0.167 ft

Attachment 1
Field Forms

Page 1 MW 33 Test
AQUIFER TESTING FIELD FORM

Date: 11/4/2020

Field Personnel: B. Beaulieu, N. Scharfman, P. D. Stewart

Test Data

Pumping Well ID: MW-33 (alluvial)

Well Diameter/Screened Interval: 2" / 18.2-28.2 ft

Observation Well IDs: MW-17 (perched), MW-11 (perched), and MW-13 (alluvial)

Well Diameter/Screened Interval: 2" / MW-17 (7.5-17.5 ft); MW-11 (6.7-16.7 ft); and MW-13 (13-18 ft)

Pump and depth: Grundfos Redi-Flo 2 at well bottom (28.2 ft)

Transducer(s):

Purge water discharge location: Water Truck (Bravo Environmental) to drum, then vacated

Test setup comments and conditions:
 Light rain on and off. 1/2 OD tubing ID Flowmeter in-line flow meter, then valve, to drum. Use step test to calibrate meter to bucket, appears to be appropriately accurate (<5%)

Start pumping (time **to nearest second**): 11:11:00 AM

Stop pumping (time **to nearest second**):

Time	Control Well (MW-33) Depth to Water (feet)	Discharge Rate (gpm)	MW-33 DTW (feet)	MW-17 DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet)	Comments
Baseline							
9:28			19.42				
9:29				10.72			
9:30					14.11		
9:30					11.12 11.12		
Preliminary Yield/Step-Testing							
		Baseline 2					
9:50				10.71	14.17		
9:51						11.11	
9:52			19.42				
10:32			18.6				
10:35			18.55				
Drawdown - Initial step test -							
10:42			1.15	9 gpm	@	135.5 Hz	
10:43			19.55				
			19.61				
10:45		Increase rate to ~	1.5	9 gpm		153.0 Hz	
10:46			19.69			153	
10:47		Increase rate to ~	1.6	10 gpm		250 Hz (17-18 sec)	
10:48			19.3	10 gpm			
10:49			19.9				
10:50			19.92				
10:51			19.93				
10:54		Increase rate to	4	gpm	@	350 Hz	
10:56			20.17				
10:57		Increase rate to	4.6	gpm		400 Hz (max)	
10:58			20.17				
10:59			20.19	STOP PUMP			
11:02			19.50				

Page 2 MW-33 Test
 AQUIFER TESTING FIELD FORM

Time	Control Well Depth to Water (feet)	Meter Discharge rate (gpm)	Bucket Rate (gpm)	MW-33 DTW (feet) <i>(control well)</i>	MW-17 DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet)	Comments
Baseline cont'd								
11:05					10.64			
11:06						14.19	11.08	
11:07				19.49				
TEST								
11:11		Start pump		4.70 gpm			14.00	17.2
11:12		4.70		20.12				
11:13					10.64	14.20	11.09	
11:14		4.68		20.16				
11:15					10.64	14.21		
11:16						14.21	11.08	
11:17				20.19			11.08	
11:18					10.64	14.21		
11:19							11.09	
11:20		4.70		20.20				
11:21					10.64			
11:22						14.21	11.08	
11:23		4.68		20.21				
11:36		4.66		20.22				
11:37					10.64	14.21		
11:38							11.08	
12:03		4.66		20.25				
12:04					10.59			
12:05						14.21		
12:09						14.19	11.09	* MW-11 probe is fluctuating by ~0.8 FT
Recovery								
12:22		4.67		20.26				
12:24					10.58			
12:25						14.25		
12:27				20.26			11.08	
12:45		4.66		20.26				
12:46					10.56	14.26	11.09	
12:53		4.66		20.27				
Recovery STOP PUMP								
				19.8				
				19.75				
				19.70				
				19.67				
				19.65				
				19.63				
				19.62				
				19.60				
				19.59				
				19.56				
				19.58	10.55			
				19.58		14.26		
				19.56				
				19.55				
				19.55				

12:59
13:00

19.54 10.54
19.54

11.08

Page 1 MW-17 TEST
AQUIFER TESTING FIELD FORM

Date: 11/4/2020

Field Personnel: B. Beaulieu, N. Schachtman, P. Oskertow

Test Data

Pumping Well ID: MW-17 (perched)

Well Diameter/Screened Interval: 4" / 7.5-17.5 ft

Observation Well IDs: MW-33 (alluvial), MW-11 (perched), and MW-13 (alluvial)

Well Diameter/Screened Interval: 2" / MW-17 (18.2-28.2 ft); MW-11 (6.7-16.7 ft); and MW-13 (13-18 ft)

Pump and depth: Grundfos Redi-Flow 2 Peristaltic

Transducer(s):

Purge water discharge location: Water Truck (Bravo Environmental) buckets to drums

Test setup comments and conditions:
 Use peristaltic pump based on known low yield / recovery.
 set transducer in MW-17 at 17 feet below TOC to allow for total drawdown

Start pumping (time **to nearest second**): 14:00 step test 14:02 - 250 mL/min
 Stop pumping (time **to nearest second**): 15:16 (control well) 14:16 ↑ 360 mL/min

Time	Control Well Depth to Water (feet)	Discharge Rate (gpm)	MW-33 DTW (feet)	MW-17 DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet)	Comments
------	--	----------------------------	------------------------	------------------------	------------------------	------------------------	----------

Baseline

13:43			19.46				
13:43					14.26	11.0	
13:44				10.51			
13:56				10.50			

Preliminary Yield/Step Testing

14:00				10.50			
				10.51			
				10.52			
14:01				10.53			
				10.54			

Drawdown

14:02				10.59			
14:03				10.60			
14:04				10.63			increase rate to 250 mL/min
14:05				10.70			
14:05				10.79			
14:07				10.93			
14:10				11.04			
14:11				11.16			
14:14				11.29			
14:16				11.43			increase rate to 360 mL/min
14:17				11.51			
14:18				11.61			
14:19				11.75			
14:20				11.82			
14:21				11.92			

Page 2 MW-17 test
AQUIFER TESTING FIELD FORM

Time	Control Well Depth to Water (feet)	Meter Discharge rate (gpm)	Bucket Rate (gpm)	MW-33 DTW (feet)	MW-17 DTW (feet)	MW-11 DTW (feet)	MW-13 DTW (feet)	Comments
14.24					12.21			
14.25					12.30			
14.26					12.39			
14.27					12.48			
14.28					12.55			
14.29					12.63			
14.30					12.72			
14.31					12.81			
14.32		360ml/min			12.86			
14.33					12.91			
14.34					12.98	14.27		
14.35					13.12		11.00	
14.36				19.42	13.20			
14.37					13.26			
14.38					13.33			
14.39					13.41			
14.40					13.46			
14.54					14.45			
14.55				19.41		14.21	11.01	
15:01					14.99			
15:07					15.39			
15:09				19.41		14.21		
15:10							11.02	
15:16		Stop Pumping			16.12			
Recovery								
15:16					16.12			
15:17					16.11			
15:19				19.41	16.10			
15:21				19.44	16.09			
15:23					16.08			
15:29					16.04			
15:34					16.02			
15:38					16.01			
15:42						14.20		
15:45							11.02	
15:49				19.35				pull MW-11 trans.
15:54					15.96			pull MW-13 "
								pull MW-33 "
								pull MW-17 "

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix G Historical Groundwater Data

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-01	5/30/1991	--	--	--	5.8	5.8	1 U	5.2	--
	1/7/1993	ND	--	ND	ND	ND	ND	ND	--
	5/1/1993	280	--	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/19/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	630 U	630 U	250 U	--	--	--	--	--
	8/10/2005	630 U	630 U	250 U	--	--	--	--	--
	8/18/2006	600 U	600 U	240 U	--	--	--	--	--
	8/9/2007	670 U	670 U	270 U	--	--	--	--	--
	7/22/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	640 U	640 U	260 U	--	--	--	--	--
	8/18/2010	609 U	609 U	242 U	--	--	--	--	--
8/26/2011	630 U	630 U	250 U	--	--	--	--	--	
9/27/2012	650 U	650 U	260 U	--	--	--	--	--	
9/27/2013	660 U	660 U	270 U	--	--	--	--	--	
MW-02	5/30/1991	--	--	--	0.5 U	1 U	1 U	1 U	--
	3/8/1994	--	--	--	ND	ND	ND	ND	--
	8/4/2000	420	500 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/19/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	250 U	500 U	250 U	--	--	--	--	--
	8/10/2005	250 U	500 U	250 U	--	--	--	--	--
	8/21/2006	240 U	480 U	250 U	--	--	--	--	--
	8/10/2007	1,900 Y	530 U	270 U	--	--	--	--	--
	10/5/2007	630 U	630 U	250 U	0.5 U	1 U	1 U	1 U	0.0151 U
	10/5/2007 (Dup)	630 U	630 U	250 U	0.5 U	1 U	1 U	1 U	0.0151 U
	7/22/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	670 U	670 U	270 U	--	--	--	--	--
	8/18/2010	ND	ND	ND	--	--	--	--	--
8/26/2011	270 U	540 U	250 U	--	--	--	--	--	
9/28/2012	660 U	660 U	270 U	--	--	--	--	--	
9/26/2013	680 U	680 U	270 U	--	--	--	--	--	
MW-03	5/30/1991	500 U	500 U	8,200	9,000	8,600	570	380	--
	1/7/1993	1,080	ND	1,800	290	160	5 J	21	--
	5/1/1993	1,320	ND	2,500	310	160	34	35	--
	3/8/1994	--	--	--	38	32	7.7	8.6	--
	9/13/1995	1,000 A5	--	1,000	73	19	2.3	5.2	0.0755 U
	9/21/2009	710 Y	500 U	670 Y	6.6	4.9	14	4.83	0.0151 U
MW-04	5/30/1991	--	--	--	0.5 U	1 U	1 U	1 U	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
MW-05	5/30/1991	--	--	--	0.5 U	1 U	1 U	1 U	--
	3/8/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	450	--	--	--	--	--	--	--
MW-06	1/6/1993	930	ND	ND	ND	ND	ND	ND	--
	5/1/1993	1,140	ND	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	1,300	--	120	0.5 U	0.5 U	0.5 U	0.5	0.0755 U
	7/15/1998	680	--	310	ND	ND	ND	3,000	--
	9/23/2009	370 Y	520 U	250 U	--	--	--	--	0.0151 U
MW-07	1/6/1993	1,240	423	2,300	110	12	42	150	--
	5/24/1993	1,440	ND	4,900	1400	54	140	410	--
	3/15/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	1,400	--	7,200	640	55	530	540	0.0755 U
	9/22/2009	630 U	630 U	1,300 Y	2.2	1.3	0.5 U	1.78	--
MW-08	1/6/1993	1,130	244	3,800	3,700	27	39	38	--
	5/27/1993	1,610	ND	5,800	4,700	96	84	230	--
	3/15/1994	--	--	--	2,500	ND	ND	ND	--
	9/13/1995	1,400	--	3,200	610	19	5 U	100	0.0755 U
	7/15/1998	--	--	2,300	ND	ND	ND	4,000	--
	9/21/2009	250 U	500 U	2,900 Y	9	3.9	1.6	8.19	0.03
MW-09	1/1/1993	4,800 x	ND	89	ND	ND	ND	ND	--
	5/24/1993	210,000	--	ND	--	--	--	--	--
	3/15/1994	340,000	6400	60,000	160	100	540 Jx	410	--

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-10	1/7/1993	1,740	281	3,500	320	37	5 J	82	--
	5/25/1993	2,160	ND	4,300	140	31	130	63	--
	3/8/1994	--	--	--	240	35	330	40	--
	9/13/1995	1,300	--	4,900	390	57	230	88	0.0755 U
	7/15/1998	--	--	6,400	510	70	440	100	--
	7/16/1999	2,170	500 U	5,300	300	58	360	83	0.0151 U
	8/3/2000	3,200	500 U	5,000	140	50	210	99	0.0151 U
	08/3/2000 (Dup)	3,100	500 U	4,800	130	48	200	95	0.0151 U
	8/7/2001	280 L	500 U	4,300 Y	190 C	40 C	190 C	62	0.0151 U
	08/7/2001 (Dup)	290 L	500 U	4,200 Y	190 C	41 C	200 C	64.1	0.0151 U
	8/19/2002	450 L	500 U	5,800 DY	250 D	46 D	260 D	75	0.0143 U
	8/21/2003	320 Y	480 U	4,700 Y	130	44	180	75 P	0.0151 U
	8/5/2004	340 Z	500 U	4,000 Y	110	21	140	42	0.0151 U
	08/5/2004 (Dup)	320 Z	500 U	4,000 Y	130	32	140	43	0.0143 U
	8/26/2005	1,700 Y	500 U	4,400 Y	310 D	51 D	290 D	77.4 D	0.0151 U
	8/21/2006	500 L	480 U	4,400 Y	430 D	65 D	280 D	90 D	0.0151 U
	08/21/2006 (Dup)	500 L	480 U	4,600 Y	470 D	70 D	3,310 D	96 D	0.0151 U
	8/9/2007	660 L	500 U	5,100 Y	360 D	54	230 D	90.6	0.0143 U
	7/23/2008	440 L	500 U	4,700 DY	340 D	51	260 D	65.6	0.0143 U
	07/23/2008 (Dup)	330 L	500 U	4,800 DY	340 D	51	270 D	73.7	0.0143 U
	9/24/2009	490 L	530 U	4,100 Y	160 D	37	130 D	54.3	0.0143 U
	09/24/2009 (Dup)	500 L	520 U	4,200 Y	140 D	33	110 D	47.2	0.0143 U
	8/19/2010	380 L	550 U	3,200 Y	70 D	16 D	99 D	22 D	0.0159 U
08/19/2010 (Dup)	340 L	540 U	3,200 Y	74 D	17 D	100 D	23 D	0.0159 U	
8/26/2011	270 U	530 U	2,900 Y	110 D	24 D	130 D	28 D	0.0525	
08/26/2011 (Dup)	270 U	530 U	3,000 Y	110 D	21 D	110 D	23 D	0.0377	
9/28/2012	280 L	520 U	2,300 Y	--	--	--	--	0.0151 U	
09/28/2012 (Dup)	270 U	530 U	2,300 Y	--	--	--	--	0.0151 U	
9/26/2013	270 U	530 U	1,900 Y	64	13	55	25	0.0159 U	
09/26/2013 (Dup)	270 U	530 U	1,800 Y	63	13	54	25	0.0151 U	
MW-11	1/7/1993	ND	ND	ND	ND	ND	ND	ND	--
	5/1/1993	608	ND	ND	--	--	--	--	--
	3/10/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
MW-12	1/7/1993	1,650	617	3,100	770	47	71	83	--
	5/27/1993	1,750	ND	3,800	900	67	74	120	--
	3/10/1994	--	--	--	680	39	54	76	--
	9/13/1995	1,700	--	3,600	600	56	84	110	0.0755 U
	7/15/1998	--	--	4,600	320	30	40	120	--
	7/16/1999	1,740	500 U	3,400	210	24	34	56	0.0151 U
	07/16/1999 (Dup)	1,690	500 U	3,600	220	26	37	60	0.0151 U
	8/3/2000	2,800	500 U	4,500	220	54	62	138	0.0151 U
	8/8/2001	270 L	500 U	4,500 Y	710 DC	48 C	42 C	89.9	0.0151 U
	8/19/2002	410 L	500 U	5,400 DY	420 D	41 D	53 D	77	0.0151 U
	08/19/2002 (Dup)	400 L	500 U	5,300 DY	450 D	43 D	57 D	83	0.0151 U
	8/21/2003	290 Y	480 U	3,900 Y	560 D	40	54	74.7 P	0.0143 U
	08/21/2003 (Dup)	250 Y	480 U	4,000 Y	560 D	40	55	75.7 P	0.0143 U
	8/5/2004	250 U	500 U	280 Z	17	1.6	1.9	2.3	0.0151 U
	8/11/2005	760 L	500 U	3,400 DZ	880 D	52 D	63 D	84 D	0.0151 U
	08/11/2005 (Dup)	410 L	500 U	3,300 DZ	890 D	48 D	63 D	77 D	0.0151 U
	8/18/2006	240 U	480 U	970 Y	350 D	21	15	12	0.0151 U
	8/9/2007	400 L	500 U	3,300 Y	730 D	42	48	72.2	0.0151 U
	08/9/2007 (Dup)	470 L	500 U	3,200 Y	680 D	39	47	75.8	0.0143 U
	7/23/2008	300 L	500 U	3,300 DY	660 D	45	34 D	94.6	0.0143 U
9/23/2009	550 L	500 U	3,100 Y	840 D	48 D	44 D	67 D	0.0143 U	
8/19/2010	623 A1,L	199 U	2,410	133	29.6	46.1	52	0.0374 U	
8/25/2011	290 L	520 U	2,500 Y	420 D	25 D	24 D	38 D	0.0151 U	
9/27/2012	350 L	520 U	2,100 Y	--	--	--	--	0.0151 U	
9/26/2013	350 L	530 U	640 Y	74	6	13	11	0.0159 U	
MW-13	5/26/1993	ND	ND	ND	--	--	--	--	--
	3/11/1994	--	--	--	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
MW-14	5/26/1993	4,060	ND	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	--	--	--	0.77	0.78	1.5	2.6	--
	7/15/1998	550	--	--	--	--	--	--	--
	9/22/2009	160,000 D	50,000 U	--	--	--	--	--	--
8/19/2010	1,600	536 M	--	--	--	--	--	0.14	

Table G.1
Pre-2019 Groundwater Analytical Data

Analyte		DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
Unit		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-15	5/27/1993	212	ND	455	34.3	1	ND	2	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	650	--	290	ND	ND	ND	ND	--
	9/23/2009	260 U	520 U	250 U	--	--	--	--	0.0151 U
MW-16	5/1/1993	250,000	--	ND	--	--	--	--	--
	3/15/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	4,000	--	300	1.3	2.2	1.3	0.91	0.0755 U
	8/19/2010	624 U	624 U	248 U	--	--	--	--	--
	9/23/2009	82,000 D	32,000 U	--	--	--	--	--	--
MW-17	5/26/1993	4,810	ND	ND					
	3/10/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	320 A3		80 U	0.5 U	0.5 U	0.5 U	0.5 U	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
MW-18	5/26/1993	ND	ND	ND	--	--	--	--	--
	3/11/1994	--	--	--	ND	ND	ND	ND	--
	7/15/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
MW-19	5/24/1993	2,330	2,500	ND	--	--	--	--	--
	3/9/1994	--	--	--	ND	ND	ND	ND	--
	9/13/1995	380 A3	--	80 U	0.5 U	0.5 U	0.5 U	0.5 U	--
	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	9/23/2009	630 U	630 U	250 U					--
MW-20	5/1/1993	2,840	--	5,600	9	22	95	160	--
	3/15/1994	--	--	--	1.5	5.2	7 J	26	--
MW-21	5/27/1993	ND	ND	171	ND	ND	ND	1	--
	3/10/1994	--	--	--	ND	ND	ND	ND	--
MW-22	3/10/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	8/4/2000	630 U	630 U	250 U	--	--	--	--	--
	8/24/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/6/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/21/2006	630 U	630 U	250 U	--	--	--	--	--
	8/10/2007	650 U	650 U	260 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--
	8/19/2010	ND	ND	ND	--	--	--	--	--
	8/26/2011	630 U	630 U	250 U	--	--	--	--	--
9/28/2012	650 U	650 U	260 U	--	--	--	--	--	
9/27/2013	660 U	660 U	270 U	--	--	--	--	--	
MW-23	3/11/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/8/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/6/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/21/2006	630 U	630 U	250 U	--	--	--	--	--
	8/10/2007	650 U	650 U	260 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/25/2009	250 U	500 U	250 U	--	--	--	--	--
	8/20/2010	642 U	642 U	255 U	--	--	--	--	--
	8/25/2011	630 U	630 U	250 U	--	--	--	--	--
9/28/2012	660 U	660 U	270 U	--	--	--	--	--	
9/27/2013	660 U	660 U	270 U	--	--	--	--	--	
MW-24	3/11/1994	ND	ND	570	ND	ND	ND	ND	--
	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	9/21/2009	630 U	630 U	250 U	--	--	--	--	--
MW-25	3/10/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	9/22/2009	630 U	630 U	250 U	--	--	--	--	--

Table G.1
Pre-2019 Groundwater Analytical Data

	Analyte	DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-26	3/11/1994	130,000	ND	2100	ND	ND	ND	ND	--
	7/15/1998	4,900	--	--	ND	ND	ND	ND	--
	8/20/2010	618 U	618 U	245 U	--	--	--	--	--
MW-27	3/11/1994	ND	ND	ND	ND	ND	ND	ND	--
	4/14/1998	ND	ND	ND	--	--	--	--	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/4/2000	630 U	630 U	250 U	--	--	--	--	--
	8/8/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/6/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/18/2006	600 U	600 U	240 U	--	--	--	--	--
	8/9/2007	630 U	630 U	250 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/21/2009	630 U	630 U	250 U	--	--	--	--	--
	8/20/2010	645 U	645 U	256 U	--	--	--	--	--
	8/25/2011	630 U	630 U	250 U	--	--	--	--	--
	9/27/2012	660 U	660 U	270 U	--	--	--	--	--
9/27/2013	660 U	660 U	270 U	--	--	--	--	--	
MW-28	3/31/1994	28,000	ND	450	ND	ND	ND	ND	--
	7/15/1998	1,600	--	--	--	--	--	--	--
	8/20/2010	878 A4	301 A2,N	262 U	--	--	--	--	2.76
MW-29	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	9/21/2009	630 U	630 U	250 U	--	--	--	--	--
MW-30	7/13/1998	1,320	--	ND	ND	ND	ND	ND	--
	8/24/1998	1,680	--	--	--	--	--	--	--
	4/28/1999	943	500 U	--	--	--	--	--	--
	7/15/1999	1,230	500 U	--	--	--	--	--	--
	07/15/1999 (Dup)	1,200	500 U	--	--	--	--	--	--
	11/18/1999	1,660	500 U	--	--	--	--	--	--
	2/3/2000	2,200	500 U	--	--	--	--	--	--
	5/31/2000	1,400	500 U	--	--	--	--	--	--
	8/3/2000	2,000	500 U	--	--	--	--	--	--
	08/3/2000 (Dup)	320	500 U	--	--	--	--	--	--
	8/7/2001	250 U	500 U	250 U	--	--	--	--	--
	8/19/2002	250 U	500 U	250 U	--	--	--	--	--
	8/21/2003	240 U	480 U	250 U	--	--	--	--	--
	8/5/2004	250 U	500 U	250 U	--	--	--	--	--
	8/26/2005	3,800 Y	1,100 L	250 U	--	--	--	--	--
	10/28/2005	250 U	500 U	--	--	--	--	--	--
	8/21/2006	240 U	480 U	250 U	--	--	--	--	--
	8/9/2007	3,000 Y	680 L	270 U	--	--	--	--	--
	10/5/2007	670 U	670 U	270 U	0.5 U	1 U	1 U	1 U	0.0151 U
	7/23/2008	250 U	500 U	250 U	--	--	--	--	--
9/25/2009	260 U	520 U	250 U	--	--	--	--	--	
8/20/2010	643 U	643 U	255 U	--	--	--	--	--	
8/26/2011	270 U	540 U	250 U	--	--	--	--	--	
9/28/2012	830 Y	1,600 O	250 U	--	--	--	--	--	
9/26/2013	270 U	530 U	270 U	--	--	--	--	--	
MW-31	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	7/15/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/19/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/21/2006	630 U	630 U	250 U	--	--	--	--	--
	8/9/2007	670 U	670 U	270 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	630 U	630 U	250 U	--	--	--	--	--
	8/18/2010	ND	ND	ND	--	--	--	--	--
	8/25/2011	630 U	630 U	250 U	--	--	--	--	--
9/28/2012	680 U	680 U	270 U	--	--	--	--	--	
9/27/2013	660 U	660 U	270 U	--	--	--	--	--	

**Table G.1
Pre-2019 Groundwater Analytical Data**

Analyte		DRO	ORO	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	cPAH TEQ
Unit		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Well	Sample Date								
MW-32	7/15/1998	ND	ND	ND	ND	ND	ND	ND	--
	7/16/1999	630 U	630 U	250 U	--	--	--	--	--
	8/3/2000	630 U	630 U	250 U	--	--	--	--	--
	8/7/2001	630 U	630 U	250 U	--	--	--	--	--
	8/20/2002	630 U	630 U	250 U	--	--	--	--	--
	8/21/2003	630 U	630 U	250 U	--	--	--	--	--
	8/5/2004	630 U	630 U	250 U	--	--	--	--	--
	8/11/2005	630 U	630 U	250 U	--	--	--	--	--
	8/18/2006	600 U	600 U	240 U	--	--	--	--	--
	8/9/2007	630 U	630 U	250 U	--	--	--	--	--
	7/23/2008	630 U	630 U	250 U	--	--	--	--	--
	9/24/2009	650 U	650 U	260 U	--	--	--	--	--
	8/18/2010	616 U	616 U	244 U	--	--	--	--	--
	8/26/2011	630 U	630 U	250 U	--	--	--	--	--
9/27/2012	670 U	670 U	270 U	--	--	--	--	--	
9/26/2013	660 U	660 U	270 U	--	--	--	--	--	

Note:

-- Not analyzed.

Abbreviations:

- CLP Contract Laboratory Program
- cPAH Carcinogenic polycyclic aromatic hydrocarbon
- DRO Diesel-range organics
- GC Gas chromatography
- GRO Gasoline-range organics
- HPLC High performance liquid chromatography
- µg/L Micrograms per liter
- MS Mass spectrometry
- ND Non-detect value, reporting limit unknown
- ORO Oil-range organics
- TEQ Toxic equivalent

Qualifiers:

- A1,L This sample contains a DRO not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards. Diesel result is biased high due to amount of gasoline contained in the sample.
- A2,M This sample contains an ORO not identified as a specific hydrocarbon product. The result was quantified against a lube oil calibration standard. Oil result is biased high due to amount of diesel contained in the sample.
- A3 Detected hydrocarbons in the diesel range appear to be due to overlap of heavy oil-range hydrocarbons.
- A4 The product appears to be aged or degraded diesel.
- A5 Detected hydrocarbons in the diesel range appear to be degraded diesel as well as some overlap of heavy oil-range hydrocarbons.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- DC The reported result is from a dilution. The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- DY The reported result is from a dilution. The chromatogram resembles a petroleum product but does not match the calibration standard.
- DZ The reported result is from a dilution. The chromatogram does not resemble a petroleum product.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- M Oil result is biased high due to amount of diesel contained in the sample.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- P The GC or HPLC confirmation criteria were exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was undetected at the reported concentration.
- x The chromatogram is a poor match to the standard
- Y The chromatogram resembles a petroleum product but does not match the calibration standard.
- Z The chromatogram does not resemble a petroleum product.

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-01	17.96	5/30/1991	8.77	--	--	9.19
	17.96	6/11/1991	9.21	--	--	8.75
	17.96	2/12/1993	10.08	--	--	7.88
	17.96	6/29/1993	9.85	--	--	8.11
	17.96	6/1/1994	10.65	--	--	7.31
	17.96	4/9/1998	9.56	--	--	8.40
	17.96	5/21/1998	8.85	--	--	9.11
	17.96	6/30/1998	9.33	--	--	8.63
	17.96	7/15/1998	9.84	--	--	8.12
	17.96	7/16/1999	12.27	--	--	5.69
	17.96	8/3/2000	11.59	--	--	6.37
	17.96	8/7/2001	12.65	--	--	5.31
	17.96	8/19/2002	11.98	--	--	5.98
	17.96	8/19/2002	10.78	--	--	7.18
	17.96	8/21/2003	12.29	--	--	5.67
	17.96	8/5/2004	12.05	--	--	5.91
	17.96	8/10/2005	11.99	--	--	5.97
	17.96	8/18/2006	12.04	--	--	5.92
	17.96	8/9/2007	11.98	--	--	5.98
	17.96	7/22/2008	11.22	--	--	6.74
	17.96	8/18/2010	12.45	--	--	5.51
	17.96	8/26/2011	11.57	--	--	6.39
	17.96	9/27/2012	12.31	--	--	5.65
	17.96	9/27/2013	11.93	--	--	6.03
	17.96	10/9/2017	12.3	--	--	5.66
17.96	2/27/2019	10.68	--	--	7.28	
17.96	5/6/2020	11.17	--	--	6.79	
17.96	8/10/2020	11.7	--	--	6.26	
MW-02	22.71	5/30/1991	9.4	--	--	13.31
	22.71	6/11/1991	9.56	--	--	13.15
	22.71	2/12/1993	9.69	--	--	13.02
	22.71	6/29/1993	9.6	--	--	13.11
	22.71	6/1/1994	10.65	--	--	12.06
	22.71	4/9/1998	9.2	--	--	13.51
	22.71	5/21/1998	9.74	--	--	12.97
	22.71	6/30/1998	9.8	--	--	12.91
	22.71	7/15/1998	10.05	--	--	12.66
	22.71	8/4/2000	10.4	--	--	12.31
	22.71	8/7/2001	11.21	--	--	11.50
	22.71	8/19/2002	10.79	--	--	11.92
	22.71	8/21/2003	10.7	--	--	12.01
	22.71	8/5/2004	10.23	--	--	12.48
	22.71	8/10/2005	10.48	--	--	12.23
	22.71	8/21/2006	10.53	--	--	12.18
	22.71	8/10/2007	10.68	--	--	12.03
	22.71	10/5/2007	11.34	--	--	11.37
	22.71	7/22/2008	10.26	--	--	12.45
	22.71	8/18/2010	10.31	--	--	12.40
	22.71	8/26/2011	10.24	--	--	12.47
	22.71	9/28/2012	10.91	--	--	11.80
	22.71	9/26/2013	10.75	--	--	11.96
	22.71	10/9/2017	10.92	--	--	11.79
	22.71	2/27/2019	9.92	--	--	12.79
22.71	5/6/2020	9.76	--	--	12.95	
22.71	8/10/2020	10.17	--	--	12.54	
MW-03	20.93	5/30/1991	12.31	--	--	8.62
	20.93	6/11/1991	12.67	--	--	8.26
	20.93	2/12/1993	13.68	--	--	7.25
	20.93	6/29/1993	13.4	--	--	7.53
	20.93	9/13/1995	14.9	--	--	6.03
	20.93	4/9/1998	12.94	--	--	7.99
	20.93	5/21/1998	12.01	--	--	8.92
	20.93	6/30/1998	12.68	--	--	8.25
	20.93	7/15/1998	13.34	--	--	7.59
	20.93	2/27/2019	13.14	--	--	7.79
	20.93	5/6/2020	13.39	--	--	7.54
20.93	8/10/2020	14.18	--	--	6.75	

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-04	not surveyed	5/30/1991	13.53	--	--	--
	not surveyed	6/11/1991	14.27	--	--	--
	not surveyed	2/12/1993	free product ⁽¹⁾	--	--	--
	not surveyed	6/29/1993	16.15	--	--	--
	not surveyed	4/9/1998	12.8	--	--	--
	not surveyed	5/21/1998	14.17	--	--	--
	not surveyed	6/30/1998	14.72	--	--	--
	not surveyed	7/15/1998	15.33	--	--	--
	not surveyed	7/16/1999	15.09	--	--	--
	not surveyed	8/3/2000	17.01	--	--	--
	not surveyed	8/7/2001	dry	--	--	--
	not surveyed	8/19/2002	dry	--	--	--
	not surveyed	8/21/2003	dry	--	--	--
	not surveyed	8/5/2004	dry	--	--	--
	not surveyed	8/10/2005	dry	--	--	--
	not surveyed	7/23/2008	dry	--	--	--
	not surveyed	9/24/2009	dry	--	--	--
	not surveyed	8/18/2010	dry	--	--	--
	not surveyed	9/27/2012	dry	--	--	--
	not surveyed	9/26/2013	dry	--	--	--
not surveyed	10/9/2017	17.45	--	--	--	
not surveyed	2/27/2019	14.26	--	--	--	
not surveyed	8/10/2020	17.12	--	--	--	
MW-05	22.69	5/30/1991	12.67	--	--	10.02
	22.69	6/11/1991	13.36	--	--	9.33
	22.69	2/12/1993	12.46	--	--	10.23
	22.69	6/29/1993	13.9	--	--	8.79
	22.69	6/1/1994	15.05	--	--	7.64
	22.69	4/9/1998	10.3	--	--	12.39
	22.69	5/21/1998	10.32	--	--	12.37
	22.69	6/30/1998	10.46	--	--	12.23
	22.69	7/15/1998	12.57	--	--	10.12
	22.69	9/25/2009	dry	--	--	--
	22.69	10/9/2017	dry	--	--	--
	22.69	2/27/2019	14.95	--	--	7.74
	22.69	5/6/2020	14.96	--	--	7.73
22.69	8/10/2020	15.9	--	--	6.79	
MW-06	17.48	2/12/1993	10.96	--	--	6.52
	17.48	6/29/1993	10.7	--	--	6.78
	17.48	6/1/1994	11.5	--	--	5.98
	17.48	9/13/1995	11.92	--	--	5.56
	17.48	4/9/1998	10.39	--	--	7.09
	17.48	5/21/1998	9.61	--	--	7.87
	17.48	6/30/1998	10.14	--	--	7.34
	17.48	7/15/1998	10.64	--	--	6.84
	17.48	10/9/2017	11.91	--	--	5.57
	17.48	2/27/2019	10.21	--	--	7.27
	17.48	5/6/2020	10.62	--	--	6.86
17.48	8/10/2020	11.35	--	--	6.13	
MW-07	22.21	2/12/1993	13.9	--	--	8.31
	22.21	6/29/1993	13.58	--	--	8.63
	22.21	9/13/1995	15	--	--	7.21
	22.21	4/9/1998	13.28	--	--	8.93
	22.21	5/21/1998	12.3	--	--	9.91
	22.21	6/30/1998	12.89	--	--	9.32
	22.21	7/15/1998	13.52	--	--	8.69
	22.21	10/9/2017	16.19	--	--	6.02
	22.21	2/27/2019	14.44	--	--	7.77
	22.21	5/6/2020	14.82	--	--	7.39
22.21	8/10/2020	15.6	--	--	6.61	

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-08	20.61	2/12/1993	12.94	--	--	7.67
	20.61	6/29/1993	12.59	--	--	8.02
	20.61	6/1/1994	13.44	--	--	7.17
	20.61	9/13/1995	14.02	--	--	6.59
	20.61	4/9/1998	12.27	--	--	8.34
	20.61	5/21/1998	11.31	--	--	9.30
	20.61	6/30/1998	11.8	--	--	8.81
	20.61	7/15/1998	12.55	--	--	8.06
	20.61	5/6/2020	13.19	--	--	7.42
	20.61	8/10/2020	13.93	--	--	6.68
MW-09	23.36	2/12/1993	free product ⁽¹⁾	--	--	--
	23.36	6/29/1993	free product ⁽¹⁾	--	--	--
	23.36	9/13/1995	free product ⁽¹⁾	--	--	--
	23.36	4/9/1998	free product ⁽¹⁾	--	--	--
	23.36	5/21/1998	free product ⁽¹⁾	--	--	--
	23.36	6/30/1998	free product ⁽¹⁾	--	--	--
	23.36	7/15/1998	free product ⁽¹⁾	--	--	--
	23.36	8/6/2004	dry	--	--	--
	23.36	9/22/2009	dry	--	--	--
	23.36	5/6/2020	16.19	16.05	0.14	7.283
23.36	8/11/2020	16.96	16.85	0.11	6.489	
MW-10	22.89	2/12/1993	15.68	--	--	7.21
	22.89	6/29/1993	15.34	--	--	7.55
	22.89	6/1/1994	16.14	--	--	6.75
	22.89	9/13/1995	16.79	--	--	6.10
	22.89	4/9/1998	15.01	--	--	7.88
	22.89	5/21/1998	14.04	--	--	8.85
	22.89	6/30/1998	14.68	--	--	8.21
	22.89	7/15/1998	15.29	--	--	7.60
	22.89	7/16/1999	12.34	--	--	10.55
	22.89	8/3/2000	16.11	--	--	6.78
	22.89	8/7/2001	17.25	--	--	5.64
	22.89	8/19/2002	16.53	--	--	6.36
	22.89	8/21/2003	16.83	--	--	6.06
	22.89	8/5/2004	16.44	--	--	6.45
	22.89	8/21/2006	16.68	--	--	6.21
	22.89	8/10/2007	16.55	--	--	6.34
	22.89	7/23/2008	15.9	--	--	6.99
	22.89	8/19/2010	16.91	--	--	5.98
	22.89	8/26/2011	16	--	--	6.89
	22.89	9/28/2012	16.92	--	--	5.97
	22.89	9/26/2013	16.56	--	--	6.33
	22.89	10/9/2017	16.88	--	--	6.01
22.89	2/27/2019	15.11	--	--	7.78	
22.89	5/6/2020	15.38	--	--	7.51	
22.89	8/10/2020	16.21	--	--	6.68	
MW-11	25.07	2/12/1993	9.45	--	--	15.62
	25.07	6/29/1993	9.09	--	--	15.98
	25.07	6/1/1994	11.99	--	--	13.08
	25.07	4/9/1998	8.3	--	--	16.77
	25.07	5/21/1998	9.57	--	--	15.50
	25.07	6/30/1998	10.1	--	--	14.97
	25.07	7/15/1998	11.11	--	--	13.96
	25.07	9/22/2009	dry	--	--	--
	25.07	10/9/2017	18.54	--	--	6.53
	25.07	2/28/2019	7.26	--	--	17.81
	25.07	5/7/2020	12.39	--	--	12.68
	25.07	8/10/2020	15.43	--	--	9.64

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-12	21.16	2/12/1993	14.02	--	--	7.14
	21.16	6/29/1993	13.81	--	--	7.35
	21.16	6/1/1994	14.61	--	--	6.55
	21.16	9/13/1995	15.11	--	--	6.05
	21.16	4/9/1998	13.56	--	--	7.60
	21.16	5/21/1998	12.51	--	--	8.65
	21.16	6/30/1998	13.13	--	--	8.03
	21.16	7/15/1998	13.72	--	--	7.44
	21.16	7/16/1999	12.85	--	--	8.31
	21.16	8/3/2000	14.38	--	--	6.78
	21.16	8/8/2001	15.51	--	--	5.65
	21.16	8/19/2002	14.74	--	--	6.42
	21.16	8/21/2003	15.1	--	--	6.06
	21.16	8/5/2004	14.9	--	--	6.26
	21.16	8/11/2005	14.85	--	--	6.31
	21.16	8/18/2006	14.95	--	--	6.21
	21.16	8/9/2007	14.88	--	--	6.28
	21.16	7/23/2008	14.25	--	--	6.91
	21.16	8/19/2010	15.24	--	--	5.92
	21.16	8/25/2011	14.27	--	--	6.89
	21.16	9/27/2012	12.31	--	--	8.85
	21.16	9/26/2013	14.97	--	--	6.19
21.16	10/9/2017	15.18	--	--	5.98	
21.16	2/27/2019	13.34	--	--	7.82	
21.16	5/7/2020	13.6	--	--	7.56	
21.16	8/11/2020	14.6	--	--	6.56	
MW-13	25.09	6/29/1993	9.95	--	--	15.14
	25.09	4/9/1998	9.21	--	--	15.88
	25.09	5/21/1998	10.04	--	--	15.05
	25.09	6/30/1998	10.19	--	--	14.90
	25.09	7/15/1998	10.62	--	--	14.47
	25.09	10/9/2017	12.06	--	--	13.03
	25.09	2/28/2019	10.85	--	--	14.24
	25.09	5/7/2020	11.03	--	--	14.06
25.09	8/10/2020	11.46	--	--	13.63	
MW-14	23.77	6/29/1993	7.43	--	--	16.34
	23.77	9/13/1995	10.49	--	--	13.28
	23.77	4/9/1998	7.03	--	--	16.74
	23.77	5/21/1998	6.97	--	--	16.80
	23.77	6/30/1998	7.59	--	--	16.18
	23.77	7/15/1998	9.12	--	--	14.65
	23.77	7/16/1999	8.58	--	--	15.19
	23.77	8/6/2004	9.83	--	--	13.94
	23.77	8/19/2010	8.58	--	--	15.19
	23.77	10/9/2017	9.96	--	--	13.81
	23.77	2/27/2019	5.78	--	--	17.99
	23.77	5/7/2020	6.43	--	--	17.34
23.77	8/10/2020	8.51	--	--	15.26	
MW-15	21.75	6/1/1994	14.64	--	--	7.11
	21.75	4/9/1998	12.74	--	--	9.01
	21.75	5/21/1998	12.28	--	--	9.47
	21.75	6/30/1998	13.11	--	--	8.64
	21.75	7/15/1998	13.82	--	--	7.93
	21.75	10/9/2017	15.75	--	--	6.00
	21.75	2/27/2019	13.82	--	--	7.93
	21.75	5/7/2020	14.11	--	--	7.64
21.75	8/10/2020	15	--	--	6.75	
MW-16	22.94	6/29/1993	free product ⁽¹⁾	--	--	--
	22.94	9/13/1995	9.58	--	--	13.36
	22.94	4/9/1998	6.74	--	--	16.20
	22.94	5/21/1998	6.88	--	--	16.06
	22.94	6/30/1998	8.64	--	--	14.30
	22.94	7/15/1998	9.16	--	--	13.78
	22.94	8/6/2004	9.71	--	--	13.23
	23.94	8/19/2010	11.1	--	--	12.84
	22.94	10/9/2017	14.3	--	--	8.64
	22.94	2/27/2019	6.67	--	--	16.27
	22.94	5/7/2020	9.92	--	--	13.02
22.94	8/10/2020	12.41	--	--	10.53	

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-17	25.24	6/1/1994	12.56	--	--	12.68
	25.24	9/13/1995	12.5	--	--	12.74
	25.24	4/9/1998	8.57	--	--	16.67
	25.24	5/21/1998	10.27	--	--	14.97
	25.24	6/30/1998	10.58	--	--	14.66
	25.24	7/15/1998	11.37	--	--	13.87
	25.24	10/9/2017	13.21	--	--	12.03
	25.24	2/28/2019	7.8	--	--	17.44
	25.24	5/7/2020	10.07	--	--	15.17
	25.24	8/10/2020	12.62	--	--	12.62
MW-18	26.56	6/29/1993	11.5	--	--	15.06
	26.56	4/9/1998	10.66	--	--	15.90
	26.56	5/21/1998	11.49	--	--	15.07
	26.56	6/30/1998	11.7	--	--	14.86
	26.56	7/15/1998	12.1	--	--	14.46
	26.56	10/9/2017	13.71	--	--	12.85
	26.56	2/28/2019	11.1	--	--	15.46
	26.56	5/7/2020	12.5	--	--	14.06
	26.56	8/10/2020	13.4	--	--	13.16
MW-19	20.20	6/29/1993	free product ⁽¹⁾	--	--	--
	20.20	6/1/1994	14.39	--	--	5.81
	20.20	9/13/1995	14.5	--	--	5.70
	20.20	4/9/1998	13.34	--	--	6.86
	20.20	5/21/1998	12.52	--	--	7.68
	20.20	6/30/1998	13.03	--	--	7.17
	20.20	7/15/1998	13.57	--	--	6.63
	20.20	10/9/2017	14.59	--	--	5.61
	20.20	2/27/2019	12.93	--	--	7.27
	20.20	5/7/2020	13.3	--	--	6.90
MW-20	23.34	6/29/1993	16.21	--	--	7.13
	23.34	9/13/1995	free product ⁽¹⁾	--	--	--
	23.34	4/9/1998	16.16	15.61	0.55	7.62
	23.34	5/21/1998	15.63	14.29	1.34	8.782
	23.34	6/30/1998	free product ⁽¹⁾	--	--	--
	23.34	7/15/1998	free product ⁽¹⁾	--	--	--
	23.34	9/22/2009	dry	--	--	--
	23.34	10/9/2017	17.15	--	--	6.19
	23.34	2/28/2019	15.27	--	--	8.07
	23.34	5/7/2020	15.55	--	--	7.79
MW-22	31.40	6/1/1994	23.97	--	--	7.43
	31.40	4/9/1998	23.24	--	--	8.16
	31.40	5/21/1998	20.83	--	--	10.57
	31.40	6/30/1998	22.38	--	--	9.02
	31.40	7/15/1998	22.58	--	--	8.82
	31.40	8/3/2000	23.52	--	--	7.88
	31.40	8/8/2001	25.23	--	--	6.17
	31.40	8/20/2002	24.97	--	--	6.43
	31.40	8/21/2003	25.18	--	--	6.22
	31.40	8/6/2004	24.36	--	--	7.04
	31.40	8/11/2005	24.85	--	--	6.55
	31.40	8/18/2006	25.46	--	--	5.94
	31.40	8/10/2007	24.9	--	--	6.50
	31.40	7/23/2008	24.6	--	--	6.80
	31.40	8/19/2010	24.94	--	--	6.46
	31.40	8/26/2011	24.8	--	--	6.60
	31.40	9/28/2012	25.82	--	--	5.58
	31.40	9/27/2013	24.91	--	--	6.49
	31.40	10/9/2017	25.36	--	--	6.04
	31.40	2/28/2019	23.97	--	--	7.43
31.40	5/6/2020	23.04	--	--	8.36	
31.40	8/10/2020	24.76	--	--	6.64	

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-23	31.43	6/1/1994	24.73	--	--	6.70
	31.43	4/9/1998	23.96	--	--	7.47
	31.43	5/21/1998	22.12	--	--	9.31
	31.43	6/30/1998	23.11	--	--	8.32
	31.43	7/15/1998	23.3	--	--	8.13
	31.43	7/16/1999	22.8	--	--	8.63
	31.43	8/3/2000	24.22	--	--	7.21
	31.43	8/8/2001	25.48	--	--	5.95
	31.43	8/20/2002	25.43	--	--	6.00
	31.43	8/21/2003	25.21	--	--	6.22
	31.43	8/6/2004	24.59	--	--	6.84
	31.43	8/11/2005	25.43	--	--	6.00
	31.43	8/21/2006	25.55	--	--	5.88
	31.43	8/10/2007	25.26	--	--	6.17
	31.43	7/23/2008	23.89	--	--	7.54
	31.43	8/20/2010	25.64	--	--	5.79
	31.43	8/25/2011	24.15	--	--	7.28
	31.43	9/28/2012	26	--	--	5.43
	31.43	9/27/2013	25.12	--	--	6.31
	31.43	10/9/2017	25.45	--	--	5.98
	31.43	2/28/2019	23.83	--	--	7.60
31.43	5/6/2020	22.93	--	--	8.50	
31.43	8/10/2020	24.72	--	--	6.71	
MW-24	27.89	6/1/1994	14.35	--	--	13.54
	27.89	4/9/1998	11.31	--	--	16.58
	27.89	5/21/1998	12.42	--	--	15.47
	27.89	6/30/1998	12.06	--	--	15.83
	27.89	7/15/1998	13.06	--	--	14.83
	27.89	10/9/2017	14.61	--	--	13.28
	27.89	2/28/2019	11.32	--	--	16.57
	27.89	5/6/2020	12.58	--	--	15.31
	27.89	8/10/2020	13.31	--	--	14.58
MW-25	21.45	6/1/1994	15.06	--	--	6.39
	21.45	4/9/1998	12.52	--	--	8.93
	21.45	5/21/1998	11.53	--	--	9.92
	21.45	6/30/1998	12.51	--	--	8.94
	21.45	7/15/1998	13.23	--	--	8.22
	21.45	10/9/2017	13.57	--	--	7.88
	21.45	2/28/2019	6.9	--	--	14.55
	21.45	5/7/2020	8.02	--	--	13.43
	21.45	8/11/2020	9.68	--	--	11.77
MW-26	27.14	4/9/1998	12.54	--	--	14.60
	27.14	5/21/1998	13.31	--	--	13.83
	27.14	6/30/1998	13.19	--	--	13.95
	27.14	7/15/1998	14.21	--	--	12.93
	27.14	9/22/2009	dry	--	--	--
	27.14	8/20/2010	14.32	--	--	12.82
	27.14	10/9/2017	16.31	--	--	10.83
	27.14	2/28/2019	11.69	--	--	15.45
	27.14	5/6/2020	12.89	--	--	14.25
	27.14	8/10/2020	13.08	--	--	14.06
MW-27	25.90	4/9/1998	18.71	--	--	7.19
	25.90	5/21/1998	17.05	--	--	8.85
	25.90	6/30/1998	18.02	--	--	7.88
	25.90	7/15/1998	18.22	--	--	7.68
	25.90	7/16/1999	17.18	--	--	8.72
	25.90	8/4/2000	18.59	--	--	7.31
	25.90	8/8/2001	20.03	--	--	5.87
	25.90	8/20/2002	20.09	--	--	5.81
	25.90	8/21/2003	20.03	--	--	5.87
	25.90	8/6/2004	19.23	--	--	6.67
	25.90	8/11/2005	19.84	--	--	6.06
	25.90	8/18/2006	19.95	--	--	5.95
	25.90	8/9/2007	20.03	--	--	5.87
	25.90	8/25/2011	19.03	--	--	6.87
	25.90	9/27/2012	19.44	--	--	6.46
	25.90	9/27/2013	19.61	--	--	6.29
	25.90	10/9/2017	20.11	--	--	5.79
	25.90	2/28/2019	18.25	--	--	7.65
25.90	5/7/2020	18.1	--	--	7.80	
25.90	8/10/2020	18.5	--	--	7.40	

Table G.2
Water Level Data

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-28	27.36	6/1/1994	16.84	--	--	10.52
	27.36	4/9/1998	13.24	--	--	14.12
	27.36	5/21/1998	14.07	--	--	13.29
	27.36	6/30/1998	14.6	--	--	12.76
	27.36	7/15/1998	14.21	--	--	13.15
	27.36	9/22/2009	dry	--	--	--
	27.36	10/9/2017	dry	--	--	--
	27.36	2/28/2019	12.39	--	--	14.97
	27.36	5/7/2020	17.91	--	--	9.45
	27.36	8/10/2020	13.6	--	--	13.76
MW-29	29.77	4/9/1998	15.99	--	--	13.78
	29.77	5/21/1998	16.54	--	--	13.23
	29.77	6/30/1998	16.57	--	--	13.20
	29.77	7/15/1998	16.78	--	--	12.99
	29.77	10/9/2017	16.8	--	--	12.97
	29.77	2/28/2019	15.51	--	--	14.26
	29.77	5/6/2020	15.82	--	--	13.95
	29.77	8/10/2020	16.2	--	--	13.57
MW-30	26.360	7/15/1998	15.53	--	--	10.83
	26.360	8/24/1998	14.9	--	--	11.46
	26.360	4/28/1999	13.19	--	--	13.17
	26.360	7/16/1999	13.76	--	--	12.60
	26.360	11/18/1999	14.54	--	--	11.82
	26.360	2/3/2000	13.16	--	--	13.20
	26.360	5/31/2000	13.68	--	--	12.68
	26.360	8/3/2000	14.09	--	--	12.27
	26.360	8/7/2001	15.25	--	--	11.11
	26.360	8/19/2002	14.31	--	--	12.05
	26.360	8/21/2003	14.28	--	--	12.08
	26.360	8/5/2004	13.99	--	--	12.37
	26.360	8/10/2005	14.02	--	--	12.34
	26.360	10/28/2005	14.63	--	--	11.73
	26.360	8/10/2005	14.02	--	--	12.34
	26.360	8/21/2006	14.89	--	--	11.47
	26.360	8/9/2007	14.05	--	--	12.31
	26.360	10/5/2007	16.1	--	--	10.26
	26.360	7/23/2008	18.4	--	--	7.96
	26.360	8/20/2010	15.14	--	--	11.22
26.360	8/26/2011	16.23	--	--	10.13	
26.360	9/28/2012	17.82	--	--	8.54	
26.360	9/27/2013	20	--	--	6.36	
26.360	10/9/2017	15.37	--	--	10.99	
26.360	8/10/2020	16.8	--	--	9.56	
MW-31	19.89	7/15/1998	12.98	--	--	6.91
	19.89	7/16/1999	12.27	--	--	7.62
	19.89	8/3/2000	13.39	--	--	6.50
	19.89	8/7/2001	14.52	--	--	5.37
	19.89	8/19/2002	14.04	--	--	5.85
	19.89	8/21/2003	14.3	--	--	5.59
	19.89	8/5/2004	13.92	--	--	5.97
	19.89	8/11/2005	13.97	--	--	5.92
	19.89	8/21/2006	13.99	--	--	5.90
	19.89	8/9/2007	13.95	--	--	5.94
	19.89	7/23/2008	13.4	--	--	6.49
	19.89	8/18/2010	14.42	--	--	5.47
	19.89	8/25/2011	13.5	--	--	6.39
	19.89	9/28/2012	14.53	--	--	5.36
	19.89	9/27/2013	14.09	--	--	5.80
	19.89	10/9/2017	14.32	--	--	5.57
	19.89	2/27/2019	12.68	--	--	7.21
	19.89	5/6/2020	13.09	--	--	6.80
19.89	8/10/2020	13.72	--	--	6.17	

**Table G.2
Water Level Data**

Well ID	Casing Elevation (feet NAVD 88)	Date	Depth to Water (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet NAVD 88)
MW-32	21.18	7/15/1998	13.25	--	--	7.93
	21.18	7/16/1999	12.34	--	--	8.84
	21.18	8/3/2000	14.37	--	--	6.81
	21.18	8/7/2001	15.51	--	--	5.67
	21.18	8/20/2002	14.88	--	--	6.30
	21.18	8/21/2003	15.16	--	--	6.02
	21.18	8/5/2004	14.8	--	--	6.38
	21.18	8/11/2005	14.86	--	--	6.32
	21.18	8/18/2006	14.89	--	--	6.29
	21.18	8/9/2007	14.81	--	--	6.37
	21.18	7/23/2008	14.15	--	--	7.03
	21.18	8/18/2010	15.44	--	--	5.74
	21.18	8/26/2011	14.31	--	--	6.87
	21.18	9/28/2012	15.97	--	--	5.21
	21.18	9/26/2013	14.75	--	--	6.43
	21.18	10/9/2017	15.75	--	--	5.43
	21.18	2/28/2019	16.75	--	--	4.43
	21.18	5/6/2020	13.38	--	--	7.80
21.18	8/10/2020	14.31	--	--	6.87	
MW-33	25.91	5/6/2020	18.32	--	--	7.59
	25.91	8/10/2020	19.25	--	--	6.66
MW-34	26.67	5/6/2020	18.74	--	--	7.93
	26.67	8/10/2020	20.27	--	--	6.40
MW-35	26.95	5/6/2020	14.2	--	--	12.75
	26.95	8/10/2020	15.08	--	--	11.87
MW-36	31.59	5/6/2020	23.5	--	--	8.09
	31.59	8/10/2020	25.05	--	--	6.54
MW-37	31.13	5/6/2020	22.54	--	--	8.59
	31.13	8/10/2020	23.91	--	--	7.22
MW-38	31.09	5/6/2020	22.32	--	--	8.77
	31.09	8/10/2020	24.09	--	--	7.00
MW-39	18.95	5/7/2020	12.08	--	--	6.87
	18.95	8/10/2020	12.8	--	--	6.15
MW-40	24.65	5/6/2020	17.05	--	--	7.60
	24.65	8/10/2020	18.07	--	--	6.58
UST-4	31.68	10/9/2017	18.3	--	--	13.38
	31.68	2/28/2019	17.09	--	--	14.59
	31.68	5/6/2020	17.34	--	--	14.34
	31.68	8/10/2020	17.67	--	--	14.01

Notes:

-- Not applicable

RED Depth to water derived from historically reported groundwater elevation in feet mean sea level datum at time of report; surveyed casing elevation was not reported and depth is considered an estimate.

1 LNAPL noted historically at unreported thickness.

Abbreviations:

LNAPL Light non-aqueous phase liquid

NAVD 88 North American Vertical Datum of 1988

**Table G.3
LNAPL Recovery Notes**

Date	Wells with Socks	Notes
4/1/1999	MW3, MW7, MW9, MW20	total 25 lb removed (35?)
7/1/1999	MW3, MW7, MW9, MW20	
11/1/1999	MW3, MW7, MW9, MW20	
2/1/2000	MW3, MW7, MW9, MW20	very little in MW3, MW7
5/1/2000	MW3, MW7, MW9, MW20	POL took over
8/1/2000	MW3, MW7, MW9, MW20	total 43.5 lb removed
8/1/2001	MW3, MW7, MW9, MW20	total 52 lb removed; only MW9 changed regularly and MW20 only fills during low water table
8/1/2002	MW3, MW7, MW9, MW20	total 101 lb removed
8/1/2003	MW3, MW7, MW9, MW20	total 105 lb removed
8/1/2004	MW3, MW7, MW9, MW20	total 116 lb removed
8/1/2005	MW3, MW7, MW9, MW20	total 123 lb removed
8/1/2006	MW3, MW7, MW9, MW20	total 125 lb removed
11/1/2007	MW3, MW7, MW9, MW20	total 125 lb removed
7/1/2008	MW3, MW7, MW9, MW20	total 125 lb removed
8/1/2010	MW3, MW7, MW9, MW20	product only at MW9

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix H Terrestrial Ecological Evaluation

Simplified Terrestrial Ecological Evaluation

Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest ½ acre (1/4 acre if the area is less than 0.5 acre).																					
1) From the table below, find the number of points corresponding to the area and enter this number in the field to the right.	4																				
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;"><u>Area (acres)</u></th> <th style="text-align: left;"><u>Points</u></th> </tr> </thead> <tbody> <tr><td>0.25 or less</td><td>4</td></tr> <tr><td>0.5</td><td>5</td></tr> <tr><td>1.0</td><td>6</td></tr> <tr><td>1.5</td><td>7</td></tr> <tr><td>2.0</td><td>8</td></tr> <tr><td>2.5</td><td>9</td></tr> <tr><td>3.0</td><td>10</td></tr> <tr><td>3.5</td><td>11</td></tr> <tr><td>4.0 or more</td><td>12</td></tr> </tbody> </table>	<u>Area (acres)</u>	<u>Points</u>	0.25 or less	4	0.5	5	1.0	6	1.5	7	2.0	8	2.5	9	3.0	10	3.5	11	4.0 or more	12	
<u>Area (acres)</u>	<u>Points</u>																				
0.25 or less	4																				
0.5	5																				
1.0	6																				
1.5	7																				
2.0	8																				
2.5	9																				
3.0	10																				
3.5	11																				
4.0 or more	12																				
2) Is this an industrial or commercial property? If yes, enter a score of 3. If no, enter a score of 1.	3																				
3) Enter a score in the box to the right for the habitat quality of the site, using the following rating system. High=1, Intermediate=2, Low=3	3																				
4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2.	2																				
5) Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.	4																				
6) Add the numbers in the boxes on lines 2-5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified evaluation may be ended.	12																				

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix I Detailed Cost Estimates

**Table I.1
Summary of Remedial Alternative Costs**

Alternative	Restoration Time Frame (years) ⁽¹⁾	Construction Capital Cost	Other Professional Services	Long-Term Monitoring and Closure ⁽²⁾	Cost ⁽³⁾
Alternative 1	30	\$143,000	\$151,000	\$1,205,000	\$1,600,000
Alternative 2	5-10	\$727,000	\$317,000	\$2,690,000	\$4,200,000
Alternative 3	5-10	\$1,605,000	\$553,000	\$1,278,000	\$4,200,000
Alternative 4	5-10	\$5,899,000	\$790,000	\$1,190,000	\$10,200,000
Alternative 5	5-10	\$4,109,000	\$1,466,000	\$875,000	\$8,300,000

Notes:

Total costs are rounded up to the nearest \$100,000.

- 1 Restoration time frame is the estimated time to meet proposed groundwater CULs off-property and at the downgradient edge of the Port property. Time frame includes remedy implementation.
- 2 Long-term monitoring and closure costs are based on the assumption of 30 years of monitoring for Alternatives 1 through 4 and 15 years of monitoring for Alternative 5. Long-term monitoring costs for Alternative 2 include two maintenance injection events of the treatment barrier. Costs for Alternatives 3 and 5 also include one contingency injection event to address any residual groundwater impacts at the downgradient edge of the Port property. All long-term monitoring costs are adjusted for NPV using a discount rate of 5%. Costs are included for annual monitoring, reporting/agency periodic reviews, and institutional controls.
- 3 Includes total of construction costs, professional services (including long-term monitoring), sales tax, 25% contingency on direct construction costs, and a 20% contingency on indirect construction costs.

Abbreviations:

- CUL Cleanup level
- NPV Net present value
- Port Port of Longview

**Table I.2
Detailed Costs for Remedial Alternative 1**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	\$ 2,000.00	\$ 2,000	
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	\$ 11,000.00	\$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	\$ 3,000.00	\$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	\$ 20.00	\$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	\$ 8,500.00	\$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	1	LS	\$ 1,925.00	\$ 1,925	Assumes one day of utility locating services, including a GPR survey to locate adjacent pipelines.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	\$ 20,000.00	\$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	\$ 100.00	\$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	0	LS	\$ 1,300.00	\$ -	Cost included above in surfactant injections and extractions.
Installation of four 4-inch injection wells	1	LS	\$ 22,000.00	\$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Three rounds of PetroCleanze injections in six locations	4160	lbs	\$ 3.60	\$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	\$ 16,000.00	\$ 48,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not required.
Soil/water drum disposal during injection well installation and development	1	LS	\$ 2,600.00	\$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	\$ 7,500.00	\$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				\$ 143,000	
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	\$ 7,150	PM Costs for remediation activities.
Engineering Design Report and Remedial Action Work Plan	1	LS	\$ 65,000.00	\$ 65,000	Includes draft and final based on Ecology comments.
Contractor Coordination and Preparation	1	LS	\$ 20,000.00	\$ 20,000	Assumes that Floyd Snider will coordinate with all subcontractors.
Field management and oversight	190	hrs	\$ 150.00	\$ 28,500	Assumes 12-hr days and pre- and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 6 days for injection and well installation, development, and locate, 5 days for injection and extraction activities (PetroCleanze), and 1 day oversight for pipeline inspection. One field staff present during all field activities.
Mobilization, demob, food and lodging	1	LS	\$ 5,000.00	\$ 5,000	Includes food, lodging, field equipment costs.
Completion report	1	LA	\$ 25,000.00	\$ 25,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				\$ 151,000	

**Table I.2
Detailed Costs for Remedial Alternative 1**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	\$ 7,600.00	\$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	\$ 25,000.00	\$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring at the Site for 30 years. COCs and select MNA parameters will be analyzed on select wells across the Site. Per event cost is for year 1.
Annual Reporting and Five-Year Reviews	28	Event	\$ 19,500.00	\$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	\$ 1,700.00	\$ -	Disposal of purge water drums every 2 years. Per event cost is for the first disposal event in year 2.
SUBTOTAL NPV - LONG-TERM MONITORING				\$ 1,025,300	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every 2 years. Net present value is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	\$ 90,000.00	\$ 90,000	Includes costs for developing, negotiating, and recording environmental covenants with all affected property owners and developing the Soil Management Plan.
Closure report and Ecology correspondence	1	LS	\$ 40,000.00	\$ 40,000	Draft and final completion report, including Ecology review.
Well abandonment activities	49	Wells	\$ 1,000.00	\$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; includes injection wells; includes inflation.
SUBTOTAL LONG -TERM MONITORING AND CLOSURE				\$1,205,000	
Ecology Oversight	3	%	DC	\$ 20,870	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to construction capital costs	25	%	DC	\$ 35,750	25% contingency added to direct construction costs.
20% Contingency added to construction indirect costs	20	%	DC	\$ 30,200	20% contingency added to indirect construction costs.
Taxes	10	%	DC	\$ 14,300	Applicable to injection activities.
Total				\$ 1,600,000	

Abbreviations:

COC Contaminant of concern
 CUL Cleanup level
 CY Cubic yards
 DC Direct costs

GPR Ground-penetrating radar
 hr Hour
 IDW Investigation-derived waste
 LS Lump sum

MNA Monitored natural attenuation
 UIC underground injection control

**Table I.3
Detailed Costs for Remedial Alternative 2**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	\$ 2,000.00	\$ 2,000	
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	\$ 11,000.00	\$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	\$ 3,000.00	\$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	\$ 20.00	\$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	\$ 8,500.00	\$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	\$ 1,925.00	\$ -	Cost included below in surfactant injections and extractions.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	\$ 20,000.00	\$ 20,000	Assumes that hydrant costs are not included in Regenesi quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	\$ 100.00	\$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	1	LS	\$ 1,925.00	\$ 1,925	Assumes 1 day of utility locating services, including a GPR survey to locate off-property and on-property activities.
Installation of four 4-inch injection wells	1	LS	\$ 22,000.00	\$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesi cost for three applications of PetroCleanze in six locations	4160	lbs	\$ 3.60	\$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	\$ 15,000.00	\$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal during injection well installation and development	1	LS	\$ 2,600.00	\$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	\$ 7,500.00	\$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.
Off-Property PersulfOx Injections					
Permit for PersulfOx injections: UIC Permit	38	borings	\$ 100.00	\$ 3,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	0	LS	\$ 1,925.00	\$ -	Cost included above in surfactant injections and extractions.
Regenesi Total Cost for PersulfOx Off-Property Injections	1	LS	\$ 55,000	\$ 55,000	Unit costs for PersulfOx product; includes estimated shipping costs.
MW-04 Area (3,840 sq. ft); Installation of 24 injection points - geoprobe	1	LS	\$ 54,000	\$ 54,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10 and 20 ft bgs (12 points per day with two rigs; 2 days).
MW-30 Area (2,210 sq. ft); Installation of 14 injection points - geoprobe	1	LS	\$ 32,000	\$ 32,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10-20 ft bgs (12 points per day with two rigs; 1 day).
Airknife to clear locations	1.5	Day	\$ 2,300	\$ 3,450	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 1.5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	\$ 2,000.00	\$ 2,000	Assumes that no soil will be generated and very little water.
CAA-1 PetroFix Barrier Injections					
Permit for PetroFix injections: UIC Permit	218	borings	\$ 100.00	\$ 21,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	0	LS	\$ 1,925.00	\$ -	Cost included above in surfactant injections and extractions.
Regenesi Total Cost for PetroFix barrier injections in CAA-1	1	LS	\$ 146,000	\$ 146,000	Unit costs for PetroFix product; includes estimated shipping costs.
PetroFix barrier (650' by 12'); Installation of two rows with 218 total injection points - geoprobe	1	LS	\$ 250,000	\$ 250,000	Assumes two rows 650 ft in length with 6-ft spacing with injections that will be conducted using a geoprobe (12 points per day with two rigs; 19 days).
Airknife to clear locations	7	Day	\$ 2,300	\$ 16,100	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 7 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	\$ 3,000.00	\$ 3,000	Assumes that no soil will be generated and very little water.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				\$ 727,000	

**Table I.3
Detailed Costs for Remedial Alternative 2**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	\$ 36,350	PM Costs for injection activities.
Engineering Design Report and Remedial Action Work Plan	1	LS	\$ 80,000.00	\$ 80,000	Includes draft and final based on Ecology comments.
Contractor Coordination and Preparation	1	LS	\$ 20,000.00	\$ 20,000	Assumes that Floyd Snider will coordinate with all subcontractors.
Field management and oversight	784	Hrs	\$ 150.00	\$ 117,600	Assumes 12 hrs days and pre and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and downgradient well installation and development, 5 days for injection and extraction activities (PetroCleanze), 1 day utility locate, and 1 day oversight for pipeline inspection with one field staff; 22 days injection activities with two field staff (PersulfOx and PetroFix).
Mobilization, demob, food and lodging	1	LS	\$ 22,800.00	\$ 22,800	Includes food, lodging, field equipment costs.
Completion report	1	LA	\$ 40,000.00	\$ 40,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				\$ 317,000	
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	\$ 7,600.00	\$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	\$ 25,000.00	\$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring for 30 years. COCs and select MNA parameters will be analyzed on select wells to be determined in a long term monitoring plan. Per event cost is for year 1.
Annual Reporting and Five Year Reviews	28	Event	\$ 19,500.00	\$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	\$ 1,700.00	\$ -	Disposal of purge water drums every 2 years. Per event cost is for the first disposal event in year 2.
SUBTOTAL NPV - LONG-TERM MONITORING				\$ 1,025,300	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every two years. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	\$ 75,000.00	\$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port property and developing the Soil Management Plan.
Well abandonment activities	49	wells	\$ 1,000.00	\$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	\$ 40,000.00	\$ 40,000	Draft and final completion report including Ecology review.
Contingency PetroFix barrier injection events	1	LS	DC	\$ 1,500,000	Two additional injection events to maintain the PetroFix barrier and prevent off-property migration of impacts. For evaluation, the PetroFix barrier is expected to last approximately 10 years per injection event, which is based on Regenesys' estimates and the assumption of a relatively low flux of groundwater across the barrier. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
SUBTOTAL LONG-TERM MONITORING AND CLOSURE				\$ 2,690,000	
Ecology Oversight	3	%	DC	\$ 58,220	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	\$ 181,750	25% contingency added to injection activities.
20% Contingency added to construction indirect costs	20	%	DC	\$ 63,400	20% contingency added to indirect construction costs.
Taxes	10	%	DC	\$ 72,700	Applicable to injection activities.
Total				\$ 4,110,000	

Abbreviations:

bgs below ground surface
CAP Cleanup Action Plan
CUL Cleanup level
CY Cubic yards

DC Direct cost
ft feet
GPR Ground-penetrating radar
Hrs Hours

lbs Pounds
LS Lump sum
NA Not applicable
NPV Net present value

**Table I.4
Detailed Costs for Remedial Alternative 3**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	\$ 2,000.00	\$ 2,000	
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	\$ 11,000.00	\$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	\$ 3,000.00	\$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	\$ 20.00	\$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of at least two 2-inch monitoring wells	1	LS	\$ 8,500.00	\$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included below in surfactant injections and extractions.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	\$ 20,000.00	\$ 20,000	Assumes that hydrant costs are not included in Regenesys quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	\$ 100.00	\$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring; Included above in surfactant wells.
Utility Locate	1	LS	\$ 4,825.00	\$ 4,825	Assumes three days of detailed utility locating services including a GPR survey (3 days).
Installation of four 4-inch injection wells	1	LS	\$ 22,000.00	\$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesys cost for three applications of PetroCleanze in six locations	4160	lbs	\$ 3.60	\$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	\$ 15,000.00	\$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal during injection well installation and development	1	LS	\$ 2,600.00	\$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	\$ 7,500.00	\$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.
Off-Property PersulfOx Injections					
Permit for PersulfOx injections: UIC Permit	38	borings	\$ 100.00	\$ 3,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Regenesys Total Cost for PersulfOx Off-Property Injections	1	LS	\$ 55,000	\$ 55,000	Costs for PersulfOx product; includes estimated shipping costs.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included above in surfactant injections and extractions.
MW-04 Area (3,840 sq. ft); Installation of 24 injection points - geoprobe	1	LS	\$ 54,000	\$ 54,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10 and 20 ft bgs (12 points per day with two rigs; 2 days).
MW-30 Area (2,210 sq. ft); Installation of 14 injection points - geoprobe	1	LS	\$ 32,000	\$ 32,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10 and 20 ft bgs (12 points per day with two rigs; 1 day).
Airknife to Clear locations	1.5	Day	\$ 2,300	\$ 3,450	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 1.5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	\$ 2,000.00	\$ 2,000	Assumes that no soil will be generated and very little decontamination water.

**Table I.4
Detailed Costs for Remedial Alternative 3**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS (cont.)					
CAA-2 PersulfOx and RegenOx Injections					
Hydrant permit	0	LS	\$ 20,000.00	\$ -	Assumes that hydrant costs are included above with surfactant Injection costs.
Permit for injection of PersulfOx and RegenOx: UIC Permit	188	borings	\$ 100.00	\$ 18,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for RegenOx Injections in CAA-2	1	LS	\$ 134,000.00	\$ 134,000	Costs for RegenOx product inside rail lines; includes estimated shipping costs.
Regenesis Total Cost for PersulfOx Injections in CAA-2	1	LS	\$ 124,000.00	\$ 124,000	Costs for PersulfOx product inside rail lines; includes estimated shipping costs.
Northern Plume Area (5,000 sq. ft); Installation of 18 RegenOx and 18 PersulfOx injection points - geoprobe	1	LS	\$ 78,000.00	\$ 78,000	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 4 days). PersulfOx: Assumes no utilities in injection area; 12 to 14 ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 2 days).
Central Plume Area (16,000 sq. ft); Installation of 57 RegenOx and 48 PersulfOx injection points - geoprobe	1	LS	\$ 236,450.70	\$ 236,451	RegenOx: Assumes utilities in injection area; a 10 to 14 ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 10 days). PersulfOx: Assumes no utilities in injection area; 12 to 14 ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 4 days).
Southern Plume Area (10,000 sq. ft); Installation of 36 RegenOx and 30 PersulfOx injection points - geoprobe	1	LS	\$ 147,500.00	\$ 147,500	RegenOx: Assumes utilities in injection area; a 10 to 14 ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 6 days). PersulfOx: Assumes no utilities in injection area; 12 to 14 ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 3 days).
Airknife to clear locations	5	Day	\$ 2,300.00	\$ 11,500	Assumes that 40 percent of the locations (and nearby vicinity for subsequent injections) would be cleared once for utilities using an airknife (12 holes per day; 5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	\$ 5,000.00	\$ 5,000	Assumes that very little soil and water will be generated.
CAA-1 PersulfOx Injections					
Hydrant permit	0	LS	\$ 20,000.00	\$ -	Assumes that hydrant costs are included above with surfactant Injection costs.
Permit for injection of PersulfOx: UIC Permit	213	borings	\$ 100.00	\$ 21,300	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring; Included above in surfactant wells.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for PersulfOx Injections in CAA-1	1	LS	\$ 308,000.00	\$ 308,000	Costs for PersulfOx product outside rail lines; includes estimated shipping costs.
Central Plume Area (30,000 sq. ft); Installation of 180 injection points - geoprobe	1	LS	\$ 170,000.00	\$ 170,000	Assumes a 12 to 14 ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are approximately between 8 to 20 ft bgs (12 points per day with two rigs, 15 days).
Southern Plume Area (5,650 sq. ft); Installation of 33 injection points - geoprobe	1	LS	\$ 29,000.00	\$ 29,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are approximately between 8-20 ft bgs (12 points per day with two rigs, 3 days).
Airknife to clear locations	9	Day	\$ 2,300.00	\$ 20,700	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 9 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	\$ 7,500.00	\$ 7,500	Assumes that very little soil and water will be generated.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				\$ 1,605,000	

**Table I.4
Detailed Costs for Remedial Alternative 3**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management (Construction)	5	%	DC	\$ 80,250	PM Costs for injection activities.
Engineering Design Report and Remedial Action Work Plan	1	LS	\$ 110,000.00	\$ 110,000	Includes draft and final based on Ecology comments.
Contained-In Waste Application and Determination	1	LS	\$ 5,000.00	\$ 5,000	Assumes that a contained-in-waste determination is needed. Time includes memo/letter preparations, ecology coordination.
Contractor Coordination and Preparation	1	LS	\$ 20,000.00	\$ 20,000	Assumes that Floyd Snider will coordinate with all subcontractors.
Field management and oversight	1650	Hrs	\$ 150.00	\$ 247,500	Assumes 12-hr days and pre- and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and well installation and development, 5 days for injection and extraction activities (PetroCleanze), 3 days utility locate, and 1 day oversight for pipeline inspection with one field staff; 29 days injection activities with two field staff (PersulfOx); 18 days injection activities with three field staff (RegenOx).
Mobilization, demob, food and lodging	1	LS	\$ 45,000.00	\$ 45,000	Includes food, lodging, field equipment costs
Completion report	1	LA	\$ 45,000.00	\$ 45,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				\$ 553,000	
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	\$ 7,600.00	\$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	\$ 25,000.00	\$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring for 30 years. COCs and select MNA parameters will be analyzed on select wells to be determined in a long term monitoring plan. Per event cost is for year 1.
Annual Reporting and Five-Year Reviews	28	Event	\$ 19,500.00	\$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	\$ 1,700.00	\$ -	Disposal of purge water drums every 2 years. Per event cost is for the first disposal event in year 2.
SUBTOTAL NPV - LONG-TERM MONITORING				\$ 1,025,300	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every two years. Net present value is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	\$ 75,000.00	\$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port property and developing the Soil Management Plan.
Well abandonment activities	49	wells	\$ 1,000.00	\$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	\$ 40,000.00	\$ 40,000	Draft and final completion report including Ecology review.
Contingency PersulfOx injections	1	LS	DC	\$ 88,000	Additional 5,000 sq. ft of injections to address residual groundwater impacts if off-property migration is ongoing. For evaluation, costs for a total of 30 PersulfOx injections (product, installation, and oversight) implemented 5 years after remedy implementations are included. Net present value is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
SUBTOTAL LONG-TERM MONITORING AND CLOSURE				\$ 1,278,000	
Ecology Oversight	3	%	DC	\$ 77,520	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	\$ 401,250	25% contingency added to injection activities.
20% Contingency added to construction indirect costs	20	%	DC	\$ 110,600	20% contingency added to indirect construction costs.
Taxes	10	%	DC	\$ 160,500	Applicable to injection activities.
Total				\$ 4,186,000	

Abbreviations:

bgs Below ground surface
 CAP Cleanup Action Plan
 COC Contaminant of concern
 CUL Cleanup level
 CY Cubic yards

DC Direct cost
 ft Feet
 gals gallons
 GPR Ground-penetrating radar
 hrs Hours

lbs Pounds
 LS Lump sum
 NA Not applicable
 UIC underground injection control

**Table I.5
Detailed Costs for Remedial Alternative 4**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	\$ 2,000.00	\$ 2,000	
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	\$ 11,000.00	\$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	\$ 3,000.00	\$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	\$ 20.00	\$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	\$ 8,500.00	\$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included below in surfactant injections and extractions.
CAA-1 Limited Excavation					
Mob/Demob and Facilities Management	1	LS	\$ 29,044.00	\$ 29,044	Based on similar project experience.
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes closure of travel lanes is not necessary.
Utilities: relocation/cap/reconnect	1	LS	\$ 15,000.00	\$ 15,000	Assumes there are utilities that will need to be capped and reconnected.
Shoring - Installation of sheet pile wall to 50 feet	570	LF	\$ 2,995.00	\$ 1,707,150	Assumes approximately 570 linear ft of sheet piling will need to be installed to 50 ft bgs along the western edge of the rail lines.
Excavate and stockpile clean overburden soil and reuse as backfill	13,000	CY	\$ 15.00	\$ 195,000	Assumes that an average of 10 ft of clean overburden soil can be used as backfill material; this cost includes handling clean soil and placing as backfill material.
Excavate, load, haul and soil disposal	20,800	ton	\$ 76.00	\$ 1,580,800	Assumes excavation of an approximately 35,000 sq. ft area of soil to 22 ft bgs with an average thickness of impacted soil at 10 ft; hauling of soil land disposal at a Sub title D landfill (25 days).
Provide, install, and compact backfill material	20,800	ton	\$ 39.00	\$ 811,200	Does not include mixing and placement of ORC pellets in bottom of excavation (5 days).
Dewatering and groundwater handling services	750,000	gallons	\$ 0.44	\$ 330,000	Assume dewatering at approximately 15 ft bgs and on Site treatment to dispose to sanitary sewer.
Regenesis Total Cost for ORC Pellets	1	LS	\$ 145,042.00	\$ 145,042	Assumes that 18,018 lbs of ORC Advanced will be placed in 30,000 sq. ft of the excavation bottom. Includes estimated shipping costs.
ORC placement and mixing	1	LS	\$ 18,000.00	\$ 18,000	Assume 5 days of ORC pellet mixing and placement (5 days).
Site restoration	1	LS	\$ 20,000.00	\$ 20,000	Assumes that site will be restored or finished according to development plans; e.g., asphalt or concrete.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	\$ 20,000.00	\$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	\$ 100.00	\$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	1	LS	\$ 4,825.00	\$ 4,825	Assumes three days of detailed utility locating services including a GPR survey (3 days)
Installation of four 4-inch injection wells	1	LS	\$ 22,000.00	\$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesis cost for three applications of PetroCleanze in six locations	4,160	lbs	\$ 3.60	\$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	\$ 15,000.00	\$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days)
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary
Soil/water drum disposal during injection well installation and development	1	LS	\$ 2,600.00	\$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	\$ 7,500.00	\$ 7,500	Assumes that a total of 6,100 gallons will be extracted and transported off site for disposal.

**Table I.5
Detailed Costs for Remedial Alternative 4**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS (cont.)					
Off-Property PersulfOx Injections					
Permit for PersulfOx injections: UIC Permit	38	borings	\$ 100.00	\$ 3,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Regenesis Total Cost for PersulfOx Off-Property Injections	1	LS	\$ 55,000	\$ 55,000	Costs for PersulfOx product; includes estimated shipping costs.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included above in surfactant injections and extractions.
MW-04 Area (3,840 sq. ft); Installation of 24 injection points - geoprobe	1	LS	\$ 54,000	\$ 54,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10-20 ft bgs (12 points per day with two rigs; 2 days)
MW-30 Area (2,210 sq. ft); Installation of 14 injection points - geoprobe	1	LS	\$ 32,000	\$ 32,000	Assumes a 12 to 14 foot spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are between 10-20 ft bgs (12 points per day with two rigs; 1 day)
Airknife to Clear locations	1.5	Day	\$ 2,300	\$ 3,450	Assumes that 40 percent of the locations would be cleared for utilities using an airknife (12 holes per day; 1.5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary
Soil/water drum disposal	1	LS	\$ 2,000.00	\$ 2,000	Assumes that no soil will be generated and very little decontamination water.
CAA-2 RegenOx and PersulfOx Injections					
Hydrant permit	0	LS	\$ 20,000.00	\$ -	Assumes that hydrant costs are included above with surfactant Injection costs.
Permit for injection of RegenOx: UIC Permit	188	borings	\$ 100.00	\$ 18,800	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring. Included above in surfactant wells.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included above in surfactant injections and extractions.
Regenesis Total Cost for RegenOx Injections in CAA-2	1	LS	\$ 134,000.00	\$ 134,000	Costs for RegenOx product inside rail lines; includes estimated shipping costs.
Regenesis Total Cost for PersulfOx Injections in CAA-2	1	LS	\$ 124,000.00	\$ 124,000	Costs for PersulfOx product inside rail lines; includes estimated shipping costs.
Northern Plume Area (5,000 sq. ft); Installation of 18 RegenOx and 18 PersulfOx injection points - geoprobe	1	LS	\$ 78,000.00	\$ 78,000	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 4 days). PersulfOx: Assumes no utilities in injection area; 12- to 14-ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 2 days).
Central Plume Area (16,000 sq. ft); Installation of 57 RegenOx and 48 PersulfOx injection points - geoprobe	1	LS	\$ 236,450.70	\$ 236,451	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 10 days). PersulfOx: Assumes no utilities in injection area; 12- to 14-ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 4 days).
Southern Plume Area (10,000 sq. ft); Installation of 36 RegenOx and 30 PersulfOx injection points - geoprobe	1	LS	\$ 147,500.00	\$ 147,500	RegenOx: Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 6 days). PersulfOx: Assumes no utilities in injection area; 12- to 14-ft spacing between injection points and not able to use existing wells; injection depths are approximately between 10 and 20 ft bgs; and one application (12 points per day with two rigs; 3 days).
Airknife to clear locations	5	Day	\$ 2,300.00	\$ 11,500	Assumes that 40% of the locations (and nearby vicinity for subsequent injections) would be cleared once for utilities using an airknife (12 holes per day; 5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal	1	LS	\$ 5,000.00	\$ 5,000	Assumes that very little soil and water will be generated.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				\$ 5,899,000	

**Table I.5
Detailed Costs for Remedial Alternative 4**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	\$ 294,950	PM Costs for injection and excavation activities.
Engineering Design Report and Remedial Action Work Plan, Contract Documents for Excavation	1	LS	\$ 130,000.00	\$ 130,000	Includes draft and final based on Ecology comments. Assumes that an EDR and work plan are required.
Contractor Coordination and Preparation	1	LS	\$ 20,000.00	\$ 20,000	Assumes that Floyd Snider will coordinate with all subcontractors.
Field management and oversight	1663	Hours	\$ 150.00	\$ 249,450	Assumes 12 hrs days and pre and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and downgradient well installation and development, 5 days for injection and extraction activities (PetroCleanze), 3 days utility locate, and 1 day oversight for pipeline inspection with one field staff; 35 days excavation oversight with one field staff; 8 days PersulfOx injections with two field staff; and 18 days for injection activities with three field staff (RegenOx).
Mobilization, demob, food and lodging	1	LS	\$ 50,000.00	\$ 50,000	Includes food, lodging, field equipment costs.
Completion report	1	LS	\$ 45,000.00	\$ 45,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				\$ 790,000	
LONG-TERM MONITORING AND CLOSURE					
Project Management	30	Event	\$ 7,600.00	\$ -	Includes correspondence with PLP Group/Port and sampling coordination. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Per event cost is for year 1.
Groundwater monitoring	30	Event	\$ 25,000.00	\$ -	Assumes compliance with CULs is reached within approximately 30 years, and for evaluation purposes, annual groundwater monitoring for 30 years. COCs and select MNA parameters will be analyzed on select wells to be determined in a long term monitoring plan. Per event cost is for year 1.
Annual Reporting and Five-Year Reviews	28	Event	\$ 19,500.00	\$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	15	Event	\$ 1,700.00	\$ -	Disposal of purge water drums every two years. Per event cost is for the first disposal event in year
SUBTOTAL NPV - LONG-TERM MONITORING				\$ 1,025,300	For evaluation purposes, assumes 30 years of annual project management and groundwater monitoring; 28 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every two years. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	\$ 75,000.00	\$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port
Well abandonment activities	49	wells	\$ 1,000.00	\$ 49,000	Assumes that most well boxes do not need to be removed, only chipped-in-place and filled with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	\$ 40,000.00	\$ 40,000	Draft and final completion report including Ecology review.
SUBTOTAL LONG - TERM MONITORING AND CLOSURE				\$ 1,190,000	
Ecology Oversight	3	%	DC	\$ 95,000	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	\$ 1,474,750	25% contingency added to excavation and injection activities.
20% Contingency added to construction indirect costs	20	%	DC	\$ 158,000	20% contingency added to indirect construction costs.
Taxes	10	%	DC	\$ 589,900	Applicable to excavation and injection activities.
Total				\$ 10,197,000	

Abbreviations:

CAP Cleanup Action Plan
CY Cubic yards
DC Direct cost

ft Feet
lbs Pounds
LS Lump sum

NA Not applicable
NPV Net present value
UIC Underground injection control

**Table I.6
Detailed Costs for Remedial Alternative 5**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION CAPITAL COSTS					
Former Longview Fibre Pipeline Inspection					
Mob/Demob and Facilities Management	1	LS	\$ 2,000.00	\$ 2,000	
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes closure of travel lanes is not necessary.
Excavation, exposure, and inspection of pipeline contents	1	LS	\$ 11,000.00	\$ 11,000	Includes the costs to expose the pipeline, cut an opening, and reseal the pipeline (1 day).
Spill Response Measures	1	LS	\$ 3,000.00	\$ 3,000	Assumes that some spill response measures will be needed as a backup.
Excavate, Load, Haul and dispose Sub title D Landfill	0	CY	\$ 20.00	\$ -	Assumes that no soil will need to be transported off site for disposal, and backfill is not needed.
Installation of Additional Downgradient Wells					
Installation of two 2-inch monitoring wells	1	LS	\$ 8,500.00	\$ 8,500	Includes well installation and development (2 days). The number of wells to be determined in a pre-design Investigation work plan.
Utility Locate	0	LS	\$ 8,000.00	\$ -	Cost included below in surfactant injections and extractions.
Surfactant Injections and Extractions					
Hydrant permit	1	LS	\$ 20,000.00	\$ 20,000	Assumes that hydrant costs are not included in Regenesis quote.
Permit for injection of PetroCleanze: UIC Permit	6	borings	\$ 100.00	\$ 600	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
Utility Locate	1	LS	\$ 8,000.00	\$ 8,000	Assumes 5 days of detailed utility locating services including a GPR survey (5 days).
Installation of four 4-inch injection wells	1	LS	\$ 22,000.00	\$ 22,000	Includes airknife to clear the soil for utilities and well development (3 days).
Total Regenesis cost for three applications of PetroCleanze in six locations	4,160	lbs	\$ 3.60	\$ 14,976	Cost for PetroCleanze product. Assumes three rounds with 281 gals per injection.
Injection and Extraction Services	3	LS	\$ 15,000.00	\$ 45,000	Assumes three rounds of surfactant injections and extractions at six wells (5 days).
Traffic Control	0	Day	\$ 1,000.00	\$ -	Assumes that traffic control is not necessary.
Soil/water drum disposal during injection well installation and development	1	LS	\$ 2,600.00	\$ 2,600	Cost includes soil and water drum disposal generated from installation and development activities.
Water disposal from extraction activities	1	LS	\$ 7,500.00	\$ 7,500	Assumes that a total of 6,100 gals will be extracted and transported off site for disposal.
Plume Wide PersulfOx and RegenOx Injections (CAA-1, CAA-2, and Off-Property)					
Hydrant permit	0	LS	\$ 20,000.00	\$ -	Assumes that hydrant costs are included with the surfactant injection costs.
Permit for injection of PersulfOx: UIC Permit	1,370	borings	\$ 100.00	\$ 137,000	15A NCAC 02C.0200 Well Construction Standards: Criteria and Standards Applicable to Injection Wells; State charges \$100 per boring.
ROW Permit and Traffic Control Plan	1	LS	\$ 5,000.00	\$ 5,000	Permit to perform injection work in the City of Longview ROW and prepare required Traffic Control Plan.
Utility Locate	0	LS	\$ 4,825.00	\$ -	Cost included above in surfactant injections and extractions.
Regenesis total cost for PersulfOx Injections	1	LS	\$ 659,000.00	\$ 659,000	Quote from Regenesis; Includes estimated shipping.
Regenesis total cost for RegenOx Injections	1	LS	\$ 983,923.00	\$ 983,923	Quote from Regenesis; Includes estimated shipping.
Plume-wide PersulfOx injections (105,000 sq. ft); Installation of 625 injection points - geoprobe	1	LS	\$ 460,000.00	\$ 460,000	Assumes a 12- to 14-ft spacing between injection points and not able to use existing wells. Assumes that utilities have enough of a vertical and lateral separation to not be affected by PersulfOx; injections depths are approximately between 10 and 20 ft bgs (15 points per day with two rigs; 42 days).
Plume-wide RegenOx injections (105,000 sq. ft); Installation of 745 injection points - geoprobe	1	LS	\$ 1,600,000.00	\$ 1,600,000	Assumes utilities in injection area; a 10- to 14-ft spacing between injection points and not able to use existing wells; injections depths are approximately between 6 and 20 ft bgs; and three applications (18 points per day with three rigs; 125 days).
Airknife to Clear locations	42	Day	\$ 2,300	\$ 96,600	Assumes that 40% of the locations would be cleared for utilities using an airknife (12 holes per day; 42 days).
Traffic Control	10	Day	\$ 1,000.00	\$ 10,000	Assume lane closure and traffic control during ROW injections.
Soil/water drum disposal	1	LS	\$ 12,000.00	\$ 12,000	Assumes that some soil and decontamination water will be generated.
SUBTOTAL CONSTRUCTION CAPITAL COSTS				\$ 4,109,000	

**Table I.6
Detailed Costs for Remedial Alternative 5**

Item Description	Quantity	Unit	Unit Cost	Cost	Notes
CONSTRUCTION INDIRECT COSTS					
Project Management	5	%	DC	\$ 205,450	PM Costs for injection activities.
Engineering Design Report and Remedial Action Work Plan, Contract Documents for Excavation	1	LS	\$ 130,000.00	\$ 130,000	Includes draft and final based on Ecology comments. Assumes that an EDR and work plan are required.
Contractor Coordination and Preparation	1	LS	\$ 20,000.00	\$ 20,000	Assumes that Floyd Snider will coordinate with all subcontractors.
Field management and oversight	6000	Hrs	\$ 150.00	\$ 900,000	Assumes 12-hr days and pre- and post-field prep with 3 hrs per day of administrative and reporting tasks; UIC permit application tasks; a total of 5 days for injection and downgradient well installation and development, 5 days for injection and extraction activities (PetroCleanze), 5 days utility locate, and 1 day oversight for pipeline inspection with one field staff; 42 days injection activities with two field staff (PersulfOx); 125 days injection activities with three field staff (RegenOx).
Mobilization, demob, food and lodging	1	LS	\$ 160,000.00	\$ 160,000	Includes food, lodging, field equipment costs
Completion report	1	LA	\$ 50,000.00	\$ 50,000	Completion report for Ecology records.
SUBTOTAL CONSTRUCTION INDIRECT COSTS				\$ 1,466,000	
LONG-TERM MONITORING AND CLOSURE					
Project Management	15	Event	\$ 7,600.00	\$ -	Includes correspondence with PLP Group/Port correspondence, and sampling coordination of up to 15 years of sampling events. Assumes up to 10 hrs of coordination per event; and 30 hrs of client and PLP coordination per year. Assumes a 2% annual rate increase/inflation.
Groundwater monitoring	18	Event	\$ 25,000.00	\$ -	Assumes compliance with CULs is reached within approximately 5-10 years, and for evaluation purposes, annual groundwater monitoring for 14 years and quarterly monitoring during the 15th year. COCs and select MNA parameters will be analyzed on select wells; includes inflation.
Annual Reporting and Five-Year Reviews	13	Event	\$ 19,500.00	\$ -	Assumes 50 hrs of staff time and 10 hrs of PM time per annual report. Estimate also includes costs for Ecology's periodic Five-Year Reviews. Per event cost is for Year 1.
Water drum disposal	8	Event	\$ 1,700.00	\$ -	Disposal of purged water drums every 2 years.
SUBTOTAL NPV - LONG-TERM MONITORING				\$ 622,400	For evaluation purposes, assumes 15 years of annual project management and groundwater monitoring; 13 annual reports (first annual report will be incorporated into the Completion Report and the final annual report data will be incorporated into the Completion Report), and water drum disposal every 2 years. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
Institutional Controls	1	LS	\$ 75,000.00	\$ 75,000	Includes costs for developing, negotiating, and recording environmental covenants on Port property and developing the Soil Management Plan.
Well abandonment activities	49	wells	\$ 1,000.00	\$ 49,000	Assumes that most well boxes do no need to be removed only chipped-in-place and fill with concrete; wells in sidewalks need to be removed and the sidewalk section needs to be replaced. Includes injection wells.
Closure report and Ecology correspondence	1	LS	\$ 40,000.00	\$ 40,000	Draft and final completion report including Ecology review.
Contingency PersulfOx injections	1	LS	DC	\$ 88,000	Additional 5,000 sq. ft of injections to address residual groundwater impacts at the downgradient edge of the Port property. For evaluation, costs for a total of 30 PersulfOx injections deployed 5-years after remedy implementation are included. NPV is based on an assumption of 2% inflation and 7% rate of return (5% discount rate).
SUBTOTAL LONG -TERM MONITORING AND CLOSURE				\$ 875,000	
Ecology Oversight	3	%	DC	\$ 100,000	Oversight and administration costs incurred by Ecology to review remedial activities and annual groundwater reports.
25% Contingency added to remedial construction activities	25	%	DC	\$ 1,027,250	25% contingency added to injection activities.
20% Contingency added to construction indirect costs	20	%	DC	\$ 293,200	20% contingency added to indirect construction costs.
Taxes	10	%	DC	\$ 410,900	Applicable to injection activities.
Total				\$ 8,281,000	

Abbreviations:

CAP Cleanup Action Plan
CY Cubic yards
DC Direct cost
gals Gallons

GPR Ground-penetrating radar
Hrs Hours
lbs Pounds
LS Lump sum

NA Not applicable
NPV Net Present Value
PM Project Manager
UIC underground injection control

Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix J Boring Logs

Petroleum Services Unlimited, Inc.
 1081 Columbia Blvd.
 Longview, WA 98632

PROJECT NUMBER
 40612

WELL NUMBER
 MW-1

SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 START DATE 4-30-91 FINISH DATE 4-30-91 WATER LEVEL est. 8'6" depth LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-8"-8" (N)	SOIL DESCRIPTION NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	WELL CONSTRUCTION CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	INTERVAL	TYPE AND NUMBER	RECOVERY			
5	1.0				Silt, light brown, dry, silt (ML)	Flush mount monument casing Bentonite seal to 1' 3 ea 50# bags Wyoben enviro plug med. used 6'3" of 4" dia sch 40 PVC blank casing 10-20 CSSI sand pack to 6' depth
	2.5		10"	3-4-7 (11)		
	5.0				Sand, brown, loose, med. grains, wet, to 5'5" then is a silt, grey, wet, w/charcoal and wood chips to 6'3", then is a silty clay, grey green, dry, clay with organic odor Clay as above except moist, w/wood chips to 8'6", then is a fine sand dark grey, wet, loose, sand (SP) Clay w/silt, grey, moist, soft, clay w/wood fibres (OH), to 11'2" then is a sand, saturated (SP) Interbedded sands and clay, grey, wet, loose, interbeds (SC)	4" dia 20 slot sch 40 PVC screen - top of screen at 6'5" depth ATD 10' of 4" dia 20 slot sch 40 PVC screen used 6 ea 100# bags 10-20 CSSI silica sand used
	6.5		18"	2-3-2 (5)		
	7.5					
10	9.0		18"	3-2-6 (8)		
	10.0					
	11.5		15"	2-2-2 (4)		
15	13.0		19"	6-4-3 (7)		
						Centralizing guides used 7" threaded bottom sump Bottom of screen @ 16'3"
					End boring at 16'10"	

Petroleum Services Unlimited, Inc.
 1081 Columbia Blvd.
 Longview, WA 98632

PROJECT NUMBER
 40612

WELL NUMBER
 MW2

SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 START DATE 4-30-91 FINISH DATE 4-30-91 WATER LEVEL _____ LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	WELL CONSTRUCTION CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	INTERVAL	TYPE AND NUMBER	RECOVERY			
5	1.0				Top 1' of surface is a crushed rock pavement.	Flush mount monument with concrete seal locking compression cap Bentonite plug to 1' 3 ea 50" bags Wyoben enviro plug med used, sand pack to 4' 6' of 4" dia sch 40 PVC blank casing 6'2" top of screen 4.5 ea 100# bags 10-20 SCC silica sand used SATD 6'2" of 4" dia 20 slot sch 40 PVC screen Bottom of screen at 12'5" slip cap bottom sump
	2.5		10"	6-8-7 (15)	Poorly graded fine sand, brown, dry, sand (SP)	
	4.5				Poorly graded fine, sand w/silt brown to light grey, moist, sand with some silt (SP-SM)	
10	6.0		18"	3-4-4 (8)		
	7.5				Sand w/silt as above to 8'6" depth then grading to a silty fine sand	
	9.0		15"	3-3-5 (8)	Saturated, loose, silty sand (SM)	
15	11.5				Silty sand (SM) as above to 11'9" then is a clay, dark grey, dry, clay w/wood fibres throughout and some silt and charcoal lenses (OH)	
	13		18"	2-2-4 (6)		
	14.5		18"	1-4-6 (10)	Clay (OH) as above to 14'2" then is a silt, dark grey, wet, loose silt (ML)	
					End boring at 14'6" depth	Bentonite plug seal from 12'5" to 14'5"

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER
40612

WELL NUMBER
MW3

SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
START DATE 5-1-91 FINISH DATE 5-1-91 WATER LEVEL _____ LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS 8"-6"-8" (N)	SOIL DESCRIPTION NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	WELL CONSTRUCTION CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	INTERVAL	TYPE AND NUMBER	RECOVERY			
4	2.5				Poorly graded fine sand w/silt, brown to grey, dry, loose, sand w/silt (SP-SM) to 3'6", then is a silt, grey dry, silt w/some iron stain (ML) to 3'10", then is a well graded sand, dry, loose sand with gravel to 3/8" (SW)	Flush mount monument with concrete seal, locking compression cap on casing Bentonite seal to 1' depth 4 ea 50# bags Wyoben enviro plug medium used 8'3" of 4" dia sch 40 PVC blank casing used
	4.0		17"	1-2-3 (5)		
	6.0					
	7.5		18"	2-3-4 (7)		
	9.0		18"	2-2-2 (4)		
	10.5		18"	4-3-4 (7)		
	11.5					
12	13.0		15"	4-3-4 (7)	Poorly graded fine sand w/silt, blue grey, saturated, loose, sand with interbeds of clayey silt, (SP) with irridescent sheen	5 ea 100# bags 10-20 CSSI silica sand used 10' of 4" dia 20 slot sch 40 PVC screen used.
16	17.5				Interbedded clayey silt and silt, dark grey, wet, med dense, silt (MH) to 18'3", then is a well graded sand, blue grey, wet, med dense, sand (SW)	Bottom of screen @ 18'5" 7" bottom sump
	19.0		15"	3-4-9 (13)		
					End boring at 19'	

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER
40612

WELL NUMBER
MW4

SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
START DATE 5-2-91 FINISH DATE 5-2-91 WATER LEVEL _____ LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-8"-6" (N)	SOIL DESCRIPTION NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	WELL CONSTRUCTION CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	INTERVAL	TYPE AND NUMBER	RECOVERY			
4					Crushed rock pavement to 1'	Flush mount monumnet with concrete seal, locking compression cap Bentonite seal to 1' 6 ea 50# bags Wyoben Enviro plug medium used 7'2" of 4" dia sch 40 PVC blank casing Sand pack to 5' 5 ea 100# bags 10-20 SCCI silica sand used
8	7.5					
	9.0		12"	5-10-17 (27)	Poorly graded fine to med sand, grey, moist, med dense, sand (SP)	Top of screen at 7'5"
	10.5		13"	6-9-9 (18)	Sand (SP) as above, except w/some silt and pumice fragments	10' of 4" dia 20 slot sch 40 PVC screen used
12	12.0		13"	6-9-10 (19)	Poorly graded fine sand w/silt, grey brown, wet, med dense sand w/silt (SP-SM) to 11'3", then is a silt 2/sand, grey, wet, med dense, silt (SM)	5 ea 100# bags 10-20 CSSI silica sand used
16	17.5					
	19.0		15"	3-7-7 (14)	Interbedded silt and silty fine sand and clayey silt, grey, wet med dense, silts (SC-SM)	Bottom of screen @ 17'5" 7" bottom sump
20					End boring @ 19'	

Petroleum Services Unlimited, Inc.
1081 Columbia Blvd.
Longview, WA 98632

PROJECT NUMBER
40612

WELL NUMBER
MWS

SHEET 1 OF 1

MONITORING WELL DRILLING & CONSTRUCTION LOG

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
START DATE 5-3-91 FINISH DATE 5-3-91 WATER LEVEL _____ LOGGER C. Grant

DEPTH BELOW SURFACE	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	WELL CONSTRUCTION CASING TYPE, DIAMETER, SCREEN INTERVAL, SLOT SIZE, GRAVEL PACK GRADATION & INTERVAL, GROUT INTERVAL, ETC.
	INTERVAL	TYPE AND NUMBER	RECOVERY			
4						Flush mount monument w/ concrete seal, locking compression cap Bentonite seal to 1' 8 ea 50# bags Wyoben Enviro plug medium used 12'1" of 2" dia sch 40 PVC Blank casing used
8						
	9.5					
			18"	6-4-4 (8)	Poorly graded fine sand w/silt, grey brown, wet, loose, sand w/ interbedded silt & silty clay layers to .25" (SP-SM)	
	11.0					
12			18"	3-4-6 (10)	Sand (SP-SM) as above, to 11'7" then is a clay w/silt, grey, moist plastic, clay (OH) to 12'3", then	Sand pack to 12'5" Top of screen @ 12'6"
	12.5					
			18"	3-4-3 (7)	is a clayey silt, grey moist, loose silt w/organic fibres (OH)	6 ea 100# bags 10-20 C/ silica sand used
	14.0					
			18"	3-3-4 (7)	Silty clay, grey, moist, firm, clay w/interbedded silt layers (OH)	
16	15.5					10' of 2" dia 20' slot sch 40 PVC screen used
20	21.0					
			10"	3-4-5 (9)	Well graded fine to med sand with silt, grey, saturated, loose, sand w/silt (SP-SM)	Bottom of screen @ 22'6" 5" bottom sump
	22.5					
24					End boring at 22'8"	

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-6 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 12/9/92

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 22.5'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad ballast				0	0.0	Flush mounted steel cap	
1.5	Brown, fine to medium SAND, trace gravel				5	0.0-2.0	Cement seal	
	Iron staining @5.5' Increasing silt				10	2.0-13.5	Bentonite chips	
6.9	Gray silty CLAY to clayey SILT				15	13.5-22.5	10x20 Sand	
8.0	Gray, fine SAND grading coarser with depth				20	16.0-21.0	4" Schedule 40 0.010 slotted screen	
	Coarse pumice at 11.8'				25	21.0-21.5	Sump	
15.0	Light gray to light brown, fine to medium SAND, trace coarse sand and silt Pumice layers				30			
22.5	Bottom of Hole - 22.5' Below Ground Surface							

Hollow Stem Auger

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templaton
CHECKED: T. Belunes
DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-7 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 12/7/92

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 24.5'
DEPTH				DEPTH	INSTALLATION DETAILS NOTES		
0.0	Brown to black silt, sand and gravel FILL					0.0	Flush mounted steel cap
1.7	Brown, silty, fine to medium SAND					0.0-2.0	Cement seal
5.3	Gray and orange, silty CLAY, iron stained					2.0-16.0	Bentonite chips
7.3	Light gray SILT						
8.0	Light gray, fine to medium SAND, with silt layers wet at 8.3', sheen						
10.7	Light gray, clayey SILT to silty CLAY						
13.5	Gray, fine to medium SAND, some silt coarse pumice layers saturated Saturated @ 14'						
16.0						16.0-24.5	10x20 Sand
18.0						18.0-23.0	4" Schedule 40 0.010 slotted screen
23.0	Some SILT layers					23.0-23.5	Sump
24.5	Bottom of Hole - 24.5' Below Ground Surface						

Hollow Stem Auger

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

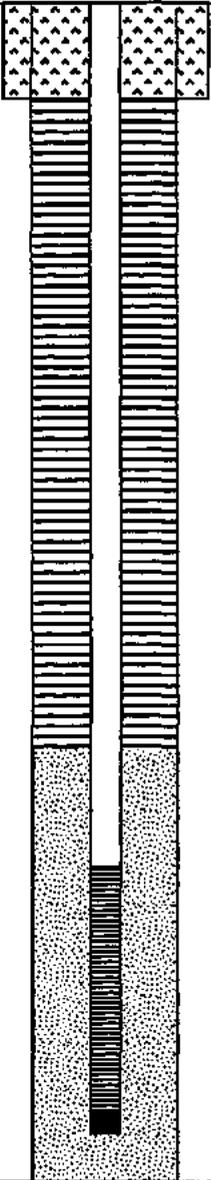
LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/29/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-8 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/8/92

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 24.5'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Brown SILT, SAND and gravel FILL					0.0	Flush mounted steel cap	
						0.0-2.0	Cement seal	
1.6	Gray, silty fine to medium SAND					2.0-15.35	Bentonite chips	
	Trace of roots							
7.8	Dark gray SILT and fine SAND							
8.2	Gray SILT Pink layer @ 8.2'							
9.6	Gray fine SAND							
12.0	Gray SILT							
13.9	Gray fine to medium SAND with SILT layers					15.35-24.5	10x20 Sand	
	Saturated @16'					18.0-23.5	4" Schedule 40 0.010 slotted screen	
	Some SILT layers				23.0-23.5	Sump		
24.5	Bottom of Hole - 24.5' Below Ground Surface							

DRILL RIG: CME-65
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunas
DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-10 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Part of Longview

BORING DATE: 12/7/92

STRATIGRAPHY					DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD			HOLE DRILLED TO: 24.5'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Brown SAND and GRAVEL FILL				0		0.0	Flush mounted steel cap
1.7	Brown, fine to medium SAND, trace gravel				1.7		0.0-2.0	Cement seal
7.1	Gray SILT grading to fine to medium SAND				7.1		2.0-16.0	Bentonite chips
8.4	Gray fine to medium SAND, trace gravel				8.4			
11.3	Gray SILT and SAND layers				11.3			
17.3	Gray fine to medium SAND, some silt layers				17.3		16.0-24.5	10x20 Sand
20.0	Gray fine to medium SAND, trace coarse sand				20.0		18.0-23.0	4" Schedule 40 0.010 slotted screen
24.5	Bottom of Hole - 24.5' Below Ground Surface				24.5		23.0-23.5	Sump

Hollow Stem Auger

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-11 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/3/92

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 20.0'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad ballast					0.0	Flush mounted steel cap	
						0.0-2.0	Cement seal	
2.5	Gray, fine to medium SAND and GRAVEL					2.0-5.0	Bentonite chips	
3.4	Brown fine to medium SAND, trace gravel					5.0-18.0	10x20 Sand	
	Iron staining					6.8-18.68	4" Schedule 40 0.010 slotted screen	
9.8	Light gray SILT, micaceous, petroleum odor			Hollow Stem Auger		16.66-17.16	Sump	
13.1	Gray and white, coarse SAND pumice layers					18.0-20.0	Bentonite chips	
17.8	Gray silty CLAY to clayey SILT							
19.0	Light gray, fine to medium SAND							
20.0	Bottom of Hole - 20.0' Below Ground Surface							

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belmes
DATE: 7/28/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-12 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/4/92

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 28.5'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad ballast				0	0.0	Flush mounted steel cap	
2.0	Light to dark brown fine to medium SAND wet @4.5'				2.0	0.0-2.0	Cement seal	
5.4	Gray SILT and SAND layers				5.4	2.0-20.0	Bentonite chips	
7.8	Gray-blue SILT				7.8			
10.8	SILT and SAND layers				10.8			
11.8	Gray fine to medium SAND some silt layers				11.8			
16.6	Pink layer Gray silty CLAY to clayey SILT				16.6			
19.0	Gray, fine to medium SAND, some silt layers				19.0	20.0-28.5	10x20 Sand	
					22.0	22.0-27.0	4" Schedule 40 0.010 slotted screen	
					27.0	27.0-27.5	Sump	
28.5	Bottom of Hole - 28.5' Below Ground Surface				28.5			
					30			

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Belunes
DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-14 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 5/17/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 12.5'
DEPTH					DEPTH	INSTALLATION DETAILS NOTES	
0.0	Railroad ballast					0.0	Flush mounted steel cap
						0.0-2.9	Cement seal
2.0	Moist, brown, medium SAND					2.9-6.0	Bentonite chips
3.0	Moist, brown, fine sandy SILT, with gravel, pieces of bunker?					6.0-12.5	10x20 Sand
4.5	Moist, brown, clayey SILT					7.0-12.0	4" Schedule 40 0.010 slotted screen
5.0	Moist, brown, medium SAND						
	Black staining, strong odor						
7.0	Wet, gray, clayey SILT, some wood, petroleum odor		▼	Hollow Stem Auger			
10.2	Wet, gray, medium SAND, strong odor						
11.2	Wood-free product					12.0-12.5	Sump
12.5	Bottom of Hole - 12.5' Below Ground Surface						
					15		
					20		
					25		
					30		

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belunes

CHECKED: T. Belunes

DATE: 7/23/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-15 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 5/18/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 19.0'	OPEN TO: DEPTH TO W.L.: 12.5
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad ballast					0.0	Flush mounted steel cap	
2.2	FILL					0.0-2.8	Cement seal	
2.5	Moist, brown, clayey SILT					2.8-6.5	Bentonite chips	
3.5	Moist, brown, medium SAND					6.5-19.0	10x20 Sand	
5.8	Moist, brown, clayey SILT					8.5-18.5	4" Schedule 40 0.010 slotted screen	
6.8	Wet, gray and brown, clayey SILT					18.5-19.0	Sump	
7.0	Wet, gray, silty fine SAND							
7.8	Moist, gray SILT petroleum odor @ 8.5'							
9.0	Moist, gray, clayey SILT slight odor							
11.5	Moist, gray, medium SAND petroleum odor @ 13.5'		▼	Hollow Stem Auger				
17.0	Wet, gray SILT							
19.0	Bottom of Hole - 19.0' Below Ground Surface							

DRILL RIG: CME-66

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belnes

CHECKED: T. Belnes

DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-16 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 5/18/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 19.0'	OPEN TO:
DEPTH							DEPTH CASING AUGERS:	DEPTH TO W.L.:
					DEPTH	INSTALLATION DETAILS NOTES		
0.0	Railroad ballast				0	0.0	Flush mounted steel cap	
2.0	Moist, brown, silty, medium SAND				2.0	0.0-2.5	Cement seal	
2.7	SILT				2.7	2.5-4.5	Bentonite chips	
3.0	Moist, brown, medium SAND				3.0	4.5-16.0	10x20 Sand	
7.0	Moist to wet, gray, clayey SILT				7.0	4.5-14.5	4" Schedule 40 0.010 slotted screen	
9.0	Wet, gray, clayey SILT Free product				9.0			
10.0	Wet, gray, medium SAND Free product				10.0			
10.8	Wet, gray, clayey SILT Strong odor				10.8			
12.0	Wet, gray, silty CLAY Strong odor; some product				12.0			
14.0	CLAY free product				14.0			
15.0	Wet, gray SILT, slight odor				15.0	14.5-15.0	Sump	
17.0	Wet, gray medium SAND				17.0	18.0-19.0	Bentonite chips	
19.0	Bottom of Hole - 19.0' Below Ground Surface				19.0			
					20			
					25			
					30			

Hollow Stem Auger

DRILL RIG: CME-55
 DRILLING CONTRACTOR: Geotech
 DRILLER:

LOGGED: T. Belunas
 CHECKED: T. Belunas
 DATE: 7/23/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-17 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 5/19/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 23.5'	OPEN TO:
DEPTH							DEPTH CASING AUGERS:	DEPTH TO W.L.:
						DEPTH	INSTALLATION DETAILS NOTES	
0.0	Railroad ballast					0.0	Flush mounted steel cap	
1.0	Moist brown medium SAND Bunker C					0.0-3.0	Cement seal	
2.0	Moist brown medium SAND					3.0-6.5	Bentonite chips	
	Wet @ 8.0'					6.5-19.0	10x20 Sand	
10.2	Moist to wet gray clayey SILT slight odor					7.5-17.5	4" Schedule 40 0.010 slotted screen	
12.2	Wet gray medium SAND strong odor					17.5-18.0	Sump	
13.5	Wet gray medium SAND Free product strong odor					19.0-21.0	Bentonite chips	
18.5	Wet gray medium SAND slight odor					21.0-23.5	Heave	
18.5	Moist gray clayey SILT							
20.0	Wet gray medium SAND							
23.5	Bottom of Hole - 23.5' Below Ground Surface							

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: T. Belunes

CHECKED: T. Belunes

DATE: 7/23/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-18 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 5/19/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 18.5'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad ballast					0.0	Flush mounted steel cap	
1.0	SAND with crushed rock					0.0-3.0	Cement seal	
1.6	Moist, brown, medium SAND (massive)					3.0-6.75	Bentonite chips	
10.0	Moist, brown, clayey SILT					6.75-18.5	10x20 Sand	
10.6	Moist, gray, clayey SILT					8.0-18.0	4" Schedule 40 0.010 slotted screen	
12.25	Moist to wet, gray, medium SAND		▼	Hollow Stem Auger		18.0-18.5	Sump	
18.5	Bottom of Hole - 18.5' Below Ground Surface							
				20				
				25				
				30				

DRILL FIG: CME-55
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: T. Belunes
CHECKED: T. Belunes
DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-19 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

SHEET 1 OF 1

BOREHOLE LOCATION:

PROJECT: Port of Longview

BOREHOLE CONDITION:

BORING DATE: 5/20/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 19.0'	OPEN TO:
DEPTH							DEPTH CASING AUGERS:	DEPTH TO W.L.:
						DEPTH	INSTALLATION DETAILS NOTES	
0.0	Railroad ballast					0.0	Flush mounted steel cap	
2.0	Moist, black SAND Free product, Bunker?					0.0-3.0	Cement seal	
4.0	Moist, gray, silty CLAY Free product @ 6.6					3.0-13.0	Bentonite chips	
8.5	Moist, brown, fine to medium SAND Slight odor @ 10.5 Wet @ 12.8			Hollow Stem Auger		13.0-19.0	10x20 Sand	
19.0	Bottom of Hole - 19.0' Below Ground Surface					13.5-18.5	4" Schedule 40 0.010 slotted screen	
						18.5-19.0	Sump	

DRILL RIG: CME-55

LOGGED: J. Bach

DRILLING CONTRACTOR: Geotech

CHECKED: T. Belunes

DRILLER:

DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-20 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 5/20/93

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			BORING METHOD	HOLE DRILLED TO: 28.5'	OPEN TO: DEPTH TO W.L.:
DEPTH							DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad Ballast					0.0	Flush mounted steel cap	
3.0	Moist, hard, blackish brown to gray, sandy GRAVEL					0.0-3.0	Cement seal	
3.5	Bunker C (?) Moist, gray CLAY and GRAVEL					3.0-9.0	Bentonite chips	
5.0	Moist, gray, silty, fine SAND with gravel					9.0-22.0	10x20 Sand	
10.5	Dark gray, sandy CLAY Wet @ 10.5					11.5-21.5	4-inch schedule 40 0.010 slotted PVC screen	
12.2	Moist to wet, gray fine SAND with gravel Free product at 13.0'					21.5-22.0	Sump	
14.0	Wet, gray CLAY Shene on water at 15.0'					22.0-28.5	Bentonite chips	
16.0	Gray, fine to medium SAND with gravel							
28.6	Bottom of Hole - 28.5' Below Ground Surface							

Hollow Stem Auger

DRILL RIG: CME-55

DRILLING CONTRACTOR: Geotech

DRILLER:

LOGGED: J. Bach

CHECKED: T. Belunes

DATE: 7/26/93



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-22 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 3/1/94

STRATIGRAPHY			GRAPHIC LOG	WATER NOTES	DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION	DEPTH					HOLE DRILLED TO: 33.4	OPEN TO: DEPTH TO W.L.:
							DEPTH	INSTALLATION DETAILS NOTES
0.0	Asphalt				0		0.0-1.5	Cement Seal
0.5	Railroad Ballast PID = 0						1.5-17.0	3/8" Bentonite Chips
3.3	Brown medium SAND (FILL) PID = 0							
3.6	PID = 0 Brown medium SAND, trace gravel				5			
					10			
					15			
					20		17.0-31.8	10-20 SAND
					25		20.2-30.2	4" Schedule 40 PVC 0.010 Slotted Screen
22.0	Brown SILT							
23.0	Brown medium SAND with gravel							
24.0	Gray clayey SILT, moist							
26.5	Gray fine to medium SAND with SILT layers.							
					30		30.2-30.7	Sump
							31.8-32.8	Sluff
							32.8-33.4	Bentonite Chips
33.4	Bottom of Hole - 33.4' Below ground surface				35			
							WELL DEVELOPMENT NOTES	
							Well Development Notes	

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-23 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 3/2/94

STRATIGRAPHY		GRAPHIC LOG	WATER NOTES	DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION					HOLE DRILLED TO: 33.4	OPEN TO: DEPTH TO W.L.:
DEPTH						DEPTH	INSTALLATION DETAILS NOTES
0.0	Asphalt			0		0.0-2.5	Cement Seal
0.5	Brown silty GRAVEL					2.5-19.0	3/8" Bentonite Chips
2.2	Brown medium SAND (damp)			5			
11.8	Brown SILT			10			
12.3	Brownish-gray fine SAND			15			
14.5	Interbedded brown SILT and SAND			20		19.0-33.6	10-20 SAND
18.0	Brown medium SAND			25		22.4-32.4	4" Schedule 40 PVC 0.010 Slotted Screen
20.0	Gray clayey SILT wet to moist at 24'			30		32.4-33.3	Sump
25.5	Gray medium SAND, wet			35			
33.6	Bottom of Hole - 33.6' Below ground surface						
						WELL DEVELOPMENT NOTES Well Development Notes	

DRILL RIG:

DRILLING CONTRACTOR:

DRILLER:

LOGGED: T. Norton

CHECKED:

DATE:



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-24 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

SHEET 1 OF 1

BOREHOLE LOCATION:

PROJECT: Port of Longview

BOREHOLE CONDITION:

BORING DATE: 3/3/94

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			HOLE DRILLED TO: 23.0	OPEN TO:
DEPTH						DEPTH CASING AUGERS:	DEPTH TO W.L.:
						INSTALLATION DETAILS	
						DEPTH	NOTES
0.0	Railroad Ballast			0		0.0-1.5	Cement Seal
						1.5-7.0	3/8" Bentonite Chips
6.5	Brown medium SAND			5			
7.0	Brown SILT					7.0-20.9	10-20 SAND
7.5	PID = 0 Brownish-gray fine to medium SAND			10		9.6-19.6	4" Schedule 40 PVC 0.010 Slotted Screen
12.4	Gray SILT			15			
15.2	Gray clayey SILT, moist, odor						
15.4	PID = 1.2 Gray medium SAND, trace gravel, wet, odor, sheen on water						
18.2	Gray fine SAND, wet			20		19.6-20.5	Sump
20.4	Gray SILT, wet					20.9-23.0	Bentonite Chips
21.4	Gray clayey SILT						
22.6	Gray SAND (wet)						
23.0	Bottom of Hole - 23.0' Below ground surface			25			
				30			
				35			
						WELL DEVELOPMENT NOTES	
						Well Development Notes	

DRILL RIG:

LOGGED: T. Norton

DRILLING CONTRACTOR:

CHECKED:

DRILLER:

DATE:



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-25 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 3/2/94

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			HOLE DRILLED TO: 18.7	OPEN TO: DEPTH TO W.L.:
DEPTH						DEPTH	INSTALLATION DETAILS NOTES
0.0	Railroad Ballast			0		0.0-1.5	Cement Seal
1.3	Brown SILT					1.5-4.5	3/8" Bentonite Chips
3.6	Gray medium SAND					4.5-18.7	10-20 SAND
4.8	Gray SILT			5			
	7.4-7.7 Organic Layer						
7.7	Gray SILT						
8.0	Gray fine SAND wet at 8.5			10		7.8-17.8	4" Schedule 40 PVC 0.010 Slotted Screen
10.5	silty clay zone Gray SILT and fine SAND, wet						
12.5	Gray SILT						
13.4	Gray SILT to SILTY CLAY, wet			15			
16.0	Gray medium SAND, wet					17.8-18.7	Sump
18.7	Bottom of Hole - 18.7 Below ground surface			20			
				25			
				30			
				35			
						WELL DEVELOPMENT NOTES	
						Well Development Notes	

DRILL RIG:

DRILLING CONTRACTOR:

DRILLER:

LOGGED: T. Norton

CHECKED:

DATE:



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-26 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 2

PROJECT: Port of Longview

BORING DATE: 3/3/94

STRATIGRAPHY		GRAPHIC LOG	WATER NOTES	DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION					HOLE DRILLED TO: 43.6	OPEN TO:
DEPTH						DEPTH:	INSTALLATION DETAILS NOTES
0.0	Railroad Ballast			0		0.0-1.5	Cement Seal
1.0	Brown medium SAND PID = 0			5		1.5-6.0	3/8" Bentonite Chips
11.5	Gray clayey SILT			10		6.0-21.0	10-20 SAND
12.8	Slight petroleum odor Gray medium SAND, moist to wet, sheen on water			15		9.4-19.4	4" Schedule 40 PVC 0.010 Slotted Screen
15.5	Gray SILT, wet			20		19.4-20.3	Sump
16.5	PID = 100 at 17' Gray fine SAND, wet, sheen on water			25		21.0-32.0	3/8" Bentonite Chips
20.8	Gray SILT, wet			30		32.0-43.5	Sluff, collapsed hole
21.8	Gray silty CLAY, odor			35			
22.6	PID = 85 at 22' strong odor gray medium SAND, wet strong odor Silt at 28', sheen on water						
29.0	Gray SILT, wet						
30.4	Gray clayey SILT, wet						
31.2	slight odor Gray medium SAND, wet PID = 0 at 37.5 ft. Continued						

WELL DEVELOPMENT NOTES
Well Development Notes

DRILL RIG:
DRILLING CONTRACTOR:
DRILLER:

LOGGED: T. Norton
CHECKED:
DATE:



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-27 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

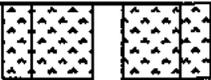
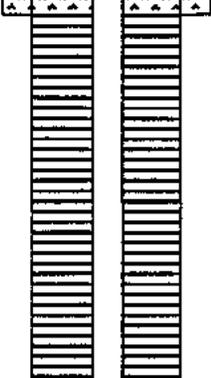
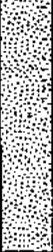
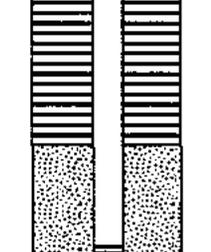
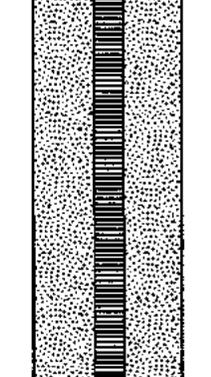
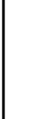
BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 3/21/94

STRATIGRAPHY				DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION		
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES			HOLE DRILLED TO: 28.6	OPEN TO:	INSTALLATION DETAILS NOTES
DEPTH						DEPTH CASING AUGERS:	DEPTH TO W.L.:	
0.0	Railroad Ballast			0		0.0-2.0	Cement Seal	
1.5	Gray medium SAND, damp			5		2.0-15.3	3/8" Bentonite Chips	
7.0-8.8	Gravels			10				
11.4	PID = 0 Gray fine SAND, damp			15		4.5-18.7	10-20 SAND	
16.1	Gray sandy SILT PID = 0			20		18.0-28.0	2" Schedule 40 PVC 0.010 Slotted Screen	
19.2	Moist to moist Gray clayey SILT		19.2	25				
20.9	Gray fine sandy SILT, wet PID = 0			30		28.0-28.6	Sump	
28.6	Bottom of Hole - 28.6' Below ground surface			35				
						WELL DEVELOPMENT NOTES		
						Well Development Notes		

DRILL RIG:

DRILLING CONTRACTOR:

DRILLER:

LOGGED: T. Norton

CHECKED:

DATE:



RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. MW-28 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 943-9735

BOREHOLE LOCATION:

BOREHOLE CONDITION:

SHEET 1 OF 1

PROJECT: Port of Longview

BORING DATE: 3/22/94

STRATIGRAPHY		GRAPHIC LOG	WATER NOTES	DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION					HOLE DRILLED TO: 29.9	OPEN TO: DEPTH TO WL.:
DEPTH						DEPTH	INSTALLATION DETAILS NOTES
0.0	Asphalt			0		0.0-2.0	Cement Seal
0.5	Railroad Ballast					2.0-7.0	3/8" Bentonite Chips
3.3	Brown fine to medium SAND FILL			5		7.0-21.5	10-20 SAND
6.3	Gray fine to medium SAND, moist			10		9.8-19.8	2" Schedule 40 PVC 0.010 Slotted Screen
	wood at 11' trace gravel at 12.8-13.3 PID = 58.7 at 14.6			15		19.8-20.4	Sump
	wet at 15' odor, sheen on water PID = 60 at 15.5'			20		21.5-26.0	Bentonite Chips
16.5	Gray clayey SILT					26.0-29.9	Sluff
17.4	Gray silty fine SAND, wet						
	PID = 20 at 20' sheen			25			
22.3	Interbedded CLAY and SILT, petroleum odor						
23.3	Gray medium SAND, wet						
	PID = 20 at 26'			30			
29.0	Gray SILT, wet PID = 0						
29.9	Bottom of Hole - 29.9' Below ground surface			35			
						WELL DEVELOPMENT NOTES	
						Well Development Notes	

DRILL RIG:

DRILLING CONTRACTOR:

DRILLER:

LOGGED: T. Norton

CHECKED:

DATE:



PROJECT: Port of Longview/CAP/WA

RECORD OF BOREHOLE MW-30

SHEET 1 OF 1

PROJECT NUMBER: 983 9710

BORING LOCATION:

DATUM:

BORING DATE: 6/24/98

DEPTH FEET	BORING METHOD	SOIL PROFILE		SAMPLES				PENETRATION RESISTANCE BLOWS/FT.			PIEZOMETER GRAPHIC			
		DESCRIPTION	USCS	GRAPHIC LOG	NUMBER	TYPE	BLOWS / 6 IN. 140 lb. hammer 30 inch drop	N	REC/ATT	PI		WATER CONTENT, PERCENT Wp	VM	WATER LEVEL
0	4 1/4-inch I.D. HSA	Loose to compact, olive gray (SY 4/1), fine to medium SAND, little silt, moist	SP										<p>Flush Mount Monument Cement 2-inch Sch. 40 PVC Casing Bentonite Chips 10/20 Siliceous Sand 2-inch Sch. 40 PVC Screen (0.010 slots) 15.4 Slough</p>	
1			SS		5-6-10	18	14/18	0.0						
5														
10			Loose, olive gray (SY 4/1), fine to coarse SAND, little silt, trace fine to coarse rounded gravel, moist		SP	2	SS	6-5-5	10	15.5/18	0.0			
15			Loose, medium gray (N5), fine to medium SAND, wet		SP	3*	SS	5-3-2	5	18/18	0.0			
20		Olive gray (SY 3/2), fine sandy SILT with thin laminations of clayey silt, roots, wet	SM											
25		Loose, dark gray (N3), silty fine to medium SAND, few silt lenses, wet	SP	4	SS	3-2-3	5	18/18	0.0					
30				5*	SS	3-4-6	10	18/18	0.0					
		Total depth 26.5 ft bgs												
		* Samples submitted to a laboratory for analysis of total petroleum hydrocarbons												

DRILL RIG: Mobile B-59

LOGGED: R. Blegen

DRILLING CONTRACTOR: Geo-Tech Explorations

CHECKED:

DRILLER: A. Pabb

DATE 10/9/98



PROJECT: Port of Longview/CAP/WA

RECORD OF BOREHOLE MW-31

SHEET 1 OF 1

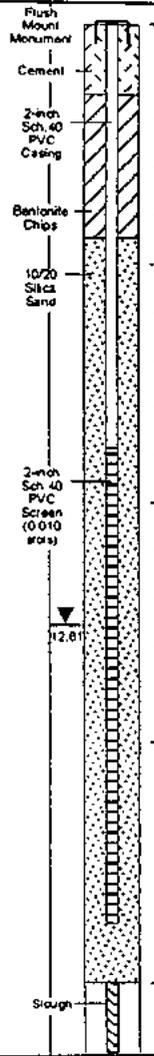
DATUM:

PROJECT NUMBER: 983 9710

BORING LOCATION:

BORING DATE: 6/24/98

DEPTH- FEET	BORING METHOD	SOIL PROFILE		SAMPLES					PENETRATION RESISTANCE BLOWS/FT. ■			PIEZOMETER GRAPHIC WATER LEVEL		
		DESCRIPTION	USCS GRAPHIC LOG	NUMBER	TYPE	BLOWS / 6 IN 140 lb hammer 30 inch drop	N	REC/ALT	PID	Wp	W		Wt	
0		Thin surface soil												
		Loose, dark yellowish brown (10YR 4/2), fine to medium SAND, slightly moist	SM											
5		Loose, moderate yellowish brown (10YR 5/4), fine sandy SILT with thin sand laminations	SM	1	SS	2-3-3	6	1.2/1.5	0.0	■				
		Loose, moderate yellowish brown (10YR 5/4), silty fine SAND, moist to wet, iron oxide staining from 10.0 to 10.5 ft	SM	2*	SS	3-3-3	6	1.3/1.5	0.0	■				
15		Loose, medium gray (N5), medium to coarse SAND, trace fine sand, wet, pumice common from 20.0 to 21.5 ft, 1-inch silt lense at 20.4 ft	SP	3	SS	3-3-3	6	1.4/1.5	1.8	■				
20				4*	SS	3-4-5	9		0.0	■				
		Total depth 21.5 ft bgs												
		* Samples submitted to a laboratory for analysis of total petroleum hydrocarbons												



DRILL RIG: Mobile B-58

LOGGED: R. Elegen

DRILLING CONTRACTOR: Geo-Tech Explorations

CHECKED:

DRILLER: A. Pablo

DATE: 10/9/98



PROJECT: Port of Longview/UST
Characterization/WA

RECORD OF BOREHOLE UST-1

SHEET 1 OF 1

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview
Maintenance/Shop Facility

DATUM: MSL

BORING DATE: 7/22/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE			SAMPLES		ANALYTICAL RESULTS		HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES PIEZOMETER STANDPIPE INSTALLATION	
			DESCRIPTION	GRAPHIC LOG	USCS	DEPTH (feet)	REC/ATT	NUMBER	STEX (ppm)				TPH (ppm)
0	6.25" O.D. Hollow Stem Auger 3.5" O.D. Split Barrel Core Tube		3" Asphalt			0.0	5%					Borehole Abandoned 1207 Start drilling 1229 - Sample No. UST1-7/22-6 1235 - Sample No. UST1-7/22-14 1258 - Sample No. UST1-7/22-24 1337 - End Drilling	
			GRAVEL SUBGRADE			1.0							
			Dark yellowish brown (10YR 4/2), fine to medium SAND, little silt, dry, (FILL)		SM			25%					
5									1				
				Moderate reddish-brown (10YR 4/8), silty, fine to medium SAND, trace gravel (iron-oxide staining)									
				Interbedded, dark yellowish brown (10 YR 4/2), fine to medium SAND and pale brown fine, sandy SILT, slightly moist	SM	9.2	50%						
10				Brownish-gray (5YR 4/1), clayey SILT, moist	SP-M	10.0							
				Dark yellowish brown (10YR 4/2), fine to coarse SAND, trace gravel, trace silt	CL-ML	10.4							
					SW	11.0							
15				Dark yellowish brown (10YR 4/2), fine to coarse SAND, little silt	SM	14.0	40%		2		0.0		
								25%			0.0		
20											0.0		
25		Medium dark gray (10YR 4/2), fine to medium sandy SILT, little gravel, WET (First water)	ML	23.0									
		Olive gray (5YR 3/2) fine sandy SILT. Trace rootlets. Wet.	ML	24.0	100%		3						
						100%							
		Dark gray (N3), fine to coarse SAND, little silt, wet	SM	27.0									
30		Bottom of Hole @29.0' Below Ground Surface				29.0							

DRILL RIG: CME-55

LOGGED: R. Blegen

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

CHECKED: MDL

DRILLER: D. Abernathy

DATE: 7/30/93



PROJECT: Port of Longview/UST
Characterization/WA

RECORD OF BOREHOLE UST-2

SHEET 1 OF 1

DATUM: MSL

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview
Maintenance/Shop Facility

BORING DATE: 7/23/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE				SAMPLES		ANALYTICAL RESULTS		HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES PIEZOMETER STANDPIPE INSTALLATION	
			DESCRIPTION	GRAPHIC LOG	USCS	DEPTH (feet)	REC/ATT	NUMBER	BTX (ppm)	TPH (ppm)				
0	6.25" O.D. Hollow Stem Auger 3.5" O.D. Split Barrel Core Tube		Dark yellowish brown (10YR 4/2), silty, sandy GRAVEL (Railroad Ballast and Fill)			0.0	100%					0650-Start drilling Borehole Abandoned		
			Dark yellowish brown (10YR 4/2), fine to medium SAND, little silt, (FILL)		SM			100%					Tip reading 2.7 ppm	
5								100%					0859 - Sample No. UST2-7/23-5	
								100%						
10					Olive gray (5Y 3/2), fine to medium SAND, some coarse sand, little silt				100%					0910 - Sample No. UST2-7/23-10
					Olive gray (5Y 3/2), fine to medium SAND, some coarse sand, little silt		SM	13.5						
					Dark yellowish brown (10 YR 4/2) silty fine SAND, some iron-oxide staining		SM	13.8	100%					
15					Dark gray (N3), clayey SILT, little fine sand, moist		CL-ML	14.6						1020 - Sample No. UST2-7/23-15
					Dark gray (N3), fine to medium SAND, little silt, moist		SM	15.2						
					Moderate yellowish brown (10YR 5/4) gravelly, medium SAND, gravel consists of pumice fragments		SW	18.0						
20					Dark gray (N3), fine to coarse SAND, wet, pumice fragments common		SW	18.5	75%					1031 - Sample No. UST2-7/23-20
					Olive gray (5Y 4/1), clayey SILT, laminated with light brownish gray (5YR 6/1), clayey SILT		CL-ML	22.0	100%					
					Olive gray (5Y 3/2) silty fine SAND, wet		SM	22.6						
25					Bottom of Hole @24.0' Below Ground Surface			24.0						

DRILL RIG: CME-55

LOGGED: R. Blegen

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

CHECKED: MCL

DRILLER: D. Abernathy

DATE: 7/30/93



PROJECT: Port of Longview/UST
Characterization/WA

RECORD OF BOREHOLE UST-3

SHEET 1 OF 1

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview
Maintenance/Shop Facility

DATUM: MSL

BORING DATE: 7/23/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE			SAMPLES		ANALYTICAL RESULTS		HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES PIEZOMETER STANDPIPE INSTALLATION				
			DESCRIPTION	GRAPHIC LOG	USCS	DEPTH (feet)	REC/ATT	NUMBER	BTEX (ppm)				TPH (ppm)			
0	6.25" O.D. Hollow Stem Auger	3.5" O.D. Split Barrel Core Tube	Dark yellowish brown (10YR 4/2), gravelly SAND (FILL and BALLAST)			0.0	100%					1309 - Start drilling Borehole Abandoned				
			Dark yellowish brown (10YR 4/2), silty, fine to medium SAND (FILL)		SM	1.25										
								100%								
5								100%	1						1319 - Sample No. UST3-7/23-6	
			Iron-oxide staining at 8 feet													
			Dark gray (N3), fine to medium SAND, little silt, slightly moist		SM	8.5							0.0			
10						Dark yellowish brown (10YR 4/2), silty, fine to medium SAND, thin laminations of iron-oxide stained material	SM	9.3								1328 - Sample No. UST3-7/23-10
			Dark gray (N3), silty fine SAND		SM	12.7										
			Dark gray (N3) fine to coarse SAND. Little fine gravel. Trace silt. Moist, slight petroleum odor.		SM SW	13.0							16.4			1409 - Sample No. UST3-7/23-14.5
													0.0			
			Wet material at 16 feet													
			Dark yellowish brown (10YR 4/2), silty, fine to medium SAND		SM	18.5										1415 - Sample No. UST3-7/23-18
20			Interlaminated, olive gray (5Y 3/2), silty, fine SAND and clayey SILT	SM/ML	19.5											
	Olive gray (5Y 3/2) clayey SILT, plant roots common	CL-ML	20.5									1420 - End Drilling				
			Bottom of Hole @21.5' Below Ground Surface			21.5	100%									

DRILL RIG: CME-55

LOGGED: R. Blegen

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

CHECKED: MDL

DRILLER: D. Abernathy

DATE: 7/30/93



PROJECT: Port of Longview/UST
Characterization/WA

RECORD OF BOREHOLE UST-4

SHEET 1 OF 1

PROJECT NUMBER: 933-9729

BORING LOCATION: Port of Longview
Maintenance/Shop Facility

DATUM: MSL

BORING DATE: 7/26/93

DEPTH FEET	BORING METHOD	SAMPLING METHOD	SOIL PROFILE			SAMPLES		ANALYTICAL RESULTS		HEADSPACE ANALYSIS (ppm)	WELL CONSTRUCTION DIAGRAM	NOTES PIEZOMETER STANDPIPE INSTALLATION				
			DESCRIPTION	GRAPHIC LOG	USCS	DEPTH (feet)	REC/AIT	NUMBER	BTEX (ppm)				TPH (ppm)			
0	6.25" O.D. Hollow Stem Auger	3.5" O.D. Split Barrel Cone Tube	4" Asphalt			0.0	5%				<p>Flush-Mount Monument 2.0 Bentonite Chips 2" Sch 40 PVC Casing & Screen (0.020" slots) 5.8 110 111 11.08 Sand (CSSI 10-20) 41.7 Top of Screen @ 14.28 16.44 7/26/93 1613 101 Bottom of Screen @ 24.28 Total Depth @ 25.0 feet 6.25"</p>	0937-Start drilling				
			Gravel subgrade			1.0										
			Dark yellowish brown (10YR 4/2) fine to medium SAND, little silt (FILL)				SM									
5									100%						1004 - Sample No. UST4-7/26-5	
									100%							
									100%							
10						Olive gray (5Y 3/2), silty fine SAND iron-oxide staining, petroleum odor		SM	10.3							1021 - Sample No. UST4-7/26-10
						Light olive gray (5Y 5/2) to dark yellowish brown (10YR 4/2) fine to medium SAND, little silt		SM	11.0	100%						
						Light olive gray (5Y 5/2) to olive gray (5Y 3/2) silty fine to medium SAND		SM	14.0	100%						1106 - Sample No. UST4-7/26-15
										100%						
20						Dark gray (N3), medium SAND, little coarse sand, trace silt		SP	18.2							
						Dark gray (N3), silty, fine to medium SAND, little coarse sand, wet		SM	19.0	90%						1127 - Sample No. UST4-7/26-20
			Dark gray (N3) gravelly, fine to coarse SAND													
			Olive gray (5Y 3/2), silty fine SAND, few wood fragments, wet		SM	22.8										
25			Bottom of Hole @ 24.0' Below Ground Surface			24.0										

DRILLING: CME-55

LOGGED: R. Blegen

DRILLING SUBCONTRACTOR: Geo-Tech Explorations, Inc.

CHECKED: MDL

DRILLER: D. Abernathy

DATE: 7/30/93



PROJECT Part of Longview

RECORD OF BOREHOLE UST 5

SHEET 1 OF 1

DATUM: MSL

PROJECT NUMBER: 943 9735

BORING LOCATION:

BORING DATE: 6/3/94

DEPTH FEET	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS/FT					PIEZOMETER GRAPHIC			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS / 6 IN. 140 lb. hammer 30 inch drop	N	REC/INT	WATER CONTENT PERCENT					WATER LEVEL		
					DEPTH						0	10	20	30	40		50	
0	4-inch HSA	Brown SAND and coarse GRAVEL FILL		0.0														
5		Brown fine to medium SAND, some gravel. black staining at 8.0-10.0'		6.0														
10		Gray fine to medium SAND, trace silt and gravel 15.0-19.0 staining		15.0														
20		Brown medium to coarse SAND and fine to coarse GRAVEL		20.0														
21		Gray to brown silty fine to coarse SAND, trace gravel, wet		21.0														
24		Bottom of Hole at 24.0'		24.0													▼ 19.0	
25																		
30																		

DRILL RIG: CME-75

DRILLING CONTRACTOR:

DRILLER:



LOGGED:

CHECKED:

DATE: 8/2/94

RECORD OF STANDPIPE/PIEZOMETER INSTALLATION BOREHOLE NO. 1B-2 RECORD OF MONITORING WELL INSTALLATION

PROJECT NUMBER: 933-9725
BOREHOLE LOCATION:
BOREHOLE CONDITION:

SHEET 1 OF 1
PROJECT: Port of Longview
BORING DATE: 12/4/92

STRATIGRAPHY					DEPTH IN FEET	INSTALLATION SKETCH	START OF INSTALLATION	
ELEV.	DESCRIPTION	GRAPHIC LOG	WATER NOTES	BORING METHOD			HOLE DRILLED TO: 20.0'	OPEN TO:
DEPTH							DEPTH CASING AUGERS:	DEPTH TO W.L.: 13.0
					INSTALLATION DETAILS NOTES			
0.0	Railroad ballast				0			
1.8	Gray, fine to medium SAND, trace gravel				5			
9.7	Iron Staining Gray SILT, iron stained				10			
12.0	Gray, fine to medium SAND, some silt layers				15			
17.3	SILT							
17.8	Gray SILT to silty CLAY pink layer							
19.8	Gray, fine to medium SAND							
20.0	Bottom of Hole - 20.0' Below Ground Surface				20			
					25			
					30			

Hollow Stem Auger

DRILL RIG:
DRILLING CONTRACTOR: Geotech
DRILLER:

LOGGED: A. Templeton
CHECKED: T. Balunas
DATE: 8/5/93



Petroleum Services Unlimited, Inc.
 1081 Columbia Blvd.
 Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SBI	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5/1/91 FINISH 5/1/91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
1.0					Top 1' - crushed rock pavement		
2.5	2.5		0	3-7-7 (14)	No recovery		
			0	6-9-7 (16)	No recovery w/1.5" ID split spoon w/3" ID split spoon poorly graded sand, grey, dry, med dense, sand (SP)		Rock in sampler head Redrive 3" ID split spoon
5.0	5.5		8"	2-3-11 (14)	Poorly graded sand as above to 4'5" then in contact with a silt grey, moist, loose silt w/some iron stain and fine grained sand lenses throughout (ML)		
			17"	4-3-3 (6)			
7.5	7.0		10"	3-4-4 (8)	Silt (ML) as above to 6'8", then is a poorly graded sand, grey, wet, loose, fine to coarse sand w/an odor of petroleum (SP)		PID = 27 ppm Iridescent sheen on spoon
			16"	3-2-2 (4)	Sand (SP) as above, except saturated to 8' - then is a silt, grey, wet, loose silt (ML)		GW at approx 7' depth PID = 167 ppm
10	8.5				End boring at 8.5"		6 ea 50# bags Wyoben enviro plug medium used to abandon boring

Petroleum Services Unlimited, Inc.
 1081 Columbia Blvd.
 Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SB2	SHEET 1	OF 1
SOIL BORING LOG			

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-1-91 FINISH 5-1-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					3" asphalt pavement cover		
2.5	2.5				Poorly graded fine sand w/silt brown, dry, sand w/occasional charcoal lenses to 3'2", then is a silt, grey, silt w/wood fibres to 3'6" then is a well graded sand, grey, moist, fine to coarse sand (SW)		PID = 7.1 ppm odor of petroleum
	4.0		15"	3-3-6 (9)			
5.0							
	6.0		15"	4-3-3 (6)	At 6' is a well graded sand as above to 6'8", then is a poorly graded fine sand w/silt, dark grey, wet, loose, sand to 7'3", then is a clay w/ silt, dark grey, plastic clay (OH)		PID = 1000+ ppm
7.5	7.5						
			18"	2-2-2 (4)	Clay, as above, except wet with occasional fine grained sand lenses, to 8'8", then is a poorly graded fine sand w/silt, grey, wet, loose, fine sand (SP-SM)		PID = 2000 ppm odor of petroleum
9.0							
			17"	5-4-6 (10)	Sand as above to 9'3", then is a clay w/silt, grey blue, wet, plastic, clay w/wood fibres to 9'8", then is a poorly graded fine sand w/silt, grey blue, wet, loose, fine sand (SP-SM)		PID = 690 ppm odor of petroleum
10.0	10.5						
12.5					End boring at 10.5'		

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Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SB3	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-1-91 FINISH 5-1-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5							
4.0							
5	4.0		18"	2-2-3 (5)	Poorly graded fine sand w/silt, brown, dry, loose, sand (SP-SM), to 4'11", then is a silt, brown, loose, silt with iron stain throughout (ML), to 5'4", then is a clayey silt, grey blue, silt (OH) w/an odor of petroleum		PID = 32.5 ppm
7.5	5.5						
7.5	7.0		16"	4-4-5 (9)	Silt w/sand, grey blue, wet, loose silt (ML), to 7'9" then is a well graded fine to coarse sand, blue, wet, loose sand (SW) to 8'3", then is a poorly graded fine sand w/silt, grey blue, wet, loose, sand w/wood chips (SP-SM)		PID - 177 ppm Odor of petroleum
10	8.5						
10	10.0		18"	2-2-3 (5)	Poorly graded fine sand w/silt (SP-SM) as above, to 10'7", then is a silt, blue grey, moist, silt (OH), to 10'10", then is a silty clay, black, moist, clay with organic fibres throughout (OH) to 11'2", then is a clay, grey, dry, plastic, clay (OH)		PID = 30 ppm Odor of petroleum
12.5	11.5						
					End boring at 11'6"		9 ea 50# bags Wyoben Enviro plug medium used to abandon boring

Petroleum Services Unlimited, Inc.
 1081 Columbia Blvd.
 Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SB4	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5					Top 8" is a crushed rock pavement		
4.0							
5	5.5		18"	7-7-6 (13)	Poorly graded fine sand, grey, dry, med dense, sand (SP), to 5' then is a silt, brown, soft, silt w/iron stain throughtout (ML) to 5'4" then is a clayey silt, grey blue, dry silt (CL-ML)		
7.5	7.0						
8.5	8.5		14"	4-5-4 (9)	Well graded sand, blue grey, wet loose, sand w/occasional pebbles (SW), to 8'2", then is a poorly graded fine sand, blue grey, saturated, sand (SP)		PID = 147 ppm Odor of petroleum
10	10.0						
11.5	11.5		18"	5-5-4 (9)	Poorly graded sandy silt, blue grey, wet, loose, silt (ML) to 10'7", then is an interbedded silt and clay, blue grey, wet (ML)		PID = 32 ppm Odor of petroleum
12.5					End boring at 11'6"		10 ea 50# bags Wyoben enviro plug medium used to abandon boring

Petroleum Services Unlimited, Inc.
 1081 Columbia Blvd.
 Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SB5	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and eveloping
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5					Top 8" is a crushed rock pavement		
5	4.0 5.5		13.5'	3-4-7 (11)	Poorly graded fine to med sand, brown, dry, med dense, sand (SP)		
7.5	7.0 8.5		17"	4-4-4 (3)	Poorly graded fine sand w/silt brown grey, moist, loose, washed sand w/occasional silt lenses and pieces of charcoal (SP-SM)		
10	10.0 11.5		18"	4-4-6 (10)	Silt, grey blue, wet, stiff, silt (OL) to 10'8", then is a clayey silt, grey blue, moist, silt with woodchips throughout (OH)		PID = 12.7ppm Odor of petroleum
12.5	11.5 13.0		18"	2-3-4 (7)	Silt w/sand grey, wet, firm, silt with organic fibres (OL) to 12'2", then is a clayey silt, grey blue, moist, firm, silt with woodchips and charcoal throughout (OH)		PID = 15.8 Odor of petroleum
					End boring at 13'		11 ea 50# bags Wyoben Enviro plug medium used to abandon boring

Petroleum Services Unlimited, Inc.
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 Longview, WA 98632

PROJECT NUMBER 40612	BORING NUMBER SB6	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way Longview Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
2.5					Top 6-8" is a crushed rock pavement Soil cuttings are a fine to med. grain sand, brown, dry		
5							
7.5							
8.5							
10	10.0		18"	5-4-4 (8)	Interbedded brown and grey silt layers, moist, soft, silt (OL) to 9' then is a clay w/silt, grey blue, dry, soft, clay with interbedded silt (OH)		PID = 0.0 ppm Odor of petroleum
11.5			13"	3-4-4 (8)	Clay (OH) as above, to 11', then is a silt, grey, moist, soft, silt (OL)		
12.5			15"	5-3-3 (6)	Clay, grey, plastic, soft, clay (OH), to 11'10" then is a silt w/sand, grey blue, wet, loose, silt (OL)		PID = 3.7 ppm
13.0					End boring at 13'		9 ea 50# bags Wyoben Enviro plug medium used to abandon boring

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PROJECT NUMBER 40612	BORING NUMBER SB7	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (IN)	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5					Top 24" is a crushed rock pavement		
4.0			15"	5-7-11 (18)	Poorly graded fine sand, dry, med dense, sand (SP)		
5.5							
7.5	7.5		18"	2-1-1 (2)	Clayey silt, grey blue, wet, silt w/irridescent sheen and organic fibres, charcoal pieces (OL) to 8'3", then is a clay w/silt, dark grey, slightly plastic, dry to moist, soft, clay with some wood fibres (CL-ML)		PID = 133 ppm
9.0							
10					End boring at 9'		7 ea 50# bags Wyoben Enviro plug med used to abandon boring

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PROJECT NUMBER 40612	BORING NUMBER SB8	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-2-91 FINISH 5-2-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-8"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5					Top 3" is an asphalt pavement Drill cuttings are a dark brown sand and gravel.		
7.5	7.5						
9.0			16"	2-3-3 (6)	Poorly graded fine sand w/silt brown, loose, sand (SP) to 8'1" then is a clay w/silt, dark grey dry, plastic, firm clay (OH)		PID = 7.9 ppm Odor of petroleum
10			16"	3-5-5 (10)	Clay (OH), as above, to 9'7" then is a silt, grey, moist, loose silt w/interbeds of fine sand and clay lenses		PID = 4.8 ppm Odor of petroleum
10.5					End of boring at 10'6"		10 ea 50# bags Wyoben Enviro plug med used to abandon boring
12.5							

Petroleum Services Unlimited, Inc.
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PROJECT NUMBER 40612	BORING NUMBER SB9	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-3-91 FINISH 5-3-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5					Top 8-12" is a crushed rock pavement Drill cuttings and a brown sand		
5							
7.5							
9.0			18"	2-2-3 (5)	Silty clay, grey, dry, firm, slightly plastic, clay w/organic fibres throughout (OH), to 8'8", then is a silt, grey, moist, firm silt (OL)		PID = 11.7 ppm Odor of petroleum
10			16.5"	4-6-4 (10)	Silt (OL), as above, to 9'6" there is a poorly graded fine sand with silt, dark grey, moist to wet, loose, sand (SP-SM)		PID = 10.3 ppm Odor of petroleum
10.5							
12.5					End boring at 10'6"		10 ea 50# bags Wyoben Enviro plug med used to abandon boring

Petroleum Services Unlimited, Inc.
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PROJECT NUMBER 40612	BORING NUMBER SB10	SHEET 1 OF 1
SOIL BORING LOG		

PROJECT Port of Longview LOCATION 20 Port Way, Longview, Washington
 ELEVATION _____ DRILLING CONTRACTOR Hokkaido Drilling and Developing
 DRILLING METHOD AND EQUIPMENT Mobile B-61 Hollow Stem Auger Drilling Rig
 WATER LEVEL AND DATE _____ START 5-3-91 FINISH 5-3-91 LOGGER C. Grant

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)				
2.5					Top 8-12" is a crushed rock pavement		
7.5	7.5				Clay w/silt, grey, moist, soft, silt (OL), to 8', then is a poorly graded sand w/silt, grey, moist, very loose, sand w/organic fibres (SP-SM)		PID = 6.7 ppm
9.0		17"		4-2-2 (4)			
10		18"		3-2-1 (3)	Silt, grey, moist, soft, silt (OL) to 9'7", then is a clay w/silt, light grey, wet, soft, clay (OH) to 9'10", then is a silt w/sand wet, loose, silt w/clay lenses		PID = 3.1 ppm
10.5							
12.5					End boring at 10'6"		9 ea 50# bags Wyoben Enviro plug medium used to abandon boring

Test Pit Logs

Test Pit 1

11/23/92

South side of Bunker C Tank

<u>Depth ft.</u>	<u>Description</u>
0-2	Moist brown sand, some silt and clay fill. Hard dark grey bunker layer at 1.5 ft. Tile pipeline at 1.5 ft. , oily sheen on water in pipeline.
2-6.5	Grey clayey silt, decaying organic odor. Wood at 6.5 ft. PID 3.2 ppm at 4.0 ft.

Test Pit 2

11/23/92

West side of Bunker C Tank

0-2	Brown to yellow sand and cobble Fill, some pieces of bunker
2-2.5	Gray clayey silt
2.5-4	Light brown clayey silt
4-7	Light brown silty fine to medium sand
7-11	Grey clayey silt, with fine sands and wood fragments, strong petroleum odor.

Water entering pit from 3.5 and 5 ft., sheen on water from 3.5 ft.
PID readings of 9.7 ppm and 8.0 ppm from 7 and 11 ft., respectively.

Test Pit 3

11/23/92

South side of Bunker C Tank.

0-1.5	Brown silty sand.
1.5-5	Grey silty sand to sandy silt, strong petroleum odor. PID at 2 ft 33.4 ppm, sample TP-3-2(d).
5-8	Grey clayey silt with wood fragments. PID at 8 ft 365 ppm, sample TP-3-8.
8-10	Grey fine sand, some silt, strong petroleum odor.

PID reading from soil pile vary from 55 to 365 ppm

Golder Associates

Test Pit 4
11/23/92
Northwest side of Bunker C Tank.

<u>Depth Ft.</u>	<u>Description</u>
0-2.5	Moist, brown sandy silt.
2.5-3	Brown-grey medium sand, some silt.
3-6	Moist, mottled brown silty fine sand, some clay.
6-8	Moist, brown clayey silt.
8-12	Grey fine to medium sand, some silt.
12-15	Wet, mottled gray silt.

Test Pit 5
11/23/92
East side of Bunker C Tank

0-1.5	Brown clayey silt, some sand. Water entering pit at 1.5 feet.
1.5-2.0	Grey to black hard material, possible Bunker C spill.
2-3	Moist, grey sand to sandy silt.
3-5	Moist, grey silty fine to medium sand.
5-6	Moist to wet, grey silty clay to clayey silt, water at 5 feet.
6-13	Wet, grey clayey silt

Test Pit 6
11/23/92
South of
Bunker C Tank by Army Reserve Property

0-15.	Crushed rock fill.
1.5-2	Hard grey Bunker C (?)
2-6	Brown clayey fine sandy silt.
6-7	Wet, mottled brown clayey silt.

Golder Associates

- 7-10 Wet, grey clayey silt
10-11 Grey medium sand, strong odor

Test Pit 7
11/23/92
West side of tank.

<u>Depth ft.</u>	<u>Description</u>
0-1.5	Brown clayey silt.
1.5-2	Black chunks of tar like material.

Test Pit 8
11/23/92
East side of Tank

- 0-4 Moist, brown clayey sandy silt
4-7 Grey medium sand.
7 Wet grey silt

Excavation appears "Clean".

Test Pit 9
11/23/92
South of Tank by Army Reserve property.

- 0-1.5 Crushed rock and clay, silt, sand fill.
1.5-3 Moist, mottled, brown sandy clayey silt.
3-6.5 Grey brown silty sand.
6.5-10 Moist to wet, grey sandy silt, some wood fragment.
10-16 Dry to moist, grey clay, some silt
16 Wet grey sand, strong petroleum odor.

PROJECT: Chevron - Longview

START CARD No.: R04372

BORING No.: AMW1

Elevation Reference: MSL
 Relative Ground Surface Elevation: NA
 Well Completed: 9/11/95
 Relative Casing Elevation: 13.33
 Boring Method: H & A
 Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings ppm	Ground Water	AS-BUILT DESIGN	ANALYSES
0	3/4"-minus gravel FILL	FILL					Flush Mounted Monument Concrete Surface Seal Locking Cap	
	Medium stiff, moist, red-brown, medium SAND.	SP	S1/2.5	5			Hydrated Bentonite Seal	
	Medium dense, moist, gray SILT. Mild organic odor.	ML	S2/5	5	345		Casing (Schedule 40 2-inch PVC)	WTPH-G WTPH-D BTEX
	Very soft, wet, dark gray, silty, fine and medium SAND, interbedded with thin silt lenses. Strong hydrocarbon-like odor.	SW with ML	S3/7.5	2	1510			WTPH-G WTPH-D BTEX
			S4/10	4	15	SW		WTPH-G WTPH-D BTEX
	Medium dense, saturated, gray, coarse, andesitic SAND. Mild organic odor.						10-20 Colorado Silica Sand Filter Pack	
			S5/15	9	23		PVC Screen (2-inch I.d. with 0.010-inch slots)	
		SP					Native Sand Filter Pack	
			S6/20	8	9			
	Medium stiff, saturated, dark gray, fine SAND, becoming coarser with depth. Mild organic odor.						Threaded End Cap	
		SP	S7/25	5	11			
30	Boring completed at 27 feet below ground surface. Monitoring well AMW1 installed to 22.5 feet below ground surface. Note - significant volume of heaving native sand flowed into auger during well installation and prevented placement of engineered filter-pack sand in the interval 14'-25' below ground surface.							

LEGEND

- 2-inch O.D. split-spoon sample with % recovered
- Encountered groundwater level while drilling
- Measured static groundwater level
- Groundwater Analysis (Test Method Shown)
- Soil Analysis (Test Method Shown)

AEE PROJECT NUMBER: 12-1272-01
 Chevron - Longview
 Part of Longview Maintenance Yard
 Terminal Way
 Longview, Washington

**AGRA EARTH AND ENVIRONMENTAL
 ENGINEERING & ENVIRONMENTAL SERVICES**
 7477 SW Tech Center Drive
 Portland, Oregon 97223-8024
 Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/11/95

Drilling Completed: 9/11/95

Logged By: PDE a:\CHEVRON\LONGVIEW\1272MW1.DRW

PROJECT: Chevron - Longview

START CARD No.: R04372

BORING No.: AMW2

Elevation Reference: MSL
 Well Completed: 9/11/95
 Boring Method: H S A
 Relative Ground Surface Elevation: NA
 Relative Casing Elevation: 13.27
 Borehole Diameter: 8.25" O.D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Relative Readings	Ground Water	AS-BUILT DESIGN	ANALYSES
0	3/4"-minus gravel FILL.	FILL						WTPH-G WTPH-D (BTEX)
0-5	Soft, moist, gray, silty, fine SAND. Strong hydrocarbon-like odor. Poor sample recovery.		S8/2.5	4	800			
5	Mild organic odor.	SM	S9/5	3	27			
5-10	Medium dense, moist, brown-gray, micaceous SILT. Mild organic odor.	ML	S10/7.5	7	63			
10	Medium soft, wet to saturated, dark gray, medium SAND. Mild organic odor.		S11/10	n/a	16	SW		
10-15	Medium dense, wet, gray SILT.	ML						
15	Medium stiff, saturated, dark gray, coarse, andesitic SAND.	SP	S12/15	n/a	21			
15-20	Medium stiff, wet, gray SILT.	ML						
20	Medium stiff, saturated, dark gray, coarse, andesitic SAND.	SP	S13/20	8	23			
20-30	Boring completed at 22 feet below ground surface. Monitoring well AMW2 installed to 20 feet below ground surface.							

LEGEND

2-inch O.D. split-spoon sample with % recovered

Encountered groundwater level while drilling

Measured static groundwater level

Groundwater Analysis (Test Method Shown)

Soil Analysis (Test Method Shown)

AEE PROJECT NUMBER: 12-1272-01
 Chevron - Longview
 Port of Longview Maintenance Yard
 Terminal Way
 Longview, Washington

AGRA EARTH AND ENVIRONMENTAL
 ENGINEERING & ENVIRONMENTAL SERVICES
 7477 SW Tech Center Drive
 Portland, Oregon 97223-8024
 Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/11/95

Drilling Completed: 9/11/95

Logged By: PDE \\CHEVRON\LONGVIEW\1272\MW2.DRW

PROJECT: Chevron - Longview

START CARD No.: R04372

BORING No.: AMW3

Elevation Reference: MSL		Well Completed: 9/11/95		Boring Method: H S A		ANALYSES		
Relative Ground Surface Elevation: NA		Relative Casing Elevation: 13.00		Borehole Diameter: 3.25" O. D.				
Depth (Feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatle Readings ppm	Ground Water	AS-BUILT DESIGN	
0	3/4" minus gravel FILL.	FILL					Flush Mounted Monument Concrete Surface Seal	
0-5	Soft, moist, brown, micaceous, silty, fine SAND. Poor sample recovery.	SM	S14/2.5	3	11		Locking Cap Hydrated Bentonite Seal	
5			S15/5	3	16		Casing (Schedule 40 2-inch PVC)	
5-7	Brown, clean, medium SAND lens.	SP						
7-8	Silty, fine SAND.	SM	S16/7.5					
8-10	Medium soft, moist, brown, medium SAND. Sand coarsening with depth, becoming saturated.	SP		5	21			
10			S17/10	4	21	SW		
10-15	Medium soft, saturated, gray, micaceous, fine SAND.	SP		4	21		10-20 Colorado Silica Sand Filter Pack	
15			S18/12.5					
15-20	Medium dense, saturated, gray, coarse, andesitic SAND.	SP		8	24		PVC Screen (2-inch i.d. with 0.010-inch slots)	
20			S19/15				Native Sand Filter Pack	
20-22			S20/20	5	24		Threaded End Cap	
22-30	Boring completed at 22 feet below ground surface. Monitoring well AMW3 installed to 20 feet below ground surface.							

LEGEND

2-inch O.D. split-spoon sample with % recovered



Groundwater Analysis (Test Method Shown)

Encountered groundwater level while drilling

8015
8240

Soil Analysis (Test Method Shown)

Measured static groundwater level

AEE PROJECT NUMBER: 12-1272-01
Chevron - Longview
Port of Longview Maintenance Yard
Terminal Way
Longview, Washington

AGRA EARTH AND ENVIRONMENTAL
ENGINEERING & ENVIRONMENTAL SERVICES
7477 SW Tech Center Drive
Portland, Oregon 97223-8024
Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/11/95

Drilling Completed: 9/11/95

Logged By: PDE @CHEVRON/LONGVIEW/1272/MW3.DRW

PROJECT: Chevron - Longview

START CARD No.: R04372

BORING No.: AMW4

Elevation Reference: MSL

Well Completed: 9/12/95

Boring Method: H S A

Relative Ground Surface Elevation: NA

Relative Casing Elevation: 13.71

Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings ppm	Ground Water	AS-BUILT DESIGN	ANALYSES
0	3/4"-minus gravel FILL.	FILL						
	Medium dense, moist, brown, fine SAND	SP						
	Medium dense, moist, gray, slightly organic SILT.	OL						
	Medium stiff, moist, gray, silty, fine SAND. Strong hydrocarbon-like odor. Poor sample recovery.		S21/2.5	6	1520			
5	Thin lenses of clean, medium SAND below 5 feet. Strong hydrocarbon-like odor.		S22/5	3	1913			
	Poor sample recovery.	SM	S23/7.5	4	1939			
10	Soils becoming saturated.		S24/10	4	681	SW		
	Medium soft, saturated, gray, micaceous, fine SAND.							
	Medium stiff, saturated, gray, fine and medium SAND. Moderate hydrocarbon-like odor.	SW	S25/15	6	123			
15	Grading into coarse, andesitic SAND.							
20	Medium-grained, mafic, SAND below 21 feet below ground surface.	SP	S26/20	11	109			
	Boring completed at 22 feet below ground surface. Monitoring well AMW4 installed to 20 feet below ground surface.							

LEGEND

2-inch O.D. split-spoon sample with % recovered

Groundwater Analysis (Test Method Shown)

Encountered groundwater level while drilling

Soil Analysis (Test Method Shown)

Measured static groundwater level

AEE PROJECT NUMBER: 12-1272-01
 Chevron - Longview
 Port of Longview Maintenance Yard
 Terminal Way
 Longview, Washington

AGRA EARTH AND ENVIRONMENTAL
 ENGINEERING & ENVIRONMENTAL SERVICES
 7477 SW Tech Center Drive
 Portland, Oregon 97223-8024
 Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/12/95

Drilling Completed: 9/12/95

Logged By: PDE

at:CHEVRONLONGVIEW\1272\AMW4.DF

PROJECT: Chevron - Longview

START CARD No.: R04372

BORING No.: AMW5

Elevation Reference: MSL

Well Completed: 9/12/95

Boring Method: H S A

Relative Ground Surface Elevation: NA

Relative Casing Elevation: 13.55

Borehole Diameter: 8.25" O. D.

Depth (feet)	SOIL DESCRIPTION	USC	Sample Type	Blow Counts	Volatile Readings	Ground Water	AS-BUILT DESIGN	ANALYSES
0	3/4"-minus gravel FILL	FILL					Flush Mounted Monument Concrete Surface Seal Locking Cap	
	Soft, moist, brown, slightly gravelly, medium and coarse SAND. Poor recovery.	SW	S27/2.5	4	7		Hydrated Bentonite Seal	
							Casing (Schedule 40 2-inch PVC)	
6	Very soft, moist, brown-gray, silty, fine SAND.	SM	S28/5	2	8			
	Soft, moist, brown, medium SAND.	SP						
			S29/7.5	7	12			
	Medium dense, moist to saturated, brown-light gray, silty, very fine SAND, interbedded with gray fine and medium, clean SAND.	SM with SW	S20/10	9	7	SW		WTPH-G WTPH-D BTEX
10							10-20 Colorado Silica Sand Filter Pack	PS TPH-G TPH-D BTEX
	Dense, saturated, brown-gray, coarse, andesitic SAND.	SP	S31/15	6	6		PVC Screen (2-inch I.D. with 0.010-inch slots)	WTPH-G WTPH-D BTEX
15							Native Sand Filter Pack	
			S32/20	4	5		Threaded End Cap	
20								
	Boring completed at 22 feet below ground surface. Monitoring well AMW5 installed to 20 feet below ground surface.							
25								
30								

LEGEND

- 2-inch O.D. split-spoon sample with % recovered
- Groundwater Analysis (Test Method Shown)
- Encountered groundwater level while drilling
- Soil Analysis (Test Method Shown)
- Measured static groundwater level

AEE PROJECT NUMBER: 12-1272-01
 Chevron - Longview
 Port of Longview Maintenance Yard
 Terminal Way
 Longview, Washington

AGRA EARTH AND ENVIRONMENTAL
 ENGINEERING & ENVIRONMENTAL SERVICES
 7477 SW Tech Center Drive
 Portland, Oregon 97223-8024
 Phone (503) 639-3400 FAX (503) 620-7892

Drilling Started: 9/12/95

Drilling Completed: 9/12/95

Logged By: PDE a1CHEVRON/LONGVIEW/1272/AMW5.DRW

PROJECT:
POL-TPH

LOCATION:
Longview, WA

WELL ID:
MW-33

DRILL DATE:
3/9/2020

COORDINATE SYSTEM:
**NAD 83 WA SP S/
NAVD88**

ECOLOGY WELL ID:
BME 942

DRILLED BY:
Holt: John Bennett

LOGGED BY:
G. Cisneros

NORTHING:
292780.64

EASTING:
1017605.9

DRILLING EQUIPMENT:
Truck Mounted Auger

GROUND SURFACE ELEV.:
26.1

TOC ELEVATION:
25.91

DRILLING METHOD:
Hollow Stem Auger

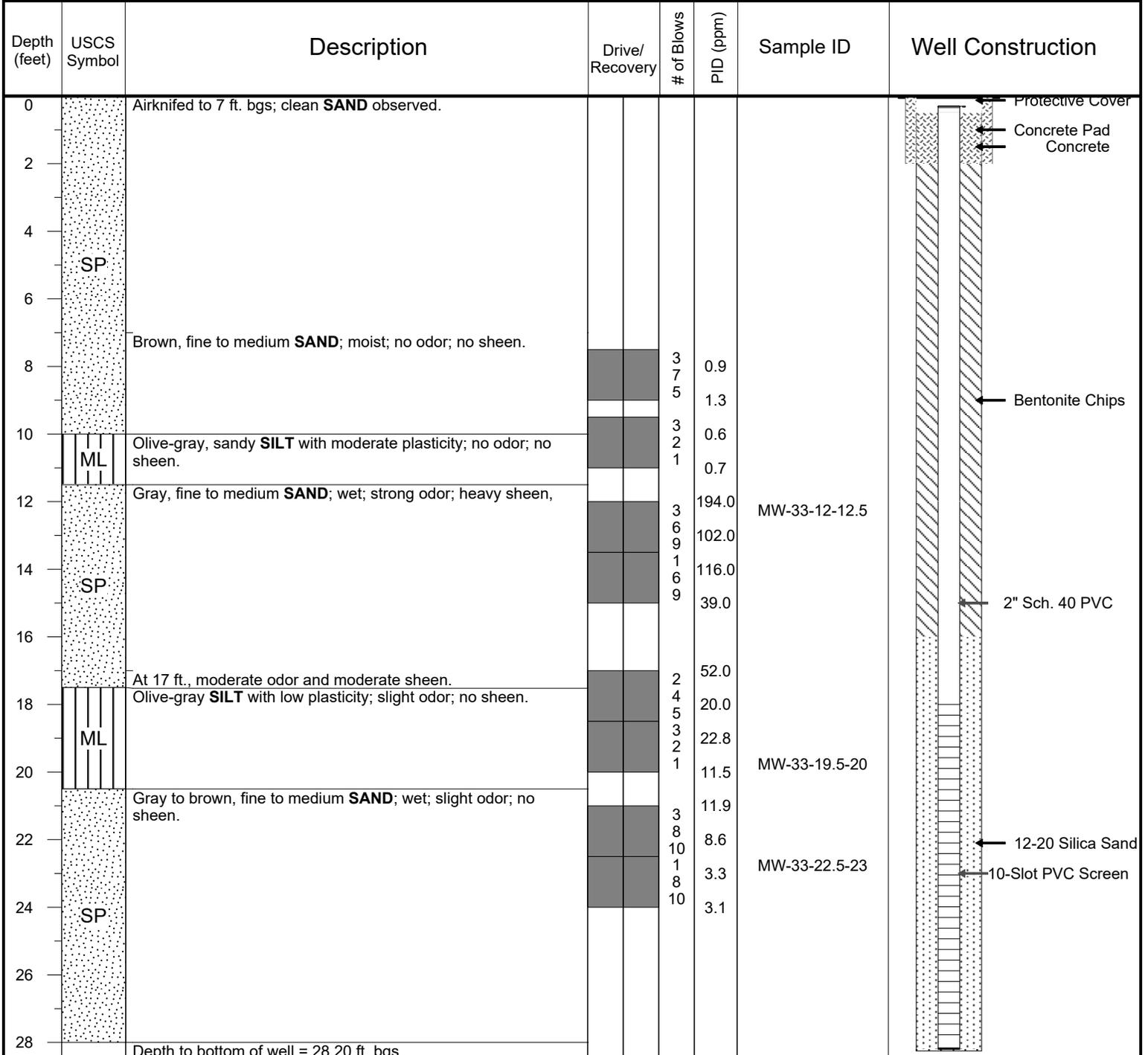
TOTAL DEPTH (ft bgs):
28.2

DEPTH TO WATER (ft bgs):
18.18

SAMPLING METHOD:
1.5 ft. Interval Split Spoon

BORING DIAMETER:
8 inch

SCREENED INTERVAL:
18-28



ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-34
DRILL DATE: 3/10/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 944
DRILLED BY: Holt: John Bennett	LOGGED BY: G. Cisneros	NORTHING: 292630.78
DRILLING EQUIPMENT: Truck Mounted Auger	GROUND SURFACE ELEV.: 26.96	EASTING: 1017483.21
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft bgs): 32	DEPTH TO WATER (ft bgs): 18.92
SAMPLING METHOD: 1.5 ft. Interval Split Spoon	BORING DIAMETER: 8 inch	SCREENED INTERVAL: 22-32

Depth (feet)	USCS Symbol	Description	Drive/Recovery	# of Blows	PID (ppm)	Sample ID	Well Construction
0		Airknifed to 10 ft. bgs; asphalt ground surface; road base fill to 0.5 ft.					
10	SP	Brown, fine to medium SAND ; moist; no odor; no sheen.		9 15 15	0.1		
14	ML	Olive, sandy SILT with low plasticity; moist; slight odor; no sheen.		9 5 6	0.3		
16	SM	Gray, silty, fine SAND ; moderate odor; slight sheen.		3 7	377.0	MW-34-15-15.5	
18	SP-SM	Gray, fine to medium SAND with 10% silt.		4 5	95.0 96.0		
18	SM/ML	From 18 to 20.5 ft., interbedded silty SAND and sandy SILT .		4 4 4	116.0 73.0		
20	ML	Olive-gray SILT with medium plasticity; moist; slight odor; no sheen.		2 2 2	315.0	MW-34-20-20.5	
22	SM	Gray, silty, fine SAND ; wet; slight odor; no sheen.		3 5 7	29.6 14.8		
24	SP	Brown, fine to medium SAND ; wet; slight odor; no sheen.		4 4 4 3	42.0	MW-34-24-24.5	
28	SM	Gray, silty, fine SAND ; moist; slight odor; no sheen.		1	58.0		
28	SP	Gray, fine to medium SAND ; wet; very slight odor; no sheen.		3 5	9.4	MW-34-28-28.5	
32		Depth to bottom of well = 32 ft. bgs.					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-35
DRILL DATE: 3/10/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 943
DRILLED BY: Holt: John Bennett	LOGGED BY: G. Cisneros	NORTHING: 292571.93
DRILLING EQUIPMENT: Truck Mounted Auger	GROUND SURFACE ELEV.: 27.4	EASTING: 1017321.65
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft bgs): 25.8	DEPTH TO WATER (ft bgs): 13.71
SAMPLING METHOD: 1.5 ft. Interval Split Spoon	BORING DIAMETER: 8 inch	SCREENED INTERVAL: 16-26

Depth (feet)	USCS Symbol	Description	Drive/Recovery	# of Blows	PPID (ppm)	Sample ID	Well Construction
0		Airknifed to 6 ft. bgs; asphalt ground surface.					
2							
4							
6		Brown, fine to medium SAND ; moist; no odor; no sheen.					
8							
10				4	1.2		
12	SP			12	1.0		
14				3	2.1		
16		At 19 ft., becomes wet.		10	1.3		
18				10	0.3		
20		Olive-gray SILT with moderate plasticity; moist; no odor; no sheen.		2	0.2	MW-35-15.5-16	
22	ML			7	0.2		
24		Brown to gray, fine to medium SAND with shell fragments; wet; no odor; no sheen.		7	0.2		
26	SP			8	0.3		
26		Depth to bottom of well = 25.80 ft. bgs.		9			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

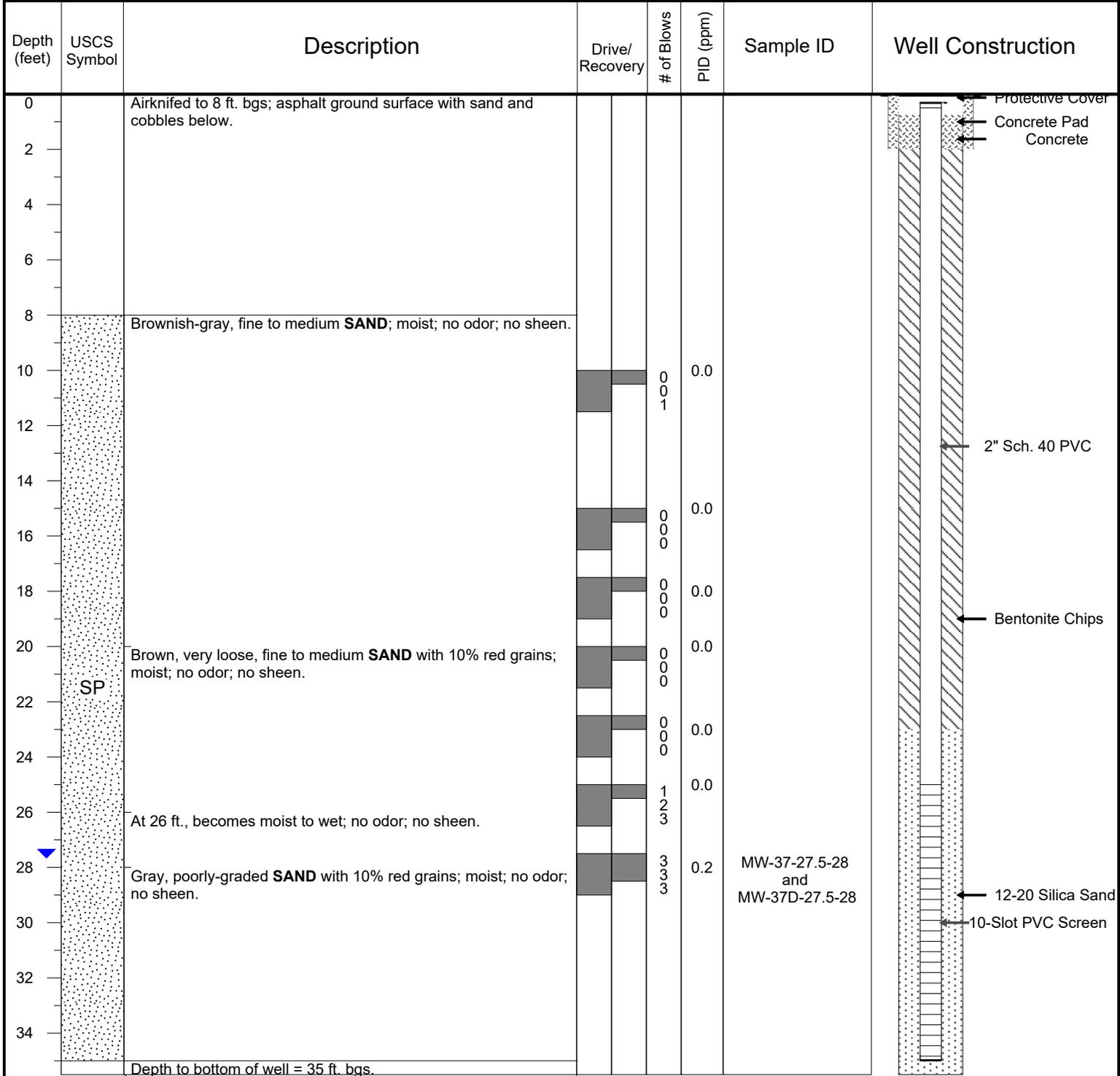
PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-36
DRILL DATE: 3/11/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 945
DRILLED BY: Holt: John Bennett	LOGGED BY: G. Cisneros	NORTHING: 292270.4
DRILLING EQUIPMENT: Truck Mounted Auger	GROUND SURFACE ELEV.: 31.88	EASTING: 1017406
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft bgs): 35.33	DEPTH TO WATER (ft bgs): 24.45
SAMPLING METHOD: 1.5 ft. Interval Split Spoon	BORING DIAMETER: 8 inch	SCREENED INTERVAL: 25-35

Depth (feet)	USCS Symbol	Description	Drive/Recovery	# of Blows	PID (ppm)	Sample ID	Well Construction
0		Airknifed to 8 ft. bgs.					
8		Brown, fine to medium SAND ; moist; no odor; no sheen.					
10	SP		7	4	0.0		
12				5			
12	ML	Reddish-brown, stiff SILT with moderate plasticity; moist; no odor; no sheen.					
14		Brown, fine to medium SAND ; moist; no odor; no sheen.					
16			2	4	0.0		
16	SP			4			
18			3	5	0.0		
20			3	5	0.0		
22		Brown to olive, stiff SILT with moderate to high plasticity; moist; no odor; no sheen.					
22	ML			0	0.1		
24				0	0.1		
24				0	0.1		
26	SP-SM	Gray, fine to medium SAND with 10% silt; wet; no odor; no sheen.					
26			1	2	0.3		
28		Brown, fine to medium SAND with 10% fine red grains; saturated; no odor; no sheen.					
28			1	2		MW-36-27.5-28	
30				2			
30	SP						
32							
34							
		Depth to bottom of well = 35.33 ft. bgs.					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-37
DRILL DATE: 3/12/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 947
DRILLED BY: Holt: John Bennett	LOGGED BY: G. Cisneros	NORTHING: 292043.9
		EASTING: 1017170.7
DRILLING EQUIPMENT: Truck Mounted Auger	GROUND SURFACE ELEV.: 31.67	TOC ELEVATION: 31.13
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft bgs): 35	DEPTH TO WATER (ft bgs): 27.5
SAMPLING METHOD: 1.5 ft. Interval Split Spoon	BORING DIAMETER: 8 inch	SCREENED INTERVAL: 25-35



ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

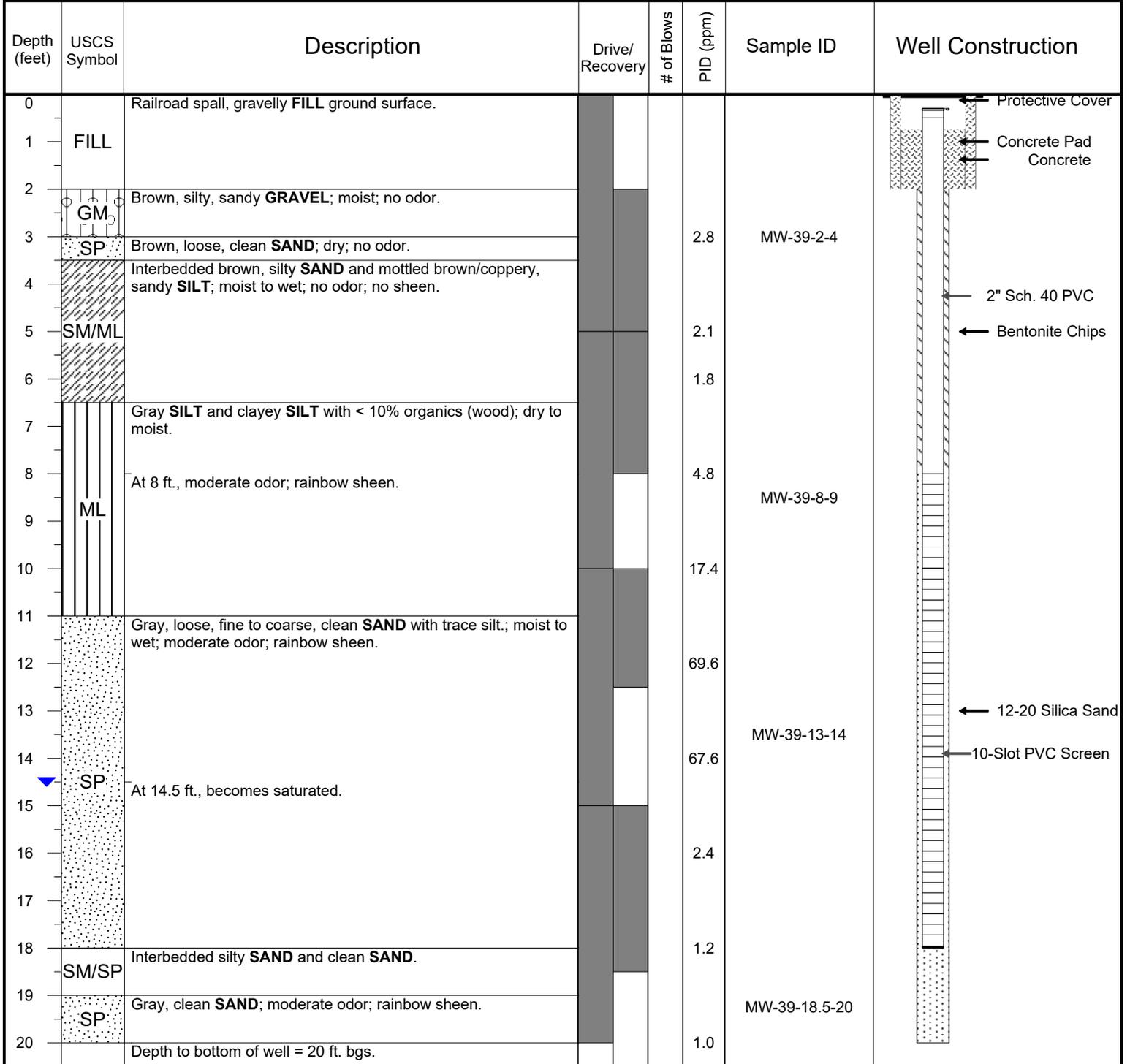
PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-38
DRILL DATE: 3/11/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 946
DRILLED BY: Holt: John Bennett	LOGGED BY: G. Cisneros	NORTHING: 291808.13
		EASTING: 1017497.79
DRILLING EQUIPMENT: Truck Mounted Auger	GROUND SURFACE ELEV.: 31.46	TOC ELEVATION: 31.09
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft bgs): 35	DEPTH TO WATER (ft bgs): 24
SAMPLING METHOD: 1.5 ft. Interval Split Spoon	BORING DIAMETER: 8 inch	SCREENED INTERVAL: 25-35

Depth (feet)	USCS Symbol	Description	Drive/Recovery	# of Blows	PID (ppm)	Sample ID	Well Construction
0	FILL	Asphalt ground surface FILL.					
2	SW	SAND and cobbles.					
4		Brown-gray, loose SAND; no odor; no sheen.					
6							
8							
10		Brown to gray, fine to medium SAND; moist; no odor; no sheen.	8	8	0.0		
12			9	9	0.0		
14							
16		Brown, fine to medium SAND; moist; no odor; no sheen.	4	4	0.0		
18		At 18 ft., rock in sampler; no recovery.					
20	SP		3	3	0.0		
22		Brown, fine to medium SAND with 10% fine red grains; moist; no odor; no sheen.	2	2	0.0		
24		At 23 ft., becomes moist to wet.	4	4	0.0	MW-38-23.5-24	
26		At 25 ft., becomes saturated; no odor; no sheen.	4	4	0.0		
28			2	2	0.0		
30		Same as above.	2	2	0.0		
32							
34							
Depth to bottom of well = 35 ft. bgs.							

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-39
DRILL DATE: 3/12/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 948
DRILLED BY: Holt: Mike Running	LOGGED BY: P. Osterhout	NORTHING: 293200.28
DRILLING EQUIPMENT: LAR Geoprobe	GROUND SURFACE ELEV.: 19.23	EASTING: 1017952.25
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20	DEPTH TO WATER (ft bgs): 14.5
SAMPLING METHOD: 5' x 2" Liner	BORING DIAMETER: 3 inch	SCREENED INTERVAL: 8-18



ABBREVIATIONS:
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NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: MW-40
DRILL DATE: 3/9/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 941
DRILLED BY: Holt: John Bennett	LOGGED BY: P. Osterhout	NORTHING: 292857.32
DRILLING EQUIPMENT: Truck Mounted Auger	GROUND SURFACE ELEV.: 24.77	EASTING: 1017668.47
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft bgs): 26	DEPTH TO WATER (ft bgs): 14.95
SAMPLING METHOD: 1.5 ft. Interval Split Spoon	BORING DIAMETER: 10 inch	SCREENED INTERVAL: 16-26

Depth (feet)	USCS Symbol	Description	Drive/Recovery	# of Blows	PID (ppm)	Sample ID	Well Construction
0		Hand Augered to 2 ft. bgs.					
2		Airknifed to 5 ft. bgs.					
6	SP	Fine SAND with angular, coarse gravel.					
10	GM	Silty GRAVEL.					
12	SP	Fine SAND; moist; strong odor; brown droplets.		0	351.0	MW-40-10.5-11	
12		At 12 ft., trace gravel present and wood at the bottom of sampler.		3	460.0	MW-40-11-13	
13	SM	At 12.5 ft., grades to silty SAND.		2	172.0		
13		At 12.5 ft., grades to silty SAND.		3	36.0		
14		At 13.5 ft., grades to dark brown SILT with 5 -10% sand and organics; slight odor.		3	36.0		
15	ML	At 15 ft., becomes gray; slight to moderate odor; no sheen.		0	47.0		
16				1	86.0		
18	SP-SM	Brown, fine SAND with 10% silt; wet; moderate odor; slight sheen.		5	650.0	MW-40-17 and MW-40D-17	
20		Gray, fine to medium SAND; slight odor; wet; slight sheen.		6	391.0		
20				11	391.0		
22	SP			3	414.0		
22				4	391.0		
22				8	391.0		
24		At 23.5 ft., odor dissipates.		2	157.0		
24				4	170.0		
24				7	10.7	MW-40-24-24.5	
26		Depth to bottom of well = 25.70 ft. bgs.					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-1

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292952.598299

EASTING:
1017608.66501

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
17.5 and 21.75

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.			
2		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		5.1	
3		Same as above; no odor; no sheen; moist.		5.8	
4				5.6	
5		Same as above; no odor; no sheen; moist.			
6				9.4	
7		Brown, medium dense, fine to coarse SAND with 10% fine red grains; no odor; no sheen.			
8				7.6	
9					
10	SP				

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-1

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292952.598299

EASTING:
1017608.66501

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
17.5 and 21.75

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Same as above; no odor; no sheen; moist.		7.6	
12		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		6.3	
13					
14		Same as above; no odor; no sheen; moist.		5.6	
15					
16		Same as above; no odor; no sheen; moist.		6.0	
17		Same as above; wet perched zone.		7.0	
18	ML	Olive gray, stiff SILT with moderate plasticity and organic debris; no odor; no sheen; moist.		117.4	
19		Olive gray, medium dense, fine SAND with 5% silt; moderate odor; no sheen; moist.		360.4	
20					GP-1-19.5-20@1500

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-1

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292952.598299

EASTING:
1017608.66501

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
17.5 and 21.75

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		10.3	
22	ML	Olive gray, stiff, sandy SILT ; slight odor; no sheen; wet.		27.0	GP-1-21-21.5@1505
23		Gray, medium dense, fine to coarse SAND with 10% fine red clasts; no odor; no sheen; saturated.		23.1	
24	SP	Same as above; no odor; no sheen; saturated.		10.5	
25					GP-1-GW@1516

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-2

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292848.310601

EASTING:
1017538.62636

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
16.5 and 21

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base FILL.			
1		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.8	
2					
3		Same as above; no odor; no sheen; moist.		5.3	
4					
5		Brown, medium dense, fine to medium SAND with small 2-inch layers of crushed gray rock and a 2-inch layer of black coal at 6 feet bgs; no odor; no sheen; moist.		8.9	
6				4.3	
7					
8		Light brown, medium dense, fine to coarse SAND; no odor; no sheen.		5.6	
9					
10	SP				

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-2

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292848.310601

EASTING:
1017538.62636

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
16.5 and 21

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
11		Light brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		8.3	
12		Same as above; no odor; no sheen; moist.		7.1	
13				6.1	
14		Gray staining from 14.5 to 15.5 feet bgs; slight odor at 14.5 feet; no sheen; moist.		6.3	
15				5.6	
16		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			GP-2-16-16.5@1353
17		Gray, medium dense, fine to medium SAND ; slight odor; no sheen; wet to saturated.		7.6	
18		Gray medium dense, fine to medium SAND ; no odor; no sheen; saturated.		7.4	
19	ML	Olive, stiff, sandy SILT ; no odor; no sheen; moist.		6.6	
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-2

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292848.310601

EASTING:
1017538.62636

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
16.5 and 21

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21		Gray, medium dense, fine to medium SAND with 10% fine red clasts; no odor; no sheen; saturated.		7.3	
22					
23	SP	Same as above; no odor; no sheen; saturated.		5.2	
24					
25					GP-2-GW@1411

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-3

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292780.862706

EASTING:
1017486.36455

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
16.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base FILL.			
1		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
2				51.7	GP-3-2-3@1240
3		Wood at 3.5 feet bgs.			
4	SP	Same as above with 10% fine gravel; no odor; no sheen.		3.4	
5		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		7.7	
6					
7	SW	Brown, medium dense, fine to coarse SAND with 10% rounded gravel and 5% silt; no odor; no sheen; moist.		6.2	
8		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		6.2	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-3

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292780.862706

EASTING:
1017486.36455

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
16.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Same as above; no odor; no sheen; moist.		6.2	
13		Same as above; no odor; no sheen; moist.		5.3	
15	SP	Same as above; no odor; no sheen; wet.		5.2	
16.5					GP-3-16-16.5@1246
17		Brown to gray, fine to medium SAND ; no odor; no sheen; saturated.		5.8	
18				4.6	
19		Same as above; no odor; no sheen; saturated.			
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-3

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292780.862706

EASTING:
1017486.36455

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
16.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21		Brown to gray, fine to medium SAND ; no odor; no sheen; saturated.		3.4	
22		Same as above; no odor; no sheen; saturated.		3.2	
23	ML	Olive brown, stiff SILT with low plasticity; no odor; no sheen; moist.			
24	SP	Gray, medium dense, fine to medium SAND with 10% fine red grains; no odor; no sheen; saturated.		2.1	
25					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-4

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292694.507727

EASTING:
1017433.34722

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
21.5 and 24

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
		Road Base FILL.			
1	FILL				
	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist to wet.		4.6	
2	ML	Sandy SILT lens at 2 feet bgs.			
	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		5.8	
3					
4	SP	Same as above; no odor; no sheen; moist.			
5					
	SW	Brown, medium dense, fine to coarse SAND with 5% silt and 5% gravel; no odor; no sheen.		7.7	
6		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
7					
8		Same as above; no odor; no sheen; moist.		6.1	
9	SP				
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-4

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292694.507727

EASTING:
1017433.34722

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
21.5 and 24

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Same as above; no odor; no sheen; moist.		4.7	
12				4.5	
13	ML	Brown, stiff SILT with low plasticity.			
14		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
15		Same as above; no odor; no sheen; moist.			
16				5.7	
17					
18	SP				
19		Same as above; no odor; no sheen; moist to wet.		3.0	
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-4

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292694.507727

EASTING:
1017433.34722

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
21.5 and 24

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21		Same as above; no odor; no sheen; wet.		6.0	
		Same as above; no odor; no sheen; saturated.		4.0	GP-4-21-21.5@1204
22	SM	Brown, medium dense, silty, fine SAND ; no odor; no sheen; saturated.		4.7	
23	ML	Brown, stiff, sandy SILT ; no odor; no sheen; moist.		2.4	
24	SP	Brown to gray, medium dense, fine to medium SAND with 10% fine red grains; no odor; no sheen; saturated.			
25					GP-4-GW@

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-5

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292576.577732

EASTING:
1017216.47276

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
20

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	Conc.	Concrete.			
1	FILL	Road Base FILL.			
		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
2				1.1	
3					
4					
5		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.			
6				1.3	
7					
8		Same as above; no odor; no sheen; moist.			
9				2.5	
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-5

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292576.577732

EASTING:
1017216.47276

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
20

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		3.2	
12					
13		Same as above; no odor; no sheen; moist.		3.5	
14					
15		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
16				1.2	
17					
18		Gray, fine to medium SAND ; no odor; no sheen; wet.		4.0	
19					GP-5-19-19.5@0820
20	ML	Olive gray, stiff SILT with low plasticity; no odor; no sheen; wet.		2.9	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-5

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292576.577732

EASTING:
1017216.47276

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
20

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SP	Brown to gray, medium dense, fine to coarse SAND with 5% fine red grains; no odor; no sheen; saturated.		2.8	
22		Olive gray, stiff, sandy SILT with low to moderate plasticity; no odor; no sheen; saturated.		3.4	
23	ML				
24		Olive gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.		3.1	
25	SP				

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-6

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292563.555458

EASTING:
1017346.54222

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
20

DEPTH TO WATER (ft bgs):
16.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base FILL.			
1		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		2.1	
2					
3				3.6	
4		Same as above; no sheen; no odor; moist.			
5				4.2	
6		Brown, medium dense, fine to medium SAND with 5% subrounded gravel and crushed rock; no odor; no sheen; moist.		1.8	
7					
8		Same as above; no sheen; no odor; moist.		1.7	
9	SP				
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Collected groundwater at 1324

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-6

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292563.555458

EASTING:
1017346.54222

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
20

DEPTH TO WATER (ft bgs):
16.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to medium SAND with 5% angular gravel clasts; no odor; no sheen; moist.		3.0	
12				3.7	
13		Same as above; moist to wet at 13.75 feet bgs; no odor; no sheen.			
14					
15		Brown, medium dense, fine to medium SAND ; no odor; no sheen; wet to saturated at 16.5 feet bgs.		3.7	
16				2.0	
17					GP-6-16-17@1117
18	SW	Brown, medium dense, fine to coarse SAND with 10% white grains; no odor; no sheen; saturated.		3.1	
19					
20	ML	Olive gray, stiff, fine, sandy SILT ; no odor; no sheen; wet.		2.4	GP-6-GW@1324

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Collected groundwater at 1324

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-7

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292390.444892

EASTING:
1017269.96574

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base FILL .			
1		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		3.0	
2				1.0	
3		Same as above; no odor; no sheen; moist.			
4					
5		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.			
6				2.4	
7					
8		Same as above; no odor; no sheen; moist.		2.0	
9					
10	SP				

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-7

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292390.444892

EASTING:
1017269.96574

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to medium SAND with 5% gravel and 5% silt; no odor; no sheen; moist.		3.5	
13		Same as above; no odor; no sheen; moist.		2.9	
15		Same as above; no odor; no sheen; moist.			
16				2.2	
18				4.0	
19	SM	Brown, medium dense, silty, fine SAND with 15% silt.			
20		Brown, medium dense, fine to medium SAND with 5% gravel and 5% silt; no odor; no sheen; moist.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-7

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292390.444892

EASTING:
1017269.96574

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SP	Same as above; no odor; no sheen; moist.		3.3	
22				3.5	
23	ML	Olive gray, stiff SILT with low plasticity; no odor; no sheen; moist.		3.4	
24					
25		Brown, medium dense, fine to medium SAND with 5% silt; no odor; no sheen; moist.		1.3	
26		Same as above; no odor; no sheen; wet.		2.8	GP-7-25.5-26@0851
27	SP			3.5	
28		Same as above with shells at 28 feet bgs; no odor; no sheen; saturated.			
29				3.4	
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-8

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292344.944418

EASTING:
1017283.86709

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
		Road Base FILL.			
1	FILL				
2		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
3		Same as above; no odor; no sheen; moist.		3.3	
4					
5		Same as above; no odor; no sheen; moist.			
6				3.0	
7					
8		Same as above; no odor; no sheen; moist.		2.8	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-8

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292344.944418

EASTING:
1017283.86709

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		3.9	
12		Same as above; no odor; no sheen; moist.			
13					
14				3.9	
15					
16	SP	Brown, medium dense, fine to medium SAND with 5% medium red grains (Dredge FILL); no odor; no sheen; moist.		4.6	
17					
18				4.6	
19					
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-8

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292344.944418

EASTING:
1017283.86709

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/15/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID	
21	[Dotted pattern]	Same as above; no odor; no sheen; moist.	[Grey bar]	4.3		
22						
23		Same as above; no odor; no sheen; moist.		3.9		
24						
25		Same as above; no odor; no sheen; wet.			3.6	GP-8-25.5-26@1011
26		Brown, medium dense, fine to medium SAND ; no odor; no sheen; saturated.			3.3	
27						
28				2.0		
29						
30					GP-8-GW@	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-9

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292269.877327

EASTING:
1017286.47024

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL; slight odor; no sheen.		3.4	
2	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.4	
3					
4					
5					
6	SW	Gray to dark brown, medium dense, sandy GRAVEL and crushed rock; no odor; no sheen.		1.0	
7					
8	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.1	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-9

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292269.877327

EASTING:
1017286.47024

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	GW	Dark brown to gray, medium dense, sandy crushed rock FILL ; no odor; no sheen; moist.		1.3	
12		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.5	
13	SP			0.9	
14					
15					
16	SW	Brown, medium dense, gravelly, fine to coarse SAND with 5% silt; no odor; no sheen; moist.		2.2	
17		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.7	
18	SP				
19		Same as above; gray, fine SAND ; no odor; no sheen; moist.		2.1	
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-9

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292269.877327

EASTING:
1017286.47024

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SW	Brown, medium dense, gravelly, fine to coarse SAND with 5% silt; no odor; no sheen; moist.		2.6	
22		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
23				2.2	
24					
25					
26	SP	Gray, medium dense, fine to medium SAND ; no odor; no sheen; wet.		3.6	
27		Same as above; no odor; no sheen; saturated.		4.8	
28					GP-9-27.5-28@0945
29				2.5	
30				2.3	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-10

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292333.466198

EASTING:
1017369.43114

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
21.5 and 28.25

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 3 inches.			
	FILL	Road Base FILL.			
1		Brown, medium dense, fine to medium SAND with 5% gravel; no odor; no sheen; moist.			
2					
3				3.5	
4					
5		Same as above; no odor; no sheen; moist.			
6				3.2	
7					
8	SP			3.4	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-10

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292333.466198

EASTING:
1017369.43114

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
21.5 and 28.25

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to medium SAND with 10% angular gravel; no odor; no sheen; moist.		1.8	
12				2.8	
13					
14	ML	Brown, stiff SILT with low plasticity; no odor; no sheen; moist.		0.9	
15	SM	Brown, medium dense, silty SAND ; no odor; no sheen; moist.			
16		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		3.3	
17	SP			2.0	
18					
19	ML	Brown, stiff, sandy SILT with low plasticity; no odor; no sheen; moist.		3.2	
20		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-10

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292333.466198

EASTING:
1017369.43114

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
21.5 and 28.25

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SP	Perched zone at 21.5 feet bgs.		2.2	
22		Olive gray, stiff SILT with high plasticity; no odor; no sheen; moist.			
23				3.0	
24	ML	Wood at 24.25 feet bgs.			
25	SP	Brown, medium dense, fine to medium SAND with 5% gravel; no odor; no sheen; moist.		2.1	
26		Olive, stiff SILT with high plasticity; no odor; no sheen; moist.			
27	ML			3.1	
28		Gray, medium dense, fine to medium SAND with 5% fine red grains; no odor; no sheen; saturated.			GP-10-28-28.5@0820
29	SP			2.9	
30				1.2	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-11

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292192.993596

EASTING:
1017258.79383

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.			
2		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.1	
3	SP			0.9	
4					
5					
6	GW	Dark brown, medium dense, sandy, crushed rock FILL ; no odor; no sheen; moist.		0.7	
7		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
8				0.8	
9	SP				
10					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-11

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292192.993596

EASTING:
1017258.79383

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	GW	Dark brown to gray, medium dense, sandy crushed rock FILL ; no odor; no sheen; moist.		1.4	
12	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
13	SP			0.9	
14	SM	Brown, medium dense, silty, fine SAND with 20% silt; no odor; no sheen; moist.		1.0	
15	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
16	SW	Brown, medium dense, gravelly, fine to coarse SAND with 20% subrounded gravel and 5% silt; no odor; no sheen.		1.4	
17	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
18	SM/ML	Brown to olive gray, silty SAND /sandy SILT ; no odor; no sheen; moist.		1.2	
19	SP	Gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
20	SP				

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-11

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292192.993596

EASTING:
1017258.79383

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SP	Brown to olive gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.	[Shaded]	1.0	
22				1.1	
23				1.2	
24				0.8	
25			[White]		
26	SM	Olive gray, medium dense, silty, fine to medium SAND with 20% silt and some wood debris; no odor; no sheen; moist to wet.	[Shaded]	3.8	GP-11-27-27.5@0908
27				0.8	
28					
29	ML	Olive, stiff, sandy SILT with low plasticity; no odor; no sheen; wet.	[Shaded]		
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-12

LOGGED BY:
G. Cisneros

BORING LOCATION:
8' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292127.372664

EASTING:
1017213.48767

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.		3.8	
2		Brown, medium dense, fine to medium SAND with 10% gravel; no odor; no sheen; moist.		4.2	
3				4.2	
4				4.2	
5		Light brown, medium dense, fine to medium SAND with 5% fine red grains; no odor; no sheen; moist.		4.2	
6	SP			5.1	
7					
8					
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-12

LOGGED BY:
G. Cisneros

BORING LOCATION:
8' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292127.372664

EASTING:
1017213.48767

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SW	Gray, gravelly, SAND with crushed rock; no odor; no sheen; moist.		6.3	
12		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
13				6.6	
14					
15					
16		Brown, medium dense, fine to medium SAND with 10% fine red grains; no odor; no sheen; moist.		6.7	
17					
18				6.3	
19					
20	SP				

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-12

LOGGED BY:
G. Cisneros

BORING LOCATION:
8' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292127.372664

EASTING:
1017213.48767

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21				2.8	
22		Wood encountered between 22 and 23 feet bgs.		2.9	
23		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		5.1	
24				4.5	
25		Gray, fine to medium SAND ; no odor; no sheen; wet.		2.9	
26					GP-12-26-26.5@1017
27				5.3	
28	ML	Olive, stiff SILT with high plasticity; no odor; no sheen; wet.		5.1	
29	SM	Gray, medium dense, silty SAND with 30% silt; no odor; no sheen; saturated.		4.2	
30					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-13

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292049.434655

EASTING:
1017159.27063

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.			
3	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		4.6	
6	SP	Brown, medium dense, fine to medium SAND with 10% gravel; no odor; no sheen; moist.		6.4	
8	SW	Brown, medium dense, fine to coarse SAND with 10% gravel; no odor; no sheen; moist.		6.5	
9	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-13

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292049.434655

EASTING:
1017159.27063

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SW	Brown, medium dense, gravelly, fine to coarse SAND with 5% silt; no odor; no sheen; moist.		5.7	
12		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
13				5.8	
14					
15		Same as above with 10% gravel; no odor; no sheen.		4.0	
16					
17					
18		Same as above with 5% gravel; no odor; no sheen.		4.2	
19					
20					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-13

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' East of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
292049.434655

EASTING:
1017159.27063

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SP	Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		5.3	
23		Same as above with 5% fine red grains; no odor; no sheen.		6.1	
25				5.5	
27		Gray, medium dense, fine to medium SAND with 5% fine red grains; no odor; no sheen; wet.		4.9	GP-13-26.5-27@1119
28		Same as above; no odor; no sheen; saturated.		4.8	
30					GP-13-GW@1130

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-14

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292147.66449

EASTING:
1016991.25362

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.			
2		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		3.0	
3					
4					
5				4.2	
6					
7					
8	SP			5.3	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-14

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292147.66449

EASTING:
1016991.25362

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		5.7	
12				3.7	
13					
14		Brown, medium dense, silty, fine SAND ; no odor; no sheen; moist.			
15	SM				
16		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		5.6	
17	SP				
18	ML	Brown, stiff, sandy SILT with low plasticity; no odor; no sheen; moist.		5.1	
19		Gray, medium dense, silty, fine SAND ; no odor; no sheen; moist to wet.		5.7	
19	SM				
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-14

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292147.66449

EASTING:
1016991.25362

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.	[Drive/Recovery Column]	4.6	
22				2.8	
23					
24					
25				2.4	
26		Gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.		5.4	GP-14-26-26.5@1219
27					
28		Same as above; no odor; no sheen; saturated.		2.4	
29					
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-15

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291962.269443

EASTING:
1017282.09882

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.			
2		Light brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.1	
3				1.3	
4					
5		Brown to light brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.6	
6					
7					
8		Same as above; no odor; no sheen; moist.		1.5	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-15

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291962.269443

EASTING:
1017282.09882

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Light brown, medium dense, fine to medium SAND with 5% gravel; no odor; no sheen; moist.		1.4	
12					
13		Same as above; no odor; no sheen; moist.		1.3	
14					
15	SP	Same as above; no odor; no sheen; moist.			
16				1.4	
17					
18		Same as above; no odor; no sheen; moist.			
19				1.1	
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-15

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291962.269443

EASTING:
1017282.09882

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	[Dotted pattern]	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.	[Dark gray bar]	1.5	
22					
23		Same as above; no odor; no sheen; moist.			
24					
25		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.	[White bar]	2.6	
26					
27		Gray, medium dense, fine to medium SAND with 5% fine red grains; no odor; no sheen; wet to saturated.		1.8	GP-15-27-27.5@1320
28					
29	ML/SM	Olive gray, medium dense/stiff, fine sandy SILT / silty SAND ; no odor; no sheen; saturated to wet.		2.8	
30					GP-15-GW@1335

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-16

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291811.257642

EASTING:
1017464.66298

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.			
2		Light brown, medium dense, medium to coarse SAND with 5% fine gravel; no odor; no sheen; moist.			
3				2.1	
4					
5		Brown, medium dense, medium to coarse SAND with 10% fine subrounded gravel; no odor; no sheen; moist.			
6				2.4	
7					
8		Same as above; no odor; no sheen; moist.			
9				2.1	
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-16

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291811.257642

EASTING:
1017464.66298

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Light brown, medium dense, medium to coarse SAND with 5% fine gravel; no odor; no sheen; moist.		2.6	
13		Same as above; no odor; no sheen; moist.		1.8	
15		Brown, medium dense, fine to medium SAND with 10% subrounded gravel; no odor; no sheen; moist.		2.2	
18		Same as above; no odor; no sheen; moist.		1.6	
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-16

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291811.257642

EASTING:
1017464.66298

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SW	Brown, medium dense, fine to coarse SAND with 10% subrounded gravel and 5% angular gravel; no odor; no sheen; moist.		2.1	
22					
23	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		3.4	
24					
25					
26	SP	Gray, medium dense, fine to medium SAND with 10% fine red grains; no odor; no sheen; wet to saturated.		2.1	
27					
28					
29	▼			3.1	GP-16-27.5-28@1424
30					2.7

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-17

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291757.351966

EASTING:
1017548.36186

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.		1.3	
2		Reddish brown, medium dense, fine SAND; no odor; no sheen; moist.		2.8	
3					
4					
5		Same as above; no odor; no sheen; moist.		5.3	
6		Light brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.			
7					
8		Same as above; no odor; no sheen; moist.		3.7	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-17

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291757.351966

EASTING:
1017548.36186

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Same as above; no odor; no sheen; moist.		1.8	
13		Same as above; no odor; no sheen; moist.		0.7	
15		Same as above; no odor; no sheen; moist.			
16	SP			1.8	
18		Brown to gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.9	
19					
20					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-17

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
291757.351966

EASTING:
1017548.36186

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
26.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21		Same as above; no odor; no sheen; moist.		2.5	
22					
23		Brownish gray, medium dense, fine to medium SAND with 5% fine red grains and 1/2-inch volcanic ash layer; no odor; no sheen; moist.		2.1	
24					
25		Same as above; no odor; no sheen; moist to wet.		2.2	
26		Gray, medium dense, fine to coarse SAND with 10% fine red grains; no odor; no sheen; saturated.		2.3	GP-17-26-26.5@0924
27					
28				2.1	
29		Same as above; no odor; no sheen; saturated.			
30					GP-17-GW@0934

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-18

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' West of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
291961.594646

EASTING:
1017513.07725

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.		3.2	
2					
3	SW	Brown, medium dense, fine to coarse SAND with 10% silt and 10% gravel; no odor; no sheen; moist.		4.8	
4					
5		Same as above; no odor; no sheen; moist.			
6		Light brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		2.0	
7					
8					
9		Same as above; no odor; no sheen; moist.		5.7	
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-18

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' West of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
291961.594646

EASTING:
1017513.07725

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Brown, medium dense, fine to medium SAND with 15% subrounded gravel; no odor; no sheen; moist.		4.9	
13		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		5.9	
15		Same as above; no odor; no sheen; moist.			
17		Same as above; no odor; no sheen; moist.		3.7	
18					
19					
20					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-18

LOGGED BY:
G. Cisneros

BORING LOCATION:
5' West of pipeline

DRILLED BY:
Brian, ESN

NORTHING:
291961.594646

EASTING:
1017513.07725

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/16/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SW	Brown, medium dense, fine to coarse SAND with 10% gravel and 5% silt; no odor; no sheen; moist.		3.7	
22				2.9	
23	SP	Brown, medium dense, fine to medium SAND with 5% gravel; no odor; no sheen; moist.		6.7	
24					
25	SM	Olive gray, medium dense, silty SAND ; moderate odor; moderate sheen; moist.		14.0	
26	SP	Dark brown, medium dense, fine to medium SAND with 5% gravel; no odor; no sheen.		6.7	
27				46.7	
28	SM/ML	Olive gray, medium dense, silty SAND /sandy SILT ; moderate odor; moderate sheen; wet.			GP-18-27-28@1531
28	SP	Dark gray, medium dense, fine to medium SAND ; slight odor; slight sheen; saturated.		7.5	
29				6.6	GP-18-29-30@1536
30					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-19

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292031.916154

EASTING:
1017556.63986

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
24

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.		0.3	
2		Light brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		4.6	
3					
4		Same as above; no odor; no sheen; moist.			
5				7.1	
6		Same as above; no odor; no sheen; moist.			
7				5.3	
8		Same as above; no odor; no sheen; moist.			
9				4.0	
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-19

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292031.916154

EASTING:
1017556.63986

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
24

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Light brown, fine to coarse SAND with 5% gravel; no odor; no sheen; moist.		4.4	
12		Same as above; no odor; no sheen; moist.			
13				3.5	
14					
15		Same as above; no odor; no sheen; moist.		4.8	
16					
17					
18		Same as above; no odor; no sheen; moist.		3.2	
19					
20					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-19

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292031.916154

EASTING:
1017556.63986

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
24

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21		Brown, medium dense, fine to coarse SAND ; no odor; no sheen; moist.			
22				1.6	
23	ML	Olive, stiff SILT with high plasticity; no odor; no sheen; moist to wet.		2.2	
24		Gray, medium dense, fine to medium SAND ; no odor; no sheen; wet to saturated.			GP-19-23.5-24@1435
25		Same as above; no odor; no sheen; saturated.			
26				1.9	
27	SP	Same as above; no odor; no sheen; saturated.		2.6	
28					
29		Same as above; no odor; no sheen; saturated.		2.3	
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-20

LOGGED BY:
T. Gardner-Brown

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292143.288955

EASTING:
1017584.18033

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
25

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
0.5	FILL	Road Base FILL.			
1		Light brown, medium dense, fine to medium SAND with 5% angular to subrounded gravel; no odor; no sheen; moist.			
2					
3	SP	Same as above; no odor; no sheen; moist.		4.3	
4		Same as above; no odor; no sheen; moist.			
5					
6	SW	Fine to coarse, gravelly SAND ; likely historical road base FILL; no odor; no sheen; moist.		5.2	
6.5		Light brown to gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
7					
8				5.7	
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Groundwater collected at 1350

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-20

LOGGED BY:
T. Gardner-Brown

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292143.288955

EASTING:
1017584.18033

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
25

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Light brown, medium dense, fine to medium SAND with 15% angular gravel; no odor; no sheen; moist.		4.9	
12		Refusal at 12 feet bgs; rusty metal encountered; likely former pipeline. Moved boring location approximately 15 to the northwest.		1.7	
13		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
14					
15					4.1
16		Same as above; no odor; no sheen; moist.		5.5	
17					
18	ML	Brown, stiff SILT with low plasticity; no odor; no sheen; moist.		5.6	
19		Brown to gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.		6.2	
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Groundwater collected at 1350

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-20

LOGGED BY:
T. Gardner-Brown

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292143.288955

EASTING:
1017584.18033

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
25

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SP	Brown, medium dense, fine to medium SAND with 10% subangular gravel; no odor; no sheen; moist.		5.9	
22		Gray, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
23	ML	Olive, stiff SILT with high plasticity; no odor; no sheen; moist.		6.4	
24		Gray, medium dense, fine to medium SAND with 5% gravel; saturated.		4.9	GP-20-24-25@1340
25	SP				
26	SM	Reddish brown to gray, silty, fine SAND ; no odor; no sheen; saturated.		5.1	
27					
28		Gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.		5.2	
29	SP			6.5	
30					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Groundwater collected at 1350

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-21

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292295.653404

EASTING:
1017421.7143

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
21.5 and 26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.		0.7	
2		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		1.7	
4		Same as above; no odor; no sheen; moist.			
5		Same as above; no odor; no sheen; moist.			
6				2.6	
7	SP				
8		Reddish brown, medium dense, fine to medium SAND with a 1-inch silt layer at 8.5 feet bgs; no odor; no sheen; moist.		5.2	
9					
10					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Groundwater collected at 1128

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-21

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292295.653404

EASTING:
1017421.7143

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
21.5 and 26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to coarse SAND with 5% gravel; no odor; no sheen; moist.		4.6	
12		Same as above; no odor; no sheen; moist.			
13	ML	Reddish brown, stiff SILT with moderate plasticity; no odor; no sheen; moist.		4.5	
14		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
15		Same as above; no odor; no sheen; moist.		3.6	
16					
17					
18	SP	Same as above with 1-inch silt layers at 17.5 and 18 feet bgs; no odor; no sheen; moist.		2.5	
19					
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Groundwater collected at 1128

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-21

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292295.653404

EASTING:
1017421.7143

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
21.5 and 26

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID	
21	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.	[Shaded]	4.0		
21.5		Same as above; saturated.		7.5	GP-21-21-21.5@1101	
22	ML	Olive, stiff SILT with moderate to high plasticity; no odor; no sheen; moist to wet.	[Shaded]	6.1		
24				Same as above; no odor; no sheen; moist.		
25						
26	SP	Gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.	[Shaded]	1.9	GP-21-25.5-26@1158	
27					5.5	
28				Same as above; no odor; no sheen; saturated.		6.1
29						
30						

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Groundwater collected at 1128

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-22

LOGGED BY:
G. Cisneros

BORING LOCATION:
South of pipeline in Transect Shed 1

DRILLED BY:
Brian, ESN

NORTHING:
292244.571626

EASTING:
1017476.03572

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
29.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base FILL.			
1		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.1	
2					
3				1.6	
4		Same as above; no odor; no sheen; moist.			
5		Light brown, medium dense, fine to medium SAND no odor; no sheen; moist.			
6				2.0	
7		Same as above; no odor; no sheen; moist.			
8					
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Flooring is elevated from surrounding ground surface ~2'

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-22

LOGGED BY:
G. Cisneros

BORING LOCATION:
South of pipeline in Transect Shed 1

DRILLED BY:
Brian, ESN

NORTHING:
292244.571626

EASTING:
1017476.03572

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
29.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		1.9	
12	SP	Same as above; no odor; no sheen; moist.			
13				1.4	
14					
15		Same as above; no odor; no sheen; moist.		1.9	
16					
17		Brown, medium dense, fine to medium SAND interbedded with 1-inch silt layers; no odor; no sheen; moist.			
18				2.7	
19					
20					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Flooring is elevated from surrounding ground surface ~2'

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-22

LOGGED BY:
G. Cisneros

BORING LOCATION:
South of pipeline in Transect Shed 1

DRILLED BY:
Brian, ESN

NORTHING:
292244.571626

EASTING:
1017476.03572

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
29.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21		Brown, medium dense, fine to coarse SAND ; no odor; no sheen; moist.		1.9	
22				2.3	
23	ML	Olive, stiff SILT with low plasticity; no odor; no sheen; moist.			
24	SP	Olive gray, medium dense, fine to medium SAND ; no odor; no sheen; wet.		3.2	
25	ML	Olive, stiff SILT with high plasticity; no odor; no sheen; moist.			
26		Brownish gray, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		1.8	
27	SP	Same as above; no odor; no sheen; moist.		1.9	
28					
29	ML	Olive, stiff, sandy SILT ; no odor; no sheen; wet.			
29.5	SP	Gray, medium dense, fine to medium SAND with 5% fine red grains; no odor; no sheen; saturated.		3.0	GP-22-29-29.5@1021
30					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Flooring is elevated from surrounding ground surface ~2'

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-23

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292158.666646

EASTING:
1017542.18923

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base FILL.			
1		Light brown, medium dense, fine to medium SAND with 10% angular to subrounded gravel; no odor; no sheen; moist.			
2					
3				6.5	
4		Same as above; no odor; no sheen; moist.			
5		Same as above; no odor; no sheen; moist.			
6	SP			4.2	
7		Rusty/reddish brown, medium dense, fine to medium SAND; no odor; no sheen.			
8				4.5	
9		Refusal at 9 feet bgs. Encountered rusty metal; likely the abandoned pipeline. Moved boring location approximately 10 feet to the south.			
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-23

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292158.666646

EASTING:
1017542.18923

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SW	Gray, fine to coarse SAND with 15% angular gravel; no odor; no sheen; moist.		4.5	GP-23-10.5-11@1222
				1.9	
12		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.3	
13					
14					
15		Same as above; no odor; no sheen; moist.			
16	SP			3.1	
17					
18		Same as above; no odor; no sheen; moist.			
19					
20				1.7	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-23

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292158.666646

EASTING:
1017542.18923

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21	SW	Brown to gray, fine to coarse SAND with angular gravel and 5% silt; no odor; no sheen; moist.		2.1	
22		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
23	SP			2.0	
24		Olive, stiff SILT with high plasticity; no odor; no sheen; moist.			
25	ML			3.1	
26		Gray, medium dense, fine to medium SAND ; no odor; no sheen; moist to wet.		4.8	
27				1.9	
28	SP	Same as above; no odor; no sheen; saturated.			GP-23-27-27.5@1241
29		Same as above; no odor; no sheen; saturated.			
30				4.6	

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-24

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292177.904933

EASTING:
1017655.17749

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
21

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base FILL . Crushed angular gravel.			
1		Light brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		3.2	
2					
3		Same as above; no odor; no sheen; moist.			
4					
5		Brown to light brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		4.0	
6					
7					
8		Same as above; no odor; no sheen; moist.		3.4	
9					
10				1.4	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-24

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292177.904933

EASTING:
1017655.17749

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
21

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Same as above; no odor; no sheen; moist.		2.3	
12				2.4	
13		Same as above; no odor; no sheen; moist.			
14				1.6	
15		Same as above; no odor; no sheen; moist.			
16				2.1	
17					
18		Same as above; no odor; no sheen; moist.			
19					
20					
				3.2	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-24

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292177.904933

EASTING:
1017655.17749

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
21

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21		Brown, medium dense, fine to medium SAND with 5% fine red grains; no odor; no sheen; wet to saturated.		0.6	GP-24-20-20.5@1519
22		Olive, stiff SILT with high plasticity; no odor; no sheen; wet.			
23	ML			2.5	
24		Olive gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.			
25	SP			2.0	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-25

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292282.681266

EASTING:
1017572.25179

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
20.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base FILL. Crushed angular gravel.			
1		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
2				3.4	
3	SP	Same as above; no odor; no sheen; moist.			
4					
5					
6	GW	Crushed rock and sandy GRAVEL; no odor; no sheen; saturated.		3.1	
7		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
8				2.8	
9		Same as above; no odor; no sheen; moist.			
10				4.0	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-25

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292282.681266

EASTING:
1017572.25179

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
20.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Same as above; no odor; no sheen; moist.		4.1	
12		Same as above; no odor; no sheen; moist.			
13				3.8	
14		Brown, medium dense, fine to medium SAND with 10% silt; no odor; no sheen; moist to wet.			
15	SM-SP				
16	GM	Brown, medium dense, silty, sandy, angular GRAVEL ; no odor; no sheen; moist.		3.1	
17		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.			
18				2.4	
19		Same as above; no odor; no sheen; moist to wet.			
20				1.4	

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-25

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292282.681266

EASTING:
1017572.25179

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
20.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/17/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/ Recovery	PID (ppm)	Sample ID
21	SP	Same as above; no odor; no sheen; saturated.		2.8	GP-25-20-20.5@1550
22				3.4	
23		Gray to brown, medium dense, fine to medium SAND ; no odor; no sheen; saturated.			
24	ML	Olive gray, stiff SILT .		1.8	
25	SP	Gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-26

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292349.864424

EASTING:
1017564.72411

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
19.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base FILL. Crushed angular gravel.			
1		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.3	
2				2.6	
3	SP				
4		Same as above; no odor; no sheen; moist.		2.4	
5					
6	SW	Dark brown, gravelly, fine to coarse SAND with 15% angular gravel and 5% silt (FILL?); no odor; no sheen; moist.		2.6	
7	SP	Brown, fine to medium SAND; no odor; no sheen.			
8	ML	Reddish brown, stiff SILT with 10% fine sand; no odor; no sheen; moist.		2.9	
9		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
10					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-26

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292349.864424

EASTING:
1017564.72411

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
19.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11		Same as above; no odor; no sheen; moist.		2.6	
12	SP	Same as above; no odor; no sheen; moist.			
13				2.2	
14					GP-26-14-14.5@0915
15		Same as above; no odor; no sheen; moist.		2.2	
16	SW	Dark brown, medium dense, gravelly, fine to coarse SAND with 20% angular gravel and 5% silt; no odor; no sheen; moist.			
17		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.4	
18					
19		Gray, fine to medium SAND ; no odor; no sheen; wet.		3.3	
19.5					GP-26-19-19.5@0920
20	SP	Same as above; no odor; no sheen; saturated.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-26

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Brian, ESN

NORTHING:
292349.864424

EASTING:
1017564.72411

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
19.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21		Same as above; no odor; no sheen; saturated.		7.5	
22					
23		Olive, stiff SILT with high plasticity; no odor; no sheen; wet.		2.8	
24	ML				
25		Gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.		2.9	
26					
27		Same as above; no odor; no sheen; saturated.		2.3	
28	SP				
29					
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-27

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
292434.344428

EASTING:
1017567.29016

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
14.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Rail Line Base FILL. Crushed angular gravel.			
1		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
2				1.4	
3					
4		Same as above; no odor; no sheen; moist.			
5	SP			1.4	
6		Same as above; no odor; no sheen; moist.			
7				1.7	
8		Same as above; no odor; no sheen; moist.			
9				2.1	
10	ML	Olive gray, stiff SILT with low plasticity; no odor; no sheen; moist.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-27

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
292434.344428

EASTING:
1017567.29016

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
14.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.	[Grey bar]	2.2	
12		Gray SAND ; no odor; no sheen; moist.		2.9	
13		Same as above; slight odor at 13 feet bgs; no sheen; moist.			
14	SM	Olive, silty SAND ; moderate odor; moderate sheen; wet.	[Grey bar]	106.0	
14.5	ML	Olive SILT with low plasticity; moderate odor; moderate sheen; wet.			GP-27-14-14.5@0832
15	SP	Gray to brown, medium dense, fine to medium SAND ; slight odor; slight sheen; saturated.		[White bar]	26.0
16			[Grey bar]	8.2	
17		Same as above; no odor; no sheen; saturated.	[Grey bar]	4.8	GP-27-17-18@0853
18		Coarse white grains at 18 to 18.25 feet bgs.	[Grey bar]	3.4	
19		Same as above; no odor; no sheen; saturated.	[Grey bar]		
20			[Grey bar]		

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-27

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
292434.344428

EASTING:
1017567.29016

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
25

DEPTH TO WATER (ft bgs):
14.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21				2.7	
21.5 to 22		Coarse white grains at 21.5 to 22 feet bgs.		3.1	
22		Gray, medium dense, fine to coarse SAND with 10% fine white grains; no odor; no sheen; saturated.		3.3	
23					
24	SM	Olive brown, stiff SILT with 10% fine sand; no odor; no sheen; saturated.		1.7	
25					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-28

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
291996.858807

EASTING:
1017494.02952

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
1	FILL	Road Base FILL.		1.3	
2		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		0.8	
4		Same as above; no odor; no sheen; moist.			
5		Light brown, medium dense, fine to coarse SAND; no odor; no sheen; moist.		4.2	
7				2.5	
8		Same as above with 5% rounded gravel; no odor; no sheen; moist.			
9				2.3	
10					

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

Groundwater collected at 1200

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-28

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
291996.858807

EASTING:
1017494.02952

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	No recovery between 10 feet bgs and 30 feet bgs. Lost sampler in hole. Collected groundwater sample at 30 feet bgs.	[Shaded bar]		
12					
13					
14					
15					
16					
17					
18					
19					
20					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Groundwater collected at 1200

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-28

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
291996.858807

EASTING:
1017494.02952

DRILLING EQUIPMENT:
Geoprobe

SURFACE ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
28

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Groundwater collected at 1200

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-29

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
291923.179687

EASTING:
1017537.41072

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 4 inches.			
1	FILL	Road Base FILL.		5.8	
2		Brown, medium dense, fine to medium SAND with 10% angular gravel; no odor; no sheen; moist.		1.4	
5		Same as above; no odor; no sheen; moist.		2.1	
6					
7					
8					
9					
10					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-29

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
291923.179687

EASTING:
1017537.41072

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11	SP	Light brown, medium dense, fine to medium SAND with 5% subrounded gravel; no odor; no sheen; moist.		1.6	
12		Same as above; no odor; no sheen; moist.			
13				1.5	
14					
15		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.2	
16					
17				2.8	
18		Same as above; no odor; no sheen; moist.			
19				1.4	
20					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-29

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:
Trevor, ESN

NORTHING:
291923.179687

EASTING:
1017537.41072

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
30

DEPTH TO WATER (ft bgs):
27.5

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
21		Brown, medium dense, fine to medium SAND ; no odor; no sheen; moist.		1.2	
22		Same as above; no odor; no sheen; moist.		1.7	
23					
24	SM	Olive gray, silty SAND with 20% silt and 1/4-inch wood debris at 24.25 feet bgs; no odor; no sheen; moist.		1.2	
25	ML	Olive, stiff SILT ; no odor; no sheen; moist.		2.8	GP-29-25-25.5@1015
26		Brown to gray, medium dense, fine to medium SAND ; no odor; no sheen; wet.		2.9	
27				3.1	GP-29-27-27.5@1020
28	SP	Gray, fine to medium SAND ; no odor; no sheen; saturated.			
29		Same as above; no odor; no sheen; saturated.		2.3	
30					

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-30

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:

NORTHING:
292962.155627

EASTING:
1017572.12614

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
20

DEPTH TO WATER (ft bgs):
16.5 and 19.75

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT, odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
0	AS	Asphalt Top 6 inches.			
	FILL	Road Base FILL.			
1		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.		1.3	
2				1.4	
3		Same as above; no odor; no sheen; moist.			
4				1.6	
5		Same as above; no odor; no sheen; moist.			
6		Crushed rock FILL.		3.7	
7		Brown, medium dense, fine to medium SAND; no odor; no sheen; moist.			
8	SP			2.3	
9		Same as above; no odor; no sheen; moist.			
10				2.1	

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION: 10 Port Way,
Longview, WA

BORING ID:
GP-30

LOGGED BY:
G. Cisneros

BORING LOCATION:

DRILLED BY:

NORTHING:
292962.155627

EASTING:
1017572.12614

DRILLING EQUIPMENT:
Geoprobe

SURFACE
ELEVATION:

COORDINATE SYSTEM:
SPCS WA S NAD83 FT

DRILLING METHOD:

TOTAL DEPTH (ft bgs):
20

DEPTH TO WATER (ft bgs):
16.5 and 19.75

SAMPLING METHOD/SAMPLER LENGTH:
Continuous

BORING DIAMETER:
2"

DRILL DATE:
9/18/2015

Depth (feet)	USCS Symbol	Soil Description and Observations (color, texture, moisture, MAJOR CONSTITUENT , odor, staining, sheen, debris, etc.)	Drive/Recovery	PID (ppm)	Sample ID
11				1.2	
12					
13		Same as above; no odor; no sheen; moist.		1.5	
14					
15	ML	Reddish brown, stiff SILT with low plasticity; no odor; no sheen; moist.			
15		Brown to gray, medium dense, fine to medium SAND ; no odor; no sheen; moist to wet.		1.2	
16					GP-30-16-16.5@1112
17	SP	Gray, medium dense, fine to medium SAND ; no odor; no sheen; saturated.		2.1	
18		Olive gray, stiff SILT with high plasticity; no odor; no sheen; saturated.		1.9	
19	ML				
20	SML	Olive gray, silty, fine to medium SAND ; no odor; no sheen; saturated.			GP-30-19.5-20@1120

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
GP-31

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-9

DRILL DATE:
3/11/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292765.1886

EASTING:
1017985.424

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
14

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
13.5-18.5

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 6.5 ft bgs; brown, loose SAND observed during clearing.			
1					
2					
3	SP				
4					
5					
6				0.8	
7		Brown, silty SAND ; moist, loose, no odor. Grades to brown SILT interbedded with silty, fine, medium SAND with 5-20% organics (wood).			
8		At 8 ft., becomes wet (perched).		1.1	
9					
10	SM/ML	At 10 ft., becomes saturated.		1.3	
11					
12				1.4	
13					
13	CH	At 13 ft., 2 inch chunk of wood over gray, firm, silty CLAY ; moist; no odor.			
14		At 14 ft., grades to silty SAND with interbedded sandy SILT ; soft and loose; saturated; no odor; no sheen.		1.4	
15	SM/ML				
16				1.1	GP-31-14-15 GP-31-GW-13.5-18.5
17		At 16.5 ft., fines decrease; wet; no odor.			
18	SM				
19	SP	At 19 ft., grades to loose, clean SAND ; wet; no odor.		0.9	
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: GP-32
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-9	DRILL DATE: 3/11/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292735.4444	EASTING: 1018027.903
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: 14-19

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 6.5 ft bgs; grassy ground surface.			
1					
2					
3	SM				
4					
5					
6					
7	OL	Brown, organic-rich, sandy SILT ; moist; organic odor.		2.0	
8	ML	At 7.5 ft., organics decrease.		1.8	
9	SM-ML	Silty SAND to sandy SILT .			
10	ML	Soft, brown, mottled SILT ; moist to wet; no odor.		1.8	
11	SM	At 12 ft., becomes gray, silty, soft to firm SAND ; wet; no odor.			
12				2.6	
13	ML	At 12.5 ft., grades to soft, gray SILT ; moist.			
14	CH	Gray, firm CLAY with organics; moist; no odor.		1.8	
15		Soft SILT ; saturated.			
16	ML				
17					GP-32-GW-14-19 GP-32-17.5-18.5
18				2.5	
19	SP	Clean, gray, loose, medium SAND ; saturated; no odor; no sheen.			
20		Boring terminated at 20 ft. bgs.		1.8	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
GP-33

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-7

DRILL DATE:
3/9/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292489.2593

EASTING:
1017559.34

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
30.6

DEPTH TO WATER (ft bgs):
18.5

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Railroad ground road base.			
2	GP				
4					
6		Brown, fine to medium SAND ; moist; no odor; no sheen to 14 ft.		0.0	
8				0.7	
10	SP			0.9	
12				1.2	
14	ML	Olive-gray SILT with moderate plasticity; moist; no odor; no sheen.		1.3	GP-33-14-14.5
16		Brown, fine to medium SAND ; wet; no odor.		0.9	
18				1.2	
18				1.4	
20	SP	At 19 ft., becomes saturated; slight odor; slight sheen.		80.6	GP-33-19.5-20
22				0.6	
24	ML	Olive-gray, stiff SILT with low plasticity; wet; no odor; no sheen.		1.0	
24		Brown, fine to medium SAND ; saturated; no odor; no sheen.		0.7	GP-33-24-25
26				2.6	
28	SP			0.6	GP-33-28-29
30	SM	Olive-gray, silty SAND ; no odor; no sheen.		0.8	
30		Boring terminated at 30 ft. bgs.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

Soil Samples Only

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: GP-34
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-7	DRILL DATE: 3/9/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292439.7912	EASTING: 1017599.313
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): Not Encountered
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs.			
1					
2					
3					
4					
5		Brown, medium SAND with trace gravel; damp; no odor.			
6	SP			0.1	
7					
8		Dark gray, silty GRAVEL with sand; moist; no odor; no sheen.			
9	GM			0.3	
10		Fine, gray SAND . At 9.5 ft., wood debris.			
11	SP	Gray, gravelly SAND .		0.2	
12		At 12 ft., fines downward to very fine SAND .			
13		At 13 ft., grades to silty, very fine SAND ; wet.			
14	SM			0.4	
15	ML	At 14 ft., grades to soft SILT ; wet; no odor.			
16	SP	Coarse SAND ; wet; no odor. Fines downward		0.2	
17		Gravelly, fine to coarse SAND with trace to 20% silt.			
18	SP-SM			0.4	
19		Gray SILT with trace to 20% fine sand; wet; no odor. Organics present below 18.75 ft.			
20	ML			0.5	
20		Boring terminated at 20 ft. bgs.		0.5	

GP-34-GW-14-19
GP-34-14-15

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:
Soil Samples Only

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: GP-35
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-5	DRILL DATE: 3/10/2020
DRILLED BY: Holt: Mike Running	NORTHING: 293006.4502	EASTING: 1017856.098
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): Not Encountered
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Hand Auger to 5 ft. bgs; no recovery.			
1					
2					
3					
4					
5	SP	Brown SAND with gravel.			
6		Gray SILT ; moderate odor; minor metallic sheen.		3.0	
7				2.2	
8				3.0	GP-35-7-8
9					
10	ML			2.9	
11					
12		At 12 ft., wood chunk.		3.3	
13		Gray SAND with layers of sand and silty sand at the bottom of the core; mild to no odor throughout; no sheen.			
14					
15				2.9	
16					
17	SP-SM				GP-35-16-17
18					
19					
20		Boring terminated at 20 ft. bgs.		2.1	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:
Soil Samples Only

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: GP-36
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-5	DRILL DATE: 3/12/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292959.6519	EASTING: 1017705.684
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 25.5	DEPTH TO WATER (ft bgs): 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; no recovery.			
2					
4					
5.5	SP	Brown, loose, fine to medium, SAND with gravel,; dry to moist; no odor.			
6		Brown, clayey SILT to fine, sandy SILT with 10% organics; moist to wet; no odor.		7.8	
8	ML	At 8 ft., becomes gray; no odor.		25.6	
10	SP	Clean SAND ; strong odor; heavy rainbow sheen and brown droplets.		7.6	
12	SM/CH	At 12 ft., grades to silty SAND then silty CLAY with 15% organics; rainbow sheen.		20.9	
14		Silty SAND ; strong odor; sheen and some brown droplets. At 14 ft., becomes wet.		612.0	GP-36-13-14
16	SM			397.0	GP-36-16-17
18				241.0	
20	ML	Gray SILT ; strong odor; possibly slough.		13.1	
22	SP	Gray, poorly-graded SAND ; moderate odor; metallic sheen.			GP-36-22-23
23		At 23 ft., odor and sheen dissipate.		13.7	
24					
25		Boring terminated at 25 ft. bgs.		3.4	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Soil Samples Only

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
GP-37

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-6

DRILL DATE:
3/12/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
293081.2618

EASTING:
1017687.849

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
15.5

DEPTH TO WATER (ft bgs):
14

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; Gravel ground surface.			
1					
2					
3					
4					
5		Brown, fine, loose, clean SAND ; moist; no odor.			
6				0.3	
7	SP				
8					
9		Brown, silty SAND ; moist; no odor. Interbedded SAND and silty SAND .			
10				0.2	
11				0.1	
12	SM/SP	At 12 ft., becomes gray.		0.1	
13					GP-37-12-14 GP-37D-12-14
14		At 14 ft., becomes saturated.		0.3	
15		Boring terminated at 15 ft. bgs.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

Soil Samples Only

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: GP-38
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-3	DRILL DATE: 3/13/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292423.0772	EASTING: 1017421.518
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): 19
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Railroad ground road base.			
1	GP				
2		Brown, fine to medium SAND ; moist; no odor; no sheen.			
3					
4					
5					
6				1.5	
7					
8				0.9	
9					
10		Same as above; no odor; no sheen throughout the boring.		0.9	
11	SP			0.5	GP-38-11-11.5
12				1.4	
13				1.1	
14					
15					
16				0.8	
17					
18				1.4	
19		At 19 ft., becomes wet.			
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:
Soil Samples Only

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-02
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-2	DRILL DATE: 3/11/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292883.8583	EASTING: 1017969.462
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): 14
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: 14.5-19.5

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft.bgs.			
1					
2					
3					
4					
5	OL	Dark brown, organic-rich, firm SILT ; moist; mild odor; no sheen.			
	CH	Dark brown, silty CLAY			OIP-02-5-5.5
6		Gray-brown, sandy SILT with wood and grass; mild odor; metallic sheen.		2.3	
7		At 7 ft., becomes wet to saturated (perched); odor dissipates with depth. Interbedded with sandy SILT and clayey SILT ; sheen only on outside of the core.		1.4	
8				1.7	
9				1.5	
10				1.2	
11				1.1	
12	ML	At 12.5 ft., becomes firm and damp to moist. At 14 ft., becomes wet to saturated.			
13					
14		At 14.5 ft., becomes soft and loose.			
15		At 15 ft., mild odor; sheen.			
16				1.1	
17					OIP-02-14-15 OIP-02-GW-14.5-19.5 OIP-02D-GW-14.5-19.5
18		At 18 ft., grades to clean, loose, coarse SAND ; saturated; no odor; no sheen.			
19	SP			1.1	
20		Boring terminated at 20 ft. bgs.		1.4	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-04
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-2	DRILL DATE: 3/10/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292948.9647	EASTING: 1017938.189
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): 15
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: 15-20

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Hand auger to 5 ft. bgs; GRAVEL and cobbles observed during clearing.			
1					
2	GW				
3					
4		Hand auger sample collected from 4 to 5 ft. bgs. Gray, clean, loose, fine SAND with trace gravel and cobbles; damp to dry; no odor.			OIP-04-4-5
5					
6				0.3	
7					
8	SP	Same as above; no odor.		1.2	
9					
10				1.1	
11					
12		Interbedded clean SAND and silty SAND to SAND with silt; trace organics; moist; no odor.		1.0	
13					
14				1.0	
15		At 15 ft., becomes wet.			
16	SP/SM			1.0	
17					
18				0.4	OIP-04-15-16 OIP-04-GW-15-20
19					
20		At 19.5 ft., very slight odor; no sheen. Boring terminated at 20 ft. bgs.		2.4	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-05

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-1

DRILL DATE:
3/12/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
291921.5893

EASTING:
1017503.128

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
30.5

DEPTH TO WATER (ft bgs):
29

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface FILL .			
2	SW	Brown, loose, SAND with gravel; dry; no odor.		1.7	
4				1.7	
6				1.6	
8		AT 7 ft., 6 inch layer of dark brown to black SAND with vitreous sand grains; no odor. Same as above below.		1.3	
10	SP			1.8	
12				1.6	
14		At 14 ft., becomes lighter in color.		1.6	
16				1.7	
18				1.6	
20		Same as above.		1.0	
22				1.7	
24				1.9	
26		At 24.5 ft., becomes moist. From 25 to 27 ft., potentially slough due to dryness.		1.9	
28		Brown, loose SAND with trace gravel; moist; no odor.		1.4	
28				1.0	OIP-05-27-28
30	SP/ML SM SP	At 28.5 ft., becomes gray with lenses of silt and wood; dense; no odor. At 29 ft., becomes saturated.			
30		Gray, medium SAND ; dense; wet; no odor. Boring terminated at 30 ft. bgs.		0.9	OIP-05-28-29

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH
LOGGED BY:
P. Osterhout

LOCATION:
Longview, WA

BORING ID:
OIP-06

BORING LOCATION:
AOPC-1

DRILL DATE:
3/13/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
291947.8346

EASTING:
1017471.699

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
30.5

DEPTH TO WATER (ft bgs):
25

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
25-30

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface FILL .			
2		Gray/brown, loose, fine to coarse SAND with gravel; dry; no odor.		0.9	
4				1.0	
6				1.2	
8		Same as above; no odor.		1.3	
10				2.5	
12	SW			1.0	
14				0.9	
16		At 16 ft., begins to fine with 5-10% gravel and coarse sand; dry; no odor.		1.0	
18				1.1	
20				1.4	
22				1.6	
24	SP	Brown, poorly-graded, medium SAND ; dry; no odor.		1.3	
25		Brown, well-graded SAND with <10% gravel; moist to wet; no odor; no sheen.		1.2	
26	SW/SM	At 25 ft., becomes gray and saturated; no odor; no sheen.			
27		Brown, well-graded SAND with gravel; dry; no odor; no sheen.		0.9	OIP-06-GW-25-30 OIP-06-27-28 OIP-06-29-30
28	SW	At 27 ft., becomes dense.			
29	SP/SM	At 29 ft., becomes gray with variable silt; wet; no odor.		1.5	
30		Boring terminated at 30 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: OIP-08
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC8	DRILL DATE: 11/22/19
DRILLED BY: HOLT (Mike)	NORTHING: 292919	EASTING: 1017662.15
DRILLING EQUIPMENT: Limited Access Drill Rig	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Geoprobe	TOTAL DEPTH (ft bgs): 25	DEPTH TO WATER (ft bgs): 21
SAMPLING METHOD: 5' Liners	BORING DIAMETER: 2 inch	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	Fill	Subangular gravelly FILL			
2		Brown, fine SAND ; no odor.		0.9	
4		Same as above; no odor; no sheen.		1.0	
6	SP			1.0	
8		At 8 ft., becomes medium to fine grained SAND .		0.0	
10				0.5	
12				1.0	
14	SM	Silty SAND ; very slight sheen; no odor.			
14	ML	Low plasticity SILT ; mild odor; no sheen.		0.5	
16		Poorly graded SAND ; with moderate odor; heavy rainbow sheen and droplets.		1723.0	
18	SP	At 16.5 ft., moderate sheen.		1985.0	
20				2260.0	OIP08-19-20-112219
22	ML	Olive gray, sandy SILT ; strong odor; moderate sheen.		2519.0	
24	SP	Poorly graded SAND ; slight sheen; mild odor.		109.6	
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH
LOGGED BY:
P. Osterhout

LOCATION:
Longview, WA

BORING ID:
OIP-15

DRILLED BY:
Holt: Mike Running

NORTHING:
292869.4791

EASTING:
1017593.993

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
25.5

DEPTH TO WATER (ft bgs):
19

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
14-19

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	FILL	Asphalt ground surface FILL .			
2	GP-GM	GRAVEL with silt, sand and cobbles; loose; dry to moist; no odor.		2.3	
4				1.5	
6		Brown, loose, fine SAND ; moist; no odor.		2.6	
8				2.4	
10	SP			3.2	
12		At 12 ft., slight, solvent-like odor; similar odor to fresh cut wood.		1.9	
14		At 14 ft., becomes saturated; mild TPH odor; slight rainbow and metallic sheen.		1.8	
16	SM	Brown/gray, silty SAND with <10% wood/organics; wood/solvent-like odor; metallic sheen.		6.8	
18	ML	At 17 ft., grades to gray/brown sandy to clayey SILT ; odor and sheen dissipate below 18 ft.		2.8	OIP-15-15-16 OIP-15-GW-15-19
20				2.1	
22	SM	Loose, silty SAND ; wet; mild odor; no sheen.		2.2	OIP-15-20-21
24	SM/ML	Interbedded gray, silty SAND and sandy SILT ; wet to saturated; mild odor; no sheen. At 23 ft., odor dissipates.		1.8	
24				1.1	OIP-15-23-24
25		Boring terminates at 25 ft. bgs.		1.3	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-18
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC-3	DRILL DATE: 3/13/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292369.2061	EASTING: 1017479.331
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): 19.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 feet bgs.			
1					
2					
3					
4					
5		Brown, fine to medium SAND ; moist; no odor; no sheen.			
6				0.5	
7					
8				0.1	
9					
10					
11				0.2	
12				0.1	
13	SP	Same as above; moist; no odor; no sheen.			
14				0.2	
15				0.2	
16				0.2	
17				0.1	
18					
19		At 19 ft., becomes wet to saturated.		0.1	
		At 19.75 ft., becomes saturated.			OIP-18-19-19.5
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-19
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-3	DRILL DATE: 3/13/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292388.078	EASTING: 1017502.731
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 25.5	DEPTH TO WATER (ft bgs): 19.5
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
2					
4					
6		Brown, loose, fine to medium SAND with trace to 10% silt interbedded moist to dry; no odor.		0.2	
8	SP-SM			0.5	
10		Brown, clean SAND with trace silt; no odor.		0.5	
12				0.8	
14				0.7	
16	SP			0.5	
18				0.7	
20		At 19 ft., becomes moist to wet.		0.4	OIP-19-19-20
22				1.2	
22	SP/SM	Gray, silty SAND interbedded with loose, coarse SAND ; wet; no odor.		0.6	
24	CH	Gray, firm, silty CLAY ; wet; no odor.			
24	SM	At 24.5 ft., becomes sandy.			
25		Boring terminates at 25 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-20

LOGGED BY:
G. Cisneros

BORING LOCATION:
AOPC-3

DRILL DATE:
3/13/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292415.8279

EASTING:
1017466.926

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
19.5

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
1					
2					
3					
4					
5		Brown, fine to medium SAND ; no odor; no sheen.			
6				0.3	
7					
8	SP			0.5	
9					
10					
11	SM	Gray, silty, fine SAND with 30% silt; moderate odor; slight sheen.		505.0	OIP-20-11-11.5
12		Olive-gray, stiff SILT with moderate plasticity; moderate odor; slight sheen.			
13	ML				
14		Brown, fine to medium SAND ; moist; no odor; no sheen.		1.5	
15	SP			1.5	
16	SM	Olive-gray, silty, fine SAND ; moist; no odor; no sheen.		199.0	
17		Brown, fine to medium SAND ; moist; no odor; no sheen.			
18	SP			0.4	
19					OIP-20-19-19.5
20		At 19.5 ft., becomes wet to saturated. Boring terminated at 20 ft. bgs.		0.0	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-21

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-3

DRILL DATE:
3/13/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292468.7798

EASTING:
1017508.17

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
18

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
1					
2					
3					
4					
5		Brown, loose, fine, clean SAND ; moist; no odor.			
6	SP			1.6	
7	SP				
8		At 8 ft., becomes coppery in color.		1.8	
9	SP/ML	Gray SAND with interbedded silt; wet (perched aquifer?); no odor; no sheen.		1.8	
10	SP	Gray/brown, loose, poorly-graded SAND ; moist; no odor.		1.9	
11	ML	Gray, SILT to sandy SILT ; saturated; no odor.			
12		Gray/brown, loose, poorly-graded SAND .		2.2	
13	SP				
14	SP				
15				2.1	
16				1.3	
17	SM	At 16.5 ft., grades to silty SAND .			
18	ML	Gray SILT ; wet; no odor; no sheen.			
18		Brown, well-graded SAND with 15% gravel; wet; no odor.		1.4	OIP-21-18-19
19	SW	At 20 ft., becomes gray; wet; no odor; no sheen.			
20		Boring terminated at 20 ft. bgs.		1.3	

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-23

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-7

DRILL DATE:
3/10/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292621.408

EASTING:
1017543.662

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
30.5

DEPTH TO WATER (ft bgs):
13.5

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Railroad spall (fill) then loose, sandy GRAVEL to gravelly SAND ; dry; no odor.			
2	GW-SW			1.4	
4		Brown, loose, clean, medium SAND with trace organics (wood); dry; no odor.		1.7	
6	SP			1.4	
8				1.5	
10		At 10 ft., becomes well-graded SAND with increased gravel content.		1.4	
12	SW			5.3	
14		Gray SAND with silt; saturated; no odor; no sheen.		43.4	OIP-23-14-15
16				130.0	
18				137.0	
20		Gray SAND to silty, fine to medium SAND ; mild to moderate TPH odor; no sheen.		184.0	OIP-23-19-20
22	SM			324.0	
24				209.0	OIP-23-23-24
26				337.0	
28		At 28 ft., odor dissipates.		30.7	
30	ML	At 29.5 ft., becomes SILT . Boring terminates at 30 ft. bgs.		10.1	OIP-23-29.5-30

ABBREVIATIONS:
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NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: OIP-30
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC7	DRILL DATE: 11/19/19
DRILLED BY: HOLT (Mike)	NORTHING: 292549.47	EASTING: 1017565.76
DRILLING EQUIPMENT: Limited Access Drill Rig	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Geoprobe	TOTAL DEPTH (ft bgs): 25	DEPTH TO WATER (ft bgs): 21
SAMPLING METHOD: 5' Liners	BORING DIAMETER: 2 inch	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	Fill	Railroad, angular gravelly FILL .			
2		Brown-gray, fine to medium SAND ; moist; no odor; no sheen		1.4	
4				6.4	
6	SP	Same as above; no odor; no sheen.			
8				0.3	
10				0.2	
12	SM	Dark gray to black, silty, fine to medium SAND ; moist; strong hydrocarbon odor; moderately heavy sheen.			
14	ML	Olive gray to black, sandy SILT ; moist; strong odor; heavy sheen.		34.0	
16	SP	Brown, medium to coarse SAND ; moist; slight odor; no sheen.		19.0	
18	ML	Olive gray, sandy SILT ; moderate odor; slight sheen.		36.0	
18	SM	Olive, silty, fine SAND ; moist to wet; moderate odor; slight sheen.			
20	ML	Olive, sandy SILT ; moist.		43.0	
20	SP	Black, fine to medium SAND with visible LNAPL; wet to saturated; strong odor; heavy sheen.			OIP30-20-21-111919
22	SM	Olive, silty SAND ; moderate odor; moderate sheen.		19.2	
24	ML	Olive SILT with low plasticity.		34.0	
24	SP	Gray, fine to medium SAND ; saturated; strong odor; moderate sheen.			
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-31

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-7

DRILL DATE:
3/9/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292534.5724

EASTING:
1017589.368

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
15

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft bgs; railroad spall (fill) ground surface.			
1					
2					
3					
4					
5		Brown, well-graded SAND with gravel; moist; no odor.			
6	SW			0.8	
7					
7.5	GM	At 7.5 ft., 1 inch lens of gray, silty GRAVEL ; wet; no odor.			
8		Fine, clean SAND ; damp; organic odor.		0.7	
9				1.0	
10	SP				
11					
12		At 12 ft., grades to gravelly SAND to sandy GRAVEL ; moist; organic odor.		0.9	
13	GW-SW				
14	SP	Fine SAND ; no odor.		0.8	
14.5	ML	At 14 ft., grades to SILT with some mottling at 14.75 ft; no odor.			
15					
15		Gravelly, fine to coarse SAND ; no odor.		0.8	
16	SW				
17					OIP-31-17
18	ML	At 18 ft., 2 inch SILT lens.		1.1	
19	SP	Gray, fine SAND with trace silt; moist to wet; no odor.			
20		Boring terminated at 20 ft. bgs.		1.3	OIP-31-20

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
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NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-39
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-3	DRILL DATE: 3/10/2020
DRILLED BY: Holt: Mike Running	NORTHING: 292989.8741	EASTING: 1017795.581
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 25.5	DEPTH TO WATER (ft bgs): 9.75
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Railroad spall (fill) ground surface blocked any recovery.			
2					
4					
6	SW	Brown, loose SAND with gravel, silt, and 1 inch black, organic lens at 6 ft. bgs; dry; organic odor.		1.8	
8	ML	Brown, firm, mottled SILT ; moist; no odor. At 9 ft., becomes gray; no odor.		2.0	
10	SP	Gray SAND ; saturated; mild TPH odor; no sheen.		2.1	
12	SM/ML	Gray, silty SAND to SILT with organics (moist wood); no odor.		3.2	
14	SP	Clean SAND ; mild odor; rainbow sheen. Silty SAND ; mild to moderate odor; minor metallic sheen.		3.7	
16	SM			4.1	OIP-39-15-15.5
18				2.1	OIP-39-16.5-17
20	SP	Interbedded clean SAND and silty SAND to SAND ; very slight odor; no sheen. Gray, loose SAND ; saturated; slight pesticide odor; no sheen.		4.2	
22				3.2	OIP-39-21-22
24	SM	Gray, silty SAND ; saturated; no odor.		2.9	
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Ambient PID = 1.7 ppm.

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: OIP-42
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC5	DRILL DATE: 11/21/19
DRILLED BY: HOLT (Mike)	NORTHING: 292857.39	EASTING: 1017689.02
DRILLING EQUIPMENT: Limited Access Drill Rig	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Geoprobe	TOTAL DEPTH (ft bgs): 25	DEPTH TO WATER (ft bgs): 18.5
SAMPLING METHOD: 5' Liners	BORING DIAMETER: 2 inch	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	Fill	Railroad, angular gravelly FILL .			
2		Light brown, fine to medium SAND ; slight odor at 1 ft. bgs; no sheen.		0.2	
4				0.2	
6	SP			0.8	
8		At 8 ft., color changes to dark brown; slight odor; slight sheen.		33.6	
10	ML	Olive gray, organic SILT ; strong odor; moderate sheen.		460.5	
12	SM	Dark brown, silty, fine SAND with thick black product; strong odor; Bunker C-type sheen.		494.6	
14	ML	Olive gray, sandy SILT ; strong odor; heavy sheen.		364.2	
16	SP	Dark Brown, fine to medium SAND ; strong odor; heavy sheen.		1180.0	
18	ML	Olive gray SILT ; strong odor; heavy sheen.		1107.0	OIP42-17-17.5-112119
18		Brown to black, fine to medium SAND with visible product; wet; strong odor; heavy sheen.		1107.0	
20	SP	At 19.5 ft., grades to brown; saturated; slight odor; slight sheen.		1207.0	
22				64.1	
24		At 23 ft., no sheen.		18.0	
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-46

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-6

DRILL DATE:
3/10/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292745.5217

EASTING:
1017672.525

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
8

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft bgs.			
1					
2					
3					
4					
5					
5		Dark brown SAND with angular gravel (fill); no odor; no sheen.			
6	SW			1.6	
7					
7	SM/SP	Brown SAND and silty SAND ; moist; no odor; no sheen.			
8		At 8 ft., becomes wet.		0.7	OIP-46-8
8	SM	At 8.5 ft., becomes saturated.			
9					
10		Interbedded SILT and silty SAND .		1.4	OIP-46-10-11
11	SM/ML				
12					
13	SP	Gray, poorly-graded, medium SAND ; saturated; mild odor; core is shiny, but no sheen.		11.6	
14		Gray to brown, poorly-graded SAND to silty SAND ; no odor; no sheen.		8.6	OIP-46-14
15					
16				1.4	
17	SM/SP				
18					
19					
20		Boring terminated 20 ft. bgs.		1.5	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-47

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-5

DRILL DATE:
3/9/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292858.0696

EASTING:
1017742.196

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
25.5

DEPTH TO WATER (ft bgs):
20

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	FILL	Surficial railroad FILL .			
2	ML	Brown SILT with trace sand; moist; no odor.		3.2	OIP-47-2-3
	SP	Gray-brown, clean, fine to medium SAND ; no odor.			
	ML	Brown SILT with trace sand; moist; no odor.			
4	SP	Brown, fine to medium, clean SAND ; moist; no odor.		1.5	
6		From 6 to 8 ft. bgs, perched water zone.		6.3	
	SM	At 6.5 ft, becomes gray and silty.			
		At 7 ft., grades to SILT ; mild odor; sheen and droplets.			
8	ML			91.0	
10	SP	Poorly-graded SAND ; strong odor; sheen.		710.0	
				786.0	
12		At 11.5 ft., grades to silty SAND ; strong odor.		76.0	OIP-47-11-12
	SM			114.0	
14				133.0	
	SP	At 15 ft., becomes saturated; strong odor.			
16				315.0	OIP-47-17
	SM	Gray, soft, silty SAND ; strong odor.		110.0	
18		At 18 ft., becomes dense.			
20		Clean SAND ; mild odor.			
22	SP			750.0	
		At 22.5 ft., strong odor; brown droplets.		45.0	
		At 23 ft., mild odor; no sheen.		29.0	
24				7.4	OIP-47-25
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH
LOGGED BY:
P. Osterhout

LOCATION:
Longview, WA

BORING ID:
OIP-49

BORING LOCATION:
AOPC-5

DRILL DATE:
3/9/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292829.7502

EASTING:
1017779.565

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
15.25

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Hand cleaed to 2.5 ft. bgs; railroad base fill.			
1					
2					
3	SP	Fine to medium SAND with trace grave; moist; no odor.		0.3	
4		Well-graded, angular, silty GRAVEL ; moist to dry; no odor.		0.5	
5	GM				
6					
7		Interbedded SILT and silty SAND ; moist.		0.2	
8	SP/ML			0.3	
9	SP	At 9 ft., becomes wet, poorly-graded SAND .		168.0	
10		At 9.5 ft., grades to SILT with wood debris. At 10 ft., mild odor.		0.3	OIP-49-10
11	ML				
12				0.3	
13	SP	At 13 ft., 2 inch seam of fine to medium SAND ; strong odor; brown droplets.		38.0	
14		SILT .		713.0	
15	ML	At 14 ft., piece of wood.		5.2	
16		At 15.25 ft., becomes saturated.		2.4	
17	SP	SAND ; strong odor; brown droplets.		25.0	
18		At 17 ft., grades to SILT ; moist.		33.0	OIP-49-17
19	SM	At 18 ft., grades to silty SAND ; wet; no odor.		161.0	
20	SP	At 19 ft., grades to clean SAND ; wet; no odor.		2.5	
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: OIP-52
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC7	DRILL DATE: 11/22/19
DRILLED BY: HOLT (Mike)	NORTHING: 292623.86	EASTING: 1017450.06
DRILLING EQUIPMENT: Limited Access Drill Rig	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Geoprobe	TOTAL DEPTH (ft bgs): 25	DEPTH TO WATER (ft bgs): 21.5
SAMPLING METHOD: 5' Liners	BORING DIAMETER: 2 inch	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	ASPHALT	ASPHALT ground surface.			
0	GW	Angular GRAVEL with some sand (fill).			
2		Brown, fine to medium SAND; moist; no odor; no sheen.		0.2	
4				0.2	
6				4.0	
8		Same as above; no odor; no sheen.		0.6	
10	SP			0.6	
12				0.4	
14		Brown, poorly-graded SAND; no odor; no sheen.		19.6	
16				3.9	
18		Gray, fine poorly graded SAND; moderate odor; moderate sheen.			
18		At 18 ft., grades to silty SAND.		55.9	
20	SM			94.6	OIP52-19-19.5-112219
20				2.4	
22	ML	At 21 ft., grades to SILT; moderate odor; heavy sheen.		221.0	OIP52-22-22.5-112219
22				220.0	
24	SP	Gray SAND; moderate odor; moderate sheen.			
24		At 24 ft., color changes to brown; no odor; no sheen.		121.0	
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: OIP-53
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC7	DRILL DATE: 11/22/19
DRILLED BY: HOLT (Mike)	NORTHING: 292641.02	EASTING: 1017432.46
DRILLING EQUIPMENT: Limited Access Drill Rig	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Geoprobe	TOTAL DEPTH (ft bgs): 25	DEPTH TO WATER (ft bgs): 21
SAMPLING METHOD: 5' Liners	BORING DIAMETER: 2 inch	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	ASPHALT	ASPHALT ground surface.			
0	GW	Angular GRAVEL with some sand (fill).			
2		Brown, fine to medium SAND; moist; no odor; no sheen.		2.4	
4				2.5	
6				2.4	
8	SP	Same as above; no odor; no sheen.		2.4	
10				3.1	
12				2.5	
14	SM	Olive gray, silty, fine SAND with 30% silt; moist; no odor; no sheen.		3.0	
16		Olive gray, fine SAND; no odor; no sheen.		4.5	
18	SP			3.2	
20	SM	Olive gray, silty, SAND; wet; no odor; no sheen.			
22	ML	Olive gray, sandy SILT with moderate plasticity; saturated; no odor; no sheen.		0.5	OIP53-21-21.5-112219
24	SP	Gray to light brown, fine to medium SAND; saturated; no odor; no sheen.			
		Bottom of Boring = 25 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-54

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-7

DRILL DATE:
3/11/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292508.6819

EASTING:
1017439.913

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
18

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; asphalt ground surface.			
1					
2					
3					
4					
5					
5	SW	Brown, loose SAND with gravel and cobbles; damp; no odor.		0.2	
6					
7		Clean, loose SAND with trace gravel; damp; no odor.			
8	SP			0.5	
9					
10		Interbedded clean SAND and well-graded SAND with gravel and trace silt throughout; no odor.		0.4	
11					
12				0.4	
13					
14				0.6	
15	SP/SW				OIP-54-15-16
16				0.6	
17					
18		At 18 ft., becomes wet.		0.7	OIP-54-18-19
19					
20		Becomes saturated at the bottom of the boring. Boring terminated at 20 ft. bgs.		0.7	

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-57
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-4	DRILL DATE: 3/10/2020
DRILLED BY: Holt: Mike Running	NORTHING: 293157.0647	EASTING: 1017913.226
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 15.5	DEPTH TO WATER (ft bgs): Not Discernible
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Hand augered to 6 ft. bgs; railroad spall ground surface over silt and sand.			
1					
2					
3					
4					
5					
6		Brown, mottled SILT ; moist; no odor.			
7	ML			2.4	
8					
9	SP	Brown, loose medium, clean SAND with interbedded fine SAND ; no odor.		2.8	
10					
11	ML	Brown, mottled SILT ; moist; no odor.		2.3	
12					
13	SM/SP	Brown to gray, medium SAND with interbedded, fine, clean SAND and silty SAND .		3.2	
14				3.8	OIP-57-14
15		Boring terminated at 15 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-64

LOGGED BY:
G. Cisneros

BORING LOCATION:
AOPC-6

DRILL DATE:
3/12/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292772.4434

EASTING:
1017549.348

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
14

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	X FILL X	Asphalt ground surface FILL .			
1		Brown, fine to medium SAND ; moist; no odor; no sheen throughout boring.			
2				1.0	
3					
4				0.2	
5					
6				0.3	
7					
8				0.4	
9					
10	SP				
11				1.3	
12					
13					
14	▼	At 14 ft., becomes wet; no odor; no sheen.		1.3	OIP-64-14-15
15				0.2	
16					
17				0.2	
18		Gray, fine to medium SAND with 10% red grains; saturated; no odor; no sheen.		1.1	
19				2.2	
20		Boring terminated at 20 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: OIP-66
LOGGED BY: G. Cisneros	BORING LOCATION: AOPC8	DRILL DATE: 11/22/19
DRILLED BY: HOLT (Mike)	NORTHING: 293018.87	EASTING: 1017712.31
DRILLING EQUIPMENT: Limited Access Drill Rig	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Geoprobe	TOTAL DEPTH (ft bgs): 20	DEPTH TO WATER (ft bgs): 17
SAMPLING METHOD: 5' Liners	BORING DIAMETER: 2 inch	

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0	FILL	Gravel, rounded, base FILL.			
1		Brown, fine to medium SAND; no odor; no sheen.			
2					
3					
4	SP				
5					
6					
7	ML	Olive gray SILT with moderate plasticity and some organics; moist; slight odor; moderate sheen.			
8					
9	SP	Brown, medium to coarse SAND; slight odor.			
10	SM	Olive gray, silty SAND; moderate sheen.			
11	ML	Olive gray SILT with low plasticity; moist to wet; strong odor; moderate sheen.			
12					OIP66-12-12.5-112219
13	SP	Brown, medium to coarse SAND; moist; strong odor; heavy sheen.			OIP166D-12-12.5-112219
14					
15	SM	Olive gray, silty, fine SAND; wet; slight odor; slight sheen.			
16		Olive gray, fine to medium SAND; wet, slight odor, slight sheen.			
17					
18	SP				
19					
20		Bottom of Boring = 20 ft. bgs			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES: No PID readings were recorded at this location.

PROJECT:
POL-TPH
LOGGED BY:
P. Osterhout

LOCATION:
Longview, WA

BORING ID:
OIP-67

BORING LOCATION:
AOPC-6

DRILL DATE:
3/12/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
293057.3205

EASTING:
1017737.221

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
25.5

DEPTH TO WATER (ft bgs):
14

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
14-19

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0	GP	Brown, loose, sandy GRAVEL ground surface; no odor.			
2		No recovery.		2.0	
6	SM	Dark brown, loose, silty SAND ; dry; no odor.		3.1	
8	ML	At 6 ft., grades to brown SILT with trace organics; dry to moist; no odor; no sheen.			OIP-67-7-8
10	SM/SP	Gray/brown SAND and silty SAND ; moist; moderate to strong odor; heavy sheen and slight brown droplets.		5.5	
12		Gray/brown, interbedded silty SAND and sandy SILT ; moderate to strong odor; heavy sheen throughout.		188.0	
14				573.0	OIP-67-11-12
16	SM/ML			499.0	
18		At 18 ft., odor dissipates; no sheen.		268.0	OIP-67-GW-14-19 OIP-67-14.5-15 OIP-67-18-19
20		Clean SAND ; no odor; no sheen.		358.0	
22	SP			5.2	
24	ML	SILT ; no odor.		1.5	
25	SP	Clean, poorly-graded SAND ; no odor; no sheen.		2.7	
		Boring terminated at 25 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-68

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-6

DRILL DATE:
3/11/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
293091.7803

EASTING:
1017765.909

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
14

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
13-18

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		GRAVEL ground surface.			
1		Brown, loose, organic-rich, sandy, silty GRAVEL ; dry; no odor.			
2	GW			2.1	
3					
4	SP	Gray, fine to medium, loose, clean SAND with trace gravels; moist; no odor.		1.4	
5					
6		At 6 ft., becomes silty SAND .		1.3	
7					
8	SM			1.4	
9					
10		Gray, clayey SILT ; moist.		1.2	OIP-68-10-11 OIP-68D-10-11
11	ML				
12		Gray, silty SAND ; moist; no odor.		1.5	
13					
14		Gray, silty SAND and SAND with silt; wet to saturated; no odor; no sheen.		1.9	
15					OIP-68-GW-13-18 OIP-68-13.5-14 OIP-68-14-14.5
16	SM			1.4	
17					
18				1.4	
19					
20		Boring terminated at 20 ft. bgs.		1.0	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-69
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-4	DRILL DATE: 3/11/2020
DRILLED BY: Holt: Mike Running	NORTHING: 293233.2984	EASTING: 1017871.838
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 20.5	DEPTH TO WATER (ft bgs): 12
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: 12-17

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		GRAVEL ground surface with organics and roots.			
1		Brown, loose, sandy, silty GRAVEL ; moist; no odor.			
2	GW			0.9	
3	SP	Light brown, loose, fine, clean SAND ; moist; no odor.			
4		Gray, very fine, firm, silty SAND ; moist.		0.9	
5	SM				
6		Light brown, loose, fine, clean SAND with some laminations of silty sand; moist; no odor.		1.2	
7					
8	SM/SP			1.9	
9					
10		Gray, firm to soft CLAY with 5-10% organics; no odor.		1.0	
11	CH				OIP-69-11-12
12	SM	Gray, very fine, silty SAND ; wet to saturated; no odor; no sheen.		1.5	
13	ML	SILT.		1.1	
14	SM	Silty SAND .		1.2	OIP-69-GW-12-17 OIP-69-14.5-15
15		Medium, loose, clean SAND ; saturated; no odor; no sheen.			
16					
17	SP			1.3	
18					
19					
20		Boring terminated at 20 ft. bgs.		0.8	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:
Turbidity of temp well at time of sample collection = 6.4 NTU

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-70

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-4

DRILL DATE:
3/10/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
293256.003

EASTING:
1018014.246

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
15.5

DEPTH TO WATER (ft bgs):
14

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/ Recovery	PID (ppm)	Sample ID
0		Hand auger to 5 ft. bgs; grass and gravel ground surface.			
1					
2					
3	GW/SW				
4					
5	SW	Brown, loose, well-graded SAND ; saturated (perched groundwater); no odor; no sheen. At 5.5 ft., grades to silty SAND .		10.3	
6					
7					
8				10.2	OIP-70-8
9	SM				
10				5.8	
11		At 11 ft., turns gray and brown.			
12		At 12 ft., becomes denser, very fine, silty SAND to sandy SILT ; wet; no odor; no sheen.		0.6	OIP-70-GW-10-15 OIP-70-12-14
13	SM/ML				
14	SP	Coarse, gray SAND ; wet to saturated; no odor; no sheen.		0.7	
15		Boring terminated at 15 ft. bgs.			

ABBREVIATIONS:

ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

PROJECT:
POL-TPH

LOCATION:
Longview, WA

BORING ID:
OIP-72

LOGGED BY:
P. Osterhout

BORING LOCATION:
AOPC-5

DRILL DATE:
3/11/2020

DRILLED BY:
Holt: Mike Running

NORTHING:
292891.335

EASTING:
1017843.702

DRILLING EQUIPMENT:
LAR Geoprobe

COORDINATE SYSTEM:
NAD 83 WA SP S

DRILLING METHOD:
Direct Push

TOTAL DEPTH (ft bgs):
20.5

DEPTH TO WATER (ft bgs):
15

SAMPLING METHOD/SAMPLER LENGTH:
5' x 2" Liner

BORING DIAMETER:
2 inch

TEMP. WELL INTERVAL:
Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; concrete ground surface.			
1					
2					
3					
4					
5	SP	Clean, loose, medium SAND ; moist; no odor; no sheen.		0.9	
6		Brown, fine to very fine, silty SAND interbedded with sandy to clayey SILT with <10% wood/organics; moist to saturated; no odor; no sheen. From 6 to 13 ft. bgs, perched aquifer.			
7				1.2	
8	SM/ML				
9				8.2	
10		Coarse SAND with silt; moderate odor; rainbow sheen.		11.2	OIP-72-10-11
11		At 11 ft., odor becomes mild; sheen becomes minimal.			
12	SM				
13				17.0	
14	ML	At 13.5 ft., chunk of wood present; moderate odor; sheen visible on core. Gray/brown, firm SILT ; mild odor; no sheen.			
15		Interbedded SAND and silty SAND ; wet to saturated; no odor; no sheen.		2.3	
16				3.1	
17	SM/SP	At 16.5 ft., becomes saturated; moderate odor; sheen on core.		26.2	OIP-72-16-17
18		At 18 ft., odor dissipates; slight sheen.		19.0	
19					
20		Boring terminated at 20 ft. bgs.		1.3	

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

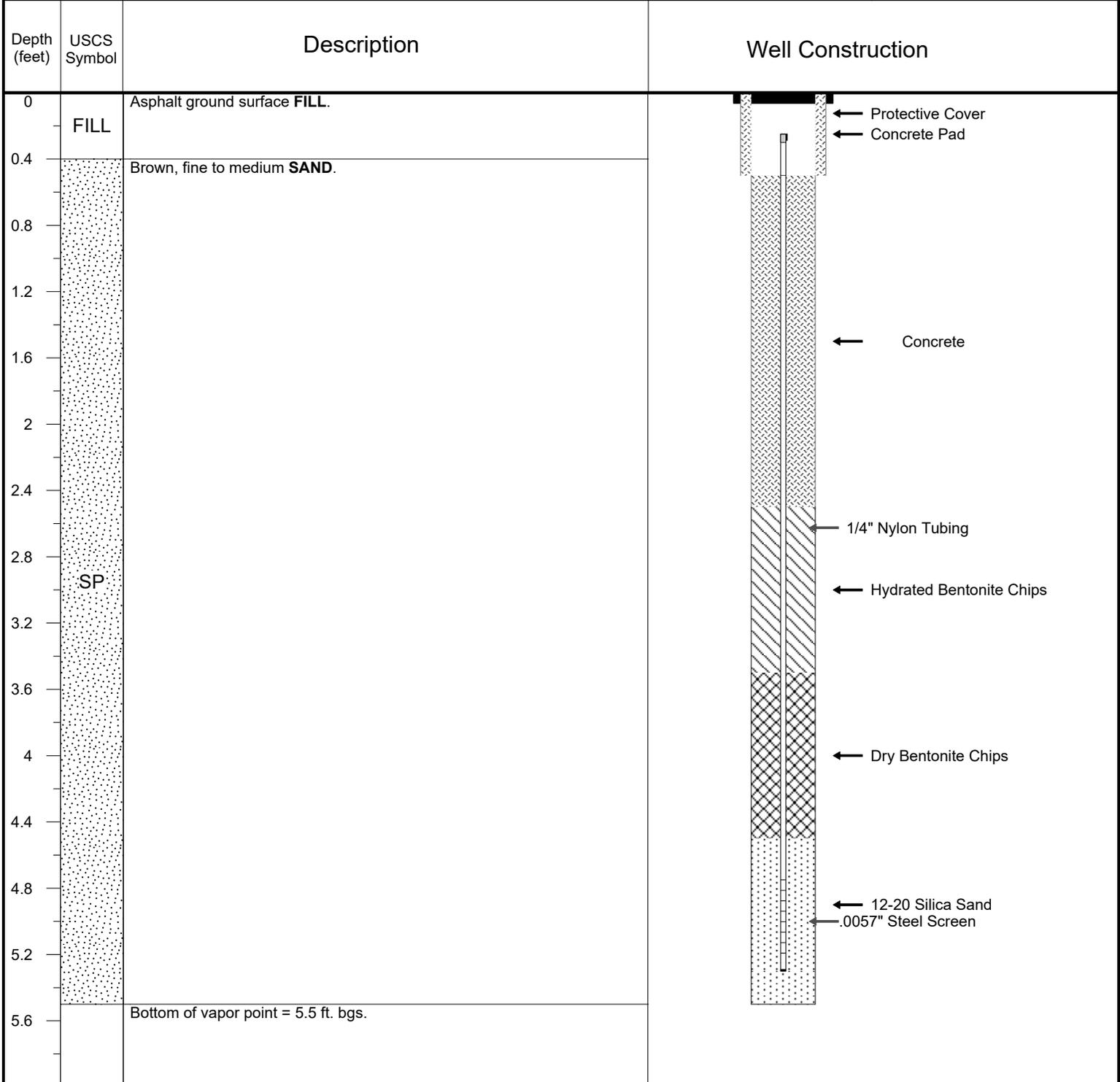
PROJECT: POL-TPH	LOCATION: Longview, WA	BORING ID: OIP-73
LOGGED BY: P. Osterhout	BORING LOCATION: AOPC-4	DRILL DATE: 3/12/2020
DRILLED BY: Holt: Mike Running	NORTHING: 293169.6157	EASTING: 1018034.585
DRILLING EQUIPMENT: LAR Geoprobe	COORDINATE SYSTEM: NAD 83 WA SP S	
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 15.5	DEPTH TO WATER (ft bgs): 13
SAMPLING METHOD/SAMPLER LENGTH: 5' x 2" Liner	BORING DIAMETER: 2 inch	TEMP. WELL INTERVAL: Not Applicable

Depth (feet)	USCS Symbol	Soil Description	Drive/Recovery	PID (ppm)	Sample ID
0		Airknifed to 5 ft. bgs; Gravel ground surface.			
1					
2					
3	GW/SW				
4					
5		Brown, loose, medium SAND with gravel; moist; no odor; no sheen.			
6	SW			0.8	
7	ML	At 7 ft., 3 inches of brown SILT . At 7.25 ft., transitions to gray.			
8	SW			0.7	
9	SM	Silty SAND .			OIP-73-9-10
10		Brown, poorly-graded SAND ; moist; no odor; no sheen.		0.9	
11					
12	SP			0.3	
13		At 13 ft., becomes saturated.			OIP-73-13-14 OIP-73D-13-14
14	SM	Lenses of silty SAND .			
15	SP	Clean SAND .			
15		Boring terminated at 15 ft. bgs.			

ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES:

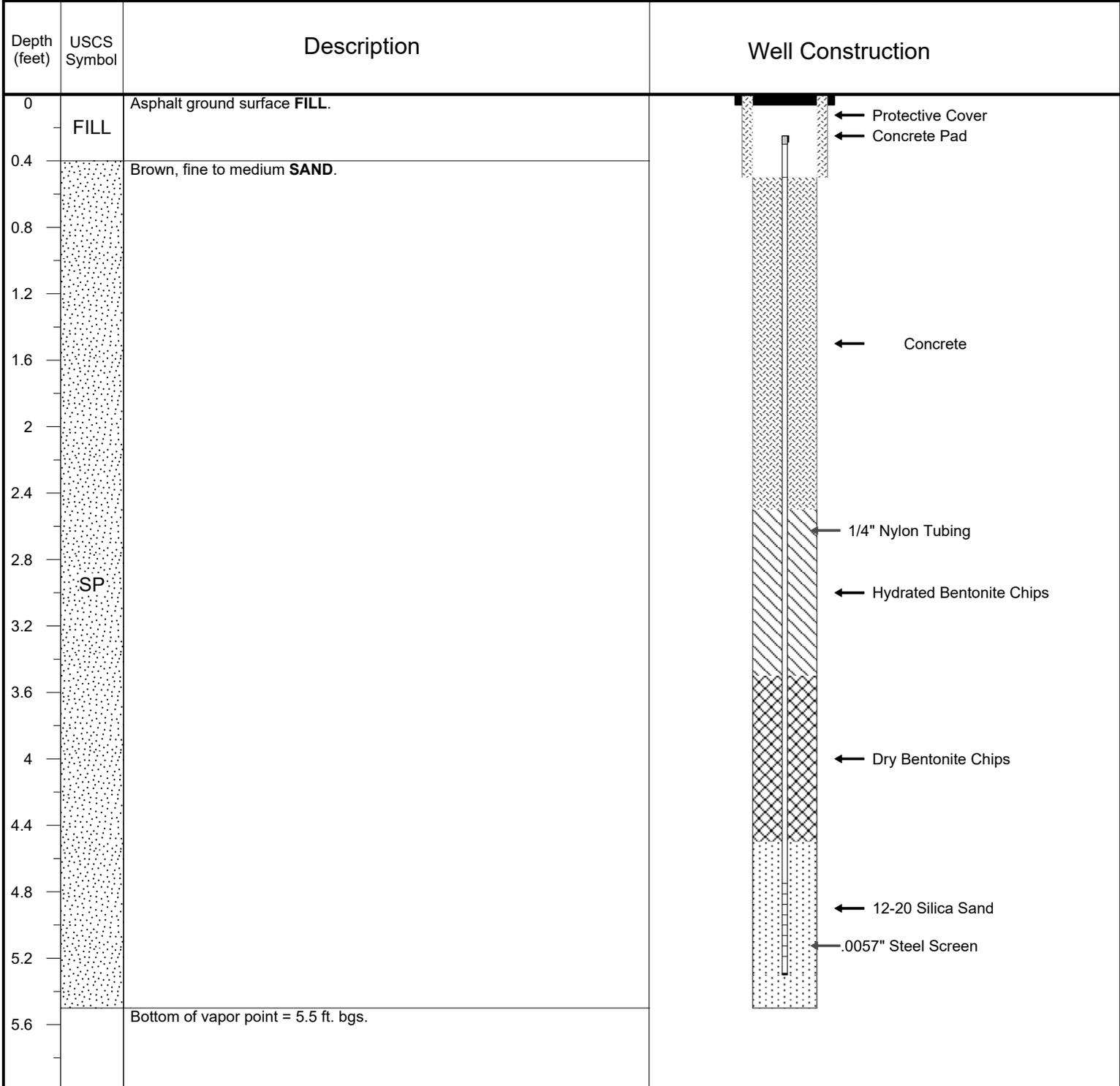
PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: VP-1
DRILL DATE: 3/11/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 938
DRILLED BY: Holt: Mike Running	LOGGED BY: G. Cisneros	NORTHING: 292929.39
		EASTING: 1017680.61
DRILLING EQUIPMENT: LAR Geoprobe	GROUND SURFACE ELEV.: 27.05	TOC ELEVATION: 26.69
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 5.5	DEPTH TO WATER (ft bgs): Not Encountered
SAMPLING METHOD: Not Applicable	BORING DIAMETER: 2 inch	SCREENED INTERVAL: 4.75-5.25



ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES: No samples collected for drive/recovery, PID, or analytical sampling.

PROJECT: POL-TPH	LOCATION: Longview, WA	WELL ID: VP-2
DRILL DATE: 3/11/2020	COORDINATE SYSTEM: NAD 83 WA SP S/ NAVD88	ECOLOGY WELL ID: BME 939
DRILLED BY: Holt: Mike Running	LOGGED BY: G. Cisneros	NORTHING: 292840.01
DRILLING EQUIPMENT: LAR Geoprobe	GROUND SURFACE ELEV.: 27	EASTING: 1017581.2
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft bgs): 5.5	DEPTH TO WATER (ft bgs): Not Encountered
SAMPLING METHOD: Not Applicable	BORING DIAMETER: 2 inch	SCREENED INTERVAL: 4.75-5.25



ABBREVIATIONS:
ft bgs = feet below ground surface USCS = Unified Soil Classification System
ppm = parts per million ▼ = denotes groundwater table

NOTES: No samples collected for drive/recovery, PID, or analytical sampling.

Surface

Project: POL-TPH	Test Pit Sampling Sheet	Date: 3/12/20
Test Pit # Surface Sample	P3	
Total Depth	6 inches	
Lithology?	Brown, fine to coarse sand & gravel with rip rap; no odor; no sheen.	
Depth to Native	No native	
Photo taken (list ID#)?	yes	
Photo with ruler?	N/A	
Presence of debris? Depth?	None	
PID Concentration (ppm) & Depth?	0.1 ppm 0-6"	
Sheen?	None	
Odor?	None	
GPS measurement taken?	No satellites available below Berth	
Other Observations:	Just below pipe E & with rip rap ~ 21 feet south of Bulkhead	
Samples Details (ID, depth, date, time, analyses) collected at depths of Lead? cPAH? GRO/DRO?	P3-0-0.5 @ 1440	

Surface

Project: POL-TPH	Test Pit Sampling Sheet	Date: 3/12/20
Test Pit # Surface Sample	P4	
Total Depth	6 inches	
Lithology?	Rip Rap Armor: Brown sand & gravel accumulated with riprap; no odor; no sheen	
Depth to Native	N/A	
Photo taken (list ID#)?	yes	
Photo with ruler?	N/A	
Presence of debris? Depth?	N/A - None except for riprap	
PID Concentration (ppm) & Depth?	0.1 ppm 0-6"	
Sheen?	None	
Odor?	None	
GPS measurement taken?	N/A	
Other Observations:	East & below pipe E & with riprap of unknown thickness; ~21 feet south of Bulkhead	
Samples Details (ID, depth, date, time, analyses) collected at depths of Lead? cPAH? GRO/DRO?	P4-0-0.5 @ 1450	

Surface

Project: POL-TPH	Test Pit Sampling Sheet	Date: 3/12/20
Test Pit # Surface Sample	P5	
Total Depth	6 inches	
Lithology?	Brown fine sand w/ some gravel; no odor; no sheen	
Depth to Native	N/A	
Photo taken (list ID#)?	yes	
Photo with ruler?	No	
Presence of debris? Depth?	N/A Some wood debris & soft disturbed soil @ top 1 inch	
PID Concentration (ppm) & Depth?	0.0 ppm 0-6 inches	
Sheen?	None	
Odor?	None	
GPS measurement taken?	N/A	
Other Observations:	Soil disturbed @ top 1 inch. Adjacent to pipes A & B ~ 3 to 11 ft south of bulkhead.	
Samples Details (ID, depth, date, time, analyses) collected at depths of Lead? cPAH? GRO/DRO?	P5-0-0.5 @ 1455	

Project: <u>POC-TPH</u> <u>Surface</u> Test Pit Sampling Sheet		Date: <u>3/12/20</u>
Test Pit # <u>Surface Sample</u>	<u>P6</u>	
Total Depth	<u>6-12"</u>	
Lithology?	<u>Brown, dense, fine to medium SAND; no odor;</u> <u>NO Sheen</u>	
Depth to Native	<u>N/A</u>	
Photo taken (list ID#)?	<u>yes</u>	
Photo with ruler?	<u>no</u>	
Presence of debris? Depth?	<u>yes, abundant wood, fabric & other debris</u> <u>in top 6 inches. Soft disturbed soil, that appears</u> <u>to be fresh soil in top 6 inches</u>	
PID Concentration (ppm) & Depth?	<u>0.0 ppm</u>	
Sheen?	<u>None</u>	
Odor?	<u>None</u>	
GPS measurement taken?	<u>N/A</u>	
Other Observations:	<u>Abundant debris & soft disturbed soil</u> <u>in top 6 inches including cloth fabric NOT in place.</u> <u>Removed top 6 inches to collect a representative sample</u>	
Samples Details (ID, depth, date, time, analyses) collected at depths of Lead? cPAH? GRO/DRO?	<u>P6-6.0-12.0 @ 1315</u> <u>P6-0.5-1.0' @ 1315</u> <u>P6-0.5-1.0 D @ 1320 Duplicate</u>	

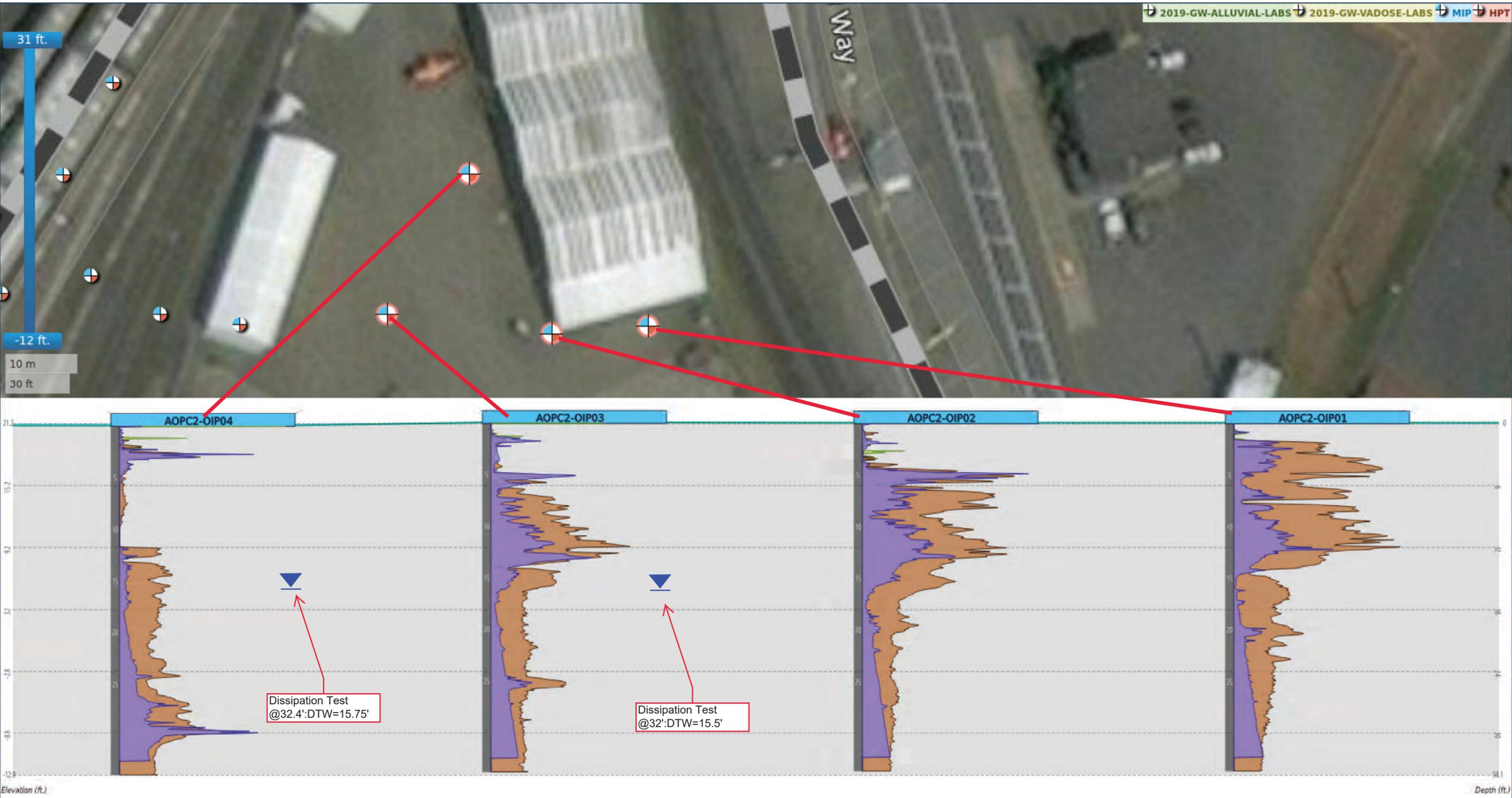
Remedial Investigation/Feasibility Study

Port of Longview TPH Site

Appendix K OIP Results and Fluorescence Response Cross Sections

Former 80,000-Barrel AST Area

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

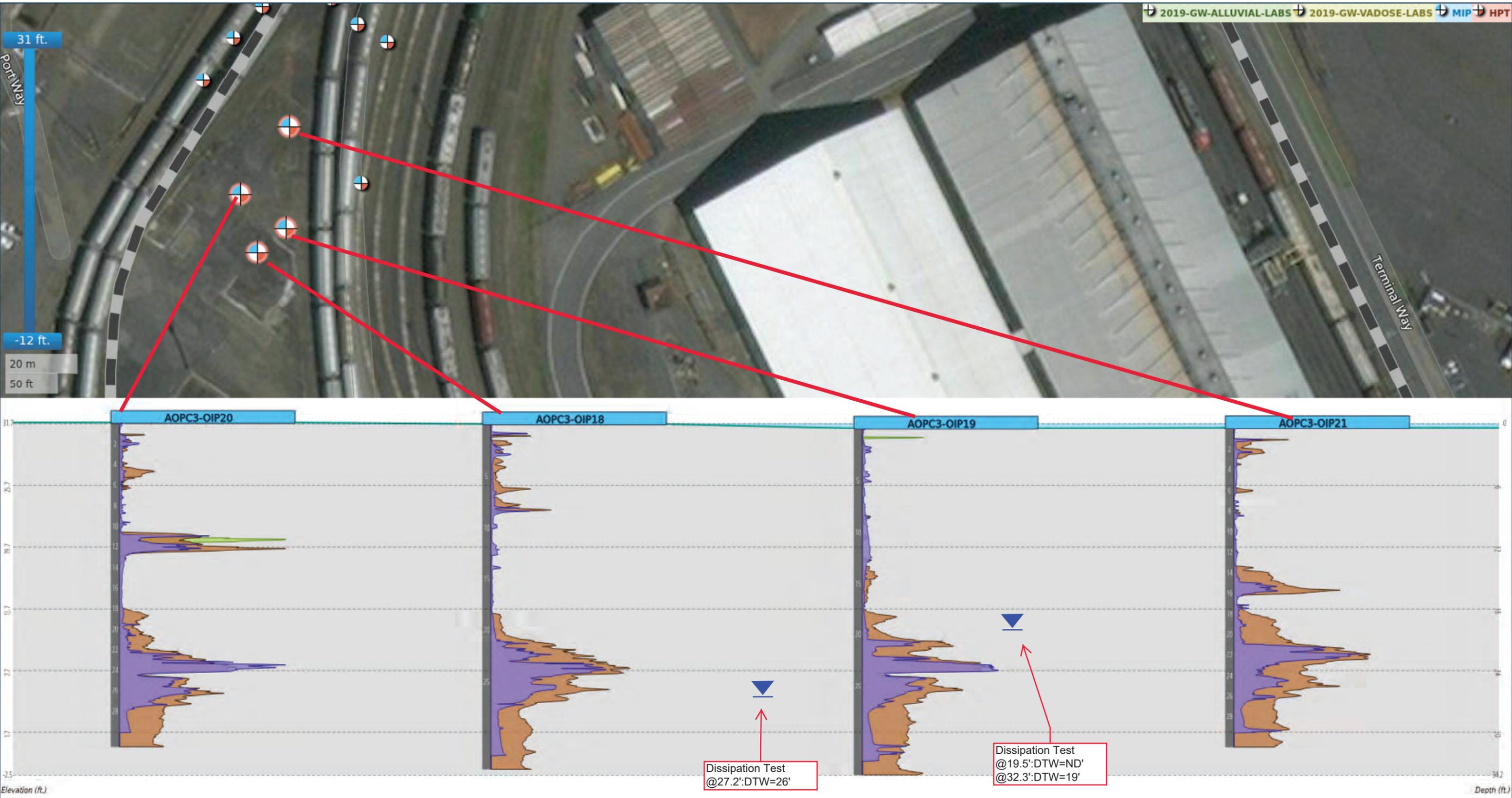


Legend

- Fluorescence
- EC
- HPT Pressure

Former Mechanic's Shop Area

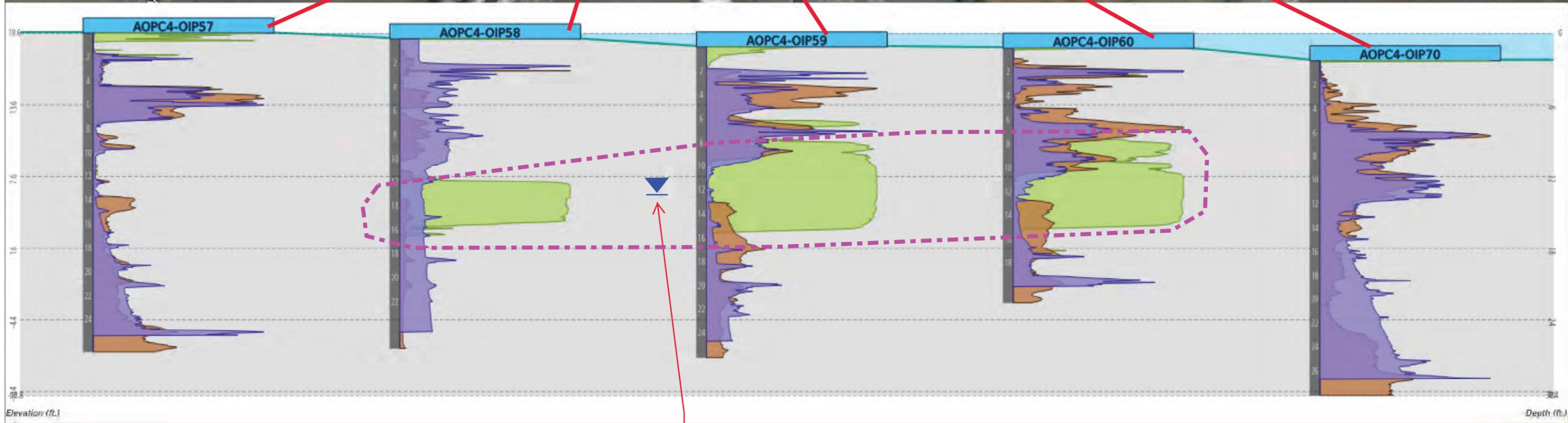
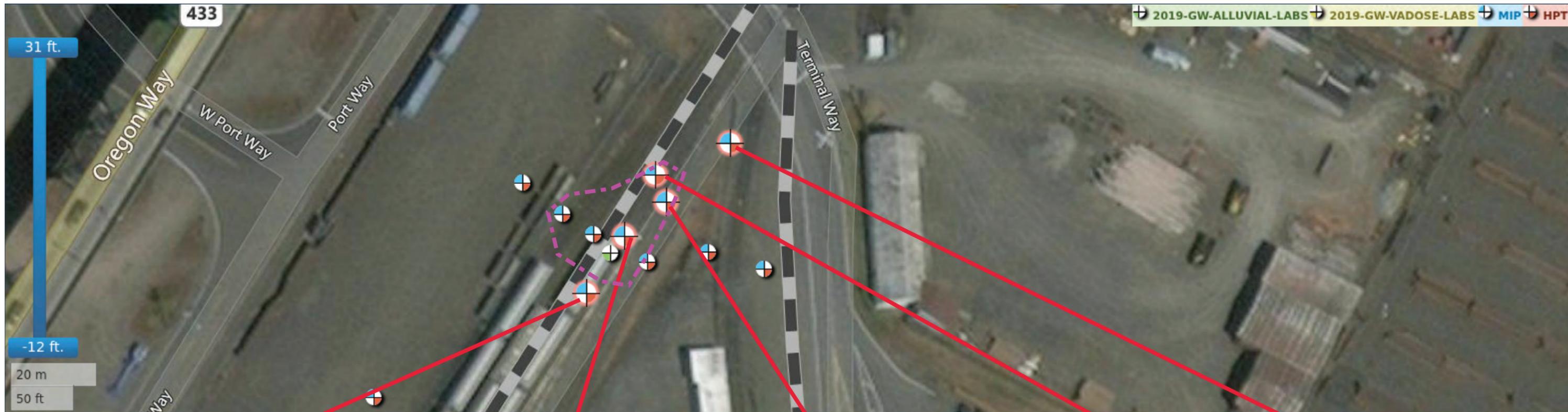
Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Northern Portion of the Former Standard Pipeline Area

N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Tests
 @17.85':DTW=13.75'
 @25.05':DTW=13.75'

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

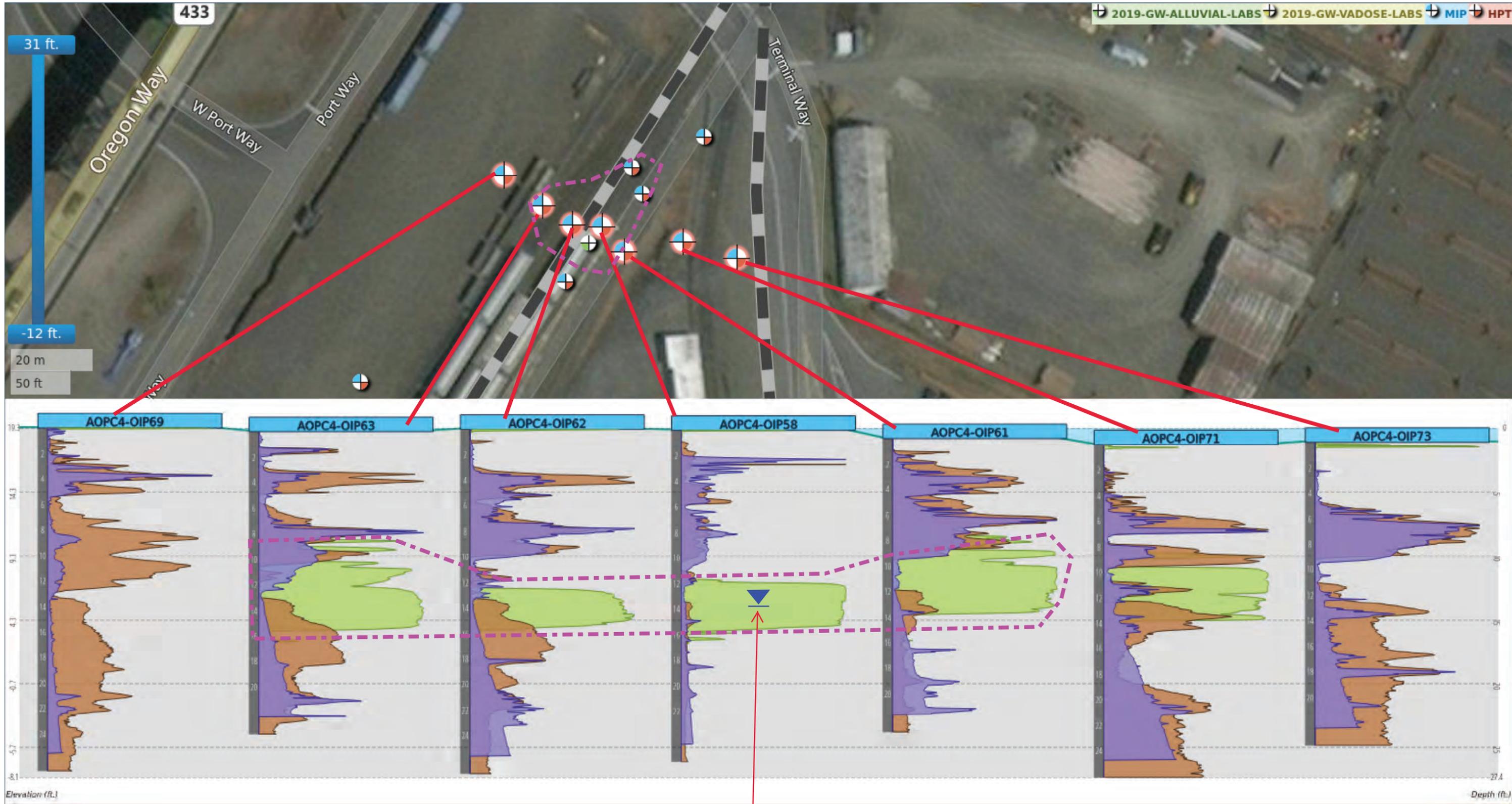
Legend

Fluorescence EC HPT Pressure

Northern Portion of the Former Standard Pipeline Area

E-W Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



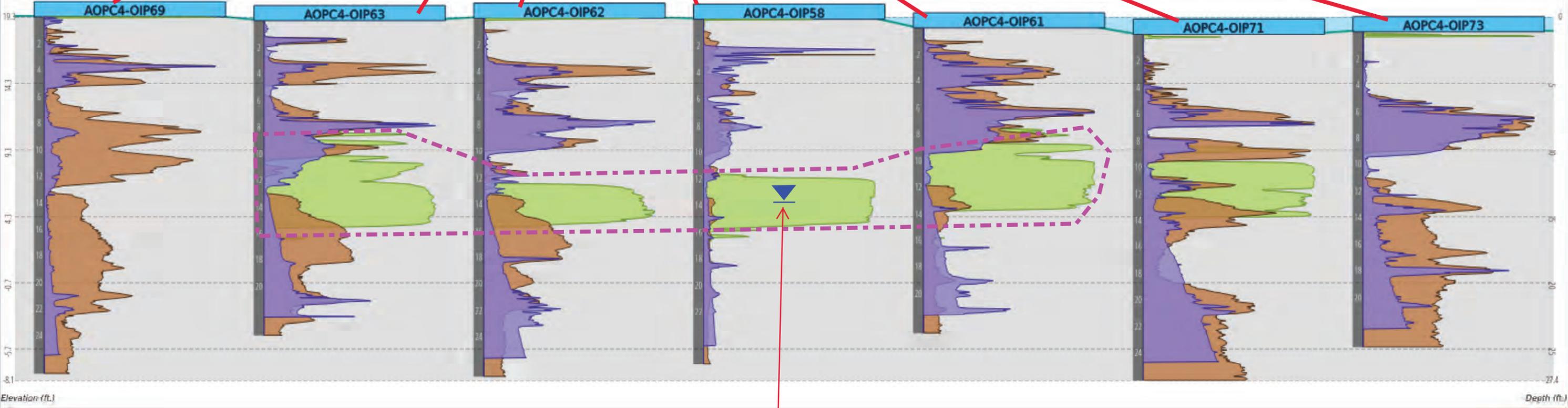
31 ft.

-12 ft.

20 m

50 ft

2019-GW-ALLUVIAL-LABS 2019-GW-VADOSE-LABS MIP HPT



Elevation (ft.)

Depth (ft.)

Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Dissipation Tests
@17.85':DTW=13.75'
@25.05':DTW=13.75'

Legend

Fluorescence EC HPT Pressure

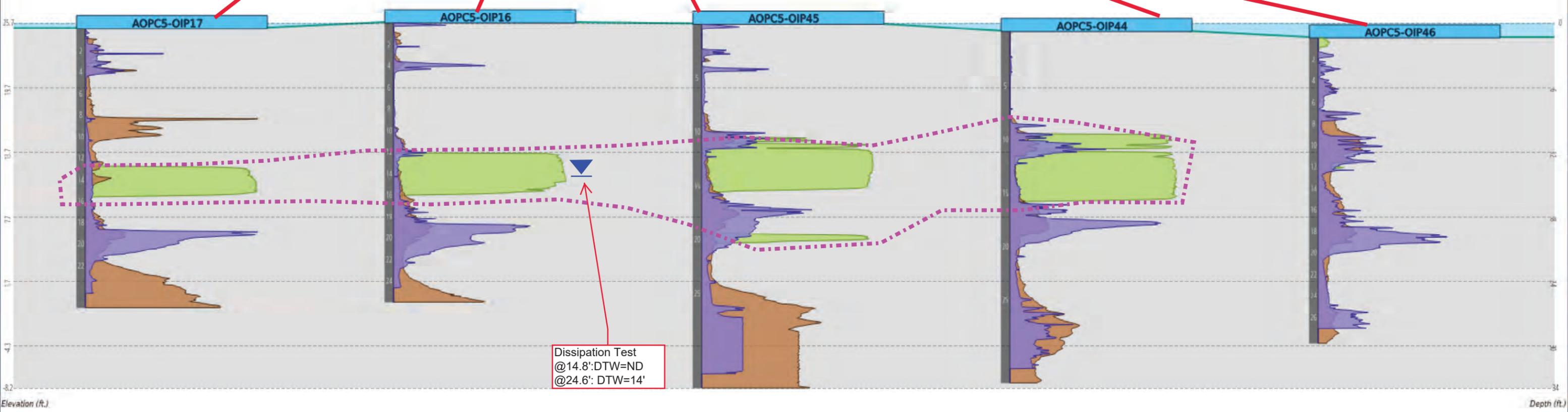
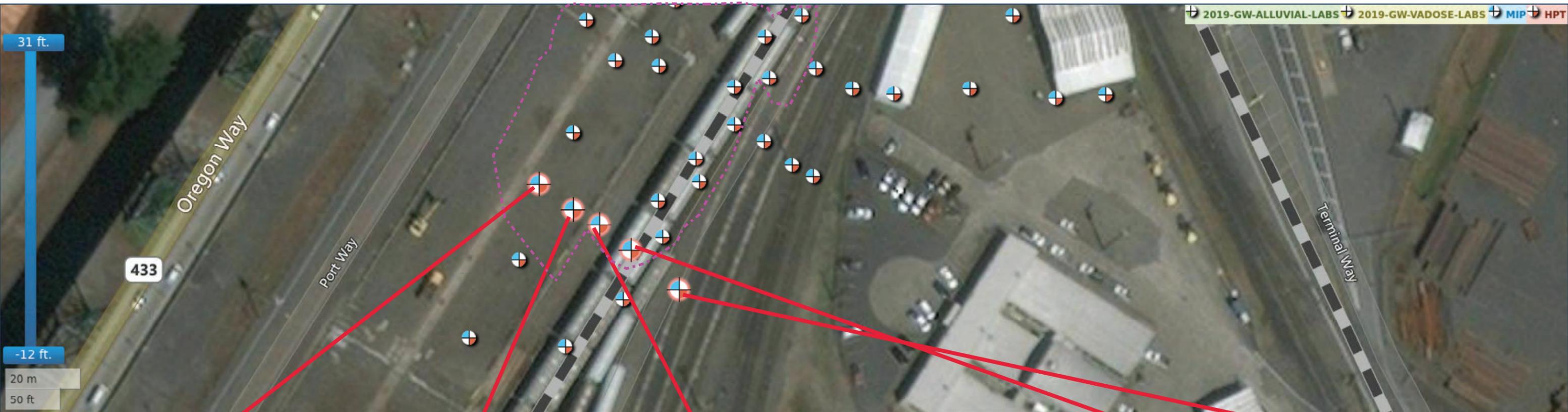
Pipelines and Former Loading Rack Area N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Pipelines and Former Loading Rack Area E-W Southern Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

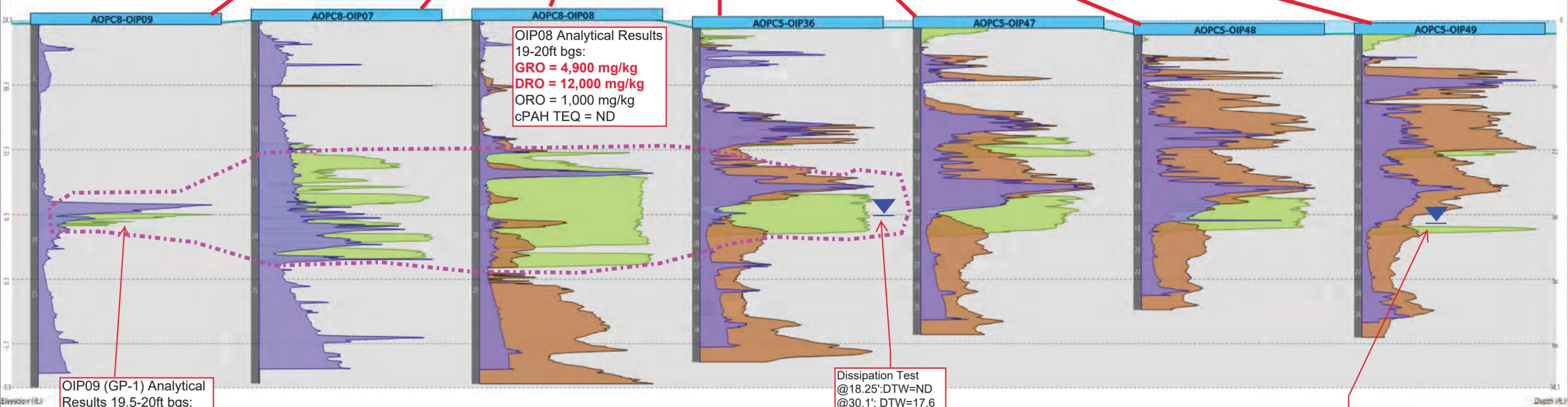


Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS



Pipelines and Former Loading Rack Area E-W Central Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



OIP08 Analytical Results
19-20ft bgs:
GRO = 4,900 mg/kg
DRO = 12,000 mg/kg
ORO = 1,000 mg/kg
cPAH TEQ = ND

OIP09 (GP-1) Analytical Results 19.5-20ft bgs:
GRO = 18 mg/kg
DRO = 280 mg/kg
ORO = ND

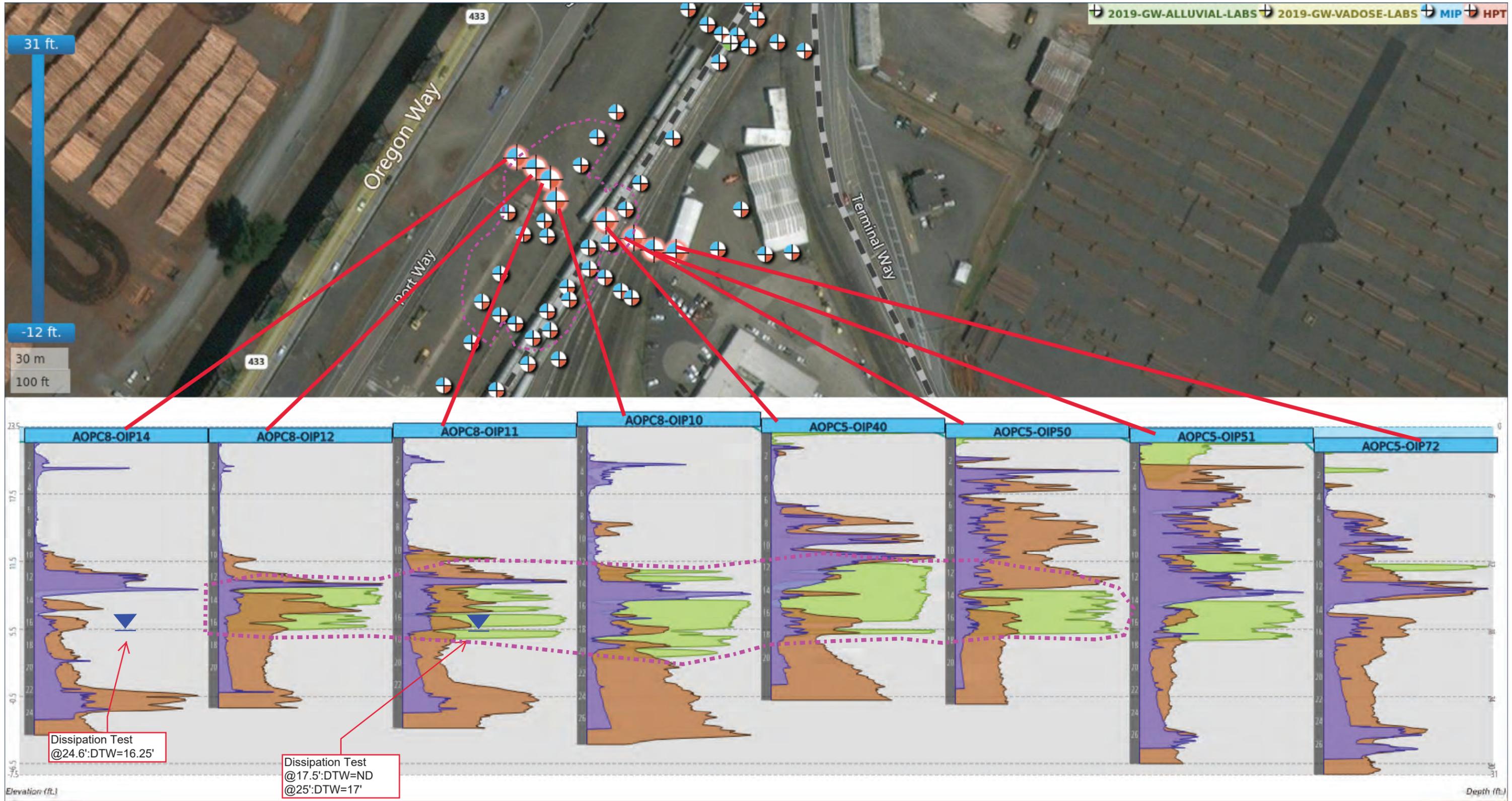
Dissipation Test
@18.25': DTW=ND
@30.1': DTW=17.6

Dissipation Test
@19.9': DTW= 17.3
@27.25': DTW=17.3

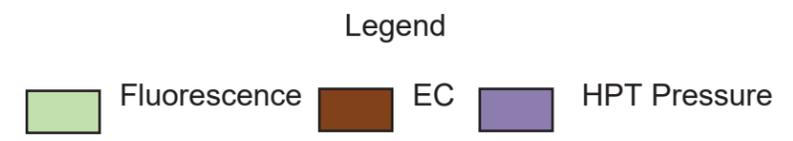
Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Pipelines and Former Loading Rack Area E-W Northern Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.

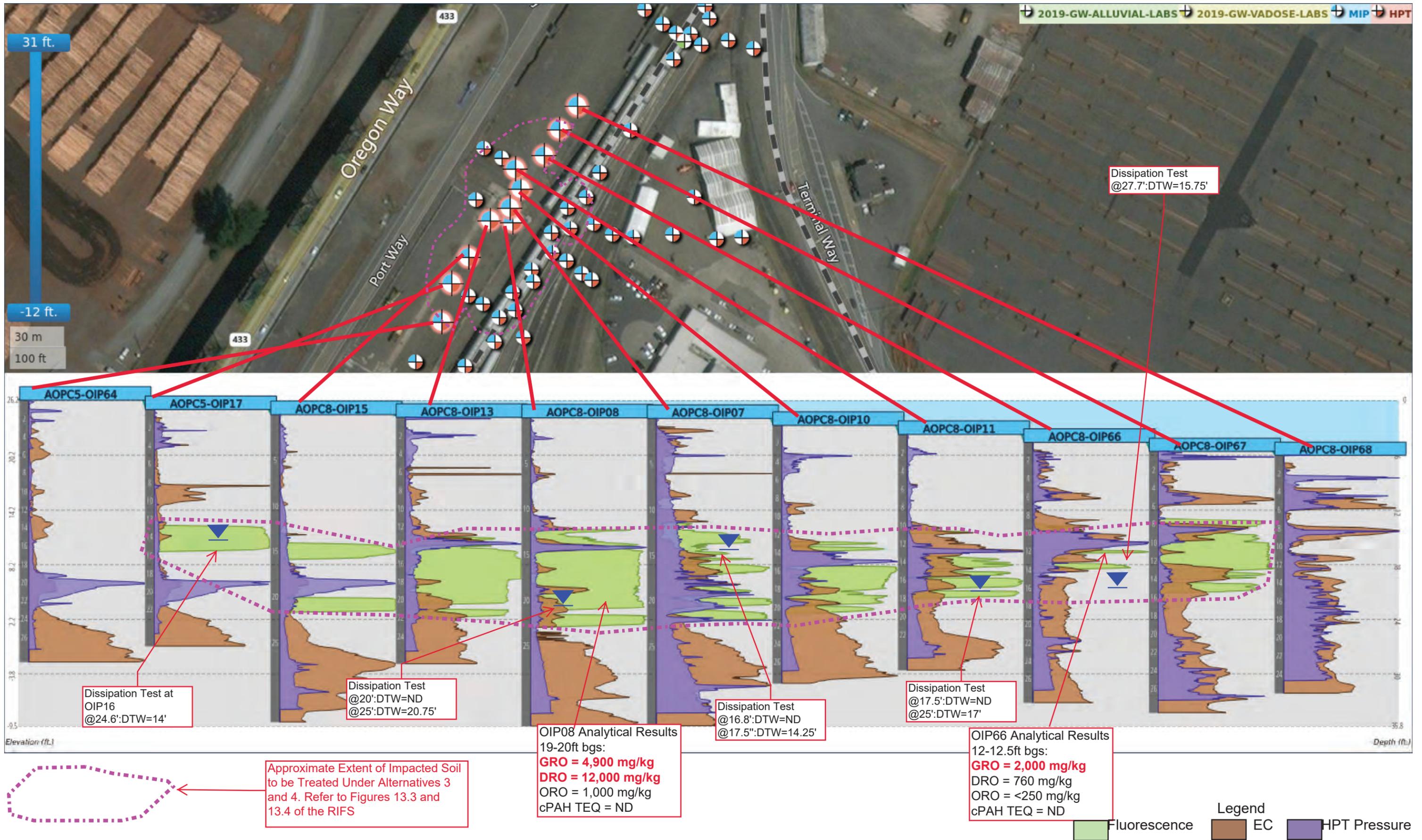


Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS



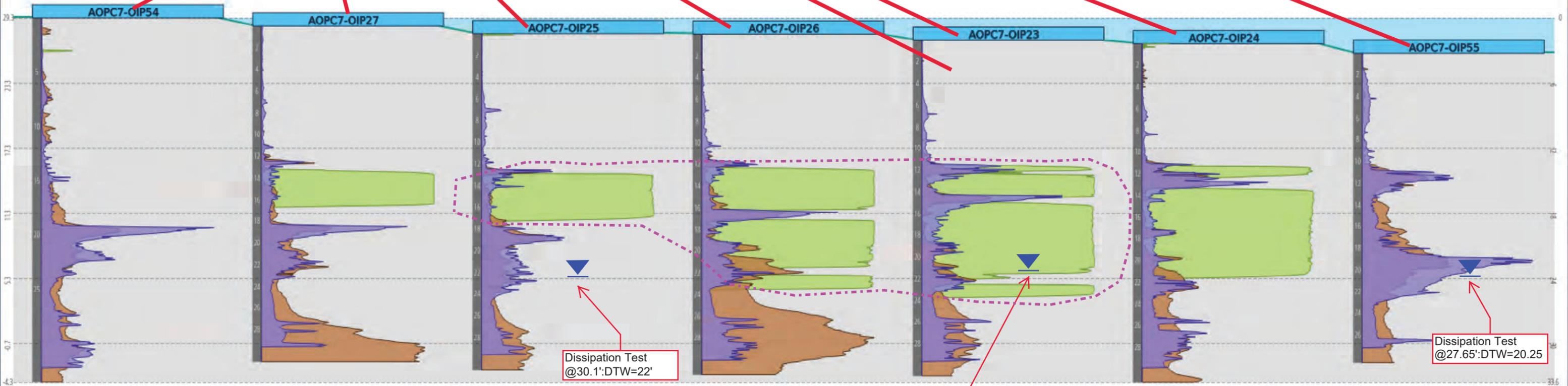
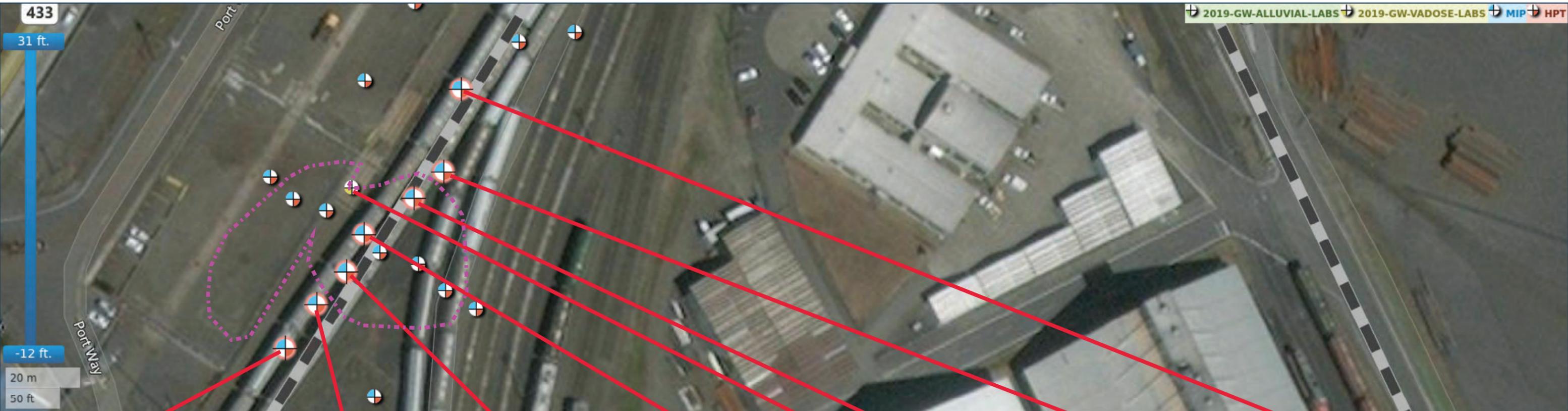
Former Calloway Ross and Warehouse 9 Area N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Monitoring Wells MW-26 and MW-28 Area N-S Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



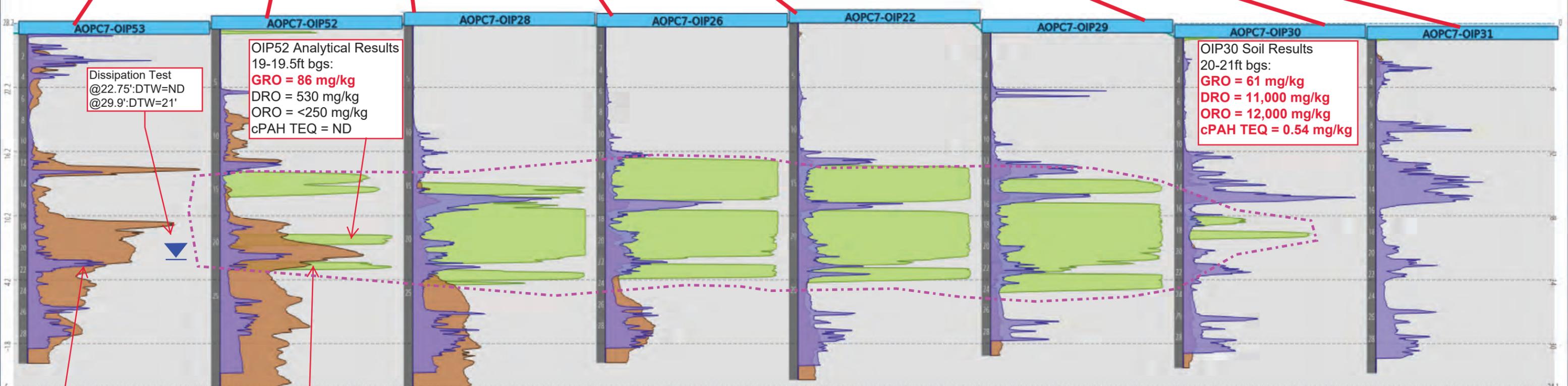
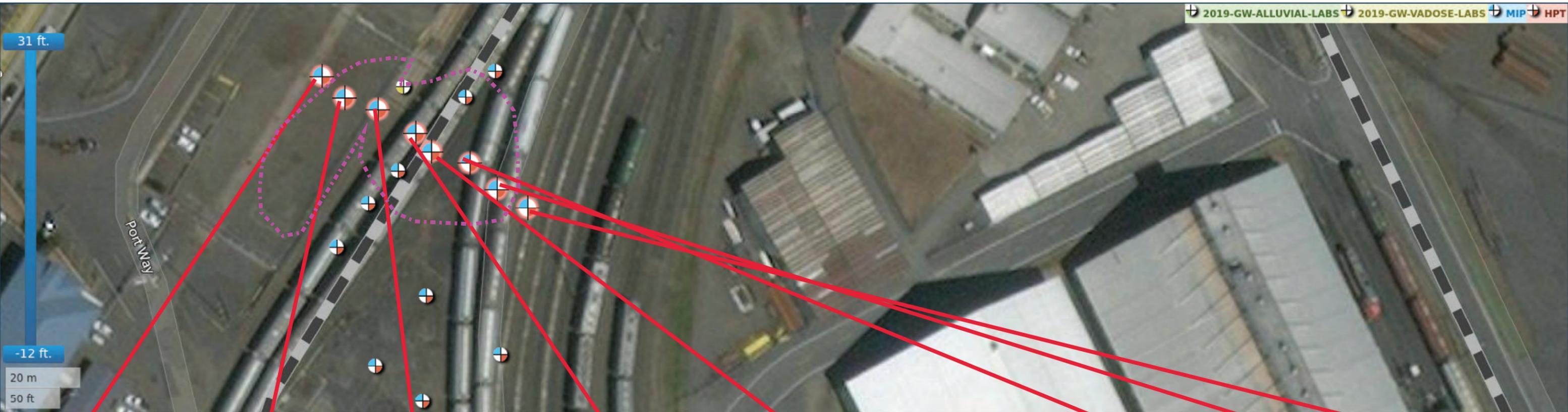
Approximate Extent of Impacted Soil to be Treated Under Alternatives 3 and 4. Refer to Figures 13.3 and 13.4 of the RIFS

Dissipation Test @30':DTW=21.2

Legend
■ Fluorescence
■ EC
■ HPT Pressure

Monitoring Wells MW-26 and MW-28 Area E-W Transect

Transects and cross sections were created in Columbia Technologies' web-based software Smart Data Solutions®, a real-time data, information processing, and visualization platform.



Dissipation Test
@22.75':DTW=ND
@29.9':DTW=21'

OIP52 Analytical Results
19-19.5ft bgs:
GRO = 86 mg/kg
DRO = 530 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

OIP30 Soil Results
20-21ft bgs:
GRO = 61 mg/kg
DRO = 11,000 mg/kg
ORO = 12,000 mg/kg
cPAH TEQ = 0.54 mg/kg

OIP53 Analytical Results
21-21.5ft bgs:
GRO = <5 mg/kg
DRO = <50 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

OIP52 Analytical Results
22-22.5ft bgs:
GRO = 260 mg/kg
DRO = 2,200 mg/kg
ORO = <250 mg/kg
cPAH TEQ = ND

Approximate Extent of Impacted Soil
to be Treated Under Alternatives 3
and 4. Refer to Figures 13.3 and
13.4 of the RIFS

