

Groundwater Sampling Summary

Event 5, Fourth Quarter 2018

Final Supplemental Groundwater Sampling and Data Evaluation
Northwest Pipe Company, Portland, Oregon ECSI #138

Prepared for

Northwest Pipe Company

February 8, 2019



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Table 1

Groundwater Elevation Measurements
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

Well ID	Measurement Point Elevation (NGVD 29, ft)	Ground Surface Elevation (NGVD 29, ft)	Measurement Date	Depth to Water (ft bgs)	Elevation (NGVD 29, ft)
MW-01	30.64	30.99	10/25/2016	12.96	17.68
			1/10/2017	11.60	19.04
			1/30/2017	11.23	19.41
			4/25/2017	9.64	21.00
			7/24/2017	11.05	19.59
			12/4/2018	13.89	16.75
MW-02	27.66	27.97	10/25/2016	10.04	17.62
			1/10/2017	8.70	18.96
			1/30/2017	8.22	19.44
			4/25/2017	6.66	21.00
			7/24/2017	8.16	19.50
			12/4/2018	10.98	16.68
MW-03	29.15	29.38	10/25/2016	11.63	17.52
			1/10/2017	10.20	18.95
			1/30/2017	9.69	19.46
			4/25/2017	8.09	21.06
			7/24/2017	9.82	19.33
			12/4/2018	12.66	16.49
MW-04	30.12	30.77	10/25/2016	12.50	17.62
			1/10/2017	11.07	19.05
			1/30/2017	10.62	19.50
			4/25/2017	9.00	21.12
			7/24/2017	10.64	19.48
			12/4/2018	13.49	16.63
MW-05	30.38	30.74	10/25/2016	12.70	17.68
			1/10/2017	11.38	19.00
			1/30/2017	10.98	19.40
			4/25/2017	9.44	20.94
			7/24/2017	10.82	19.56
			12/4/2018	13.60	16.78
MW-06	29.82	30.06	10/25/2016	12.16	17.66
			1/10/2017	10.80	19.02
			1/30/2017	10.38	19.44
			4/25/2017	8.79	21.03
			7/24/2017	10.27	19.55
			12/4/2018	13.11	16.71
T4S1MW-02S	35.27	35.59	10/25/2016	18.35	16.92
			1/10/2017	16.52	18.75
			1/30/2017	16.10	19.17
			4/25/2017	14.15	21.12
			7/24/2017	16.39	18.88
			12/4/2018	19.39	15.88
T4S1MW-03S	32.91	33.36	10/25/2016	19.04	13.87
			1/10/2017	18.04	14.87
			1/30/2017	17.61	15.30
			4/25/2017	15.65	17.26
			7/24/2017	18.09	14.82
			12/4/2018	19.85	13.06

Table 1

Groundwater Elevation Measurements
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

Well ID	Measurement Point Elevation (NGVD 29, ft)	Ground Surface Elevation (NGVD 29, ft)	Measurement Date	Depth to Water (ft bgs)	Elevation (NGVD 29, ft)
T4S1MW-09	33.47	33.75	10/25/2016	19.33	14.14
			1/10/2017	18.47	15.00
			1/30/2017	18.10	15.37
			4/25/2017	16.46	17.01
			7/24/2017	18.51	14.96
			12/4/2018	19.99	13.48
T4S1MW-10	22.22	22.53	10/25/2016	8.16	14.06
			1/10/2017	7.44	14.78
			1/30/2017	7.20	15.02
			4/25/2017	5.65	16.57
			7/24/2017	7.57	14.65
			12/4/2018	8.75	13.47
T4S1MW-17	31.06	31.34	10/25/2016	14.89	16.17
			1/10/2017	13.43	17.63
			1/30/2017	12.87	18.19
			4/25/2017	11.31	19.75
			7/24/2017	13.75	17.31
			12/4/2018	16.68	14.38
T4S1MW-22	32.95	33.30	10/25/2016	15.46	17.49
			1/10/2017	13.95	19.00
			1/30/2017	13.44	19.51
			4/25/2017	11.78	21.17
			7/24/2017	13.63	19.32
			12/4/2018	16.50	16.45
T4S1MW-23	31.21	31.45	10/25/2016	13.72	17.49
			1/10/2017	12.44	18.77
			1/30/2017	11.82	19.39
			4/25/2017	10.45	20.76
			7/24/2017	12.34	18.87
			12/4/2018	14.98	16.23
T4S1MW-25	30.95	31.38	10/25/2016	15.11	15.84
			1/10/2017	13.46	17.49
			1/30/2017	12.95	18.00
			4/25/2017	11.16	19.79
			7/24/2017	13.54	17.41
			12/4/2018	16.03	14.92
Willamette River			10/25/2016		5.03
			1/10/2017		6.82
			1/30/2017		6.07
			4/25/2017		14.88
			7/24/2017		4.00
			12/4/2018		2.20

Notes:

ft bgs = feet below ground surface

NGVD 29 = National Geodetic Vertical Datum of 1929

Table 2

Groundwater Quality Field Parameters
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

Well	Date Sampled	Temperature (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
<i>Northwest Pipe Company Wells</i>							
MW-01	10/26/2016	15.9	6.42	352	0.26	6	6.8
	2/2/2017	16.0	6.64	385	0.01	-36	3.1
	5/1/2017	15.5	6.56	423	0.12	36	3.0
	7/26/2017	17.2	6.46	513	0.08	66	1.0
	12/6/2018	15.0	6.61	460	0.47	-32	1.0
MW-02	10/26/2016	16.8	6.90	197	0.24	-138	0.7
	2/1/2017	15.4	6.97	202	0.09	-136	8.2
	4/27/2017	15.0	7.11	240	0.20	-142	8.1
	7/25/2017	20.1	6.74	244	0.07	-141	1.0
	12/5/2018	15.8	7.10	265	0.36	-167	1.6
MW-03	10/26/2016	16.4	6.61	281	0.32	-88	2.6
	2/2/2017	15.9	6.76	321	0.26	-68	3.2
	5/1/2017	15.5	6.56	334	0.07	-43	3.5
	7/27/2017	17.0	6.55	360	0.08	-69	2.6
	12/7/2018	14.6	6.74	372	1.02	-43	5.8
MW-04	10/26/2016	14.8	6.34	323	0.28	-59	4.1
	2/1/2017	14.3	6.39	440	0.32	-45	1.3
	4/27/2017	13.0	6.60	337	0.22	-59	5.0
	7/26/2017	15.1	6.42	374	0.13	-66	8.1
	12/6/2018	14.3	6.53	403	0.53	-48	1.3
MW-05	10/26/2016	15.5	6.50	375	0.17	-52	1.2
	2/2/2017	15.7	6.59	426	0.33	77	1.8
	5/1/2017	15.4	6.60	360	0.11	-40	0.5
	7/27/2017	18.0	6.46	390	0.11	19	2.2
	12/7/2018	13.5	6.71	386	0.62	-7	1.0
MW-06	10/26/2016	15.9	6.47	266	0.15	-76	2.7
	2/2/2017	15.5	6.54	299	0.20	-47	2.8
	5/1/2017	15.7	6.35	310	0.13	20	4.4
	7/27/2017	16.6	6.27	322	0.07	-9	10.7
	12/7/2018	14.3	6.61	395	0.66	-49	13.4
<i>Port of Portland Wells</i>							
T4S1MW-03S	10/25/2016	14.2	6.42	245	0.86	72	0.5
	2/1/2017	14.3	6.65	111	5.19	145	0.8
	4/26/2017	13.2	6.62	87	8.96	167	1.6
	7/25/2017	16.0	6.46	164	4.46	115	0.3
	12/5/2018	13.4	6.53	203	0.63	161	0.2
T4S1MW-09	10/25/2016	14.9	6.51	278	3.27	-53	1.6
	2/1/2017	14.9	6.67	234	2.87	-41	0.9
	4/26/2017	14.3	6.51	200	0.98	-20	4.2
	7/25/2017	16.0	6.45	216	1.77	96	1.8
	12/5/2018	14.8	6.76	176	1.49	187	0.5
T4S1MW-22	10/25/2016	15.7	6.35	217	0.33	97	4.0
	2/1/2017	14.4	6.40	255	0.30	132	1.2
	4/27/2017	15.0	6.36	232	1.20	169	1.4
	7/26/2017	16.0	6.25	242	0.88	117	0.7
	12/6/2018	15.0	6.47	281	0.63	149	0.3
T4S1MW-23	10/25/2016	15.1	6.49	165	0.90	39	1.2
	2/1/2017	14.2	6.54	177	1.31	51	1.4
	4/27/2017	14.9	6.53	161	1.12	92	1.9
	7/26/2017	18.0	6.57	165	1.47	61	0.6
	12/6/2018	13.8	6.67	182	1.14	80	1.0

Notes:

°C = degrees Celsius

mg/L = milligrams per liter

mV = millivolts

uS/cm = microsiemens per centimeter

NTU = Nephelometric Turbidity Units

Table 3

Groundwater Quality Analytical Data for Natural Attenuation Parameters
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

Sample ID	Sample Date	Natural Attenuation Parameters (mg/L)							
		Chloride	Nitrate-N	Sulfate	TOC	Iron, dissolved	Ferrous Iron ¹	Carbon Dioxide ¹	Methane
<i>Northwest Pipe Company Wells</i>									
MW-01	10/26/2016	2.46	0.37 J	10.1	1	1.59	--	81	1.25
	2/1/2017	3.69	0.061	4.71	0.84	3.01	--	68.2	1.74
	5/1/2017	4	0.029	3.57	1.34	1.53	--	82.6	3.12
	7/26/2017	5.29	4.22	29.3	1.28	0.01	--	10.3	0.177
	12/6/2018	2.5	0.2	8.5	1.2	--	4.72	50	0.62
MW-02	10/26/2016	1.98	0.023 J	4.15	1.48	5.45	--	29.6	3.68
	2/1/2017	2.5	0.39	8.09	1.23	5.39	--	17.6	3.3
	4/27/2017	2.47	0.31	5.37	1.6	1.34	--	15.6	3.42
	7/25/2017	3.14	0.27	5.88	1.52	5.91	--	19.3	5.33
	12/5/2018	2.9	0.02 U	2.5	1.6	--	4.94	34	7.3
MW-03	10/26/2016	3.61	0.018 J	10.2	1.27	6.14	--	53.6	1.48
	2/1/2017	3.92	0.018	10.4	0.93	4.46	--	44.1	0.734
	5/1/2017	5.47	0.0028 U	12.1	1.27	3.32	--	53.9	0.748
	7/27/2017	5.19	0.011	9.48	1.33	6.31	--	57.6	2.67
	12/7/2018	3.8	0.02 U	10	1.5	--	2.96	45	2.2
MW-04	10/26/2016	3	0.043 J	5.7	1.21	12.9	--	104	1.46
	2/1/2017	4.9	0.0028 U	4.42	1.09	9.75	--	98.4	1.86
	4/27/2017	4.52	0.011	2.35	1.40	9.83	--	82	1.21
	7/26/2017	4.1	0.023	2.55	0.72	10.0	--	82.9	1.78
	12/6/2018	3.3	0.046 J	4.1	1.7	--	2.96	80	2.9
MW-05	10/26/2016	5.36	0.34 J	20.5	1.67	4.46	--	75.1	1.16
	2/1/2017	7.03	0.57	29.7	1.5	0.0137 U	--	74.9	0.887
	5/1/2017	4.87	0.0028 U	11.9	1.33	4.17	--	50.5	2.31
	7/27/2017	6.53	1.05	20.9	1.28	2.14	--	63.8	1.19
	12/7/2018	3.5	0.02 U	7.1	1.6	--	1.85	40	1.7
MW-06	10/26/2016	5.07	0.016 J	5.17	1.25	7.29	--	57.1	2.28
	2/1/2017	6.12	0.0028 U	9.27	1.15	6.10	--	60.5	0.623
	5/1/2017	6.2	0.0028 U	13.9	1.27	3.53	--	81.8	0.206
	7/27/2017	5.18	0.0084 J	13.7	1.05	3.24	--	78.6	0.214 J
	12/7/2018	5.2	0.02 U	8.7	1.5	--	1.87	55	3.5
MW-06	10/26/2016	5.05	0.017 J	5.36	1.15	7.4	--	59.5	2.04
<i>Duplicate</i>	2/1/2017	5.95	0.003 J	9.09	1.12	6.09	--	62.3	0.666
	5/1/2017	6.21	0.0028 U	14	1.4	3.6	--	82.3	0.265
	7/27/2017	5.21	0.01	13.6	1.16	3.22	--	80	0.382 J
	12/7/2018	5.2	0.02 U	8.8	1.5	--	1.87	55	4.1
<i>Port of Portland Wells</i>									
T4S1MW-03S	10/25/2016	5.1 J	5.19 J	24.7 J	0.85 J	0.0304 J	--	26.2 J	0.0291 J
	2/1/2017	0.86	1.23	4.54	0.39 J	0.01 U	--	13.9	0.0101 J
	4/26/2017	0.71	0.44	2.56	0.5	0.01 U	--	9.6	0.00515 U
	7/25/2017	1.9	3.79	12.4	0.56	0.01 U	--	18.1	0.00495 U
	12/5/2018	1.6	1.2	13	0.82 J	--	0	37.5	0.1 U
T4S1MW-09	10/25/2016	2.76 J	1.23 J	5.97 J	1.09 J	7.62	--	49.1 J	2.64 J
	2/1/2017	1.7	2.94	5.66	0.61	4.41	--	29	1.22
	4/26/2017	1.65	1.87	5.95	0.7	2.00	--	27.3	0.0225 J
	7/25/2017	2.34	1.94	7.16	0.69	0.0321 J	--	30.8	0.0225 J
	12/5/2018	1.8	1.2	5.6	0.66 J	--	0	27.5	0.00025 U
T4S1MW-22	10/25/2016	2.8 J	0.095 J	5.49 J	1.19 J	0.01 U	--	48.4 J	0.0159 J
	2/1/2017	4.56	0.039	8.9	1.09	0.01 U	--	84.5	0.0334
	4/27/2017	3.38	0.92	10	1.18	0.01 U	--	49.1	0.00605 U
	7/26/2017	4.78	0.36	7.9	1.15	0.01 U	--	60	0.0154 J
	12/6/2018	6.1	0.02 U	15	1.3	--	0	50	0.16

Table 3

Groundwater Quality Analytical Data for Natural Attenuation Parameters
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

Sample ID	Sample Date	Natural Attenuation Parameters (mg/L)							
		Chloride	Nitrate-N	Sulfate	TOC	Iron, dissolved	Ferrous Iron ¹	Carbon Dioxide ¹	Methane
T4S1MW-23	10/25/2016	3.92 J	0.27 J	7.67 J	0.65 J	0.221	--	52.9 J	0.00507 J
	2/1/2017	4.24	0.58	8.74	0.68	0.185	--	26.9	0.0379
	4/27/2017	3.36	0.42	7.76	0.78	0.0545 J	--	20.4	0.00712 J
	7/26/2017	4.07	0.36	4.83	1.18	0.11	--	27.5	0.0196 J
	12/6/2018	3.6	0.42	10	0.79 J	--	0.02	26	0.068

Notes:

mg/L = milligrams per Liter

TOC = Total Organic Carbon

¹ Parameter was measured in the field in 2018.

Qualifiers

U - the analyte was analyzed for but was not detected above the detection limit.

J - the analyte was detected, but the associated numerical value is considered an estimated quantity.

Table 4

Groundwater Quality Analytical Data for Volatile Organic Compounds
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

		Volatile Organic Compounds (µg/L)			
		PCE	TCE	cis-1,2-DCE	VC
Portland Harbor ROD Concentrations (µg/L) ¹		0.24	0.6	9.9	0.022
Northwest Pipe Company Wells					
MW-01 (1,280 feet to river)	10/26/2016	158	22.8	113	16.7
	2/1/2017	71.1	14.9	107	29.9
	5/1/2017	61.7	13	220	51.6
	7/26/2017	197	26.7	174	8.51
	12/6/2018	98	13	160	19
MW-02 (1,140 feet to river)	10/26/2016	0.0598	0.15 U	0.15 U	0.0652
	2/1/2017	0.169	0.15 U	0.20 J	0.0370
	4/27/2017	0.224	0.15 U	0.21 J	0.0115 J
	7/25/2017	0.451	0.15 U	0.41 J	0.0190 J
	12/5/2018	0.1 U	0.1 U	1.4	2.6
MW-03 (975 feet to river)	10/26/2016	630	221	428	22.8
	2/1/2017	483	178	502	20.8
	5/1/2017	657	283	847	26.1
	7/27/2017	550	209	670	29.9
	12/7/2018	490	160	850	46
MW-04 (1,130 feet to river)	10/26/2016	28.2	38.4	111	4.45
	2/1/2017	12.4	20.3	119	9.73
	4/27/2017	14.4	29.7	116	16.6
	7/26/2017	18.5	35.4	137	9.43
	12/6/2018	16	19	190	4.6
MW-05 (1,370 feet to river)	10/26/2016	3,510	195	1,160	40.4
	2/1/2017	4,150	208	1,240	39.5
	5/1/2017	949	92	634	70.7
	7/27/2017	3,640	170	1,730	7.58 J
	12/7/2018	1,200	85	1,600	77
MW-06 (1,200 feet to river)	10/26/2016	287	60.4	1,160	170
	2/1/2017	805	147	1,590	51
	5/1/2017	1,280	225	1,530	21.9
	7/27/2017	810	128	1,080	18.3
	12/7/2018	430	110	1,300	130
MW-06 Duplicate (1,200 feet to river)	10/26/2016	299	70.9	1,130	177
	2/1/2017	760	145	1,600	53.9
	5/1/2017	1,280	228	1,550	20.7
	7/27/2017	728	123	1,080	22.5
	12/7/2018	400	110	1,400	130
Port of Portland Wells (Upgradient to Downgradient)					
T4S1MW-22 (1,010 feet to river)	10/25/2016	1.46 J	4.6 J	2.77 J	0.0499 J
	2/1/2017	1.28	4.29	5.36	0.106
	4/27/2017	1.43	3.56	2.11	0.022
	7/26/2017	1.71	3.00	3.78	0.0638
	12/6/2018	1.4	4.6	5.8	0.076 J

Table 4

Groundwater Quality Analytical Data for Volatile Organic Compounds
 Supplemental Groundwater Investigation
 Northwest Pipe Company Portland Plant

		Volatile Organic Compounds (µg/L)			
		PCE	TCE	cis-1,2-DCE	VC
Portland Harbor ROD Concentrations (µg/L) ¹		0.24	0.6	9.9	0.022
T4S1MW-23 (710 feet to river)	10/25/2016	1.59 J	0.15 UJ	0.70 J	0.008 UJ
	2/1/2017	0.937	0.41 J	0.65	0.0188 J
	4/27/2017	1.07	0.39 J	0.42 J	0.008 U
	7/26/2017	1.21	0.29 J	0.15 U	0.008 U
	12/6/2018	1.8	0.61	1.4	0.023 J
T4S1MW-03S (160 feet to river)	10/25/2016	0.112 J	0.15 UJ	0.15 UJ	0.008 UJ
	2/1/2017	0.23	0.15 U	0.15 U	0.008 U
	4/26/2017	0.117	0.15 U	0.15 U	0.008 U
	7/25/2017	0.0508	0.15 U	0.15 U	0.008 U
	12/5/2018	0.1 U	0.1 U	0.1 U	0.02 U
T4S1MW-09 (145 feet to river)	10/25/2016	0.0191 J	0.15 UJ	0.15 UJ	0.0197 J
	2/1/2017	0.0177 J	0.15 U	0.15 U	0.0113 J
	4/26/2017	0.005 U	0.15 U	0.15 U	0.008 U
	7/25/2017	0.0139 J	0.15 U	0.15 U	0.008 U
	12/5/2018	0.1 U	0.1 U	0.1 U	0.02 U

Notes:

µg/L = micrograms per Liter

Results shown in **bold** denote detected concentrations.

Shaded values exceed identified ROD concentrations.

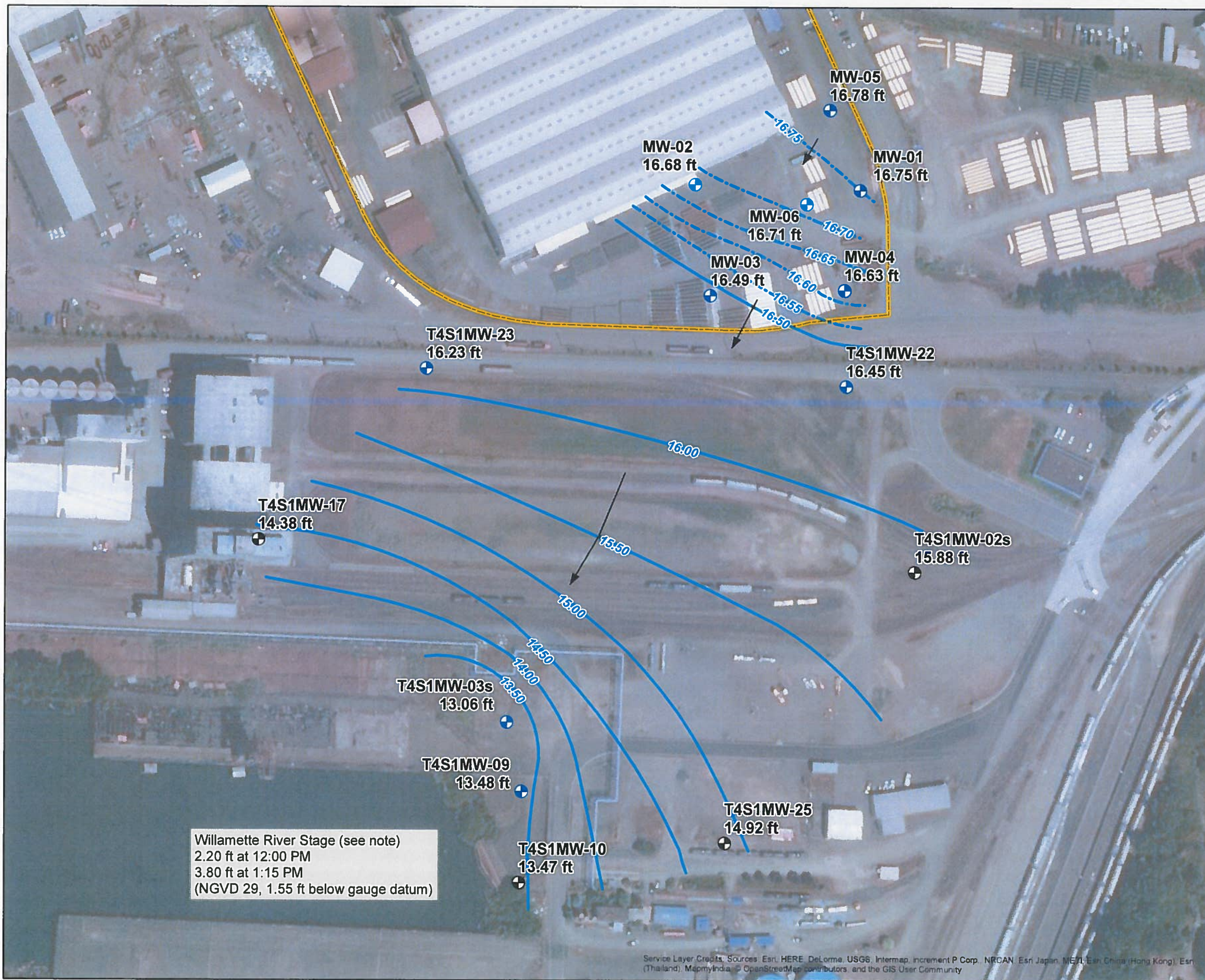
¹ROD concentrations are selected from Table 17 of the Portland Harbor Record of Decision (U.S. Environmental Protection Agency Region 10, 2017). Values were selected from remedial action objectives (RAOs) 4 and 8 associated with migration of contaminated groundwater.

Qualifiers

U - the analyte was analyzed for but was not detected above the detection limit.

J - the analyte was detected, but the associated numerical value is considered an estimated quantity.

UJ - the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.



LEGEND

- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction

Investigation Wells

- Groundwater Quality Monitoring
- Water Level Only
- Northwest Pipe Facility Boundary

Note: Groundwater levels measured between 12:00 PM and 1:15 PM on December 4, 2018. During this period, the Willamette River stage increased by 1.6 feet, as measured at the Broadway Bridge river gauge (USGS 14211720).

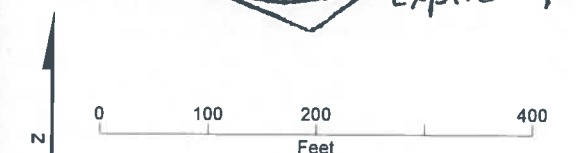
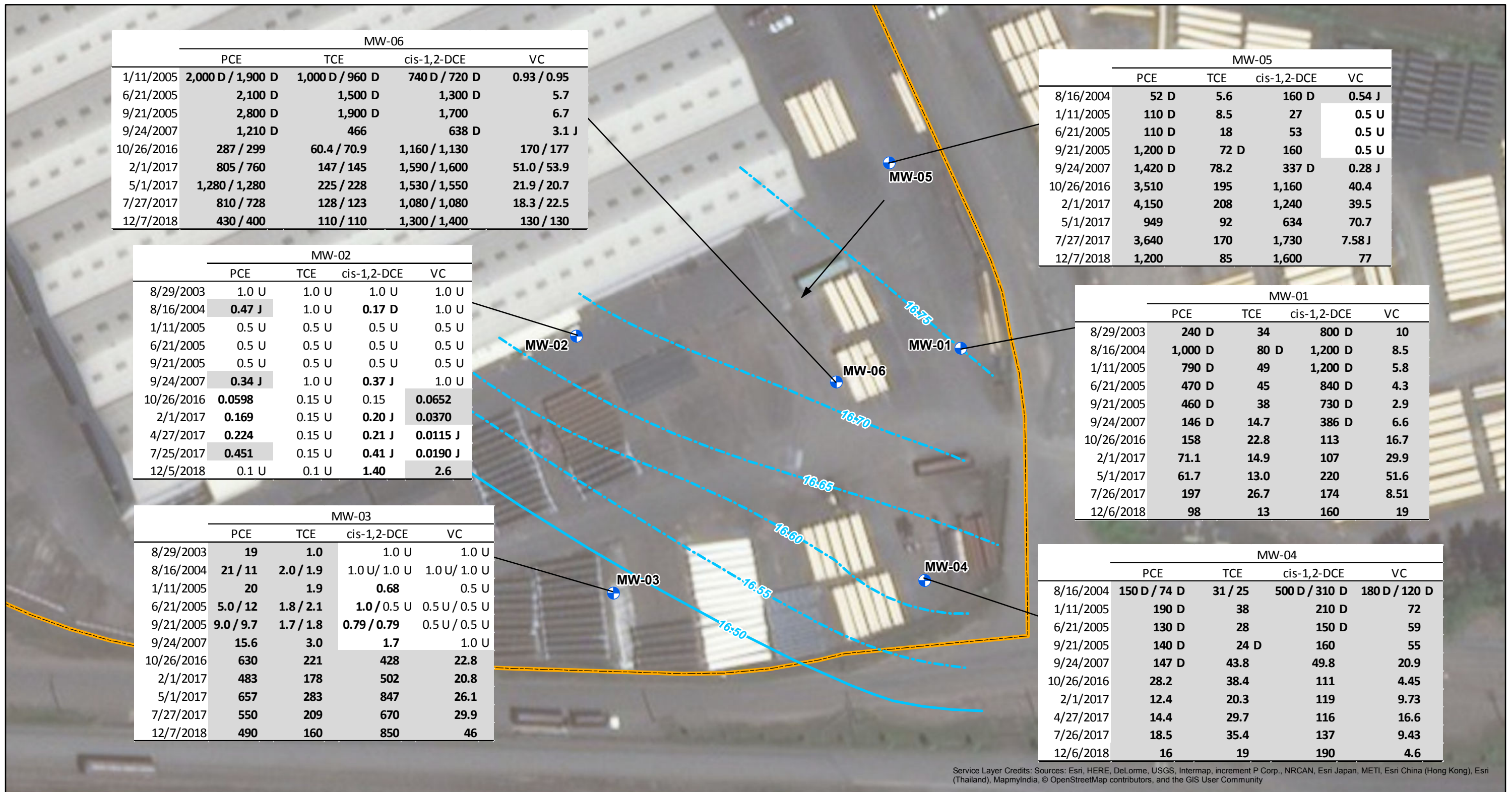


FIGURE 1
Groundwater Elevation Contour Map
December 4, 2018
 Supplemental Groundwater Sampling and Data Evaluation
 Northwest Pipe Company, Portland, Oregon

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, MEAL, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



- LEGEND**
- Groundwater Quality Monitoring Well (CVOC concentrations in µg/L)
 - Well Used for Water Level Measurements Only
 - Groundwater Elevation Contour (December 4, 2018) (0.5 ft contour interval, ft NGVD29)
 - Groundwater Elevation Contour (December 4, 2018) (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
 - Groundwater Flow Direction
 - Northwest Pipe Facility Boundary

Notes:
 All chlorinated volatile organic compound (CVOC) concentrations are reported in micrograms per liter (µg/L).
 PCE = Tetrachloroethene; TCE = Trichloroethene; cis-1,2-DCE = cis-1,2-Dichloroethene; VC = Vinyl Chloride
 U - the analyte was analyzed for but was not detected above the detection limit.
 J - the analyte was detected, but the associated numerical value is considered an estimated quantity.
 UJ - the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
 Results shown in bold denote detected concentrations.
 Shaded values exceed ROD concentrations selected from Table 17 of the Portland Harbor Record of Decision (U.S. Environmental Protection Agency Region 10, 2017). Values were selected from remedial action objectives (RAOs) 4 and 8 associated with migration of contaminated groundwater. The following values are used:
 PCE = 0.24, TCE = 0.6, cis-1,2-DCE = 9.9, and VC = 0.022. All values in µg/L.

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

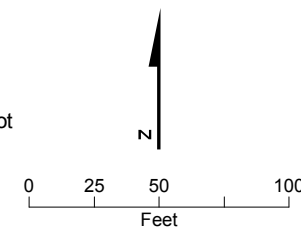
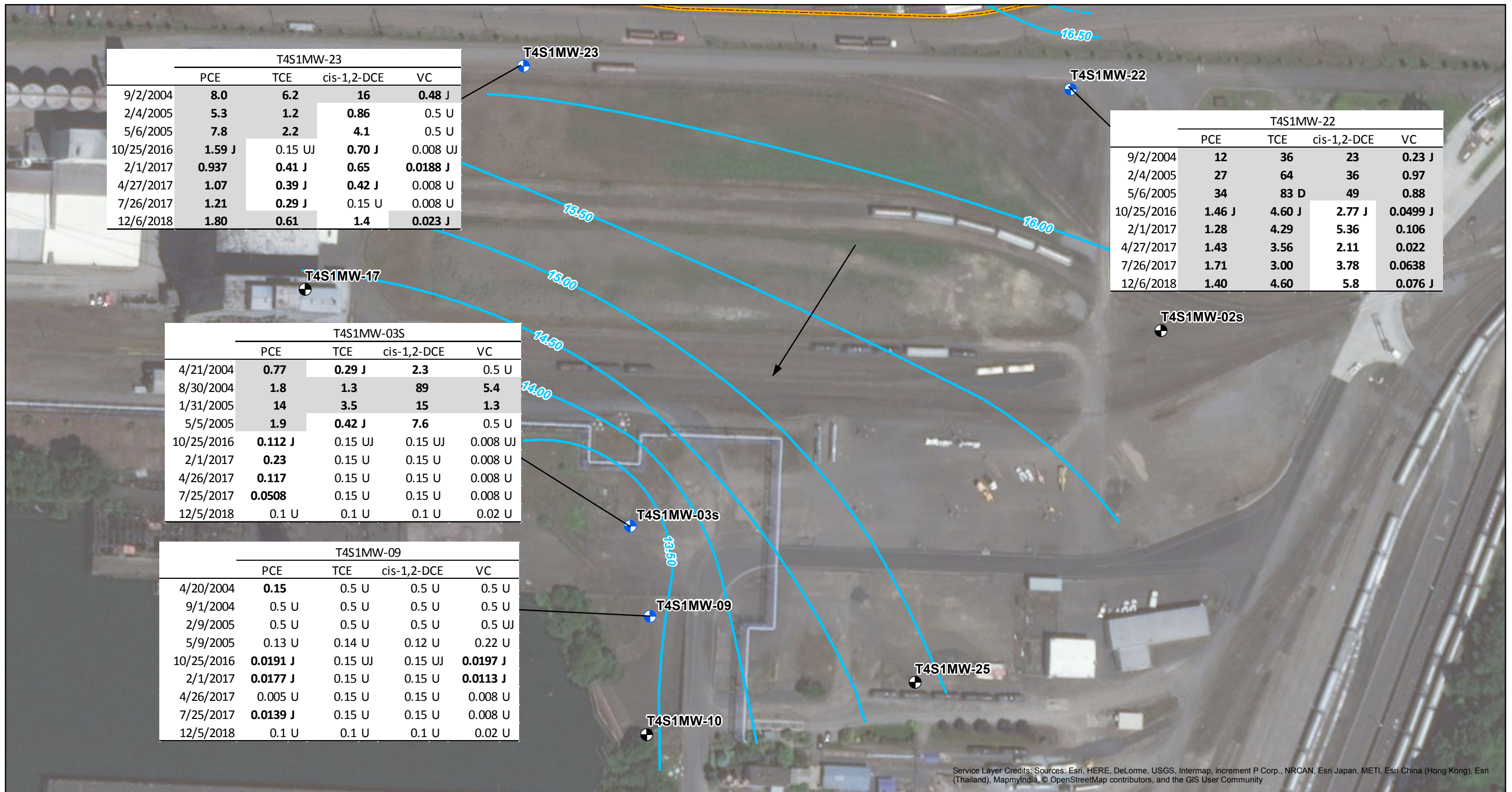


FIGURE 2a
Groundwater Investigation CVOC Concentrations
August 2003 through December 2018
 Supplemental Groundwater Sampling and Data Evaluation
 Northwest Pipe Company, Portland, Oregon





Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

LEGEND

- Groundwater Quality Monitoring Well (CVOC concentrations in µg/L)
- Well Used for Water Level Measurements Only
- Groundwater Elevation Contour (December 4, 2018) (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (December 4, 2018) (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction
- Northwest Pipe Facility Boundary

Notes:

All chlorinated volatile organic compound (CVOC) concentrations are reported in micrograms per liter (µg/L).
 PCE = Tetrachloroethene; TCE = Trichloroethene; cis-1,2-DCE = cis-1,2-Dichloroethene; VC = Vinyl Chloride
 U - the analyte was analyzed for but was not detected above the detection limit.
 J - the analyte was detected, but the associated numerical value is considered an estimated quantity.
 UJ - the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
 Results shown in bold denote detected concentrations.
 Shaded values exceed ROD concentrations selected from Table 17 of the Portland Harbor Record of Decision (U.S. Environmental Protection Agency Region 10, 2017). Values were selected from remedial action objectives (RAOs) 4 and 8 associated with migration of contaminated groundwater. The following values are used:
 PCE = 0.24, TCE = 0.6, cis-1,2-DCE = 9.9, and VC = 0.022. All values in µg/L.

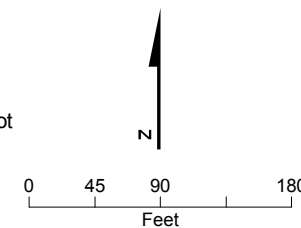


FIGURE 2b
Groundwater Investigation CVOC Concentrations
August 2003 through December 2018
 Supplemental Groundwater Sampling and Data Evaluation
 Northwest Pipe Company, Portland, Oregon



Attachment A
Field Sampling Sheets and Notes

CH2M WELL SAMPLING FIELD LOG

Date: 12/5/18
Well I.D.: T451 MW-09

Project #: 682722CH.RI.02

Field Team: BRD + LT

Total Depth (ft) 31.50 (-) DTW (ft) 19.98 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.95

Field Conditions: 45°F, SUNNY

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~22 FT Purge water disposal: Drum

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	±5% +/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
10:27	Pump on									
10:32	0.25	0.174	14.37	6.77	171.6	2.10	2.27		20.05	CLEAR, COLORLESS
10:48	2.25	0.175	14.86	6.77	186.4	1.50	0.91		20.5	CLEAR, COLORLESS
10:53	2.75	0.176	14.78	6.76	185.9	1.47	0.74	0.1	20.2	CLEAR, COLORLESS
10:59	3.2	0.176	14.75	6.76	187.0	1.49	0.52	<0.1	20.2	CLEAR, COLORLESS
:										
:										
:										
:										
11:00	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12-05-18

Time: 11 : 00

Well ID: T451MW-09

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method	
	Equip-ment	Dupli-cate	Parent Sample						
Organic Constituents									
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace	
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace	
Metals									
Dissolved Ferrous Iron	0.0 mg/L						Field measurement Only		HACH DR890- Ferrous Iron
Natural Attenuation Monitoring Constituents									
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)	
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310	
Carbon Dioxide	Field measurement Only						27.8 mg/L		HACH CO2 Test Kit
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace	
Duplicate ID	Time: -								
Comments:									

CH2M WELL SAMPLING FIELD LOG

Date: 12/5/18

Project #: 682722CH.RI.02

Well I.D.: T451MW-035

Field Team: LF + BPO

Total Depth (ft) 30 (-) DTW (ft) 19.84 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.73

Field Conditions: SUNNY, WINDY, 41°F

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~25 FT BTCL Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
11:50	PUMP ON									
12:00	0.7	0.204	13.63	6.53	162.1	0.93	0.40	0.07	20.02	CLEAR, COLORLESS
12:10	1.7	0.203	13.60	6.53	161.5	0.73	0.27	0.10	20.02	TURNED PUMP DOWN
12:15	2.4	0.202	13.64	6.53	160.4	0.67	0.16	0.16	19.96	CLEAR, COLORLESS - TURNED DOWN PUMP @ 12:15
12:20	2.8	0.203	13.38	6.53	160.5	0.63	0.21	0.08	19.95	
:										
:										
:										
:										
12:25	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12-05-18

Time: 12:25

Well ID: T451MW-03S

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
Organic Constituents								
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
Metals								
Dissolved Ferrous Iron	0.0 mg/L Field measurement Only							HACH DR890- Ferrous Iron
Natural Attenuation Monitoring Constituents								
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)
TOC	1	1	(1)	250 mL	Glass	H2SO4		SM5310
Carbon Dioxide	Field measurement Only 37.8 mg/L							HACH CO2 Test Kit
Methane	3	3	(3)	40 mL	Glass	HCl		RSK 175, no headspace
Duplicate ID: _____	Time: _____							
Comments: _____								

CH2M WELL SAMPLING FIELD LOG

Date: 12-05-18

Project #: 682722CH.RI.02

Well I.D.: MW-02

Field Team: LT + SB

Total Depth (ft) 21.00 (-) DTW (ft) 10.98 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.70

Field Conditions: SUNNY, WINDY 43°F

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or | dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): _____ Purge water disposal: DRUM

Comments/Exceptions to SAP: AT ~15 FT TUBING GOT STUCK, HAD TO WIGGLE TUBING TO GET TO DEPTH

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
14:00	PUMP ON									
14:15	2.0	0.260	15.68	7.12	-121.8	1.07	4.23		11.31	CLEAR, COLORLESS
14:20	2.5	0.261	16.01	7.12	-136.6	0.59	3.40	0.10	11.32	TURBID PUMPSPEED DOWN
14:25	2.8	0.261	15.68	7.14	-164.1	0.50	3.57	0.06	11.25	
14:30	3.1	0.262	15.74	7.14	-165.2	0.45	2.39	0.06	11.22	
14:35	3.4	0.264	15.66	7.12	-147.9	0.42	2.43	0.06	11.22	
14:40	3.7	0.266	15.72	7.12	-147.0	0.38	2.19	0.06	11.21	
14:45	4.0	0.266	15.61	7.11	-161.5	0.39	1.78	0.06	11.21	
14:50	4.3	0.265	15.60	7.11	-165.7	0.37	1.80	0.06	11.21	
14:55	4.6	0.265	15.76	7.10	-167.2	0.36	1.61	0.06	11.23	
15:00	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12-05-18

Time: 15:00

Well ID: MW-02

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method	
	Equip-ment	Dupli-cate	Parent Sample						
Organic Constituents									
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace	
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace	
Metals									
Dissolved Ferrous Iron	4.94 mg/L Field measurement Only							HACH DR890- Ferrous Iron	
Natural Attenuation Monitoring Constituents									
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)	
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310	
Carbon Dioxide	Field measurement Only 34 mg/L							HACH CO2 Test Kit	
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace	
Duplicate ID	Time: . . .								
Comments:									

CH2M WELL SAMPLING FIELD LOG

Date: 12/6/19

Project #: 682722CH.RI.02

Well I.D.: MW-04

Field Team: LT + SB

Total Depth (ft) 27.39 (-) DTW (ft) 13.52 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.36

Field Conditions: CLEAR, SLIGHTLY BREEZY 37°F

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with new or <input checked="" type="checkbox"/> dedicated polyethylene/teflon-lined tubing
	Purge Method:	Dedicated submersible pump with new or dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with new or dedicated polyethylene tubing

Pump Suction Depth (ft): ~4 FT TUBING OUT OF WELL Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
8:52	PUMP	ON								
9:20	2.6	359	13.43	6.46	9.3	2.03	1.41	0.09	13.54	CLEAR, COLORLESS
9:25	3.1	361	13.97	6.48	-7.1	1.01	1.39	0.08	13.54	
9:30	3.4	367	13.96	6.48	-6.7	0.80	0.79	0.10	13.54	TURNED PUMP DOWN FLOW RATE SLIGHTLY
9:35	3.40	376	13.94	6.50	-14.4	0.71	0.87	0.08	13.53	
9:40	4.4	384	13.86	6.51	-13.3	0.62	0.77	0.08	13.53	
9:45	4.8	387	14.13	6.51	-23.5	0.56	1.05	0.08	13.53	
9:50	5.1	392	14.32	6.52	-39.5	0.54	1.27	0.06	13.54	
9:55	5.6	397	14.27	6.52	-45.4	0.53	1.24	0.10	13.54	
10:00	6.1	403	14.27	6.53	-48.2	0.53	1.25	0.10	13.54	
10:05	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling

Groundwater Sampling

Project #: 682722CH.RI.02

DATE: 12-06-18

Time: 10:05

Well ID: MW-04

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method	
	Equip-ment	Dupli-cate	Parent Sample						
Organic Constituents									
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace	
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace	
Metals									
Dissolved Ferrous Iron	Field measurement Only 2.96 mg/L							HACH DR890- Ferrous Iron	
Natural Attenuation Monitoring Constituents									
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)	
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310	
Carbon Dioxide	Field measurement Only 80 mg/L							HACH CO2 Test Kit	
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace	
Duplicate ID	Time: _____								
Comments: _____									

CH2M WELL SAMPLING FIELD LOG

Date: 12-06-18

Project #: 682722CH.RI.02

Well I.D.: T451MW-23

Field Team: JT & SB

Total Depth (ft) 25 (-) DTW (ft) 14.97 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.71

Field Conditions: SUNNY, WINDY 41°F

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 3.5 FT TUBING OUT OF WELL Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
10:50	PUMP ON									
11:10	1.8	187	13.96	6.8	71.6	4.12	3.02	0.09	14.99	CLEAR, COLORLESS
11:15	2.25	181	13.92	6.69	74.1	1.57	1.02	0.045	14.99	
11:20	2.6	180	14.03	6.67	77.4	1.28	1.09	0.035	14.99	BUMPED UP PUMP FLOW RATE A LITTLE
11:25	2.75	181	13.89	6.67	78.2	1.19	1.02	0.03	15.00	
11:30	3.05	182	13.81	6.69	80.3	1.14	0.96		14.99	
:										
:										
:										
:										
11:35	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling

Groundwater Sampling

Project #: 682722CH.RI.02

DATE: 12-06-18

Time: 11:35

Well ID: T451MW-23

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method	
	Equip-ment	Dupli-cate	Parent Sample						
Organic Constituents									
TCE, cis 1,2-DCE	3	3	(3)	40 mL	Glass	HCl		EPA 8260C, no headspace	
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace	
Metals									
Dissolved Ferrous Iron	0.02 mg/L Field measurement Only								HACH DR890- Ferrous Iron
Natural Attenuation Monitoring Constituents									
Nitrate, Sulfate, Chloride	1	1	(1)	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)	
TOC	1	1	(1)	250 mL	Glass	H2SO4		SM5310	
Carbon Dioxide	Field measurement Only 26 mg/L								HACH CO2 Test Kit
Methane	3	3	(3)	40 mL	Glass	HCl		RSK 175, no headspace	
Duplicate ID	Time:								
Comments:									

CH2M WELL SAMPLING FIELD LOG

Date: 12-06-18

Project #: 682722CH.RI.02

Well I.D.: T451 MW-22

Field Team: JT + SB

Total Depth (ft) 23 (-) DTW (ft) 16.51 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.10

Field Conditions: SUNNY, WINDY 40°F

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

<input checked="" type="checkbox"/>	Purge Method:	Transient peristaltic pump with new or <input checked="" type="checkbox"/> dedicated polyethylene/teflon-lined tubing
	Purge Method:	Dedicated submersible pump with new or dedicated polyethylene tubing
	Purge Method:	Dedicated Hydrostar pump with new or dedicated polyethylene tubing

Pump Suction Depth (ft): ~1 FT TUBING OUT OF WELL Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
12:00	PUMP	ON								
12:15	1.5	281	14.98	6.49	144.4	1.83	0.34	0.10	16.55	CLEAR, COLORLESS TURNED PUMP SPEED DOWN A BIT
12:20	2	282	15.23	6.47	147.2	0.78	0.33	0.10	16.53	
12:25	2.2	281	15.12	6.47	147.5	0.68	0.31	0.08	16.53	
12:30	2.7	281	15.01	6.47	149.2	0.63	0.34	0.06	16.53	
:										
:										
:										
:										
12:35	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12/06/18

Time: 12:35

Well ID: T451MW-22

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
Organic Constituents								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
Metals								
Dissolved Ferrous Iron	0.0 mg/L Field measurement Only						HACH DR890- Ferrous Iron	
Natural Attenuation Monitoring Constituents								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310
Carbon Dioxide	Field measurement Only 50.0 mg/L						HACH CO2 Test Kit	
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace
Duplicate ID	Time:							
Comments:								

CH2M WELL SAMPLING FIELD LOG

Date: 12-06-18

Project #: 682722CH.RI.02

Well I.D.: MW-01

Field Team: LT + SB

Total Depth (ft) 24.57 (-) DTW (ft) 13.90 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 1.81

Field Conditions: SUNNY, Breezy 45°F

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~4 FT TUBING OUT OF WELL Purge water disposal: DRUM

Comments/Exceptions to SAP:

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
13:20	PUMP ON									
13:45	1.8	446	14.84	6.59	13.4	2.08	0.74	0.07	13.91	CLEAR, COLORLESS
13:50	2.5	453	15.11	6.59	-7.8	0.80	1.22	0.14	13.91	TURBID PUMP SPEEDS DOWN
13:55	2.7	454	15.08	6.60	-16.7	0.64	1.02	0.04	13.90	
14:00	3.0	456	15.02	6.60	-21.9	0.56	0.69	0.06	13.90	
14:05	3.4	459	14.95	6.61	-28.0	0.51	0.90	0.08	13.90	
14:10	3.7	460	14.95	6.61	-31.7	0.47	0.97	0.06	13.90	
:										
:										
:										
14:15	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12/06/18

Time: 14:15

Well ID: MW-01

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method	
	Equip-ment	Dupli-cate	Parent Sample						
Organic Constituents									
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace	
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace	
Metals									
Dissolved Ferrous Iron	4.72 mg/L						Field measurement Only		HACH DR890- Ferrous Iron
Natural Attenuation Monitoring Constituents									
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)	
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310	
Carbon Dioxide	Field measurement Only 50mg/L						HACH CO2 Test Kit		
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace	
Duplicate ID	Time: _____								
Comments: _____									

CH2M WELL SAMPLING FIELD LOG

Date: 12/7/18

Project #: 682722CH.RI.02

Well I.D.: MW-3

Field Team: BAO + LT

Total Depth (ft) 25.10 (-) DTW (ft) 12.67 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.11

Field Conditions: 40°F, sunny

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with new or dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~20' Purge water disposal: DRUM

Comments/Exceptions to SAP: ~4' of tubing out of well from 20' suction
 - WELLSIDE P2 = 0.2 ppm

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
8:45	Pump on									
8:52	0.5	697	14.83	6.79	-61.1	1.37	7.10		12.85	SC, slight yellow tint, some spec
9:13	2.0	371	15.17	6.74	-41.5	1.03	8.91	0.07	12.84	clear, colorless
9:19	2.5	369	15.27	6.74	-41.0	0.98	7.21		12.83	clear, colorless
9:24	2.75	372	14.57	6.74	-43.1	1.02	5.80	0.05	12.82	clear, colorless
:										
:										
:										
:										
9:30	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12/7/18 Time: 9:30 Well ID: MW-03

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
Organic Constituents								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
Metals								
Dissolved Ferrous Iron				2.96 mg/L		Field measurement Only		HACH DR890- Ferrous Iron
Natural Attenuation Monitoring Constituents								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310
Carbon Dioxide				Field measurement Only		45 mg/L		HACH CO2 Test Kit
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace
Duplicate ID	Time: -							
Comments:								

CH2M WELL SAMPLING FIELD LOG

Date: 12/7/18
Well I.D.: MW-06

Project #: 682722CH.RI.02

Field Team: BPO + LT 13.12
Total Depth (ft) 29.03 (-) DTW (ft) 13.12 (X 0.17 gal/ft) = Well Casing Volume (gal.) = 2.7

Field Conditions: 40°F (WINDY)
Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with | | new or | dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 23' Purge water disposal:

Comments/Exceptions to SAP: ~ 10' 2' OF TUBING OUT OF WELL TO GET ~ 23' SUBMERG
- WELL HEAD PPD = 0.2 ppm

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
9:59									13.15	
10:06	0.75	356	14.74	6.59	-209	1.02	97.2	0.1	13.15	TURN PUMP DOWN VSC, LIGHT YELLOW
10:33	2.5	393	14.24	6.61	-45.7	0.70	22.8	0.06	13.12	VSC, LIGHT YELLOW
10:38	2.75	394	14.28	6.61	-43.9	0.66	16.1	0.05	13.12	C, CLOUDINESS
10:43	3.1	395	14.34	6.61	-48.8	0.66	13.4	0.07	13.12	C, CLOUDINESS
:										
:										
:										
:										
10:50	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12/7/18

Time: 10:50

Well ID: MW-06

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
Organic Constituents								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PGE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
Metals								
Dissolved Ferrous Iron				Field measurement Only			1.87 mg/L	HACH DR890- Ferrous Iron
Natural Attenuation Monitoring Constituents								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310
Carbon Dioxide				Field measurement Only			55 mg/L	HACH CO2 Test Kit
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace
Duplicate ID	MW-100-120718-0			Time: 1200				
Comments:								

CH2M WELL SAMPLING FIELD LOG

Date: 12/7/13
Well I.D.: MW-05

Project #: 682722CH.RI.02

Field Team: BDB + LT

Total Depth (ft) 27.89 (-) DTW (ft) 13.61 (X) 0.17 gal/ft = Well Casing Volume (gal.) = 2.9

Field Conditions: 40°F, SUNNY

Decontamination: Alconox wash, DI wash

PURGE INFORMATION

Purge Method: Transient peristaltic pump with new or dedicated polyethylene/teflon-lined tubing
 Purge Method: Dedicated submersible pump with | | new or | | dedicated polyethylene tubing
 Purge Method: Dedicated Hydrostar pump with | | new or | | dedicated polyethylene tubing

Pump Suction Depth (ft): ~ 22' Purge water disposal: DRUM

Comments/Exceptions to SAP: ABOVE 2' OF PUMP OUT OF WELL FOR 22' SURFON DEPTH - 0.1 ppm WELL HEAD PID

	Purge Volume (gallons)	Specific Conduct. (µS/cm)	Temp. (°C)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Purge Rate (gpm)	DTW (ft)	* Clarity/ Color/Remarks
Target Stabilization Criteria	-	+/- 3%	-	+/- 0.1	+/- 10	+/- 0.3	+/- 10 if > 10 NTU	0.03 - 0.08	-	
Time										
11:44	PUMP ON									
11:50	0.40	349	14.17	6.80	80.8	2.07	6.59	0.06	13.61	CLEAR, COLORLESS
12:30	2.3	385	13.39	6.72	-7.8	0.71	1.49	0.05	13.61	CLEAR, COLORLESS
12:35	2.5	386	13.48	6.71	-8.5	0.67	0.76		13.61	CLEAR, COLORLESS
12:40	2.7	386	13.51	6.71	-7.0	0.62	0.98		13.61	CLEAR, COLORLESS
:										
:										
:										
:										
12:50	Start Sampling									
:	End Sampling									

* VC = Very cloudy CI = Cloudy SC = Slightly Cloudy VSC = Very Slightly Cloudy AC = Almost Clear C = Clear CC = Crystal Clear

Laboratory Analytical Program - Quarterly Sampling
Groundwater Sampling
Project #: 682722CH.RI.02

DATE: 12/7/18 Time: 12:50 Well ID: MW-05

Sample I.D.	Number of Sample Containers (Circled)			Volume	Type	Pres.	Shipping Date	Analytical Method
	Equip-ment	Dupli-cate	Parent Sample					
Organic Constituents								
TCE, cis 1,2-DCE	3	3	3	40 mL	Glass	HCl		EPA 8260C, no headspace
PCE, VC	3	3	3	40 mL	Glass	HCl		EPA 8260SIM, no headspace
Metals								
Dissolved Ferrous Iron	Field measurement Only						HACH DR890- Ferrous Iron	
Natural Attenuation Monitoring Constituents								
Nitrate, Sulfate, Chloride	1	1	1	250 mL	Poly	None		Nitrate (300), Sulfate & Chloride (300.0_28D)
TOC	1	1	1	250 mL	Glass	H2SO4		SM5310
Carbon Dioxide	Field measurement Only						HACH CO2 Test Kit	
Methane	3	3	3	40 mL	Glass	HCl		RSK 175, no headspace
Duplicate ID	Time: _____							
Comments:								

Attachment B
Laboratory Analytical Data

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

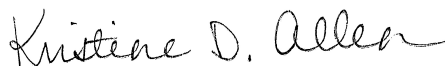
TestAmerica Job ID: 580-82404-1

Client Project/Site: Northwest Pipe Company GW Monitoring

For:

CH2M Hill, Inc.
2020 SW 4th Ave
Suite 300
Portland, Oregon 97201

Attn: Bernice Kidd



Authorized for release by:
12/24/2018 11:26:21 AM

Kristine Allen, Manager of Project Management
(253)248-4970

kristine.allen@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Job ID: 580-82404-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-82404-1

Comments

No additional comments.

Receipt

The samples were received on 12/6/2018 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.5° C.

Receipt Exceptions

The container label for the following sample did not match the information listed on the Chain-of-Custody (COC): MW02-120518-0 (580-82404-4). The container labels list the sampling time 1300, while the COC lists 1500. The sample is logged in per the COC.

The following samples were canceled by the client on 12/6/18 for carbon dioxide analysis: TB-120518 (580-82404-1), T4S1MW09-120518-0 (580-82404-2), T4S1MW3S-120518-0 (580-82404-3) and MW02-120518-0 (580-82404-4).

GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

Method(s) 300.0: Sulfate was detected in the method blank greater than the method detection limit but less than the reporting limit.

No additional analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Subcontract Work

Method TCE, cis 1,2-DCE, PCE, Vinyl Chloride: This method was subcontracted to EMAX Laboratories Inc. The subcontract laboratory certification is different from that of the facility issuing the final report.

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Client Sample ID: T4S1MW09-120518-0

Lab Sample ID: 580-82404-2

Date Collected: 12/05/18 11:00

Matrix: Water

Date Received: 12/06/18 09:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.99	0.25	ug/L			12/13/18 14:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.8		0.90	0.14	mg/L			12/06/18 17:28	1
NO3 as N	1.2		0.20	0.020	mg/L			12/06/18 17:28	1
Sulfate	5.6	B	1.2	0.26	mg/L			12/06/18 17:28	1
Total Organic Carbon	0.66	J	1.0	0.19	mg/L			12/11/18 15:32	1



Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Client Sample ID: T4S1MW3S-120518-0

Lab Sample ID: 580-82404-3

Date Collected: 12/05/18 12:25

Matrix: Water

Date Received: 12/06/18 09:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	100		0.99	0.25	ug/L			12/13/18 15:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.6		0.90	0.14	mg/L			12/06/18 18:14	1
NO3 as N	1.2		0.20	0.020	mg/L			12/06/18 18:14	1
Sulfate	13	B	1.2	0.26	mg/L			12/06/18 18:14	1
Total Organic Carbon	0.82	J	1.0	0.19	mg/L			12/11/18 15:32	1

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Client Sample ID: MW02-120518-0

Lab Sample ID: 580-82404-4

Date Collected: 12/05/18 15:00

Matrix: Water

Date Received: 12/06/18 09:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (TCD)	7300		1000	500	ug/L			12/13/18 15:24	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2.9		0.90	0.14	mg/L			12/06/18 18:26	1
NO3 as N	ND		0.20	0.020	mg/L			12/06/18 18:26	1
Sulfate	2.5	B	1.2	0.26	mg/L			12/06/18 18:26	1
Total Organic Carbon	1.6		1.0	0.19	mg/L			12/11/18 15:32	1

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 440-516880/8

Matrix: Water

Analysis Batch: 516880

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.99	0.25	ug/L			12/13/18 14:32	1
Methane (TCD)	ND		1000	500	ug/L			12/13/18 14:32	1

Lab Sample ID: LCS 440-516880/4

Matrix: Water

Analysis Batch: 516880

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methane (TCD)	4190	3350		ug/L		80	80 - 120

Lab Sample ID: LCS 440-516880/6

Matrix: Water

Analysis Batch: 516880

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methane (FID)	83.9	80.4		ug/L		96	80 - 120

Lab Sample ID: LCSD 440-516880/5

Matrix: Water

Analysis Batch: 516880

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (TCD)	4190	3340		ug/L		80	80 - 120	1	20

Lab Sample ID: LCSD 440-516880/7

Matrix: Water

Analysis Batch: 516880

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	83.9	80.4		ug/L		96	80 - 120	0	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 580-290478/3

Matrix: Water

Analysis Batch: 290478

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.90	0.14	mg/L			12/06/18 10:22	1
Sulfate	0.413	J	1.2	0.26	mg/L			12/06/18 10:22	1

Lab Sample ID: LCS 580-290478/4

Matrix: Water

Analysis Batch: 290478

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.0		mg/L		100	90 - 110
Sulfate	50.0	49.7		mg/L		99	90 - 110

TestAmerica Seattle

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 580-290478/5
Matrix: Water
Analysis Batch: 290478

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	50.0	50.0		mg/L		100	90 - 110	0	15
Sulfate	50.0	49.7		mg/L		99	90 - 110	0	15

Lab Sample ID: MB 580-290551/3
Matrix: Water
Analysis Batch: 290551

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NO3 as N	ND		0.20	0.020	mg/L			12/06/18 10:22	1

Lab Sample ID: LCS 580-290551/4
Matrix: Water
Analysis Batch: 290551

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
NO3 as N	5.00	5.00		mg/L		100	90 - 110

Lab Sample ID: LCSD 580-290551/5
Matrix: Water
Analysis Batch: 290551

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
NO3 as N	5.00	4.99		mg/L		100	90 - 110	0	15

Lab Sample ID: 580-82404-2 MS
Matrix: Water
Analysis Batch: 290551

Client Sample ID: T4S1MW09-120518-0
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
NO3 as N	1.2		5.00	6.53		mg/L		106	90 - 110

Lab Sample ID: 580-82404-2 MS
Matrix: Water
Analysis Batch: 290579

Client Sample ID: T4S1MW09-120518-0
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1.8		50.0	55.6		mg/L		107	90 - 110
Sulfate	5.6	B	50.0	60.0		mg/L		109	90 - 110

Method: SM 5310C - TOC

Lab Sample ID: MB 580-290953/25
Matrix: Water
Analysis Batch: 290953

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.19	mg/L			12/11/18 15:32	1

TestAmerica Seattle

QC Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Method: SM 5310C - TOC (Continued)

Lab Sample ID: MB 580-290953/3

Matrix: Water

Analysis Batch: 290953

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.19	mg/L			12/11/18 15:32	1

Lab Sample ID: LCS 580-290953/26

Matrix: Water

Analysis Batch: 290953

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	10.0	9.09		mg/L		91	85 - 115

Lab Sample ID: 580-82404-4 MS

Matrix: Water

Analysis Batch: 290953

Client Sample ID: MW02-120518-0

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	1.6		10.0	10.6		mg/L		90	85 - 115

Lab Sample ID: 580-82404-4 MSD

Matrix: Water

Analysis Batch: 290953

Client Sample ID: MW02-120518-0

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Carbon	1.6		10.0	11.2		mg/L		96	85 - 115	6	20

Lab Chronicle

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Client Sample ID: T4S1MW09-120518-0

Lab Sample ID: 580-82404-2

Date Collected: 12/05/18 11:00

Matrix: Water

Date Received: 12/06/18 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 14:53	EI	TAL IRV
Total/NA	Analysis	300.0		1	290551	12/06/18 17:28	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290579	12/06/18 17:28	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: T4S1MW3S-120518-0

Lab Sample ID: 580-82404-3

Date Collected: 12/05/18 12:25

Matrix: Water

Date Received: 12/06/18 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 15:09	EI	TAL IRV
Total/NA	Analysis	300.0		1	290551	12/06/18 18:14	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290579	12/06/18 18:14	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: MW02-120518-0

Lab Sample ID: 580-82404-4

Date Collected: 12/05/18 15:00

Matrix: Water

Date Received: 12/06/18 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 15:24	EI	TAL IRV
Total/NA	Analysis	300.0		1	290551	12/06/18 18:26	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290579	12/06/18 18:26	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Laboratory References:

EMAX Lab. = EMAX Laboratories Inc, 1835 W. 205th Street, Torrance, CA 90501
 TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
 TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82404-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Laboratory: TestAmerica Irvine

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	CA01531	06-30-19
Arizona	State Program	9	AZ0671	10-14-19
California	LA Cty Sanitation Districts	9	10256	06-30-19
California	State Program	9	CA ELAP 2706	06-30-19
Guam	State Program	9	Cert. No. 17-003R	01-23-19 *
Hawaii	State Program	9	N/A	01-29-19 *
Kansas	NELAP	7	E-10420	07-31-19
Nevada	State Program	9	CA015312018-1	07-31-19
New Mexico	State Program	6	N/A	01-29-19 *
Oregon	NELAP	10	4028	01-29-19 *
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-18-00214	07-09-21
Washington	State Program	10	C900	09-03-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: CH2M Hill, Inc.

TestAmerica Job ID: 580-82404-1

Project/Site: Northwest Pipe Company GW Monitoring

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82404-1	TB-120518	Water	12/05/18 00:01	12/06/18 09:00
580-82404-2	T4S1MW09-120518-0	Water	12/05/18 11:00	12/06/18 09:00
580-82404-3	T4S1MW3S-120518-0	Water	12/05/18 12:25	12/06/18 09:00
580-82404-4	MW02-120518-0	Water	12/05/18 15:00	12/06/18 09:00

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Date: 12-20-2018
EMAX Batch No.: 18L094

Attn: Kris Allen

TestAmerica, Inc.
5755 8th Street East
Tacoma WA 98424

Subject: Laboratory Report
Project: NW PIPE COMPANY GW MONITORING

Enclosed is the Laboratory report for samples received on 12/07/18.
The data reported relate only to samples listed below :

Sample ID	Control #	Col Date	Matrix	Analysis
TB-120518	L094-01	12/05/18	WATER	VOC SIM
T4S1MW09-120518-0	L094-02	12/05/18	WATER	VOC SIM
T4S1MW3S-120518-0	L094-03	12/05/18	WATER	VOC SIM
MW02-120518-0	L094-04	12/05/18	WATER	VOC SIM

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Caspar J. Pang
Laboratory Director

This report is confidential and intended solely for the use of the individual or entity to whom it is addressed. This report shall not be reproduced except in full or without the written approval of EMAX.

EMAX certifies that results included in this report meets all NELAC & DOD requirements unless noted in the Case Narrative.

NELAP Accredited Certificate Number CA002912017-13
ANAB Accredited DoD ELAP and ISO/IEC 17025 Certificate Number L2278 Testing
California ELAP Accredited Certificate Number 2672

Chain of Custody Record

18L094



Client Information (Sub Contract Lab)		Carrier Tracking No(s): 580-61927-1	
Client Contact: Shipping/Receiving		Page: Page 1 of 1	
Company: EMAX Laboratories Inc		Job #: 580-82404-1	
Address: 1835 W. 205th Street, Torrance, CA, 90501		State of Origin: Oregon	
Phone: [Redacted]		Accreditations Required (See note):	
Lab P/N: Allen, Kristine D		Analysis Requested	
E-Mail: kristine.allen@testamericainc.com		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
Due Date Requested: 12/18/2018		Total Number of Containers: 3	
TAT Requested (days):		Special Instructions/Note:	
PO #:		M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2SO4 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)	
WO #:		Other:	
Project #: 58013218		Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/>	
SSOW#:		Perform MS/MSD (Yes or No) <input checked="" type="checkbox"/>	
Project Name: Northwest Pipe Company GW Monitoring		S/B (TCE, cis 1,2-DCE, PCE, Vinyl Chloride)	
Site:		1,2-DCE, cis 1,2-DCE, PCE, Vinyl Chloride	
Sample Identification - Client ID (Lab ID)		Sample Date	
[Redacted]	12/5/18	00:01 Pacific	X
[Redacted]	12/5/18	11:00 Pacific	X
[Redacted]	12/5/18	12:25 Pacific	X
[Redacted]	12/5/18	15:00 Pacific	X
Matrix (W=water, S=solid, O=wastewater, BT=tissue, A=air)		Preservation Code:	
Sample Type (C=Comp, G=grab)		Water	
Sample Time		Water	
Sample Date		Water	
Sample Date		Water	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance.

Possible Hazard Identification
 Unconfirmed
 Deliverable Requested: I, II, III, IV, Other (specify) Return To Client Disposal By Lab Archive For Months

Primary Deliverable Rank: 2

Empty Kit Relinquished by: [Signature] Date: 12/6/18
 Relinquished by: [Signature] Date: 12/6/18
 Relinquished by: [Signature] Date: 12/6/18
 Relinquished by: [Signature] Date: 12/6/18

Custody Seals Intact: Yes No
 Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:



SAMPLE RECEIPT FORM 1

Type of Delivery <input checked="" type="checkbox"/> Fedex <input type="checkbox"/> UPS <input type="checkbox"/> GSO <input type="checkbox"/> Others <input type="checkbox"/> EMAX Courier <input type="checkbox"/> Client Delivery	Airbill / Tracking Number 4468 8717 8877	ECN 18L094 Recipient <u>Nery Casillo</u> Date <u>12/7/18</u> Time <u>0930</u>
---	---	---

COC INSPECTION

<input checked="" type="checkbox"/> Client Name	<input checked="" type="checkbox"/> Client PM/FC	<input type="checkbox"/> Sampler Name	<input checked="" type="checkbox"/> Sampling Date/Time	<input checked="" type="checkbox"/> Sample ID	<input checked="" type="checkbox"/> Matrix
<input checked="" type="checkbox"/> Address	<input checked="" type="checkbox"/> Tel # / Fax #	<input type="checkbox"/> Courier Signature	<input checked="" type="checkbox"/> Analysis Required	<input type="checkbox"/> Preservative (if any)	<input checked="" type="checkbox"/> TAT
Safety Issues (if any)	<input type="checkbox"/> High concentrations expected	<input type="checkbox"/> From Superfund Site	<input type="checkbox"/> Rad screening required		

Note: Corrections on COC not involved / dated

PACKAGING INSPECTION

Container	<input checked="" type="checkbox"/> Cooler	<input checked="" type="checkbox"/> Box	<input type="checkbox"/> Other
Condition	<input checked="" type="checkbox"/> Custody Seal	<input type="checkbox"/> Intact	<input type="checkbox"/> Damaged
Packaging	<input checked="" type="checkbox"/> Bubble Pack	<input type="checkbox"/> Styrofoam	<input type="checkbox"/> Popcorn
Temperatures (Cool, ≤6 °C but not frozen)	<input checked="" type="checkbox"/> Cooler 1 <u>1.9</u> °C	<input type="checkbox"/> Cooler 2 _____ °C	<input type="checkbox"/> Cooler 3 _____ °C
Thermometer:	<input checked="" type="checkbox"/> Cooler 6 _____ °C	<input type="checkbox"/> Cooler 7 _____ °C	<input type="checkbox"/> Cooler 8 _____ °C
	<input type="checkbox"/> Cooler 9 _____ °C	<input type="checkbox"/> Cooler 10 _____ °C	

Comments: Temperature is out of range. PM was informed IMMEDIATELY.

Note: _____

DISCREPANCIES

LabSampleID	LabSampleContainerID	Code	ClientSample Label ID / Information	Corrective Action
1	1-3	D1		R1
1-4	1-12	D16	HCl on labels	R1-labels
2-4	4-12	D2	(VOCs, SW826OC) on label	R1
3	7-9	D3	Label - T451MW035-120518-0	R1
<i>[Large diagonal scribble across the table]</i>				

12/7/18

pH holding time requirement for water samples is 15 mins. Water samples for pH analysis are received beyond 15 minutes from sampling time.

NOTES/OBSERVATIONS: Time on label for sample #1 written as 12:01 am. Time on label for sample #2 written as 3:00 pm

LEGEND:

<p>Code Description-Sample Management</p> <p><u>D1</u> Analysis is not indicated in <u>label</u></p> <p><u>D2</u> Analysis mismatch COC vs <u>label</u></p> <p>D3 Sample ID mismatch COC vs label</p> <p>D4 Sample ID is not indicated in _____</p> <p>D5 Container -[improper] [leaking] [broken]</p> <p>D6 Date/Time is not indicated in _____</p> <p>D7 Date/Time mismatch COC vs label</p> <p>D8 Sample listed in COC is not received</p> <p>D9 Sample received is not listed in COC</p> <p>D10 No initial/date on corrections in COC/label</p> <p>D11 Container count mismatch COC vs received</p> <p>D12 Container size mismatch COC vs received</p>	<p>Code Description-Sample Management</p> <p>D13 Out of Holding Time</p> <p>D14 Bubble is >6mm</p> <p>D15 No trip blank in cooler</p> <p><u>D16</u> Preservation not indicated in <u>COC</u></p> <p>D17 Preservation mismatch COC vs label</p> <p>D18 Insufficient chemical preservative</p> <p>D19 Insufficient Sample</p> <p>D20 No filtration info for dissolved analysis</p> <p>D21 No sample for moisture determination</p> <p>D22 _____</p> <p>D23 _____</p> <p>D24 _____</p>	<p><input type="checkbox"/> Continue to next page.</p> <p>Code Description-Sample Management</p> <p>R1 Proceed as indicated in <input checked="" type="checkbox"/> COC <input type="checkbox"/> Label</p> <p>R2 Refer to attached instruction</p> <p>R3 Cancel the analysis</p> <p>R4 Use vial with smallest bubble first</p> <p>R5 Log-in with latest sampling date and time+1 min</p> <p>R6 Adjust pH as necessary</p> <p>R7 Filter and preserved as necessary</p> <p>R8 _____</p> <p>R9 _____</p> <p>R10 _____</p> <p>R11 _____</p> <p>R12 _____</p>
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REVIEWS:

Sample Labeling <u>[Signature]</u>	SRF <u>[Signature]</u>	PM <u>[Signature]</u>
Date <u>12/7/18</u>	Date <u>12/7/18</u>	Date <u>12/7/18</u>

EMAX Laboratories, Inc. 1835 W. 205th St., Torrance, Ca 90501

ORIGIN ID:TCMA (253) 922-2310
SAMPLE RECEIVING
TA-SEATTLE
5755 8th AVE
SEATTLE, WA 98148

SHIP DATE: 06DEC18
ACT WGT: 11.30 LB
CAD: 989746/CAFE3211

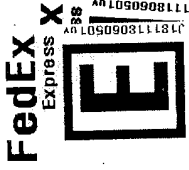
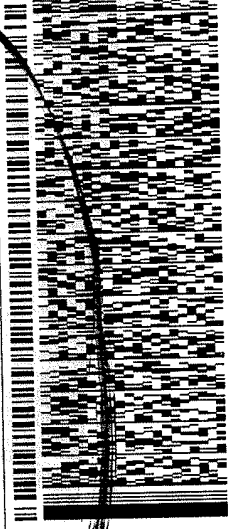
BILL SENDER

UNITED STATES US

TO SHIPPING/RECEIVING
EMAX LABORATORIES INC
1835 W. 205TH STREET

TORRANCE CA 90501

(253) 922-2310 REF: S580-31830
PO. NO



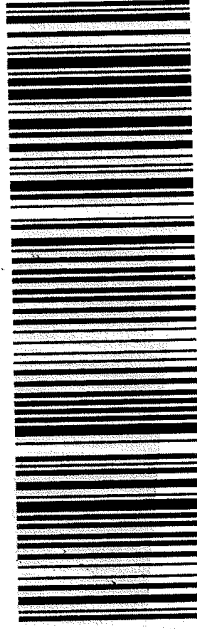
178118060501
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TRK# 4668 8717 8877
0201

FRI - 07 DEC 10:30A
PRIORITY OVERNIGHT!

92 HHRA

90501
CA-US LAX



Part # 169471-424 R172 EXP 03/19

SS1C1/F1E/104C

REPORTING CONVENTIONS

DATA QUALIFIERS:

Lab Qualifier	AFCEE Qualifier	Description
J	F	Indicates that the analyte is positively identified and the result is less than RL but greater than MDL.
N		Indicates presumptive evidence of a compound.
B	B	Indicates that the analyte is found in the associated method blank as well as in the sample at above QC level.
E	J	Indicates that the result is above the maximum calibration range or estimated value.
*	*	Out of QC limit.

Note: The above qualifiers are used to flag the results unless the project requires a different set of qualification criteria.

ACRONYMS AND ABBREVIATIONS:

CRDL	Contract Required Detection Limit
RL	Reporting Limit
MRL	Method Reporting Limit
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
DO	Diluted out

DATES

The date and time information for leaching and preparation reflect the beginning date and time of the procedure unless the method, protocol, or project specifically requires otherwise.

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LABORATORY REPORT FOR

TESTAMERICA, INC.

NW PIPE COMPANY GW MONITORING

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

SDG#: 18L094

CASE NARRATIVE

Client : TESTAMERICA, INC.

Project: NW PIPE COMPANY GW MONITORING

SDG : 18L094

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

A total of four (4) water samples were received on 12/07/18 to be analyzed for EDB by GC/MS SIM in accordance with Method SW5030B/8260B SIM and project specific requirements.

Holding Time

Samples were analyzed within the prescribed holding time.

Instrument Performance and Calibration

Instrument tune check was performed prior to calibration. Result was within acceptance criteria. Multi-calibration points were generated to establish initial calibration (ICAL). ICAL was verified using secondary source (ICV). Continuing calibration (CCV) was carried out at a frequency required by the project. All project calibration requirements were satisfied. Refer to calibration summary forms of ICAL, ICV and CCV for details.

Method Blank

Method blank was prepared and analyzed at the frequency required by the project. For this SDG, one (1) method blank was analyzed. VOF5L06B - result was compliant to project requirement. Refer to sample result summary form for details.

Lab Control Sample

Lab control sample was prepared and analyzed at a frequency required by the project. For this SDG, one (1) set of LCS/LCD was analyzed. VOF5L06L/VOF5L06C were within LCS limits. Refer to LCS summary form for details.

Matrix QC Sample

No matrix QC sample was provided on this SDG.

Surrogate

Surrogates were added on QC and field samples. All surrogate recoveries were within QC limits. Refer to sample result summary forms for details.

Sample Analysis

Samples were analyzed according to prescribed analytical procedures. Results were evaluated in accordance to project requirements. For this SDG, all quality control requirements were met.

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SAMPLE RESULTS

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/05/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/07/18
Batch No.   : 18L094                     Date Extracted: 12/11/18 19:30
Sample ID   : TB-120518                  Date Analyzed: 12/11/18 19:30
Lab Samp ID: L094-01                     Dilution Factor: 1
Lab File ID: RLY145                       Matrix          : WATER
Ext Btch ID: VOF5L06                     % Moisture     : NA
Calib. Ref.: RHY772                       Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.515	0.5000	103	70-130
4-BROMOFLUOROBENZENE	0.476	0.5000	95.2	70-130
TOLUENE-D8	0.465	0.5000	93.1	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/05/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/07/18
Batch No.   : 18L094                     Date Extracted: 12/11/18 19:56
Sample ID   : T4S1MW09-120518-0         Date Analyzed: 12/11/18 19:56
Lab Samp ID: L094-02                     Dilution Factor: 1
Lab File ID: RLY146                       Matrix          : WATER
Ext Btch ID: VOF5L06                       % Moisture     : NA
Calib. Ref.: RHY772                       Instrument ID   : TOF5
=====

```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.531	0.5000	106	70-130
4-BROMOFLUOROBENZENE	0.468	0.5000	93.7	70-130
TOLUENE-D8	0.468	0.5000	93.6	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/05/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/07/18
Batch No.   : 18L094                     Date Extracted: 12/11/18 20:21
Sample ID:  T4S1MW3S-120518-0           Date Analyzed: 12/11/18 20:21
Lab Samp ID: L094-03                    Dilution Factor: 1
Lab File ID: RLY147                      Matrix          : WATER
Ext Btch ID: VOF5L06                    % Moisture     : NA
Calib. Ref.: RHY772                     Instrument ID  : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.550	0.5000	110	70-130
4-BROMOFLUOROBENZENE	0.471	0.5000	94.1	70-130
TOLUENE-D8	0.463	0.5000	92.7	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/05/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/07/18
Batch No.   : 18L094                     Date Extracted: 12/11/18 20:47
Sample ID   : MW02-120518-0              Date Analyzed: 12/11/18 20:47
Lab Samp ID : L094-04                     Dilution Factor: 1
Lab File ID : RLY148                       Matrix          : WATER
Ext Btch ID : VOF5L06                     % Moisture      : NA
Calib. Ref. : RHY772                       Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1.4	0.20	0.10
VINYL CHLORIDE	2.6	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.539	0.5000	108	70-130
4-BROMOFLUOROBENZENE	0.465	0.5000	92.9	70-130
TOLUENE-D8	0.467	0.5000	93.4	70-130

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QC SUMMARIES

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: NA
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L094                     Date Extracted: 12/11/18 16:57
Sample ID   : MBLK1W                     Date Analyzed: 12/11/18 16:57
Lab Samp ID: VOF5L06B                   Dilution Factor: 1
Lab File ID: RLY140                     Matrix          : WATER
Ext Btch ID: VOF5L06                   % Moisture     : NA
Calib. Ref.: RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.488	0.5000	97.6	70-130
4-BROMOFLUOROBENZENE	0.480	0.5000	96.1	70-130
TOLUENE-D8	0.473	0.5000	94.6	70-130

EMAX QUALITY CONTROL DATA
LCS/LCD ANALYSIS

CLIENT: TESTAMERICA, INC.
PROJECT: NW PIPE COMPANY GW MONITORING
BATCH NO.: 18L094
METHOD: SW5030B/8260B SIM

=====

MATRIX: WATER % MOISTURE: NA
DILUTION FACTOR: 1 1
SAMPLE ID: MBLK1W
LAB SAMP ID: VOF5L06B VOF5L06L VOF5L06C
LAB FILE ID: RLY140 RLY138 RLY139
DATE EXTRACTED: 12/11/1816:57 12/11/1816:07 12/11/1816:32 DATE COLLECTED: NA
DATE ANALYZED: 12/11/1816:57 12/11/1816:07 12/11/1816:32 DATE RECEIVED: 12/11/18
PREP. BATCH: VOF5L06 VOF5L06 VOF5L06
CALIB. REF: RHY772 RHY772 RHY772

ACCESSION:

PARAMETER	BLNK RSLT (ug/L)	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	RPD (%)	QC LIMIT (%)	MAX RPD (%)
cis-1,2-Dichloroethylene	ND	0.500	0.540	108	0.500	0.522	104	3	70-130	20
Vinyl Chloride	ND	0.500	0.592	118	0.500	0.572	114	3	60-140	20
Tetrachloroethene	ND	0.500	0.503	101	0.500	0.486	97	3	70-130	20
TCE	ND	0.500	0.513	103	0.500	0.499	100	3	70-130	20

=====

SURROGATE PARAMETER	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	QC LIMIT (%)
1,2-Dichloroethane-d4	0.500	0.445	89	0.500	0.458	92	70-130
4-Bromofluorobenzene	0.500	0.482	96	0.500	0.480	96	70-130
Toluene-d8	0.500	0.481	96	0.500	0.481	96	70-130

Chain of Custody Record

Client Information (Sub Contract Lab) Client Contact: Allen, Kristine D Shipping/Receiving: kristine.allen@testamericainc.com Company: TestAmerica Laboratories, Inc		Lab PM: Allen, Kristine D E-Mail: kristine.allen@testamericainc.com State of Origin: Oregon		Carrier Tracking No(s): 4688 817 8888 Page: 1 of 1 Job #: 580-82404-1		COC No: 580-61928.1 Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
Due Date Requested: 12/18/2018 TAT Requested (days):		Analysis Requested:		Total Number of Containers:		Special Instructions/Note:	
PO #:		Matrix (Water, Solid, Over-sat, Other):		RSK 175 Methane		RSK 175 CO2 Carbon Dioxide	
WO #:		Sample Type (C=Comp, G=grab)		Field Filtered Sample (Yes or No)		Field Filtered Sample (Yes or No)	
Project #: 58013218 SSO# #:		Sample Time		Preservation Code:		Preservation Code:	
Project Name: Northwest Pipe Company GW Monitoring Site:		Sample Date		Sample Time		Sample Time	
T451MW09-120518-0 (580-82404-2)		12/5/18		11:00 Pacific		X	
T451MW3S-120518-0 (580-82404-3)		12/5/18		12:25 Pacific		X	
MW02-120518-0 (580-82404-4)		12/5/18		15:00 Pacific		X	
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody, if the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/less/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.							
Possible Hazard Identification Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2 Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months							
Empty Kit Relinquished by:		Date:		Method of Shipment:		Date/Time:	
Relinquished by: Tom Blantsy		Date: 12/6/18		Company: TA-Sea		Date/Time:	
Relinquished by:		Date/Time:		Company:		Date/Time:	
Relinquished by:		Date/Time:		Company:		Date/Time:	
Custody Seals Intact: Yes		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 12/11.9 IR 94		Company: TA-SEA	



Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 580-82404-1

Login Number: 82404

List Source: TestAmerica Seattle

List Number: 1

Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 580-82404-1

Login Number: 82404

List Number: 2

Creator: Jatib, Savana

List Source: TestAmerica Irvine

List Creation: 12/07/18 12:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-82435-1

Client Project/Site: Northwest Pipe Company GW Monitoring

For:

CH2M Hill, Inc.
2020 SW 4th Ave
Suite 300
Portland, Oregon 97201

Attn: Bernice Kidd

Kristine D. Allen

Authorized for release by:
12/24/2018 11:54:50 AM

Kristine Allen, Manager of Project Management
(253)248-4970

kristine.allen@testamericainc.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Job ID: 580-82435-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-82435-1

Comments

No additional comments.

Receipt

The samples were received on 12/7/2018 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.9° C.

Receipt Exceptions

One VOA vial for the following sample was received empty: T4S1MW22-120618-0 (580-82435-4).

Subcontract Work

Method TCE, cis 1,2-DCE, PCE, Vinyl Chloride - low level: This method was subcontracted to EMAX Laboratories Inc. The subcontract laboratory certification is different from that of the facility issuing the final report.

GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

Method(s) 300.0: Sulfate was detected in the method blank greater than the method detection limit and less than the reporting limit.

No additional analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Client Sample ID: MW04-120618-0

Lab Sample ID: 580-82435-2

Date Collected: 12/06/18 10:05

Matrix: Water

Date Received: 12/07/18 09:30

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (TCD)	2900		1000	500	ug/L			12/10/18 17:54	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.3		0.90	0.14	mg/L			12/07/18 15:50	1
NO3 as N	0.046	J F1	0.20	0.020	mg/L			12/07/18 15:50	1
Sulfate	4.1	B	1.2	0.26	mg/L			12/07/18 15:50	1
Total Organic Carbon	1.7		1.0	0.19	mg/L			12/11/18 15:32	1

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Client Sample ID: T4S1MW23-120618-0

Lab Sample ID: 580-82435-3

Date Collected: 12/06/18 11:35

Matrix: Water

Date Received: 12/07/18 09:30

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	68		0.99	0.25	ug/L			12/10/18 18:08	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.6		0.90	0.14	mg/L			12/07/18 16:25	1
NO3 as N	0.42		0.20	0.020	mg/L			12/07/18 16:25	1
Sulfate	10	B	1.2	0.26	mg/L			12/07/18 16:25	1
Total Organic Carbon	0.79	J	1.0	0.19	mg/L			12/11/18 15:32	1

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Client Sample ID: T4S1MW22-120618-0

Lab Sample ID: 580-82435-4

Date Collected: 12/06/18 12:35

Matrix: Water

Date Received: 12/07/18 09:30

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	160		0.99	0.25	ug/L			12/10/18 18:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.1		0.90	0.14	mg/L			12/07/18 16:37	1
NO3 as N	ND		0.20	0.020	mg/L			12/07/18 16:37	1
Sulfate	15	B	1.2	0.26	mg/L			12/07/18 16:37	1
Total Organic Carbon	1.3		1.0	0.19	mg/L			12/11/18 15:32	1

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Client Sample ID: MW01-120618-0

Lab Sample ID: 580-82435-5

Date Collected: 12/06/18 14:15

Matrix: Water

Date Received: 12/07/18 09:30

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	620		0.99	0.25	ug/L			12/10/18 18:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2.5		0.90	0.14	mg/L			12/07/18 16:49	1
NO3 as N	0.20		0.20	0.020	mg/L			12/07/18 16:49	1
Sulfate	8.5	B	1.2	0.26	mg/L			12/07/18 16:49	1
Total Organic Carbon	1.2		1.0	0.19	mg/L			12/11/18 15:32	1

QC Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 440-515962/8
Matrix: Water
Analysis Batch: 515962

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.99	0.25	ug/L			12/10/18 14:41	1
Methane (TCD)	ND		1000	500	ug/L			12/10/18 14:41	1

Lab Sample ID: LCS 440-515962/4
Matrix: Water
Analysis Batch: 515962

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methane (TCD)	4190	4150		ug/L		99	80 - 120

Lab Sample ID: LCS 440-515962/6
Matrix: Water
Analysis Batch: 515962

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methane (FID)	83.9	80.1		ug/L		95	80 - 120

Lab Sample ID: LCSD 440-515962/5
Matrix: Water
Analysis Batch: 515962

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (TCD)	4190	4270		ug/L		102	80 - 120	3	20

Lab Sample ID: LCSD 440-515962/7
Matrix: Water
Analysis Batch: 515962

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	83.9	78.0		ug/L		93	80 - 120	3	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 580-290627/3
Matrix: Water
Analysis Batch: 290627

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NO3 as N	ND		0.20	0.020	mg/L			12/07/18 15:15	1

Lab Sample ID: LCS 580-290627/4
Matrix: Water
Analysis Batch: 290627

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
NO3 as N	5.00	4.98		mg/L		100	90 - 110

TestAmerica Seattle

QC Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 580-290627/5

Matrix: Water

Analysis Batch: 290627

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
NO3 as N	5.00	4.97		mg/L		99	90 - 110	0	15

Lab Sample ID: 580-82435-2 MS

Matrix: Water

Analysis Batch: 290627

Client Sample ID: MW04-120618-0

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
NO3 as N	0.046	J F1	5.00	3.24	F1	mg/L		64	90 - 110

Lab Sample ID: 580-82435-2 MSD

Matrix: Water

Analysis Batch: 290627

Client Sample ID: MW04-120618-0

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
NO3 as N	0.046	J F1	5.00	3.27	F1	mg/L		65	90 - 110	1	15

Lab Sample ID: MB 580-290628/3

Matrix: Water

Analysis Batch: 290628

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.90	0.14	mg/L			12/07/18 15:15	1
Sulfate	0.334	J	1.2	0.26	mg/L			12/07/18 15:15	1

Lab Sample ID: LCS 580-290628/4

Matrix: Water

Analysis Batch: 290628

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.6		mg/L		99	90 - 110
Sulfate	50.0	49.6		mg/L		99	90 - 110

Lab Sample ID: LCSD 580-290628/5

Matrix: Water

Analysis Batch: 290628

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	50.0	49.7		mg/L		99	90 - 110	0	15
Sulfate	50.0	49.6		mg/L		99	90 - 110	0	15

Lab Sample ID: 580-82435-2 MS

Matrix: Water

Analysis Batch: 290628

Client Sample ID: MW04-120618-0

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	3.3		50.0	54.7		mg/L		103	90 - 110
Sulfate	4.1	B	50.0	56.7		mg/L		105	90 - 110

TestAmerica Seattle

QC Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 580-82435-2 MSD

Matrix: Water

Analysis Batch: 290628

Client Sample ID: MW04-120618-0

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	3.3		50.0	55.1		mg/L		104	90 - 110	1	15
Sulfate	4.1	B	50.0	57.0		mg/L		106	90 - 110	1	15

Method: SM 5310C - TOC

Lab Sample ID: MB 580-290953/25

Matrix: Water

Analysis Batch: 290953

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.19	mg/L			12/11/18 15:32	1

Lab Sample ID: LCS 580-290953/26

Matrix: Water

Analysis Batch: 290953

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	10.0	9.09		mg/L		91	85 - 115

Lab Chronicle

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Client Sample ID: MW04-120618-0

Lab Sample ID: 580-82435-2

Date Collected: 12/06/18 10:05

Matrix: Water

Date Received: 12/07/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	515962	12/10/18 17:54	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/07/18 15:50	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290628	12/07/18 15:50	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: T4S1MW23-120618-0

Lab Sample ID: 580-82435-3

Date Collected: 12/06/18 11:35

Matrix: Water

Date Received: 12/07/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	515962	12/10/18 18:08	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/07/18 16:25	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290628	12/07/18 16:25	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: T4S1MW22-120618-0

Lab Sample ID: 580-82435-4

Date Collected: 12/06/18 12:35

Matrix: Water

Date Received: 12/07/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	515962	12/10/18 18:22	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/07/18 16:37	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290628	12/07/18 16:37	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: MW01-120618-0

Lab Sample ID: 580-82435-5

Date Collected: 12/06/18 14:15

Matrix: Water

Date Received: 12/07/18 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	515962	12/10/18 18:38	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/07/18 16:49	EMM	TAL SEA
Total/NA	Analysis	300.0		1	290628	12/07/18 16:49	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Laboratory References:

EMAX Lab. = EMAX Laboratories Inc, 1835 W. 205th Street, Torrance, CA 90501
 TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022
 TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82435-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Laboratory: TestAmerica Irvine

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	CA01531	06-30-19
Arizona	State Program	9	AZ0671	10-14-19
California	LA Cty Sanitation Districts	9	10256	06-30-19
California	State Program	9	CA ELAP 2706	06-30-19
Guam	State Program	9	Cert. No. 17-003R	01-23-19 *
Hawaii	State Program	9	N/A	01-29-19 *
Kansas	NELAP	7	E-10420	07-31-19
Nevada	State Program	9	CA015312018-1	07-31-19
New Mexico	State Program	6	N/A	01-29-19 *
Oregon	NELAP	10	4028	01-29-19 *
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-18-00214	07-09-21
Washington	State Program	10	C900	09-03-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: CH2M Hill, Inc.

TestAmerica Job ID: 580-82435-1

Project/Site: Northwest Pipe Company GW Monitoring

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82435-1	TB-120618	Water	12/06/18 08:00	12/07/18 09:30
580-82435-2	MW04-120618-0	Water	12/06/18 10:05	12/07/18 09:30
580-82435-3	T4S1MW23-120618-0	Water	12/06/18 11:35	12/07/18 09:30
580-82435-4	T4S1MW22-120618-0	Water	12/06/18 12:35	12/07/18 09:30
580-82435-5	MW01-120618-0	Water	12/06/18 14:15	12/07/18 09:30

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LABORATORIES, INC.®

1835 W. 205th Street
Torrance, CA 90501
Tel: (310) 618-8889

Date: 12-20-2018
EMAX Batch No.: 18L110

Attn: Kris Allen

TestAmerica, Inc.
5755 8th Street East
Tacoma WA 98424

Subject: Laboratory Report
Project: NW PIPE COMPANY GW MONITORING

Enclosed is the Laboratory report for samples received on 12/08/18.
The data reported relate only to samples listed below :

Sample ID	Control #	Col Date	Matrix	Analysis
TB-120618	L110-01	12/06/18	WATER	VOC SIM
MW04-120618-0	L110-02	12/06/18	WATER	VOC SIM
T4S1MW23-120618-0	L110-03	12/06/18	WATER	VOC SIM
T4S1MW22-120618-0	L110-04	12/06/18	WATER	VOC SIM
MW01-120618-0	L110-05	12/06/18	WATER	VOC SIM

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,

Caspar J. Pang
Laboratory Director

This report is confidential and intended solely for the use of the individual or entity to whom it is addressed. This report shall not be reproduced except in full or without the written approval of EMAX.

EMAX certifies that results included in this report meets all NELAC & DOD requirements unless noted in the Case Narrative.

NELAP Accredited Certificate Number CA002912017-13
ANAB Accredited DoD ELAP and ISO/IEC 17025 Certificate Number L2278 Testing
California ELAP Accredited Certificate Number 2672



18110

Chain of Custody Record



Client Information (Sub Contract Lab)		Lab PM:	Allen, Kristine D	Carrier Tracking No(s):	580-61965.1			
Shipping/Receiving		Phone:		State of Origin:	Oregon			
Company: EMAX Laboratories Inc		E-Mail:	kristine.allen@testamericainc.com	Page:	Page 1 of 1			
Address: 1835 W. 205th Street,		Accreditations Required (See note):						
City: Torrance	Due Date Requested:	580-82435-1						
State: CA, 90501	TAT Requested (days):							
PO #:	Project #:	58013218						
WO #:	SSOWF#:							
Project Name: Northwest Pipe Company GW Monitoring		Site:						
Site:		Analysis Requested						
Sample Identification - Client ID		Total Number of Containers						
Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Sub TCE, cis 1,2-DCE, PCE, Vinyl Chloride - low level)	Preservation Code:	Special Instructions/Note:
12/6/18	08:00 Pacific		Water	X	X	X		Please provide CH2 Lab Spec EDD if possible.
12/6/18	10:05 Pacific		Water	X	X	X		Please provide CH2 Lab Spec EDD if possible.
12/6/18	11:35 Pacific		Water	X	X	X		Please provide CH2 Lab Spec EDD if possible.
12/6/18	12:35 Pacific		Water	X	X	X		Please provide CH2 Lab Spec EDD if possible.
12/6/18	14:15 Pacific		Water	X	X	X		Please provide CH2 Lab Spec EDD if possible.
Temp: 1.9°C								
<p>Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.</p>								
<p>Possible Hazard Identification</p> <p>Unconfirmed</p> <p>Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2</p> <p>Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months</p>								
Empty Kit Relinquished by:		Date:		Method of Shipment:				
Relinquished by: Tom Blank		Date: 12/7/18		Received by: TA-SEA		Company: TA-SEA		
Relinquished by:		Date:		Received by: [Signature]		Company: EMAX		
Relinquished by:		Date:		Received by:		Company:		
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:				

SAMPLE RECEIPT FORM 1

Type of Delivery <input checked="" type="checkbox"/> Fedex <input type="checkbox"/> UPS <input type="checkbox"/> GSO <input type="checkbox"/> Others <input type="checkbox"/> EMAX Courier <input type="checkbox"/> Client Delivery	Airbill / Tracking Number 41008 8717 9038	ECN 18L110 Recipient DREW Date 12/10/18 Time 1030
---	--	---

COQ INSPECTION

<input checked="" type="checkbox"/> Client Name	<input checked="" type="checkbox"/> Client PM/FC	<input type="checkbox"/> Sampler Name	<input checked="" type="checkbox"/> Sampling Date/Time	<input checked="" type="checkbox"/> Sample ID	<input checked="" type="checkbox"/> Matrix
<input checked="" type="checkbox"/> Address	<input checked="" type="checkbox"/> Tel # / Fax #	<input type="checkbox"/> Courier Signature	<input checked="" type="checkbox"/> Analysis Required	<input type="checkbox"/> Preservative (if any)	<input type="checkbox"/> TAT
Safety Issues (if any)	<input type="checkbox"/> High concentrations expected	<input type="checkbox"/> From Superfund Site	<input type="checkbox"/> Rad screening required		

Note: _____

PACKAGING INSPECTION

Container	<input checked="" type="checkbox"/> Cooler	<input type="checkbox"/> Box	<input type="checkbox"/> Other
Condition	<input checked="" type="checkbox"/> Custody Seal	<input checked="" type="checkbox"/> Intact	<input type="checkbox"/> Damaged
Packaging	<input checked="" type="checkbox"/> Bubble Pack	<input type="checkbox"/> Styrofoam	<input type="checkbox"/> Popcorn
Temperatures (Cool, ≤6 °C but not frozen)	<input checked="" type="checkbox"/> Cooler 1 1.9 °C	<input type="checkbox"/> Cooler 2 _____ °C	<input type="checkbox"/> Cooler 3 _____ °C
	<input type="checkbox"/> Cooler 6 _____ °C	<input type="checkbox"/> Cooler 7 _____ °C	<input type="checkbox"/> Cooler 8 _____ °C
Thermometer:	A - S/N 170324872	B - S/N 15055522	C - S/N 170324888

Comments: Temperature is out of range. PM was informed IMMEDIATELY.
Note: _____

DISCREPANCIES

LabSampleID	LabSampleContainerID	Code	ClientSample Label ID / Information	Corrective Action
1-5	1-213	D10		R1-coo
1	1-15	D16	label: HCl.	R1-label
	1-3	D2	"VOCs" on label	R1-coo
40/12/18 RS 12/10/18				

pH holding time requirement for water samples is 15 mins. Water samples for pH analysis are received beyond 15 minutes from sampling time.

NOTES/OBSERVATIONS:

LEGEND:

<p>Code Description- Sample Management</p> <p>D1 Analysis is not indicated in _____</p> <p>D2 Analysis mismatch COC vs label</p> <p>D3 Sample ID mismatch COC vs label</p> <p>D4 Sample ID is not indicated in _____</p> <p>D5 Container -[improper] [leaking] [broken]</p> <p>D6 Date/Time is not indicated in _____</p> <p>D7 Date/Time mismatch COC vs label</p> <p>D8 Sample listed in COC is not received</p> <p>D9 Sample received is not listed in COC</p> <p>D10 No initial/date on corrections in COC label</p> <p>D11 Container count mismatch COC vs received</p> <p>D12 Container size mismatch COC vs received</p>	<p>Code Description-Sample Management</p> <p>D13 Out of Holding Time</p> <p>D14 Bubble is >6mm</p> <p>D15 No trip blank in cooler</p> <p>D16 Preservation not indicated in <u>COO</u></p> <p>D17 Preservation mismatch COC vs label</p> <p>D18 Insufficient chemical preservative</p> <p>D19 Insufficient Sample</p> <p>D20 No filtration info for dissolved analysis</p> <p>D21 No sample for moisture determination</p> <p>D22 _____</p> <p>D23 _____</p> <p>D24 _____</p>	<p><input type="checkbox"/> Continue to next page.</p> <p>Code Description-Sample Management</p> <p>R1 Proceed as indicated in <input type="checkbox"/> COC <input type="checkbox"/> Label</p> <p>R2 Refer to attached instruction</p> <p>R3 Cancel the analysis</p> <p>R4 Use vial with smallest bubble first</p> <p>R5 Log-in with latest sampling date and time+1 min</p> <p>R6 Adjust pH as necessary</p> <p>R7 Filter and preserved as necessary</p> <p>R8 _____</p> <p>R9 _____</p> <p>R10 _____</p> <p>R11 _____</p> <p>R12 _____</p>
--	---	---

REVIEWS: Severine Mista Sample Labeling Date: 12/10/18

SRF: Dejean Date: 12/10/18

PM: RS Date: 12/10/18

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Temperature Controlled



**IF THIS SHIPMENT IS DELAYED IN TRANSIT,
STORE REFRIGERATED (2° TO 8° C / 36° TO 47° F)**

TAL-0090(1016)

ORIGIN ID:TCMA (253) 922-2310
SAMPLE RECEIVING
TA-SEATTLE
5755 8TH ST E

SHIP DATE: 07DEC18
ACTWGT: 15.35 LB
CAD: 989746/CAFE3211

FIFE, WA 98424
UNITED STATES US

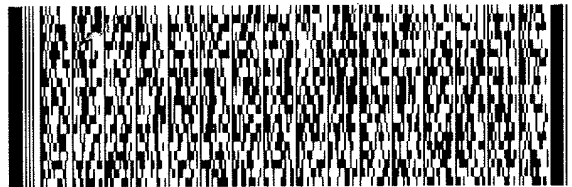
BILL SENDER

TO **SHIPPING/RECEIVING
EMAX LABORATORIES INC
1835 W. 205TH STREET**

TORRANCE CA 90501

(253) 922-2310
PO: NO

REF: S580-31848



FedEx
Express



REC'D BY FEED/ALC

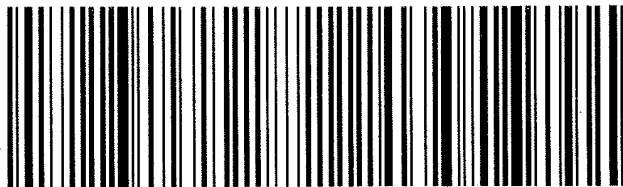
TRK# 4668 8717 9038
0201

**SATURDAY 12:00P
PRIORITY OVERNIGHT**

WO HHRA

**90501
CA-US LAX**

REF: 15847463 TRIC EXP 0318



REPORTING CONVENTIONS

DATA QUALIFIERS:

Lab Qualifier	AFCEE Qualifier	Description
J	F	Indicates that the analyte is positively identified and the result is less than RL but greater than MDL.
N		Indicates presumptive evidence of a compound.
B	B	Indicates that the analyte is found in the associated method blank as well as in the sample at above QC level.
E	J	Indicates that the result is above the maximum calibration range or estimated value.
*	*	Out of QC limit.

Note: The above qualifiers are used to flag the results unless the project requires a different set of qualification criteria.

ACRONYMS AND ABBREVIATIONS:

CRDL	Contract Required Detection Limit
RL	Reporting Limit
MRL	Method Reporting Limit
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
DO	Diluted out

DATES

The date and time information for leaching and preparation reflect the beginning date and time of the procedure unless the method, protocol, or project specifically requires otherwise.

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LABORATORY REPORT FOR

TESTAMERICA, INC.

NW PIPE COMPANY GW MONITORING

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

SDG#: 18L110

CASE NARRATIVE

Client : TESTAMERICA, INC.

Project: NW PIPE COMPANY GW MONITORING

SDG : 18L110

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

A total of five (5) water samples were received on 12/08/18 to be analyzed for EDB by GC/MS SIM in accordance with Method SW5030B/8260B SIM and project specific requirements.

Holding Time

Samples were analyzed within the prescribed holding time.

Instrument Performance and Calibration

Instrument tune check was performed prior to calibration. Result was within acceptance criteria. Multi-calibration points were generated to establish initial calibration (ICAL). ICAL was verified using secondary source (ICV). Continuing calibration (CCV) was carried out at a frequency required by the project. All project calibration requirements were satisfied. Refer to calibration summary forms of ICAL, ICV and CCV for details.

Method Blank

Method blank was prepared and analyzed at the frequency required by the project. For this SDG, two (2) method blanks were analyzed. VOF5L06B and VOF5L11B were compliant to project requirement. Refer to sample result summary forms for details.

Lab Control Sample

Lab control sample was prepared and analyzed at a frequency required by the project. For this SDG, two (2) sets of LCS/LCD were analyzed. VOF5L06L/VOF5L06C and VOF5L11L/VOF5L11C were within LCS limits. Refer to LCS summary forms for details.

Matrix QC Sample

No matrix QC sample was provided on this SDG.

Surrogate

Surrogates were added on QC and field samples. All surrogate recoveries were within QC limits. Refer to sample result summary forms for details.

Sample Analysis

Samples were analyzed according to prescribed analytical procedures. Results were evaluated in accordance to project requirements. For this SDG, all quality control requirements were met.

Sample L110-05 was reported at dilution due to high concentration.

LAB CHRONICLE
EDB BY GC/MS STM

Client : TESTAMERICA, INC.
Project : NW PIPE COMPANY GW MONITORING

SDG NO. : 18L110
Instrument ID : F5

Client Sample ID	Laboratory Sample ID	Dilution Factor	% Moist	Analysis DateTime	Extraction DateTime	Sample Data FN	Calibration Data FN	Prep. Batch	Notes
									WATER
MBLK1W	VOF5L06B	1	NA	12/11/1816:57	12/11/1816:57	RLY140	RHY772	VOF5L06	Method Blank
LCS1W	VOF5L06L	1	NA	12/11/1816:07	12/11/1816:07	RLY138	RHY772	VOF5L06	Lab Control Sample (LCS)
LCD1W	VOF5L06C	1	NA	12/11/1816:32	12/11/1816:32	RLY139	RHY772	VOF5L06	LCS Duplicate
TB-120618	L110-01	1	NA	12/11/1819:05	12/11/1819:05	RLY144	RHY772	VOF5L06	Field Sample
MW04-120618-0	L110-02	1	NA	12/11/1821:12	12/11/1821:12	RLY149	RHY772	VOF5L06	Field Sample
T4S1MW22-120618-0	L110-04	1	NA	12/11/1822:04	12/11/1822:04	RLY151	RHY772	VOF5L06	Field Sample
MBLK2W	VOF5L11B	1	NA	12/14/1818:34	12/14/1818:34	RLY238	RHY772	VOF5L11	Method Blank
LCS2W	VOF5L11L	1	NA	12/14/1817:44	12/14/1817:44	RLY236	RHY772	VOF5L11	Lab Control Sample (LCS)
LCD2W	VOF5L11C	1	NA	12/14/1818:09	12/14/1818:09	RLY237	RHY772	VOF5L11	LCS Duplicate
T4S1MW23-120618-0	L110-03N	1	NA	12/14/1821:05	12/14/1821:05	RLY244	RHY772	VOF5L11	Field Sample
MW04-120618-0DL	L110-02I	50	NA	12/14/1821:30	12/14/1821:30	RLY245	RHY772	VOF5L11	Diluted Sample
T4S1MW22-120618-0DL	L110-04I	5	NA	12/14/1821:55	12/14/1821:55	RLY246	RHY772	VOF5L11	Diluted Sample
MW01-120618-0	L110-05I	50	NA	12/14/1822:20	12/14/1822:20	RLY247	RHY772	VOF5L11	Diluted Sample

FN - Filename
% Moist - Percent Moisture

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SAMPLE RESULTS

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

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=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/11/18 19:05
Sample ID   : TB-120618                   Date Analyzed: 12/11/18 19:05
Lab Samp ID : L110-01                     Dilution Factor: 1
Lab File ID : RLY144                       Matrix          : WATER
Ext Btch ID : VOF5L06                     % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.486	0.5000	97.2	70-130
4-BROMOFLUOROBENZENE	0.489	0.5000	97.8	70-130
TOLUENE-D8	0.476	0.5000	95.2	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/11/18 21:12 # 12/14/18 21:30
Sample ID   : MW04-120618-0              Date Analyzed: 12/11/18 21:12 # 12/14/18 21:30
Lab Samp ID: L110-02 #L110-021           Dilution Factor: 1 # 50
Lab File ID: RLY149 #RLY245              Matrix          : WATER
Ext Btch ID: VOF5L06 #VOF5L11           % Moisture      : NA
Calib. Ref.: RHY772 #RHY772             Instrument ID   : TOF5
=====

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PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
# CIS-1,2-DICHLOROETHYLENE	190	10	5.0
VINYL CHLORIDE	4.6	0.10	0.020
# TETRACHLOROETHENE	16	10	5.0
# TCE	19	10	5.0

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.508	0.5000	102	70-130
4-BROMOFLUOROBENZENE	0.486	0.5000	97.1	70-130
TOLUENE-D8	0.465	0.5000	93.0	70-130
# 1,2-DICHLOROETHANE-D4	26.1	25.00	104	70-130
# 4-BROMOFLUOROBENZENE	24.0	25.00	96.1	70-130
# TOLUENE-D8	23.5	25.00	94.1	70-130

Members of the Associated File

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/11/18 21:12
Sample ID   : MW04-120618-0              Date Analyzed: 12/11/18 21:12
Lab Samp ID: L110-02                     Dilution Factor: 1
Lab File ID: RLY149                       Matrix       : WATER
Ext Btch ID: VOF5L06                     % Moisture   : NA
Calib. Ref.: RHY772                       Instrument ID : TOF5
=====

```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	190E	0.20	0.10
VINYL CHLORIDE	4.6	0.10	0.020
TETRACHLOROETHENE	16E	0.20	0.10
TCE	20E	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.508	0.5000	102	70-130
4-BROMOFLUOROBENZENE	0.486	0.5000	97.1	70-130
TOLUENE-D8	0.465	0.5000	93.0	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/14/18 21:30
Sample ID   : MW04-120618-ODL           Date Analyzed: 12/14/18 21:30
Lab Samp ID : L110-02I                  Dilution Factor: 50
Lab File ID : RLY245                     Matrix          : WATER
Ext Btch ID : VOF5L11                    % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	190	10	5.0
VINYL CHLORIDE	5.5	5.0	1.0
TETRACHLOROETHENE	16	10	5.0
TCE	19	10	5.0

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	26.1	25.00	104	70-130
4-BROMOFLUOROBENZENE	24.0	25.00	96.1	70-130
TOLUENE-D8	23.5	25.00	94.1	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/14/18 21:05
Sample ID   : T4S1MW23-120618-0         Date Analyzed: 12/14/18 21:05
Lab Samp ID: L110-03N                    Dilution Factor: 1
Lab File ID: RLY244                       Matrix       : WATER
Ext Btch ID: VOF5L11                      % Moisture   : NA
Calib. Ref.: RHY772                       Instrument ID : TOF5
=====

```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1.4	0.20	0.10
VINYL CHLORIDE	0.023J	0.10	0.020
TETRACHLOROETHENE	1.8	0.20	0.10
TCE	0.61	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.521	0.5000	104	70-130
4-BROMOFLUOROBENZENE	0.480	0.5000	95.9	70-130
TOLUENE-D8	0.464	0.5000	92.7	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client       : TESTAMERICA, INC.           Date Collected: 12/06/18
Project      : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.    : 18L110                     Date Extracted: 12/11/18 22:04 # 12/14/18 21:55
Sample ID    : T4S1MW22-120618-0         Date Analyzed: 12/11/18 22:04 # 12/14/18 21:55
Lab Samp ID  : L110-04 #L110-04I         Dilution Factor: 1 # 5
Lab File ID  : RLY151 #RLY246            Matrix          : WATER
Ext Btch ID  : VOF5L06 #VOF5L11         % Moisture      : NA
Calib. Ref.  : RHY772 #RHY772           Instrument ID   : TOF5
=====

```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
# CIS-1,2-DICHLOROETHYLENE	5.8	1.0	0.50
VINYL CHLORIDE	0.076J	0.10	0.020
TETRACHLOROETHENE	1.4	0.20	0.10
TCE	4.6	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.553	0.5000	111	70-130
4-BROMOFLUOROBENZENE	0.467	0.5000	93.4	70-130
TOLUENE-D8	0.474	0.5000	94.9	70-130
# 1,2-DICHLOROETHANE-D4	2.68	2.500	107	70-130
# 4-BROMOFLUOROBENZENE	2.35	2.500	93.8	70-130
# TOLUENE-D8	2.35	2.500	93.9	70-130

Members of the Associated File

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/11/18 22:04
Sample ID   : T4S1MW22-120618-0         Date Analyzed: 12/11/18 22:04
Lab Samp ID: L110-04                     Dilution Factor: 1
Lab File ID: RLY151                      Matrix          : WATER
Ext Btch ID: VOF5L06                     % Moisture     : NA
Calib. Ref.: RHY772                      Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	5.8E	0.20	0.10
VINYL CHLORIDE	0.076J	0.10	0.020
TETRACHLOROETHENE	1.4	0.20	0.10
TCE	4.6	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.553	0.5000	111	70-130
4-BROMOFLUOROBENZENE	0.467	0.5000	93.4	70-130
TOLUENE-D8	0.474	0.5000	94.9	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/14/18 21:55
Sample ID   : T4S1MW22-120618-ODL       Date Analyzed: 12/14/18 21:55
Lab Samp ID: L110-04I                   Dilution Factor: 5
Lab File ID: RLY246                      Matrix          : WATER
Ext Btch ID: VOF5L11                    % Moisture     : NA
Calib. Ref.: RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	5.8	1.0	0.50
VINYL CHLORIDE	ND	0.50	0.10
TETRACHLOROETHENE	1.3	1.0	0.50
TCE	4.2	1.0	0.50

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	2.68	2.500	107	70-130
4-BROMOFLUOROBENZENE	2.35	2.500	93.8	70-130
TOLUENE-DB	2.35	2.500	93.9	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/06/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/08/18
Batch No.   : 18L110                     Date Extracted: 12/14/18 22:20
Sample ID   : MW01-120618-0              Date Analyzed: 12/14/18 22:20
Lab Samp ID : L110-05I                   Dilution Factor: 50
Lab File ID : RLY247                      Matrix          : WATER
Ext Btch ID : VOF5L11                    % Moisture      : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	160	10	5.0
VINYL CHLORIDE	19	5.0	1.0
TETRACHLOROETHENE	98	10	5.0
TCE	13	10	5.0

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	27.0	25.00	108	70-130
4-BROMOFLUOROBENZENE	23.9	25.00	95.6	70-130
TOLUENE-D8	22.8	25.00	91.1	70-130

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QC SUMMARIES

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: NA
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L110                     Date Extracted: 12/11/18 16:57
Sample ID   : MBLK1W                     Date Analyzed: 12/11/18 16:57
Lab Samp ID : VOF5L06B                   Dilution Factor: 1
Lab File ID : RLY140                     Matrix          : WATER
Ext Btch ID : VOF5L06                     % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.488	0.5000	97.6	70-130
4-BROMOFLUOROBENZENE	0.480	0.5000	96.1	70-130
TOLUENE-D8	0.473	0.5000	94.6	70-130

EMAX QUALITY CONTROL DATA
LCS/LCD ANALYSIS

CLIENT: TESTAMERICA, INC.
PROJECT: NW PIPE COMPANY GW MONITORING
BATCH NO.: 18L110
METHOD: SW5030B/8260B SIM

MATRIX: WATER % MOISTURE: NA
DILUTION FACTOR: 1 1
SAMPLE ID: MBLK2W
LAB SAMP ID: VOF5L11B VOF5L11L VOF5L11C
LAB FILE ID: RLY238 RLY236 RLY237
DATE EXTRACTED: 12/14/1818:34 12/14/1817:44 12/14/1818:09 DATE COLLECTED: NA
DATE ANALYZED: 12/14/1818:34 12/14/1817:44 12/14/1818:09 DATE RECEIVED: 12/14/18
PREP. BATCH: VOF5L11 VOF5L11 VOF5L11
CALIB. REF: RHY772 RHY772 RHY772

ACCESSION:

PARAMETER	BLNK RSLT (ug/L)	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	RPD (%)	QC LIMIT (%)	MAX RPD (%)
cis-1,2-Dichloroethylene	ND	0.500	0.499	100	0.500	0.504	101	1	70-130	20
Vinyl Chloride	ND	0.500	0.555	111	0.500	0.557	111	0	60-140	20
Tetrachloroethene	ND	0.500	0.453	91	0.500	0.452	90	0	70-130	20
TCE	ND	0.500	0.469	94	0.500	0.471	94	0	70-130	20

SURROGATE PARAMETER	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	QC LIMIT (%)
1,2-Dichloroethane-d4	0.500	0.465	93	0.500	0.464	93	70-130
4-Bromofluorobenzene	0.500	0.484	97	0.500	0.481	96	70-130
Toluene-d8	0.500	0.474	95	0.500	0.479	96	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: NA
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/14/18
Batch No.   : 18L110                     Date Extracted: 12/14/18 18:34
Sample ID   : MBLK2W                     Date Analyzed: 12/14/18 18:34
Lab Samp ID: VOF5L11B                   Dilution Factor: 1
Lab File ID: RLY238                     Matrix       : WATER
Ext Btch ID: VOF5L11                   % Moisture   : NA
Calib. Ref.: RHY772                   Instrument ID : TOF5
=====

```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.506	0.5000	101	70-130
4-BROMOFLUOROBENZENE	0.479	0.5000	95.7	70-130
TOLUENE-D8	0.472	0.5000	94.4	70-130

EMAX QUALITY CONTROL DATA
LCS/LCD ANALYSIS

CLIENT: TESTAMERICA, INC.
PROJECT: NW PIPE COMPANY GW MONITORING
BATCH NO.: 18L110
METHOD: SW5030B/8260B SIM

MATRIX: WATER % MOISTURE: NA
DILUTION FACTOR: 1 1
SAMPLE ID: MBLK1W
LAB SAMP ID: VOF5L06B VOF5L06L VOF5L06C
LAB FILE ID: RLY140 RLY138 RLY139
DATE EXTRACTED: 12/11/1816:57 12/11/1816:07 12/11/1816:32 DATE COLLECTED: NA
DATE ANALYZED: 12/11/1816:57 12/11/1816:07 12/11/1816:32 DATE RECEIVED: 12/11/18
PREP. BATCH: VOF5L06 VOF5L06 VOF5L06
CALIB. REF: RHY772 RHY772 RHY772

ACCESSION:

PARAMETER	BLNK RSLT (ug/L)	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	RPD (%)	QC LIMIT (%)	MAX RPD (%)
cis-1,2-Dichloroethylene	ND	0.500	0.540	108	0.500	0.522	104	3	70-130	20
Vinyl Chloride	ND	0.500	0.592	118	0.500	0.572	114	3	60-140	20
Tetrachloroethene	ND	0.500	0.503	101	0.500	0.486	97	3	70-130	20
TCE	ND	0.500	0.513	103	0.500	0.499	100	3	70-130	20

SURROGATE PARAMETER	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	QC LIMIT (%)
1,2-Dichloroethane-d4	0.500	0.445	89	0.500	0.458	92	70-130
4-Bromofluorobenzene	0.500	0.482	96	0.500	0.480	96	70-130
Toluene-d8	0.500	0.481	96	0.500	0.481	96	70-130

Chain of Custody Record

Client Information (Sub Contract Lab)		Lab PM Allen, Kristine D	Carrier Tracking No(s)	COC No: 580-81966.1
Shipping/Receiving		E-Mail kristine.allen@testamericainc.com	State of Origin Oregon	Page Page 1 of 1
Company TestAmerica Laboratories, Inc		Accreditations Required (See note) 580-82435-1		
Address 17461 Derian Ave, Suite 100, Irvine State, Zip CA, 92614-5817		Job # 580-82435-1		
Phone: 949-261-1022(Tel) 949-260-3297(Fax)		Preservation Codes: A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:		
Email		M - Hexane N - None O - AsNaO2 P - Na2OHS Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 Z - other (specify)		
Project Name Northwest Pipe Company GW Monitoring		Analysis Requested		
Site		Total Number of Containers		
Due Date Requested 12/19/2018		Field Filtered Sample (Yes or No)		
TAT Requested (days):		Preservation Code		
PO #		Matrix (Water, Shallow, Onstream, AAR)		
WO #		Sample Type (C=Comp, G=grab)		
Project # 58013218		Sample Time		
SSOW#		Sample Date		
Sample Identification - Client ID (Lab ID)		Sample Date		
MW04-120618-0 (580-82435-2)		12/6/18		
T4S1MW23-120618-0 (580-82435-3)		12/6/18		
T4S1MW22-120618-0 (580-82435-4)		12/6/18		
MW01-120618-0 (580-82435-5)		12/6/18		
Special Instructions/Note:		RSK_175/ Methane		
Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody if the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.		Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months		
Possible Hazard Identification		Special Instructions/QC Requirements:		
Unconfirmed		Method of Shipment		
Deliverable Requested: I, II, III, IV, Other (specify)		Primary Deliverable Rank: 2		
Empty Kit Relinquished by:		Date:		
Relinquished by: <i>Tom Blankley D</i>		Date/Time: 12/7/18		
Relinquished by:		Date/Time:		
Relinquished by:		Date/Time:		
Custody Seals Intact Yes No		Custody Seal, Inc. No		



Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 580-82435-1

Login Number: 82435

List Source: TestAmerica Seattle

List Number: 1

Creator: Gall, Brandon A

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	False	Received 1 unfilled VOA vial for Sample #4.
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 580-82435-1

Login Number: 82435

List Number: 2

Creator: Avila, Stephanie 1

List Source: TestAmerica Irvine

List Creation: 12/08/18 01:39 PM

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	Received project as a subcontract.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310


TestAmerica Job ID: 580-82474-1

Client Project/Site: Northwest Pipe Company GW Monitoring

For:

CH2M Hill, Inc.
2020 SW 4th Ave
Suite 300
Portland, Oregon 97201

Attn: Bernice Kidd



Authorized for release by:
12/27/2018 5:20:05 PM

Kristine Allen, Manager of Project Management
(253)248-4970

kristine.allen@testamericainc.com

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Visit us at:
www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Job ID: 580-82474-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative 580-82474-1

Comments

No additional comments.

Receipt

The samples were received on 12/8/2018 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6° C.

Subcontract Work

Method TCE, cis 1,2-DCE, PCE, Vinyl Chloride - low level: This method was subcontracted to EMAX Laboratories Inc. The subcontract laboratory certification is different from that of the facility issuing the final report.

GC/MS VOA

Method(s) 8260C: The following sample was diluted to bring the concentration of target analytes within the calibration range: IDW-Drum2-MW5-6-120718 (580-82474-6). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

Method(s) 300.0: Sulfate was detected in the method blank greater than the method detection limit but less than the reporting limit.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: MW-03-120718

Lab Sample ID: 580-82474-1

Date Collected: 12/07/18 09:30

Matrix: Water

Date Received: 12/08/18 10:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (TCD)	2200		1000	500	ug/L			12/13/18 17:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.8		0.90	0.14	mg/L			12/08/18 13:24	1
NO3 as N	ND		0.20	0.020	mg/L			12/08/18 13:24	1
Sulfate	10	B	1.2	0.26	mg/L			12/08/18 13:24	1
Total Organic Carbon	1.5		1.0	0.19	mg/L			12/11/18 15:32	1



Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: MW-06-120718

Lab Sample ID: 580-82474-2

Date Collected: 12/07/18 10:50

Matrix: Water

Date Received: 12/08/18 10:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (TCD)	3500		1000	500	ug/L			12/13/18 17:50	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.2		0.90	0.14	mg/L			12/08/18 13:36	1
NO3 as N	ND		0.20	0.020	mg/L			12/08/18 13:36	1
Sulfate	8.7	B	1.2	0.26	mg/L			12/08/18 13:36	1
Total Organic Carbon	1.5		1.0	0.19	mg/L			12/11/18 15:32	1



Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: MW-05-120718

Lab Sample ID: 580-82474-3

Date Collected: 12/07/18 12:50

Matrix: Water

Date Received: 12/08/18 10:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (TCD)	1700		1000	500	ug/L			12/13/18 18:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.5		0.90	0.14	mg/L			12/08/18 13:47	1
NO3 as N	ND		0.20	0.020	mg/L			12/08/18 13:47	1
Sulfate	7.1	B	1.2	0.26	mg/L			12/08/18 13:47	1
Total Organic Carbon	1.6		1.0	0.19	mg/L			12/11/18 15:32	1



Client Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: MW-100-120718-0

Lab Sample ID: 580-82474-4

Date Collected: 12/07/18 12:00

Matrix: Water

Date Received: 12/08/18 10:00

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (TCD)	4100		1000	500	ug/L			12/13/18 18:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.2		0.90	0.14	mg/L			12/08/18 13:59	1
NO3 as N	ND		0.20	0.020	mg/L			12/08/18 13:59	1
Sulfate	8.8	B	1.2	0.26	mg/L			12/08/18 13:59	1
Total Organic Carbon	1.5		1.0	0.19	mg/L			12/11/18 15:32	1



Client Sample Results

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: IDW-Drum2-MW5-6-120718

Lab Sample ID: 580-82474-6

Date Collected: 12/07/18 13:40

Matrix: Water

Date Received: 12/08/18 10:00

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	31		1.0	0.22	ug/L			12/12/18 17:46	1
TCE	42		3.0	0.85	ug/L			12/12/18 17:46	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	100		80 - 122		12/12/18 17:46	1
Trifluorotoluene (Surr)	100		80 - 120		12/12/18 17:46	1
Dibromofluoromethane (Surr)	98		77 - 120		12/12/18 17:46	1
4-Bromofluorobenzene (Surr)	100		80 - 125		12/12/18 17:46	1
1,2-Dichloroethane-d4 (Surr)	100		80 - 126		12/12/18 17:46	1

Method: 8260C - Volatile Organic Compounds by GC/MS - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	800		120	28	ug/L			12/13/18 12:47	40
PCE	420		120	16	ug/L			12/13/18 12:47	40

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	111		80 - 122		12/13/18 12:47	40
Trifluorotoluene (Surr)	94		80 - 120		12/13/18 12:47	40
Dibromofluoromethane (Surr)	99		77 - 120		12/13/18 12:47	40
4-Bromofluorobenzene (Surr)	113		80 - 125		12/13/18 12:47	40
1,2-Dichloroethane-d4 (Surr)	112		80 - 126		12/13/18 12:47	40

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-290900/5

Matrix: Water

Analysis Batch: 290900

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Vinyl chloride	ND		1.0	0.22	ug/L			12/12/18 10:40	1
cis-1,2-Dichloroethene	ND		3.0	0.69	ug/L			12/12/18 10:40	1
TCE	ND		3.0	0.85	ug/L			12/12/18 10:40	1
PCE	ND		3.0	0.41	ug/L			12/12/18 10:40	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	99		80 - 122		12/12/18 10:40	1
Trifluorotoluene (Surr)	103		80 - 120		12/12/18 10:40	1
Dibromofluoromethane (Surr)	100		77 - 120		12/12/18 10:40	1
4-Bromofluorobenzene (Surr)	100		80 - 125		12/12/18 10:40	1
1,2-Dichloroethane-d4 (Surr)	100		80 - 126		12/12/18 10:40	1

Lab Sample ID: LCS 580-290900/6

Matrix: Water

Analysis Batch: 290900

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Vinyl chloride	10.0	9.57		ug/L		96	65 - 130
cis-1,2-Dichloroethene	10.0	10.7		ug/L		107	76 - 129
TCE	10.0	10.4		ug/L		104	70 - 131
PCE	10.0	9.54		ug/L		95	76 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Toluene-d8 (Surr)	100		80 - 122
Trifluorotoluene (Surr)	98		80 - 120
Dibromofluoromethane (Surr)	103		77 - 120
4-Bromofluorobenzene (Surr)	101		80 - 125
1,2-Dichloroethane-d4 (Surr)	102		80 - 126

Lab Sample ID: LCSD 580-290900/7

Matrix: Water

Analysis Batch: 290900

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Vinyl chloride	10.0	8.54		ug/L		85	65 - 130	11	35
cis-1,2-Dichloroethene	10.0	10.2		ug/L		102	76 - 129	5	15
TCE	10.0	9.97		ug/L		100	70 - 131	4	15
PCE	10.0	9.18		ug/L		92	76 - 120	4	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Toluene-d8 (Surr)	101		80 - 122
Trifluorotoluene (Surr)	101		80 - 120
Dibromofluoromethane (Surr)	103		77 - 120
4-Bromofluorobenzene (Surr)	102		80 - 125
1,2-Dichloroethane-d4 (Surr)	102		80 - 126

TestAmerica Seattle

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 580-291031/5
Matrix: Water
Analysis Batch: 291031

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		3.0	0.69	ug/L			12/13/18 10:34	1
PCE	ND		3.0	0.41	ug/L			12/13/18 10:34	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Toluene-d8 (Surr)	109		80 - 122		12/13/18 10:34	1
Trifluorotoluene (Surr)	97		80 - 120		12/13/18 10:34	1
Dibromofluoromethane (Surr)	102		77 - 120		12/13/18 10:34	1
4-Bromofluorobenzene (Surr)	114		80 - 125		12/13/18 10:34	1
1,2-Dichloroethane-d4 (Surr)	118		80 - 126		12/13/18 10:34	1

Lab Sample ID: LCS 580-291031/6
Matrix: Water
Analysis Batch: 291031

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
cis-1,2-Dichloroethene	10.0	9.86		ug/L		99	76 - 129
PCE	10.0	10.8		ug/L		108	76 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Toluene-d8 (Surr)	104		80 - 122
Trifluorotoluene (Surr)	93		80 - 120
Dibromofluoromethane (Surr)	105		77 - 120
4-Bromofluorobenzene (Surr)	110		80 - 125
1,2-Dichloroethane-d4 (Surr)	112		80 - 126

Lab Sample ID: LCSD 580-291031/7
Matrix: Water
Analysis Batch: 291031

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene	10.0	9.91		ug/L		99	76 - 129	1	15
PCE	10.0	10.1		ug/L		101	76 - 120	7	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Toluene-d8 (Surr)	105		80 - 122
Trifluorotoluene (Surr)	96		80 - 120
Dibromofluoromethane (Surr)	97		77 - 120
4-Bromofluorobenzene (Surr)	111		80 - 125
1,2-Dichloroethane-d4 (Surr)	114		80 - 126

QC Sample Results

Client: CH2M Hill, Inc.
 Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 440-516880/8
Matrix: Water
Analysis Batch: 516880

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methane (FID)	ND		0.99	0.25	ug/L			12/13/18 14:32	1
Methane (TCD)	ND		1000	500	ug/L			12/13/18 14:32	1

Lab Sample ID: LCS 440-516880/4
Matrix: Water
Analysis Batch: 516880

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methane (TCD)	4190	3350		ug/L		80	80 - 120

Lab Sample ID: LCS 440-516880/6
Matrix: Water
Analysis Batch: 516880

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Methane (FID)	83.9	80.4		ug/L		96	80 - 120

Lab Sample ID: LCSD 440-516880/5
Matrix: Water
Analysis Batch: 516880

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (TCD)	4190	3340		ug/L		80	80 - 120	1	20

Lab Sample ID: LCSD 440-516880/7
Matrix: Water
Analysis Batch: 516880

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Methane (FID)	83.9	80.4		ug/L		96	80 - 120	0	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 580-290627/3
Matrix: Water
Analysis Batch: 290627

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NO3 as N	ND		0.20	0.020	mg/L			12/07/18 15:15	1

Lab Sample ID: LCS 580-290627/4
Matrix: Water
Analysis Batch: 290627

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
NO3 as N	5.00	4.98		mg/L		100	90 - 110

TestAmerica Seattle

QC Sample Results

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 580-290627/5
Matrix: Water
Analysis Batch: 290627

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
NO3 as N	5.00	4.97		mg/L		99	90 - 110	0	15

Lab Sample ID: MB 580-292159/3
Matrix: Water
Analysis Batch: 292159

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.90	0.14	mg/L			12/07/18 15:15	1
Sulfate	0.334	J	1.2	0.26	mg/L			12/07/18 15:15	1

Lab Sample ID: LCS 580-292159/4
Matrix: Water
Analysis Batch: 292159

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.6		mg/L		99	90 - 110
Sulfate	50.0	49.6		mg/L		99	90 - 110

Lab Sample ID: LCSD 580-292159/5
Matrix: Water
Analysis Batch: 292159

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	50.0	49.7		mg/L		99	90 - 110	0	15
Sulfate	50.0	49.6		mg/L		99	90 - 110	0	15

Method: SM 5310C - TOC

Lab Sample ID: MB 580-290953/25
Matrix: Water
Analysis Batch: 290953

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.19	mg/L			12/11/18 15:32	1

Lab Sample ID: LCS 580-290953/26
Matrix: Water
Analysis Batch: 290953

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	10.0	9.09		mg/L		91	85 - 115

Lab Chronicle

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: MW-03-120718

Date Collected: 12/07/18 09:30

Date Received: 12/08/18 10:00

Lab Sample ID: 580-82474-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 17:28	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/08/18 13:24	EMM	TAL SEA
Total/NA	Analysis	300.0		1	292159	12/08/18 13:24	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: MW-06-120718

Date Collected: 12/07/18 10:50

Date Received: 12/08/18 10:00

Lab Sample ID: 580-82474-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 17:50	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/08/18 13:36	EMM	TAL SEA
Total/NA	Analysis	300.0		1	292159	12/08/18 13:36	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: MW-05-120718

Date Collected: 12/07/18 12:50

Date Received: 12/08/18 10:00

Lab Sample ID: 580-82474-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 18:13	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/08/18 13:47	EMM	TAL SEA
Total/NA	Analysis	300.0		1	292159	12/08/18 13:47	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: MW-100-120718-0

Date Collected: 12/07/18 12:00

Date Received: 12/08/18 10:00

Lab Sample ID: 580-82474-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	RSK-175		1	516880	12/13/18 18:37	EI	TAL IRV
Total/NA	Analysis	300.0		1	290627	12/08/18 13:59	EMM	TAL SEA
Total/NA	Analysis	300.0		1	292159	12/08/18 13:59	EMM	TAL SEA
Total/NA	Analysis	SM 5310C		1	290953	12/11/18 15:32	HJM	TAL SEA

Client Sample ID: IDW-Drum2-MW5-6-120718

Date Collected: 12/07/18 13:40

Date Received: 12/08/18 10:00

Lab Sample ID: 580-82474-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	290900	12/12/18 17:46	TL1	TAL SEA

TestAmerica Seattle

Lab Chronicle

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Client Sample ID: IDW-Drum2-MW5-6-120718

Lab Sample ID: 580-82474-6

Date Collected: 12/07/18 13:40

Matrix: Water

Date Received: 12/08/18 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C	DL	40	291031	12/13/18 12:47	T1W	TAL SEA

Laboratory References:

EMAX Lab. = EMAX Laboratories Inc, 1835 W. 205th Street, Torrance, CA 90501

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Laboratory: TestAmerica Irvine

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska	State Program	10	CA01531	06-30-19
Arizona	State Program	9	AZ0671	10-14-19
California	LA Cty Sanitation Districts	9	10256	06-30-19
California	State Program	9	CA ELAP 2706	06-30-19
Guam	State Program	9	Cert. No. 17-003R	01-23-19 *
Hawaii	State Program	9	N/A	01-29-19 *
Kansas	NELAP	7	E-10420	07-31-19
Nevada	State Program	9	CA015312018-1	07-31-19
New Mexico	State Program	6	N/A	01-29-19 *
Oregon	NELAP	10	4028	01-29-19 *
US Fish & Wildlife	Federal		058448	07-31-19
USDA	Federal		P330-18-00214	07-09-21
Washington	State Program	10	C900	09-03-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Sample Summary

Client: CH2M Hill, Inc.
Project/Site: Northwest Pipe Company GW Monitoring

TestAmerica Job ID: 580-82474-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-82474-1	MW-03-120718	Water	12/07/18 09:30	12/08/18 10:00
580-82474-2	MW-06-120718	Water	12/07/18 10:50	12/08/18 10:00
580-82474-3	MW-05-120718	Water	12/07/18 12:50	12/08/18 10:00
580-82474-4	MW-100-120718-0	Water	12/07/18 12:00	12/08/18 10:00
580-82474-6	IDW-Drum2-MW5-6-120718	Water	12/07/18 13:40	12/08/18 10:00
580-82474-7	Trip Blank	Water	12/07/18 00:01	12/08/18 10:00

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EMAX
LABORATORIES, INC.[®]
1835 W. 205th Street
Torrance, CA 90501
Tel: (310) 618-8889

Date: 12-20-2018
EMAX Batch No.: 18L129

Attn: Kris Allen

TestAmerica, Inc.
5755 8th Street East
Tacoma WA 98424

Subject: Laboratory Report
Project: NW PIPE COMPANY GW MONITORING

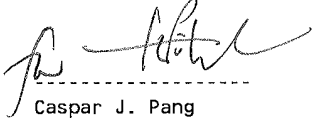
Enclosed is the Laboratory report for samples received on 12/11/18.
The data reported relate only to samples listed below :

Sample ID	Control #	Col Date	Matrix	Analysis
MW-03-120718	L129-01	12/07/18	WATER	VOC SIM
MW-06-120718	L129-02	12/07/18	WATER	VOC SIM
MW-05-120718	L129-03	12/07/18	WATER	VOC SIM
MW-100-120718-0	L129-04	12/07/18	WATER	VOC SIM
TRIP BLANK	L129-05	12/07/18	WATER	VOC SIM

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely yours,



Caspar J. Pang
Laboratory Director

This report is confidential and intended solely for the use of the individual or entity to whom it is addressed. This report shall not be reproduced except in full or without the written approval of EMAX.

EMAX certifies that results included in this report meets all NELAC & DOD requirements unless noted in the Case Narrative.

NELAP Accredited Certificate Number CA002912017-13
ANAB Accredited DoD ELAP and ISO/IEC 17025 Certificate Number L2278 Testing
California ELAP Accredited Certificate Number 2672

18L129

Chain of Custody Record

Client Information (Sub Contract Lab)		Lab PM: Allen, Kristine D	Carrier Tracking No(s):	COC No: 580-61995.1
Client Contact: Shipping/Receiving		Phone: Kristine.allen@testamericainc.com	State of Origin: Oregon	Page: Page 1 of 1
Company: EMAX Laboratories Inc		Accreditations Required (See note):		
Address: 1835 W. 205th Street, City: Torrance		Analysis Requested		
State, Zip: CA, 90501		Due Date Requested: 12/19/2018		
Phone: Email:		TAT Requested (days):		
Project Name: Northwest Pipe Company GW Monitoring		Field Filtered Sample (Yes or No)		
Site:		Perform MS/MSD (Yes or No)		
		SUB (TCB, cis 1,2-DCE, PCE, Vinyl Chloride - low level)		
		Total Number of Containers		
		Special Instructions/Note:		
		Please provide CH2 Lab Spec EDD if possible.		
		Please provide CH2 Lab Spec EDD if possible.		
		Please provide CH2 Lab Spec EDD if possible.		
		Please provide CH2 Lab Spec EDD if possible.		
		Please provide CH2 Lab Spec EDD if possible.		
		Please provide CH2 Lab Spec EDD if possible.		
		TEMP: 2.4°C		
<p>Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.</p>				
Sample Identification - Client ID (Lab ID)				
MW-03-120718	12/7/18	09:30 Pacific	Water	X
MW-06-120718	12/7/18	10:50 Pacific	Water	X
MW-05-120718	12/7/18	12:50 Pacific	Water	X
MW-100-120718-0	12/7/18	12:00 Pacific	Water	X
Trip Blank	12/7/18	00:01 Pacific	Water	X
<p>Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months Special Instructions/QC Requirements:</p>				
<p>Primary Deliverable Rank: 2</p>				
<p>Empty Kit Relinquished by: _____ Date: _____</p>				
<p>Relinquished by: Tom Blanks Date: 12/10/18 Company: TA-Sea</p>				
<p>Relinquished by: _____ Date: _____ Company: _____</p>				
<p>Relinquished by: _____ Date: _____ Company: _____</p>				
<p>Custody Seals Intact: _____ Custody Seal No.: _____ Δ Yes Δ No</p>				

SAMPLE RECEIPT FORM 1

<input checked="" type="checkbox"/> Fedex <input type="checkbox"/> UPS <input type="checkbox"/> GSO <input type="checkbox"/> Others	Airbill / Tracking Number 4008 877 9071	ECN 18L129
<input type="checkbox"/> EMAX Courier <input type="checkbox"/> Client Delivery		Recipient <u>Scabel</u>
		Date <u>12/11/18</u> Time <u>0915</u>

COC INSPECTION

<input checked="" type="checkbox"/> Client Name	<input checked="" type="checkbox"/> Client PM/FC	<input type="checkbox"/> Sampler Name	<input checked="" type="checkbox"/> Sampling Date/Time	<input checked="" type="checkbox"/> Sample ID	<input checked="" type="checkbox"/> Matrix
<input checked="" type="checkbox"/> Address	<input checked="" type="checkbox"/> Tel # / Fax #	<input type="checkbox"/> Courier Signature	<input checked="" type="checkbox"/> Analysis Required	<input type="checkbox"/> Preservative (if any)	<input type="checkbox"/> TAT
Safety Issues (if any)		<input type="checkbox"/> High concentrations expected	<input type="checkbox"/> From Superfund Site	<input type="checkbox"/> Rad screening required	

Note: No initial/date on COC correction.

PACKAGING INSPECTION

Container	<input checked="" type="checkbox"/> Cooler	<input type="checkbox"/> Box	<input type="checkbox"/> Other
Condition	<input checked="" type="checkbox"/> Custody Seal	<input checked="" type="checkbox"/> Intact	<input type="checkbox"/> Damaged
Packaging	<input checked="" type="checkbox"/> Bubble Pack	<input type="checkbox"/> Styrofoam	<input type="checkbox"/> Popcorn
Temperatures (Cool, ≤6 °C but not frozen)	<input checked="" type="checkbox"/> Cooler 1 <u>24</u> °C	<input type="checkbox"/> Cooler 2 _____ °C	<input type="checkbox"/> Cooler 3 _____ °C
	<input type="checkbox"/> Cooler 6 _____ °C	<input type="checkbox"/> Cooler 7 _____ °C	<input type="checkbox"/> Cooler 8 _____ °C
Thermometer:	A - S/N 170324872	B - S/N 15055522	<u>C</u> - S/N 170324888

Comments: Temperature is out of range. PM was informed IMMEDIATELY.

Note: _____

DISCREPANCIES

LabSampleID	LabSampleContainerID	Code	ClientSample Label ID / Information	Corrective Action
<u>1-5</u>		<u>D6</u>	<u>vals w/ HCl.</u>	<u>R1</u>
<u>213</u>	<u>3,518,9</u>	<u>D2</u>	<u>label: CH4 (RSK175)</u>	<u>R1</u>
<u>3</u>	<u>13-15</u>	<u>D1</u>		<u>R1</u>

RS
12/11/18

pH holding time requirement for water samples is 15 mins. Water samples for pH analysis are received beyond 15 minutes from sampling time.

NOTES/OBSERVATIONS:

LEGEND:

<p>Code Description- Sample Management</p> <p><u>D1</u> Analysis is not indicated in <u>label</u></p> <p><u>D2</u> Analysis mismatch COC vs <u>label</u></p> <p>D3 Sample ID mismatch COC vs label</p> <p>D4 Sample ID is not indicated in _____</p> <p>D5 Container -[improper] [leaking] [broken]</p> <p>D6 Date/Time is not indicated in _____</p> <p>D7 Date/Time mismatch COC vs label</p> <p>D8 Sample listed in COC is not received</p> <p>D9 Sample received is not listed in COC</p> <p>D10 No initial/date on corrections in COC/label</p> <p>D11 Container count mismatch COC vs received</p> <p>D12 Container size mismatch COC vs received</p>	<p>Code Description-Sample Management</p> <p>D13 Out of Holding Time</p> <p>D14 Bubble is >6mm</p> <p>D15 No trip blank in cooler</p> <p><u>D16</u> Preservation not indicated in <u>COC</u></p> <p>D17 Preservation mismatch COC vs label</p> <p>D18 Insufficient chemical preservative</p> <p>D19 Insufficient Sample</p> <p>D20 No filtration info for dissolved analysis</p> <p>D21 No sample for moisture determination</p> <p>D22 _____</p> <p>D23 _____</p> <p>D24 _____</p>	<p><input type="checkbox"/> Continue to next page.</p> <p>Code Description-Sample Management</p> <p><u>R1</u> Proceed as indicated in <u>COC</u> <input type="checkbox"/> Label</p> <p>R2 Refer to attached instruction</p> <p>R3 Cancel the analysis</p> <p>R4 Use vial with smallest bubble first</p> <p>R5 Log-in with latest sampling date and time+1 min</p> <p>R6 Adjust pH as necessary</p> <p>R7 Filter and preserved as necessary</p> <p>R8 _____</p> <p>R9 _____</p> <p>R10 _____</p> <p>R11 _____</p> <p>R12 _____</p>
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REVIEWS: Sample Labeling Date 12/11/18

SRF Signature Date 12/11/18

PM RS Date 12/11/18

EMAX Laboratories, Inc. 1835 W. 205th St., Torrance, Ca 90501

TestAmerica Temperature Controlled

THE LEADER IN ENVIRONMENTAL TESTING



**IF THIS SHIPMENT IS DELAYED IN TRANSIT,
STORE REFRIGERATED (2° TO 8° C / 36° TO 47° F)**

TAL-0090(1016)

ORIGIN ID:TCMA (253) 922-2310
SAMPLE RECEIVING
TA-SEATTLE
5755 8TH ST E

SHIP DATE: 10DEC18
ACTWGT: 19.25 LB
CAD: 989746/CAFE3211

FIFE, WA 98424
UNITED STATES US

BILL SENDER

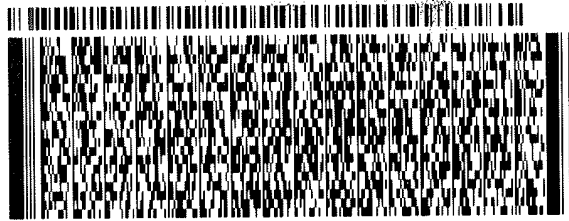
**TO SHIPPING/RECEIVING
EMAX LABORATORIES INC
1835 W. 205TH STREET**

ES:CL1/F:FF/104C

TORRANCE CA 90501

(253) 922-2310
PO: NO

REF: S580-31878



FedEx
Express



J181118066503.04

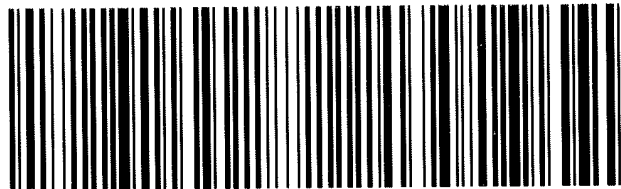
**TUE - 11 DEC 10:30A
PRIORITY OVERNIGHT**

TRK# 4668 8717 9071
0201

92 HHRA

**90501
CA-US LAX**

Part # 159471-004 FITZ EXP 03/19



REPORTING CONVENTIONS

DATA QUALIFIERS:

Lab Qualifier	AFCEE Qualifier	Description
J	F	Indicates that the analyte is positively identified and the result is less than LOQ/RL but greater than LOD/MDL/DL.
N		Indicates presumptive evidence of a compound.
B	B	Indicates that the analyte is found in the associated method blank as well as in the sample at above QC level.
E	J	Indicates that the result is above the maximum calibration range or estimated value.
*	*	Out of QC limit.

Note: The above qualifiers are used to flag the results unless the project requires a different set of qualification criteria.

ACRONYMS AND ABBREVIATIONS:

CRDL	Contract Required Detection Limit
RL	Reporting Limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
DL	Detection Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DO	Diluted out

DATES

The date and time information for leaching and preparation reflect the beginning date and time of the procedure unless the method, protocol, or project specifically requires otherwise.

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LABORATORY REPORT FOR

TESTAMERICA, INC.

NW PIPE COMPANY GW MONITORING

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

SDG#: 18L129

CASE NARRATIVE

Client : TESTAMERICA, INC.

Project: NW PIPE COMPANY GW MONITORING

SDG : 18L129

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

A total of five (5) water samples were received on 12/11/18 to be analyzed for EDB by GC/MS SIM in accordance with Method SW5030B/8260B SIM and project specific requirements.

Holding Time

Samples were analyzed within the prescribed holding time.

Instrument Performance and Calibration

Instrument tune check was performed prior to calibration. Result was within acceptance criteria. Multi-calibration points were generated to establish initial calibration (ICAL). ICAL was verified using secondary source (ICV). Continuing calibration (CCV) was carried out at a frequency required by the project. All project calibration requirements were satisfied. Refer to calibration summary forms of ICAL, ICV and CCV for details.

Method Blank

Method blank was prepared and analyzed at the frequency required by the project. For this SDG, one (1) method blank was analyzed. VOF5L11B - result was compliant to project requirement. Refer to sample result summary form for details.

Lab Control Sample

Lab control sample was prepared and analyzed at a frequency required by the project. For this SDG, one (1) set of LCS/LCD was analyzed. VOF5L11L/VOF5L11C were within LCS limits. Refer to LCS summary form for details.

Matrix QC Sample

No matrix QC sample was provided on this SDG.

Surrogate

Surrogates were added on QC and field samples. All surrogate recoveries were within QC limits. Refer to sample result summary forms for details.

Sample Analysis

Samples were analyzed according to prescribed analytical procedures. Results were evaluated in accordance to project requirements. For this SDG, all quality control requirements were met.

Samples L129-01, -02, -03 and -04 were analyzed at dilution due to high concentration.

LAB CHRONICLE
EDB BY GC/MS SIM

Client : TESTAMERICA, INC. SDG NO. : 18L129
 Project : NW PIPE COMPANY GW MONITORING Instrument ID : F5

Client Sample ID	Laboratory Sample ID	Dilution Factor	% Moist	Analysis DateTime	Extraction DateTime	Sample Data FN	Calibration Data FN	Prep. Batch	Notes
									WATER
MBLK1W	VOF5L11B	1	NA	12/14/1818:34	12/14/1818:34	RLY238	RHY772	VOF5L11	Method Blank
LCS1W	VOF5L11L	1	NA	12/14/1817:44	12/14/1817:44	RLY236	RHY772	VOF5L11	Lab Control Sample (LCS)
LCD1W	VOF5L11C	1	NA	12/14/1818:09	12/14/1818:09	RLY237	RHY772	VOF5L11	LCS Duplicate
MW-06-120718DL	L129-02I	5000	NA	12/14/1819:24	12/14/1819:24	RLY240	RHY772	VOF5L11	Diluted Sample
MW-05-120718DL	L129-03I	5000	NA	12/14/1819:49	12/14/1819:49	RLY241	RHY772	VOF5L11	Diluted Sample
MW-100-120718-0DL	L129-04I	5000	NA	12/14/1820:14	12/14/1820:14	RLY242	RHY772	VOF5L11	Diluted Sample
TRIP BLANK	L129-05	1	NA	12/14/1820:39	12/14/1820:39	RLY243	RHY772	VOF5L11	Field Sample
MW-03-120718	L129-01	250	NA	12/14/1822:46	12/14/1822:46	RLY248	RHY772	VOF5L11	Field Sample
MW-06-120718	L129-02	250	NA	12/14/1823:11	12/14/1823:11	RLY249	RHY772	VOF5L11	Field Sample
MW-05-120718	L129-03	250	NA	12/14/1823:37	12/14/1823:37	RLY250	RHY772	VOF5L11	Field Sample
MW-100-120718-0	L129-04	250	NA	12/15/1800:02	12/15/1800:02	RLY251	RHY772	VOF5L11	Field Sample

FN - Filename
 % Moist - Percent Moisture

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SAMPLE RESULTS

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 22:46
Sample ID   : MW-03-120718              Date Analyzed: 12/14/18 22:46
Lab Samp ID : L129-01                    Dilution Factor: 250
Lab File ID : RLY248                     Matrix          : WATER
Ext Btch ID: VOF5L11                     % Moisture     : NA
Calib. Ref.: RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	850	50	25
VINYL CHLORIDE	46	25	5.0
TETRACHLOROETHENE	490	50	25
TCE	160	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	137	125.0	109	70-130
4-BROMOFLUOROBENZENE	119	125.0	95.4	70-130
TOLUENE-D8	115	125.0	91.6	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client       : TESTAMERICA, INC.           Date Collected: 12/07/18
Project      : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.    : 18L129                     Date Extracted: 12/14/18 23:11 # 12/14/18 19:24
Sample ID    : MW-06-120718               Date Analyzed: 12/14/18 23:11 # 12/14/18 19:24
Lab Samp ID  : L129-02 #L129-02I          Dilution Factor: 250 # 5000
Lab File ID  : RLY249 #RLY240             Matrix          : WATER
Ext Btch ID  : VOF5L11 #VOF5L11           % Moisture      : NA
Calib. Ref.  : RHY772 #RHY772            Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
# CIS-1,2-DICHLOROETHYLENE	1300	1000	500
VINYL CHLORIDE	130	25	5.0
TETRACHLOROETHENE	430	50	25
TCE	110	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	136	125.0	109	70-130
4-BROMOFLUOROBENZENE	116	125.0	92.7	70-130
TOLUENE-D8	114	125.0	91.5	70-130
# 1,2-DICHLOROETHANE-D4	2520	2500	101	70-130
# 4-BROMOFLUOROBENZENE	2400	2500	96.1	70-130
# TOLUENE-D8	2340	2500	93.5	70-130

Members of the Associated File

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 23:11
Sample ID   : MW-06-120718              Date Analyzed: 12/14/18 23:11
Lab Samp ID : L129-02                   Dilution Factor: 250
Lab File ID : RLY249                     Matrix          : WATER
Ext Btch ID : VOF5L11                   % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1400E	50	25
VINYL CHLORIDE	130	25	5.0
TETRACHLOROETHENE	430	50	25
TCE	110	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	136	125.0	109	70-130
4-BROMOFLUOROBENZENE	116	125.0	92.7	70-130
TOLUENE-D8	114	125.0	91.5	70-130



METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 19:24
Sample ID   : MW-06-120718DL             Date Analyzed: 12/14/18 19:24
Lab Samp ID : L129-02I                   Dilution Factor: 5000
Lab File ID : RLY240                     Matrix          : WATER
Ext Btch ID : VOF5L11                   % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1300	1000	500
VINYL CHLORIDE	120J	500	100
TETRACHLOROETHENE	ND	1000	500
TCE	ND	1000	500

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	2520	2500	101	70-130
4-BROMOFLUOROBENZENE	2400	2500	96.1	70-130
TOLUENE-D8	2340	2500	93.5	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client       : TESTAMERICA, INC.           Date Collected: 12/07/18
Project      : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.    : 18L129                     Date Extracted: 12/14/18 23:37 # 12/14/18 19:49
Sample ID    : MW-05-120718              Date Analyzed: 12/14/18 23:37 # 12/14/18 19:49
Lab Samp ID  : L129-03 #L129-03I         Dilution Factor: 250 # 5000
Lab File ID  : RLY250 #RLY241           Matrix          : WATER
Ext Btch ID  : VOF5L11 #VOF5L11        % Moisture      : NA
Calib. Ref.  : RHY772 #RHY772          Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
# CIS-1,2-DICHLOROETHYLENE	1600	1000	500
VINYL CHLORIDE	77	25	5.0
TETRACHLOROETHENE	1200	50	25
TCE	85	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	137	125.0	110	70-130
4-BROMOFLUOROBENZENE	119	125.0	95.0	70-130
TOLUENE-D8	112	125.0	89.7	70-130
# 1,2-DICHLOROETHANE-D4	2570	2500	103	70-130
# 4-BROMOFLUOROBENZENE	2400	2500	96.1	70-130
# TOLUENE-D8	2320	2500	92.8	70-130

Members of the Associated File

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 23:37
Sample ID   : MW-05-120718              Date Analyzed: 12/14/18 23:37
Lab Samp ID : L129-03                   Dilution Factor: 250
Lab File ID : RLY250                     Matrix          : WATER
Ext Btch ID : VOF5L11                   % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1800E	50	25
VINYL CHLORIDE	77	25	5.0
TETRACHLOROETHENE	1200	50	25
TCE	85	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	137	125.0	110	70-130
4-BROMOFLUOROBENZENE	119	125.0	95.0	70-130
TOLUENE-D8	112	125.0	89.7	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 19:49
Sample ID   : MW-05-120718DL             Date Analyzed: 12/14/18 19:49
Lab Samp ID: L129-03I                    Dilution Factor: 5000
Lab File ID: RLY241                       Matrix          : WATER
Ext Btch ID: VOF5L11                     % Moisture      : NA
Calib. Ref.: RHY772                       Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1600	1000	500
VINYL CHLORIDE	ND	500	100
TETRACHLOROETHENE	880J	1000	500
TCE	ND	1000	500

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	2570	2500	103	70-130
4-BROMOFLUOROBENZENE	2400	2500	96.1	70-130
TOLUENE-D8	2320	2500	92.8	70-130



METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client       : TESTAMERICA, INC.           Date Collected: 12/07/18
Project      : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.    : 18L129                     Date Extracted: 12/15/18 00:02 # 12/14/18 20:14
Sample ID    : MW-100-120718-0           Date Analyzed: 12/15/18 00:02 # 12/14/18 20:14
Lab Samp ID  : L129-04 #L129-04I         Dilution Factor: 250 # 5000
Lab File ID  : RLY251 #RLY242           Matrix          : WATER
Ext Btch ID  : VOF5L11 #VOF5L11         % Moisture      : NA
Calib. Ref.  : RHY772 #RHY772          Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
# CIS-1,2-DICHLOROETHYLENE	1400	1000	500
VINYL CHLORIDE	130	25	5.0
TETRACHLOROETHENE	400	50	25
TCE	110	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	140	125.0	112	70-130
4-BROMOFLUOROBENZENE	118	125.0	94.5	70-130
TOLUENE-D8	113	125.0	90.7	70-130

# 1,2-DICHLOROETHANE-D4	2610	2500	104	70-130
# 4-BROMOFLUOROBENZENE	2380	2500	95.3	70-130
# TOLUENE-D8	2340	2500	93.7	70-130

Members of the Associated File

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/15/18 00:02
Sample ID   : MW-100-120718-0           Date Analyzed: 12/15/18 00:02
Lab Samp ID : L129-04                   Dilution Factor: 250
Lab File ID : RLY251                     Matrix          : WATER
Ext Btch ID : VOF5L11                   % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1500E	50	25
VINYL CHLORIDE	130	25	5.0
TETRACHLOROETHENE	400	50	25
TCE	110	50	25

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	140	125.0	112	70-130
4-BROMOFLUOROBENZENE	118	125.0	94.5	70-130
TOLUENE-D8	113	125.0	90.7	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 20:14
Sample ID   : MW-100-120718-ODL          Date Analyzed: 12/14/18 20:14
Lab Samp ID : L129-04I                   Dilution Factor: 5000
Lab File ID : RLY242                     Matrix          : WATER
Ext Btch ID : VOF5L11                   % Moisture     : NA
Calib. Ref. : RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	1400	1000	500
VINYL CHLORIDE	130J	500	100
TETRACHLOROETHENE	ND	1000	500
TCE	ND	1000	500

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	2610	2500	104	70-130
4-BROMOFLUOROBENZENE	2380	2500	95.3	70-130
TOLUENE-D8	2340	2500	93.7	70-130

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: 12/07/18
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/11/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 20:39
Sample ID   : TRIP BLANK                 Date Analyzed: 12/14/18 20:39
Lab Samp ID: L129-05                     Dilution Factor: 1
Lab File ID: RLY243                      Matrix          : WATER
Ext Btch ID: VOF5L11                    % Moisture     : NA
Calib. Ref.: RHY772                     Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.522	0.5000	104	70-130
4-BROMOFLUOROBENZENE	0.475	0.5000	95.0	70-130
TOLUENE-D8	0.467	0.5000	93.4	70-130

1
2
3
4
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9
10
11
12

QC SUMMARIES

METHOD SW5030B/8260B SIM
EDB BY GC/MS SIM

```

=====
Client      : TESTAMERICA, INC.           Date Collected: NA
Project     : NW PIPE COMPANY GW MONITORING Date Received: 12/14/18
Batch No.   : 18L129                     Date Extracted: 12/14/18 18:34
Sample ID   : MBLK1W                     Date Analyzed: 12/14/18 18:34
Lab Samp ID: VOF5L11B                    Dilution Factor: 1
Lab File ID: RLY238                      Matrix          : WATER
Ext Btch ID: VOF5L11                     % Moisture      : NA
Calib. Ref.: RHY772                      Instrument ID   : TOF5
=====
  
```

PARAMETERS	RESULTS (ug/L)	RL (ug/L)	MDL (ug/L)
CIS-1,2-DICHLOROETHYLENE	ND	0.20	0.10
VINYL CHLORIDE	ND	0.10	0.020
TETRACHLOROETHENE	ND	0.20	0.10
TCE	ND	0.20	0.10

SURROGATE PARAMETERS	RESULTS	SPK_AMT	% RECOVERY	QC LIMIT
1,2-DICHLOROETHANE-D4	0.506	0.5000	101	70-130
4-BROMOFLUOROBENZENE	0.479	0.5000	95.7	70-130
TOLUENE-D8	0.472	0.5000	94.4	70-130

EMAX QUALITY CONTROL DATA
LCS/LCD ANALYSIS

CLIENT: TESTAMERICA, INC.
PROJECT: NW PIPE COMPANY GW MONITORING
BATCH NO.: 18L129
METHOD: SW5030B/8260B SIM

MATRIX: WATER % MOISTURE: NA
DILUTION FACTOR: 1 1
SAMPLE ID: MBLK1W
LAB SAMP ID: VOF5L11B VOF5L11L VOF5L11C
LAB FILE ID: RLY238 RLY236 RLY237
DATE EXTRACTED: 12/14/1818:34 12/14/1817:44 12/14/1818:09 DATE COLLECTED: NA
DATE ANALYZED: 12/14/1818:34 12/14/1817:44 12/14/1818:09 DATE RECEIVED: 12/14/18
PREP. BATCH: VOF5L11 VOF5L11 VOF5L11
CALIB. REF: RHY772 RHY772 RHY772

ACCESSION:

PARAMETER	BLNK RSLT (ug/L)	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	RPD (%)	QC LIMIT (%)	MAX RPD (%)
cis-1,2-Dichloroethylene	ND	0.500	0.499	100	0.500	0.504	101	1	70-130	20
Vinyl Chloride	ND	0.500	0.555	111	0.500	0.557	111	0	60-140	20
Tetrachloroethene	ND	0.500	0.453	91	0.500	0.452	90	0	70-130	20
TCE	ND	0.500	0.469	94	0.500	0.471	94	0	70-130	20

SURROGATE PARAMETER	SPIKE AMT (ug/L)	BS RSLT (ug/L)	BS % REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD % REC	QC LIMIT (%)
1,2-Dichloroethane-d4	0.500	0.465	93	0.500	0.464	93	70-130
4-Bromofluorobenzene	0.500	0.484	97	0.500	0.481	96	70-130
Toluene-d8	0.500	0.474	95	0.500	0.479	96	70-130

Chain of Custody Record



Client Information (Sub Contract Lab)		Sampler	Lab PM	Carrier Tracking No(s)	COC No			
Client Contact: Allen, Kristine D		Phone	E-Mail	State of Origin	580-61993.1			
Shipping/Receiving		Kristine.allen@testamericainc.com		Page 1 of 1				
Company: TestAmerica Laboratories, Inc		Accreditations Required (See note)		Job #:	580-82474-1			
Address: 17461 Derian Ave, Suite 100, Irvine, CA, 92614-5817		Due Date Requested: 12/19/2018		Preservation Codes:				
City: Irvine		TAT Requested (days):		M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 X - EDTA Y - EDA Z - other (specify)				
State, Zip: CA, 92614-5817		PO #:		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:				
Phone: 949-261-1022(Tel) 949-260-3297(Fax)		WO #:						
Email:		Project #:						
Project Name: Northwest Pipe Company GW Monitoring		58013218						
Site:		SSOW#:						
Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C-comp, G-grab)	Matrix (W-water, S-soil, O-wastoff, BT-tissue, A-air)	Field Filtered Sample (Yes or No)	RSK 175/ Methane	Total Number of Containers	Special Instructions/Note:
MW-03-120718 (580-82474-1)	12/7/18	09:30 Pacific	Water	Water	X		3	
MW-06-120718 (580-82474-2)	12/7/18	10:50 Pacific	Water	Water	X		3	
MW-05-120718 (580-82474-3)	12/7/18	12:50 Pacific	Water	Water	X		3	
MW-100-120718-0 (580-82474-4)	12/7/18	12:00 Pacific	Water	Water	X		3	
<p>Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody if the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc</p>								
Possible Hazard Identification								
<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)								
Unconfirmed Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2								
Empty Kit Relinquished by			Date			Method of Shipment		
Relinquished by: <i>Tom Blanks</i>			Date/Time: 12/10/18			Received by: Company TA-Sa		
Relinquished by:			Date/Time:			Received by: Company		
Relinquished by:			Date/Time:			Received by: Company		
Custody Seals Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Custody Seal No.:			Cooler Temperature(s) °C and Other Remarks: 1.1.1.1 #89		



Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 580-82474-1

Login Number: 82474
List Number: 1
Creator: Gall, Brandon A

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Login Sample Receipt Checklist

Client: CH2M Hill, Inc.

Job Number: 580-82474-1

Login Number: 82474
List Number: 2
Creator: Avila, Stephanie 1

List Source: TestAmerica Irvine
List Creation: 12/11/18 01:30 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Attachment C
Data Quality Assessment

Groundwater Data Quality Evaluation for Northwest Pipe Company, Portland, Oregon

PREPARED FOR: Stephanie Heldt-Sheller/Northwest Pipe Company
Dave Bennett/Northwest Pipe Company

PREPARED BY: Shannon Fitzsimmons/Jacobs

REVIEWED BY: Bernice Kidd/Jacobs

REFERENCE: Northwest Pipe Company GWM 4Q Event – December 5 through December 7, 2018

DATE: January 7, 2019

Introduction

The objective of this data quality evaluation (DQE) is to assess the representativeness and usability of data quality for groundwater quality samples collected to monitor the groundwater at the Northwest Pipe Company. The rationale for monitoring, the data quality objectives (DQOs), and the method for performing this DQE is provided in the *Final Supplemental Groundwater Sampling and Data Evaluation*, Northwest Pipe Company, Oregon, August 2016 (hereafter referred to as the *NWP SAP*).

This DQE report includes evaluation of groundwater quality data from ten groundwater samples and one investigation derived waste (IDW) sample collected in accordance with the *NWP SAP* on December 5 through December 7, 2018. This DQE report is intended as a general data quality assessment designed to summarize data issues, and written in accordance with *National Functional Guidelines (NFGs) for Superfund Organic Methods Data Review* (EPA, 2016) and *NFGs for Inorganic Superfund Methods Data Review* (EPA, 2016).

Findings

The overall summaries of the data validation findings are contained in Tables 1 through 5 and summarized in the method sections that follow:

- **Table 1:** Sample Summary by Chain of Custody – Data Summary. Presents the sample identifiers, sampling dates, and SDG sorted by chain-of-custody (COC) number.
- **Table 2:** Sample Chronology – Data Summary. Presents the sample identifiers, methods, sampling dates, received dates, extraction dates, and analysis dates sorted by SDG number.
- **Table 3:** Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Matrix Spike Precision/Accuracy - Qualified Data. Presents the results that are qualified because of matrix spike/matrix spike duplicate recovery exceedances.

- **Table 5:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

Analytical Data

This DQE report includes ten normal groundwater samples, one IDW, and one FD collected from December 5 through December 7, 2018. These samples were reported under three sample delivery groups: 580-82404-1, 580-82435-1, and 580-82474-1. A list of samples included in this DQE are presented in Table 1. Five methods were used to analyze the groundwater samples and are provided in Table 2. The majority of analyses were performed by TestAmerica Laboratory, Seattle, Washington (TAM2). The dissolved gas method was performed by TestAmerica Laboratory, Irvine, California (TAMI). One low-level method was subcontracted to EMAX Laboratories Inc, Torrance, California (EMXT) to achieve lower reporting limits. Samples were collected and delivered by overnight carrier to TAM2, TAM2 was responsible for shipment of samples to TAMI and EMXT.

The data were assessed according to the requirements of the *NWP SAP* and included a review of:

1. chain of custody documentation;
2. holding-time compliance;
3. required quality control (QC) samples at the specified frequencies;
4. flagging for method blanks;
5. laboratory control sample/laboratory control sample duplicates (LCS/LCSD);
6. matrix spike/matrix spike duplicate (MS/MSD) recoveries;

and other method-specific criteria as defined by the *NWP SAP*.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included the review of a FD.

Data flags were assigned according to the *NFGs*. These flags, as well as the reason for each flag, are entered into the electronic database and can be found in Table 3. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the *NWP SAP* and are defined below:

- J = the analyte was detected, but the associated numerical value is considered an estimated quantity.
- R = the sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified. No associated value is reported.
- U = the analyte was analyzed for but was not detected above the detection limit.
- UJ = the analyte was not detected above the detection limit. However, the detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Overall Flagging Summary

The overall summaries of the data validation findings are summarized in the following sections. Table 3 provides a flagging summary of overall occurrences for each data validation reason by method.

Temperature

Temperature requirements were met.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination that affected the sample results.

Field Duplicates

In accordance with the *NWP SAP*, one field duplicate (FD) was collected from well MW06, and all precision criteria were met.

Laboratory Control Samples

LCS and LCSDs were analyzed at the required frequency and the accuracy and precision criteria were met.

Matrix Spikes

Matrix spikes and matrix spike duplicates were analyzed at the required batch frequency and all accuracy and precision criteria were met, with the following exception listed in Table 4:

The recovery for the MS and SD performed on sample MW04-120618-0 was less than the lower control limit for nitrate as nitrogen. The associated detected sample result was qualified as estimated and flagged "J".

Results

Analysis for tetrachloroethene, trichloroethylene, *cis*-1,2-dichloroethene, and vinyl chloride were analyzed by SW8260C-SIM in the groundwater samples due to the low-level reporting limit required.

Holding Times

All holding-time criteria were met.

Chain of Custody

There were no discrepancies.

Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives. The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The precision, accuracy, representativeness, completeness and comparability are addressed in the *NWP SAP*. The following summary highlights the data evaluation findings for the above defined events:

1. No data were rejected and completeness was 100 percent for all method/matrix/analyte combinations as shown in Table 5.
2. MS/SD recoveries were less than the lower control limit for Method E353.2; one result was qualified as estimated.

3. The precision and accuracy of the data, as measured by field and laboratory QC indicators, met the *NWP SAP* goals for project use.
4. The field crew followed the *NWP SAP* and project documents.

Works Cited

CH2M Hill, Inc. 2016. *Final Supplemental Groundwater Sampling and Data Evaluation (referenced herein as the NWP SAP)*, Northwest Pipe Company, Oregon. August.

EPA, 2016. *National Functional Guidelines for Superfund Organic Methods Data Review*. September.

EPA, 2016. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. September.

TABLE 1

Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
18L094	05-Dec-18	WATER	N	MW02-120518-0	580-82404-1	EMXT
			N	T4S1MW09-120518-0	580-82404-1	EMXT
			N	T4S1MW3S-120518-0	580-82404-1	EMXT
			TB	TB-120518	580-82404-1	EMXT
18L110	06-Dec-18	WATER	N	MW01-120618-0	580-82435-1	EMXT
			N	MW04-120618-0	580-82435-1	EMXT
			N	T4S1MW22-120618-0	580-82435-1	EMXT
			N	T4S1MW23-120618-0	580-82435-1	EMXT
			TB	TB-120618	580-82435-1	EMXT
18L129	07-Dec-18	WATER	N	MW-03-120718	580-82474-1	EMXT
			N	MW-05-120718	580-82474-1	EMXT
			N	MW-06-120718	580-82474-1	EMXT
			FD	MW-100-120718-0	580-82474-1	EMXT
			TB	TB_12082018	580-82474-1	EMXT
580-82404-1	05-Dec-18	WATER	N	MW02-120518-0	580-82404-1	TAM2
			N	MW02-120518-0	580-82404-1	TAMI
			MS	MW02-120518-OMS	580-82404-1	TAM2
			SD	MW02-120518-OSD	580-82404-1	TAM2
			N	T4S1MW09-120518-0	580-82404-1	TAMI
			N	T4S1MW09-120518-0	580-82404-1	TAM2
			MS	T4S1MW09-120518-OMS	580-82404-1	TAM2
			N	T4S1MW3S-120518-0	580-82404-1	TAM2
			N	T4S1MW3S-120518-0	580-82404-1	TAMI
580-82435-1	06-Dec-18	WATER	N	MW01-120618-0	580-82435-1	TAM2
			N	MW01-120618-0	580-82435-1	TAMI
			N	MW04-120618-0	580-82435-1	TAM2
			N	MW04-120618-0	580-82435-1	TAMI
			MS	MW04-120618-OMS	580-82435-1	TAM2
			SD	MW04-120618-OSD	580-82435-1	TAM2
			N	T4S1MW22-120618-0	580-82435-1	TAM2

Table 1

TABLE 1
Sample Summary by COC - Data Summary

CoC Number	Sample Date	Matrix	QAQC Type	Sample Identification	SDG	Laboratory
580-82435-1	06-Dec-18	WATER	N	T4S1MW22-120618-0	580-82435-1	TAMI
			N	T4S1MW23-120618-0	580-82435-1	TAM2
			N	T4S1MW23-120618-0	580-82435-1	TAMI
580-82474-1	07-Dec-18	WATER	N	IDW-Drum2-MW5-6-120718	580-82474-1	TAM2
			N	MW-03-120718	580-82474-1	TAM2
			N	MW-03-120718	580-82474-1	TAMI
			N	MW-05-120718	580-82474-1	TAM2
			N	MW-05-120718	580-82474-1	TAMI
			N	MW-06-120718	580-82474-1	TAMI
			N	MW-06-120718	580-82474-1	TAM2
			FD	MW-100-120718-0	580-82474-1	TAM2
			FD	MW-100-120718-0	580-82474-1	TAMI

SDG = Sample delivery group
EMXT = EMAX Laboratories Inc
TAM2 = TestAmerica Seattle
TAMI = TestAmerica Irvine

QAQC Type

FD = Field Duplicate
MS = Matrix Spike
N = Normal
SD = Matrix Spike Duplicate
TB = Trip Blank

Table 1

TABLE 2
Sample Chronology - Data Summary

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
TAM2	580-82404-1	MW02-120518-0	E300.OA	12/5/2018	12/6/2018		12/6/2018
		MW02-120518-0	E353.2	12/5/2018	12/6/2018		12/6/2018
TAMI		MW02-120518-0	RSK-175	12/5/2018	12/6/2018		12/13/2018
TAM2		MW02-120518-0	SM5310B	12/5/2018	12/6/2018		12/11/2018
EMXT		MW02-120518-0	SW8260C-SIM	12/5/2018	12/7/2018	12/11/2018	12/11/2018
TAM2		MW02-120518-OMS	SM5310B	12/5/2018	12/6/2018		12/11/2018
		MW02-120518-OSD	SM5310B	12/5/2018	12/6/2018		12/11/2018
		T4S1MW09-120518-0	E300.OA	12/5/2018	12/6/2018		12/6/2018
		T4S1MW09-120518-0	E353.2	12/5/2018	12/6/2018		12/6/2018
TAMI		T4S1MW09-120518-0	RSK-175	12/5/2018	12/6/2018		12/13/2018
TAM2	580-82435-1	T4S1MW09-120518-0	SM5310B	12/5/2018	12/6/2018		12/11/2018
EMXT		T4S1MW09-120518-0	SW8260C-SIM	12/5/2018	12/7/2018	12/11/2018	12/11/2018
TAM2		T4S1MW09-120518-OMS	E300.OA	12/5/2018	12/6/2018		12/6/2018
		T4S1MW09-120518-OMS	E353.2	12/5/2018	12/6/2018		12/6/2018
		T4S1MW3S-120518-0	E300.OA	12/5/2018	12/6/2018		12/6/2018
		T4S1MW3S-120518-0	E353.2	12/5/2018	12/6/2018		12/6/2018
TAMI		T4S1MW3S-120518-0	RSK-175	12/5/2018	12/6/2018		12/13/2018
TAM2		T4S1MW3S-120518-0	SM5310B	12/5/2018	12/6/2018		12/11/2018
EMXT		T4S1MW3S-120518-0	SW8260C-SIM	12/5/2018	12/7/2018	12/11/2018	12/11/2018
		TB-120518	SW8260C-SIM	12/5/2018	12/7/2018	12/11/2018	12/11/2018
TAM2	580-82435-1	MW01-120618-0	E300.OA	12/6/2018	12/7/2018		12/7/2018
		MW01-120618-0	E353.2	12/6/2018	12/7/2018		12/7/2018
TAMI		MW01-120618-0	RSK-175	12/6/2018	12/7/2018		12/10/2018
TAM2		MW01-120618-0	SM5310B	12/6/2018	12/7/2018		12/11/2018
EMXT		MW01-120618-0	SW8260C-SIM	12/6/2018	12/8/2018	12/14/2018	12/14/2018
TAM2		MW04-120618-0	E300.OA	12/6/2018	12/7/2018		12/7/2018
		MW04-120618-0	E353.2	12/6/2018	12/7/2018		12/7/2018
TAMI		MW04-120618-0	RSK-175	12/6/2018	12/7/2018		12/10/2018
TAM2		MW04-120618-0	SM5310B	12/6/2018	12/7/2018		12/11/2018
EMXT		MW04-120618-0	SW8260C-SIM	12/6/2018	12/8/2018	12/11/2018	12/11/2018
		MW04-120618-0	SW8260C-SIM	12/6/2018	12/8/2018	12/14/2018	12/14/2018
TAM2		MW04-120618-OMS	E300.OA	12/6/2018	12/7/2018		12/7/2018
		MW04-120618-OMS	E353.2	12/6/2018	12/7/2018		12/7/2018
		MW04-120618-OSD	E300.OA	12/6/2018	12/7/2018		12/7/2018
		MW04-120618-OSD	E353.2	12/6/2018	12/7/2018		12/7/2018
		T4S1MW22-120618-0	E300.OA	12/6/2018	12/7/2018		12/7/2018

Table 2

TABLE 2
Sample Chronology - Data Summary

Laboratory	SDG	Sample Identification	Method	Sample Date	Receive Date	Extract Date	Analysis Date
TAM2	580-82435-1	T4S1MW22-120618-0	E353.2	12/6/2018	12/7/2018		12/7/2018
TAMI		T4S1MW22-120618-0	RSK-175	12/6/2018	12/7/2018		12/10/2018
TAM2		T4S1MW22-120618-0	SM5310B	12/6/2018	12/7/2018		12/11/2018
EMXT		T4S1MW22-120618-0	SW8260C-SIM	12/6/2018	12/8/2018	12/11/2018	12/11/2018
		T4S1MW22-120618-0	SW8260C-SIM	12/6/2018	12/8/2018	12/14/2018	12/14/2018
TAM2	580-82474-1	T4S1MW23-120618-0	E300.OA	12/6/2018	12/7/2018		12/7/2018
		T4S1MW23-120618-0	E353.2	12/6/2018	12/7/2018		12/7/2018
TAMI		T4S1MW23-120618-0	RSK-175	12/6/2018	12/7/2018		12/10/2018
TAM2		T4S1MW23-120618-0	SM5310B	12/6/2018	12/7/2018		12/11/2018
EMXT		T4S1MW23-120618-0	SW8260C-SIM	12/6/2018	12/8/2018	12/14/2018	12/14/2018
		TB-120618	SW8260C-SIM	12/6/2018	12/8/2018	12/11/2018	12/11/2018
TAM2		IDW-Drum2-MW5-6-120718	SW8260C	12/7/2018	12/8/2018	12/12/2018	12/12/2018
		IDW-Drum2-MW5-6-120718	SW8260C	12/7/2018	12/8/2018	12/13/2018	12/13/2018
		MW-03-120718	E300.OA	12/7/2018	12/8/2018		12/8/2018
		MW-03-120718	E353.2	12/7/2018	12/8/2018		12/8/2018
TAMI		MW-03-120718	RSK-175	12/7/2018	12/8/2018		12/13/2018
TAM2		MW-03-120718	SM5310B	12/7/2018	12/8/2018		12/11/2018
EMXT		MW-03-120718	SW8260C-SIM	12/7/2018	12/11/2018	12/14/2018	12/14/2018
TAM2		MW-05-120718	E300.OA	12/7/2018	12/8/2018		12/8/2018
	MW-05-120718	E353.2	12/7/2018	12/8/2018		12/8/2018	
TAMI	MW-05-120718	RSK-175	12/7/2018	12/8/2018		12/13/2018	
TAM2	MW-05-120718	SM5310B	12/7/2018	12/8/2018		12/11/2018	
EMXT	MW-05-120718	SW8260C-SIM	12/7/2018	12/11/2018	12/14/2018	12/14/2018	
TAM2	MW-06-120718	E300.OA	12/7/2018	12/8/2018		12/8/2018	
	MW-06-120718	E353.2	12/7/2018	12/8/2018		12/8/2018	
TAMI	MW-06-120718	RSK-175	12/7/2018	12/8/2018		12/13/2018	
TAM2	MW-06-120718	SM5310B	12/7/2018	12/8/2018		12/11/2018	
EMXT	MW-06-120718	SW8260C-SIM	12/7/2018	12/11/2018	12/14/2018	12/14/2018	
TAM2	MW-100-120718-0	E300.OA	12/7/2018	12/8/2018		12/8/2018	
	MW-100-120718-0	E353.2	12/7/2018	12/8/2018		12/8/2018	
TAMI	MW-100-120718-0	RSK-175	12/7/2018	12/8/2018		12/13/2018	
TAM2	MW-100-120718-0	SM5310B	12/7/2018	12/8/2018		12/11/2018	
EMXT	MW-100-120718-0	SW8260C-SIM	12/7/2018	12/11/2018	12/14/2018	12/14/2018	
	MW-100-120718-0	SW8260C-SIM	12/7/2018	12/11/2018	12/15/2018	12/15/2018	
	TB_12082018	SW8260C-SIM	12/7/2018	12/11/2018	12/14/2018	12/14/2018	

Table 2

TABLE 2

Sample Chronology - Data Summary

SDG = sample delivery group

EMXT = EMAX Laboratories Inc

TAM2 = TestAmerica Seattle

TAMI = TestAmerica Irvine

Table 2

TABLE 3**Overall Flagging Summary**

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
E353.2	WATER				
	Category = Matrix	Matrix spike duplicate recovery criteria less than the lower control limit	J	Other	1
	Category = Matrix	Matrix spike recovery less than the lower control limit	J	Other	1

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

J = The analyte was positively identified, and the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.

Qualifier Type:

Protocol = Flagging due to contractor/laboratory protocol violations.

Other = Flagging due to sample, matrix, or field issues not related to Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP) protocol.

Table 3

TABLE 4

Matrix Spike Precision/Accuracy - Qualified Data

Analyte	Sample Identification	Result	MS/MSD Qualifier*	MS Recovery	Criteria
Method (Matrix): E353.2 (WATER)					
Nitrate-N	MW04-120618-0	0.046 mg/L	J	%R = 64 LCL=80 UCL=120	MS<LCL
	MW04-120618-0	0.046 mg/L	J	%R = 65 LCL=80 UCL=120	SD<LCL

%R = percent recovery

LCL = lower control limit

UCL = upper control limit

mg/L = milligrams per liter

* The most severe flag for each analyte becomes the final validation flag.

Qualifier Description:

J = The analyte was positively identified, and the quantitation is an estimation because of discrepancies in meeting certain analyte-specific quality control criteria.

Criteria:

MS<LCL = Matrix spike recovery less than the lower control limit

SD<LCL = Matrix spike duplicate recovery less than the lower control limit

Table 4

TABLE 5
Site Completeness by Analyte - Qualified Data

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total	Contractor Completeness (%)	Overall
			Analyses	Detects	Non- detects	Blank Flags	J-Flags				
E300.0A	Chloride	MG/L	11	11						100	100
	Sulfate	MG/L	11	11						100	100
E353.2	Nitrate-N	MG/L	11	5	6		1			100	100
RSK-175	Methane	UG/L	11	10	1					100	100
SM5310B	Total Organic Carbon	MG/L	11	11				3		100	100
SW8260C	cis-1,2-Dichloroethene	UG/L	1	1						100	100
	Tetrachloroethene (PCE)	UG/L	1	1						100	100
	Trichloroethene (TCE)	UG/L	1	1						100	100
	Vinyl Chloride	UG/L	1	1						100	100
SW8260C-SIM	cis-1,2-Dichloroethene	UG/L	11	9	2					100	100
	Tetrachloroethene (PCE)	UG/L	11	8	3					100	100
	Trichloroethene (TCE)	UG/L	11	8	3					100	100
	Vinyl Chloride	UG/L	11	9	2		2			100	100

% = Percent
 J-Flags = Estimated results
 R-Flags = Rejected results
 MG/L = milligrams per liter
 UG/L = micrograms per liter

Table 5

