

Portland, OR NATTS Network Assessment Review

- Established 2008 (Portland (#1), OR); relocated approximately 0.25 miles southwest in July 2016 and restarted in April 2017 (Portland (#2), OR): Carbonyls, Chromium VI, PAHs, PM₁₀ Metals, and VOCs
 - Chromium VI ended in in 2014
- For the NATTS Network Assessment (2008-2022):
 - 0 of 17 Method Quality Objective (MQO) Core HAPs were included in the national trends
 - Monitoring operations ceased from July 2016 to April 2017, and not enough samples could be taken in 2017.
 - 210 of 221 pollutant datasets were suitable for trends analysis
 - Annual Average and 3-Year Rolling Average Concentrations were generally decreasing over time for arsenic (PM₁₀), cadmium (PM₁₀), lead (PM₁₀), and nickel (PM₁₀).
 - 100% Reporting of Datasets
- Method Quality Objectives (MQO): 2008-2022
 - Completeness: Met 85% completeness in 201 of 221 pollutant datasets
 - Method Detection Limits: Met MDL Target Ratio of 1.00 in 239 of 255 pollutant datasets
 - Bias: Met ±25% for 174 of 225 pollutant datasets
 - Overall Method Precision: Met ≤15% CV for 157 of 210 pollutant datasets
 - Analytical Method Precision: Met ≤15% CV for 100 of 169 pollutant datasets
- Analytical Laboratories for 2018

VOC	Carbonyl	PM ₁₀ Metals	PAHs
ODEQ	ODEQ	ODEQ	ODEQ

- Equipment Year Deployed

Equipment Type	VOC	Carbonyl	PM ₁₀ Metals	PAHs
Sampler	2019	2016	2013	2011
Analytical	2015	<2000	2015	2015
Preconcentrator	2019	NA	NA	NA
Standards Preparation	2019	NA	NA	NA
Canister Cleaning	2005	NA	NA	NA
Extraction	NA	NA	2018	Unknown

National Summary: NATTS data were collected at 27 locations across the United States, with sites beginning in 2003 or later (Figure 1) for 20 core HAPs. Over 670,000 concentrations (primary, secondary, and replicate) were generated and analyzed for this assessment. Pollutant datasets were scored to assess whether they were suitable for trends analysis. Each pollutant dataset was evaluated against four MQOs: Completeness; Sensitivity; Bias; and Precision. Datasets that were suitable (A- or B-rated) for six consecutive years were used for national trends analysis (Table 1).

National trends were determined by comparing the most recent 3-year blocked averages (e.g., 2017-2019 vs. 2020-2022) to determine if the NATTS Trends DQO was being met:

To be able to detect a 15 percent difference (trend) between the annual mean concentrations of successive 3-year periods within acceptable levels of decision error.

Of the 20 core HAPs, 17 were assessed for the NATTS Trends DQO. Due to sampling and analytical issues, acrolein was not considered for trends analysis (Table 2). Additionally, hexavalent chromium was discontinued as a required pollutant and ethylene oxide became an official MQO pollutant beginning in 2021. The assessment showed that across the network, 11 of those 17 pollutants were decreasing between the 3-year blocks, while four of those pollutants were increasing between the 3-year blocks. Two pollutants did not exhibit a noticeable trend.

Figure 1. NATTS Site and Year Established

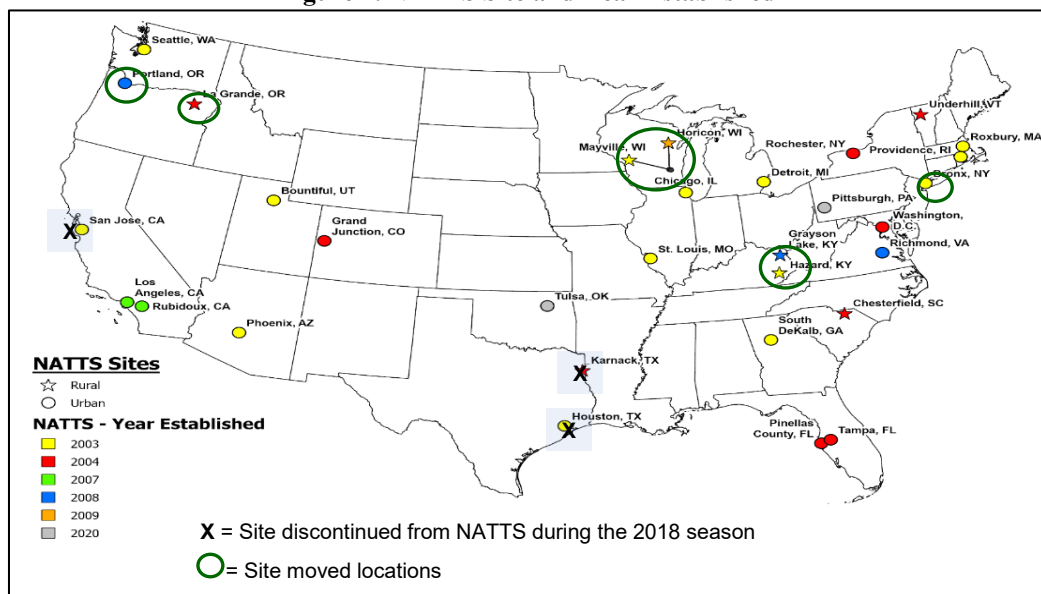


Table 1. NATTS Network Assessment: Count and Percentage of Suitable Datasets by Pollutant Group

Pollutant Group	A-rated		B-rated		Does Not Meet	
	#	%	#	%	#	%
VOCs	1,968	58%	864	25%	572	17%
Carbonyls	668	68%	231	24%	77	8%
PM ₁₀ Metals	1,906	66%	775	27%	217	7%
PAHs	571	77%	144	19%	29	4%
Total = 8,704	5,113	64%	2,014	25%	895	11%

Table 2. Three-Year Block Averages for National Trends

Pollutant ^{a,b,c}	Units	# Sites	Block 1	Block 2	% Difference
Acetaldehyde	µg/m ³	16	1.48	1.34	-9.2%
Arsenic (PM ₁₀)	ng/m ³	18	0.68	0.64	-6.6%
Benzene	µg/m ³	16	0.529	0.525	-0.8%
Benzo(a)pyrene	ng/m ³	18	0.086	0.072	-16.6%
Beryllium (PM ₁₀)	ng/m ³	18	0.008	0.010	15.0%
Butadiene, 1,3-	µg/m ³	15	0.057	0.054	-5.1%
Cadmium (PM ₁₀)	ng/m ³	20	0.087	0.090	3.7%
Carbon Tetrachloride	µg/m ³	15	0.53	0.50	-5.3%
Chloroform	µg/m ³	16	0.173	0.165	-4.8%
Formaldehyde	µg/m ³	15	2.809	2.482	-11.7%
Lead (PM ₁₀)	ng/m ³	20	2.44	2.43	-0.5%
Manganese (PM ₁₀)	ng/m ³	20	6.69	7.31	9.2%
Naphthalene	ng/m ³	17	42.00	35.10	-16.4%
Nickel (PM ₁₀)	ng/m ³	19	0.87	0.83	-3.7%
Tetrachloroethylene	µg/m ³	15	0.12	0.12	1.5%
Trichloroethylene	µg/m ³	14	0.019	0.022	16.3%
Vinyl Chloride	µg/m ³	16	0.004	0.001	-69.0%

^a Acrolein was not assessed due to sampling and analytical issues

^b Sampling for ethylene oxide formally began in 2021 and is not assessed

^c Hexavalent chromium (not assessed) was discontinued in 2013

NATTS Monitoring Site Report: Portland (#1 and #2), OR

Site Information

Region	10
NATTS Site Type	Urban
County	Multnomah
AQS Site Code	41-051-0246 (#1); 41-051-2010 (#2)
NATTS Operating Agency	OR Dept. Of Environmental Quality
Latitude	45.56137 (#1); 45.55808 (#2)
Longitude	-122.6679 (#1); -122.670982 (#2)
AQS Land Use	Residential
AQS Location Setting	Urban/City Center
County Population (2023)	789,698

Figure 2. NATTS Site Location



Pollutant Datasets Evaluation: Suitable for Trends (Y=yes; Y(T)=yes, and used for DQO Trends; N=No; "--"=not rated)

Final Pollutant Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Acetaldehyde	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Arsenic (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Benzene	N(b)	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Benzo(a)pyrene	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Beryllium (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Butadiene, 1,3-	N(c)	N(c)	N(c)	Y	Y	Y	N(b)	Y	a	a	Y	Y	Y	Y	Y
Cadmium (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Carbon tetrachloride	Y	N(a)	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	a	a	N(b)	Y	Y	Y	Y
Formaldehyde	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Lead (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Manganese (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Naphthalene	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Nickel (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Tetrachloroethylene	Y	N(b)	Y	Y	Y	Y	Y	Y	a	a	Y	Y	Y	Y	Y
Trichloroethylene	Y	Y	Y	Y	Y	Y	Y	Y	a	a	N(b)	Y	Y	Y	Y
Vinyl chloride	N(b)	Y	Y	Y	Y	N(b,d)	Y	Y	a	a	Y	Y	Y	Y	Y

^a: The Portland (#1), OR site moved approximately 0.25 miles southwest in 2016 to Portland (#2), OR. Operations resumed at the new site in 2017.

^b: Bias % Difference was outside $\pm 35\%$.

Table 3. NATTS Network Assessment Data (2003-2022) - National Distribution Statistics By Type^a

Analyte	Units	Site Type	# Data Records	% Detections	Arithmetic Mean ^b	Percentile Value ^c						
						5th	10th	25th	50th	75th	90th	95th
Acetaldehyde	µg/m ³	Urban	22,000	100%	1.73 ± 0.02	0.50	0.65	0.95	1.42	2.15	3.19	3.96
	µg/m ³	Rural	6,392	100%	1.17 ± 0.03	0.36	0.45	0.65	0.92	1.35	1.98	2.67
	µg/m ³	All Sites	28,392	100%	1.61 ± 0.02	0.45	0.58	0.85	1.29	1.97	2.99	3.79
Arsenic (PM ₁₀)	ng/m ³	Urban	21,944	95%	0.87 ± 0.03	0.03	0.16	0.32	0.56	0.96	1.65	2.37
	ng/m ³	Rural	6,385	96%	0.49 ± 0.02	0.03	0.08	0.16	0.35	0.58	0.93	1.30
	ng/m ³	All Sites	28,329	96%	0.78 ± 0.02	0.03	0.13	0.27	0.51	0.87	1.51	2.16
Benzene	µg/m ³	Urban	22,246	99%	0.85 ± 0.01	0.23	0.29	0.42	0.64	1.02	1.62	2.20
	µg/m ³	Rural	5,932	90%	0.52 ± 0.01	ND	0.06	0.20	0.38	0.67	1.08	1.51
	µg/m ³	All Sites	28,178	97%	0.78 ± 0.01	0.16	0.23	0.36	0.58	0.95	1.52	2.07
Benzo(a)pyrene	ng/m ³	Urban	17,810	73%	0.10 ± 0.01	ND	ND	ND	0.04	0.10	0.23	0.35
	ng/m ³	Rural	4,735	37%	0.07 ± 0.01	ND	ND	ND	ND	0.02	0.19	0.38
	ng/m ³	All Sites	22,545	65%	0.09 ± 0.01	ND	ND	ND	0.03	0.09	0.22	0.35
Beryllium (PM ₁₀)	ng/m ³	Urban	21,786	77%	0.042 ± 0.004	ND	ND	0.0005	0.005	0.015	0.043	0.098
	ng/m ³	Rural	6,062	49%	0.018 ± 0.002	ND	ND	ND	ND	0.004	0.012	0.041
	ng/m ³	All Sites	27,848	71%	0.037 ± 0.003	ND	ND	ND	0.003	0.011	0.038	0.083
Butadiene, 1,3-	µg/m ³	Urban	22,220	78%	0.092 ± 0.002	ND	ND	0.018	0.051	0.110	0.215	0.317
	µg/m ³	Rural	5,940	29%	0.017 ± 0.001	ND	ND	ND	ND	0.011	0.054	0.104
	µg/m ³	All Sites	28,160	68%	0.076 ± 0.002	ND	ND	ND	0.039	0.092	0.190	0.283
Cadmium (PM ₁₀)	ng/m ³	Urban	21,954	93%	0.184 ± 0.014	ND	0.019	0.043	0.081	0.160	0.354	0.572
	ng/m ³	Rural	6,067	89%	0.092 ± 0.005	ND	ND	0.026	0.055	0.099	0.179	0.270
	ng/m ³	All Sites	28,021	92%	0.164 ± 0.011	ND	0.012	0.039	0.075	0.143	0.300	0.518
Carbon Tetrachloride	µg/m ³	Urban	22,202	98%	0.556 ± 0.002	0.336	0.423	0.486	0.550	0.638	0.725	0.784
	µg/m ³	Rural	5,909	84%	0.494 ± 0.010	ND	ND	0.342	0.533	0.629	0.728	0.807
	µg/m ³	All Sites	28,111	95%	0.543 ± 0.003	ND	0.363	0.475	0.547	0.636	0.726	0.788
Chloroform	µg/m ³	Urban	22,218	88%	0.243 ± 0.016	ND	ND	0.094	0.129	0.205	0.398	0.630
	µg/m ³	Rural	5,942	56%	0.062 ± 0.002	ND	ND	ND	0.049	0.098	0.134	0.228
	µg/m ³	All Sites	28,160	82%	0.205 ± 0.013	ND	ND	0.076	0.110	0.187	0.342	0.543

Table 3. NATTS Network Assessment Data (2003-2022) - National Distribution Statistics By Type^a

Analyte	Units	Site Type	# Data Records	% Detections	Arithmetic Mean ^b	Percentile Value ^c						
						5th	10th	25th	50th	75th	90th	95th
Formaldehyde	µg/m ³	Urban	22,024	100%	3.03 ± 0.04	0.69	1.00	1.57	2.42	3.72	5.47	6.95
	µg/m ³	Rural	6,432	100%	2.16 ± 0.04	0.49	0.64	1.03	1.67	2.69	4.12	5.34
	µg/m ³	All Sites	28,456	100%	2.83 ± 0.03	0.61	0.86	1.42	2.25	3.50	5.22	6.65
Lead (PM ₁₀)	ng/m ³	Urban	21,955	100%	3.97 ± 0.10	0.70	0.95	1.46	2.49	4.34	7.87	11.16
	ng/m ³	Rural	6,066	99%	1.93 ± 0.14	0.34	0.45	0.75	1.27	2.14	3.59	4.96
	ng/m ³	All Sites	28,021	100%	3.53 ± 0.09	0.53	0.75	1.22	2.17	3.88	6.99	10.10
Manganese (PM ₁₀)	ng/m ³	Urban	21,906	100%	9.76 ± 0.25	1.06	1.49	2.53	4.96	10.43	20.40	30.79
	ng/m ³	Rural	6,067	99%	3.79 ± 0.12	0.48	0.74	1.34	2.48	4.49	8.08	11.64
	ng/m ³	All Sites	27,973	100%	8.47 ± 0.20	0.84	1.22	2.16	4.19	8.99	18.13	27.27
Naphthalene	ng/m ³	Urban	17,811	100%	67.25 ± 0.97	13.42	18.03	28.73	49.00	84.13	136.42	180.00
	ng/m ³	Rural	4,732	98%	21.76 ± 1.02	2.79	4.04	6.84	12.47	23.51	45.68	69.01
	ng/m ³	All Sites	22,543	100%	57.70 ± 0.83	5.92	9.77	20.41	40.15	74.11	124.40	167.26
Nickel (PM ₁₀)	ng/m ³	Urban	21,958	98%	1.76 ± 0.05	0.29	0.40	0.62	1.02	1.86	3.32	5.05
	ng/m ³	Rural	5,989	85%	0.56 ± 0.07	ND	ND	0.10	0.26	0.53	0.96	1.63
	ng/m ³	All Sites	27,947	95%	1.50 ± 0.04	0.00	0.17	0.45	0.84	1.59	2.92	4.47
Tetrachloroethylene	µg/m ³	Urban	22,209	84%	0.24 ± 0.05	ND	ND	0.05	0.12	0.22	0.43	0.68
	µg/m ³	Rural	5,936	38%	0.07 ± 0.02	ND	ND	ND	ND	0.04	0.12	0.31
	µg/m ³	All Sites	28,145	75%	0.21 ± 0.04	ND	ND	ND	0.08	0.20	0.38	0.61
Trichloroethylene	µg/m ³	Urban	22,204	43%	0.040 ± 0.008	ND	ND	ND	ND	0.043	0.096	0.152
	µg/m ³	Rural	5,922	19%	0.019 ± 0.003	ND	ND	ND	ND	ND	0.029	0.124
	µg/m ³	All Sites	28,126	38%	0.036 ± 0.006	ND	ND	ND	ND	0.033	0.085	0.148
Vinyl Chloride	µg/m ³	Urban	22,021	18%	0.0046 ± 0.0003	ND	ND	ND	ND	ND	0.0126	0.0251
	µg/m ³	Rural	5,940	13%	0.0070 ± 0.0008	ND	ND	ND	ND	ND	0.0125	0.0304
	µg/m ³	All Sites	27,961	17%	0.0051 ± 0.0003	ND	ND	ND	ND	ND	0.0126	0.0253

^a Statistics presented are from pollutant datasets which were suitable for trends.

^b The arithmetic mean is the average of all samples results which include actual measured values. If no chemical was registered, then a value of zero is used when calculating the mean.

^c ND: No results of this chemical were registered by the laboratory analytical equipment.

Table 4. Summary Statistics for Portland (#1 and #2), OR

Analyte	Units	# Data Records	% Detection	Arithmetic Mean ^a	Percentile Value ^b						
					5th	10th	25th	50th	75th	90th	95th
Acetaldehyde	µg/m ³	849	100%	1.39 ± 0.06	0.57	0.66	0.87	1.22	1.70	2.25	2.68
Arsenic (PM ₁₀)	ng/m ³	838	100%	0.78 ± 0.06	0.12	0.15	0.26	0.49	0.98	1.78	2.44
Benzene	µg/m ³	765	95%	0.76 ± 0.09	0.13	0.18	0.32	0.53	0.92	1.39	1.92
Benzo(a)pyrene	ng/m ³	827	22%	0.10 ± 0.03	ND	ND	ND	ND	ND	0.36	0.53
Beryllium (PM ₁₀)	ng/m ³	839	96%	0.003 ± 0.0002	0.0002	0.001	0.001	0.002	0.003	0.005	0.007
Butadiene, 1,3-	µg/m ³	784	28%	0.04 ± 0.01	ND	ND	ND	ND	0.03	0.14	0.20
Cadmium (PM ₁₀)	ng/m ³	838	99%	0.59 ± 0.12	0.01	0.02	0.04	0.08	0.25	1.55	3.05
Carbon Tetrachloride	µg/m ³	787	78%	0.40 ± 0.02	ND	ND	0.19	0.39	0.60	0.73	0.79
Chloroform	µg/m ³	784	28%	0.04 ± 0.01	ND	ND	ND	ND	0.09	0.14	0.16
Formaldehyde	µg/m ³	851	100%	2.03 ± 0.08	0.81	0.94	1.27	1.77	2.47	3.38	4.08
Lead (PM ₁₀)	ng/m ³	838	100%	3.17 ± 0.24	0.62	0.86	1.34	2.25	3.83	6.13	7.92
Manganese (PM ₁₀)	ng/m ³	838	100%	12.33 ± 1.41	1.05	1.43	2.54	5.56	12.68	30.53	46.95
Naphthalene	ng/m ³	827	100%	42.81 ± 2.45	11.41	14.16	20.36	31.86	53.33	83.51	105.36
Nickel (PM ₁₀)	ng/m ³	839	99%	1.01 ± 0.07	0.16	0.23	0.36	0.66	1.22	2.30	3.17
Tetrachloroethylene	µg/m ³	787	27%	0.08 ± 0.02	ND	ND	ND	ND	0.08	0.22	0.33
Trichloroethylene	µg/m ³	784	3%	0.01 ± 0.01	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	µg/m ³	783	0%	0.0006 ± 0.0009	ND	ND	ND	ND	ND	ND	ND

^a :The arithmetic mean is the average of all samples results which included actual measured values. If no chemical was registered, then a value of zero is used.

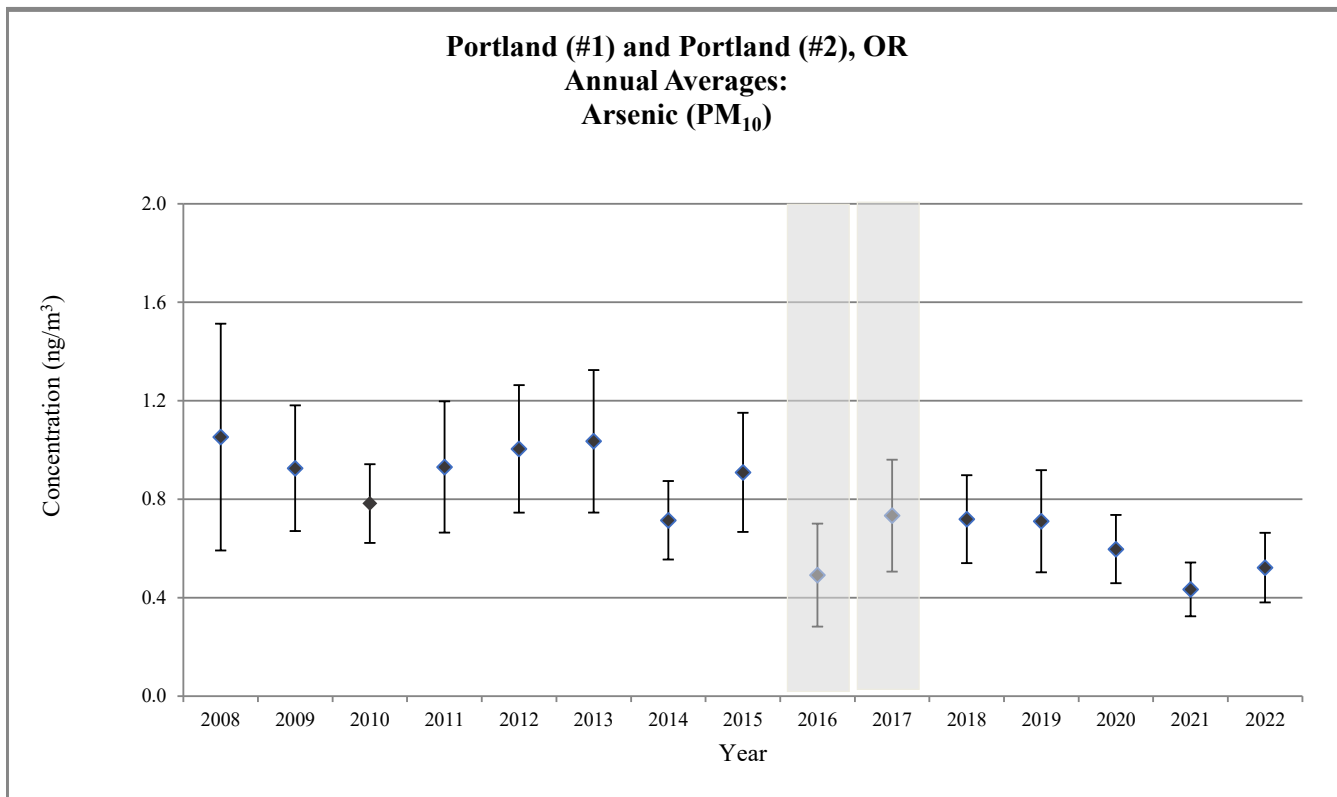
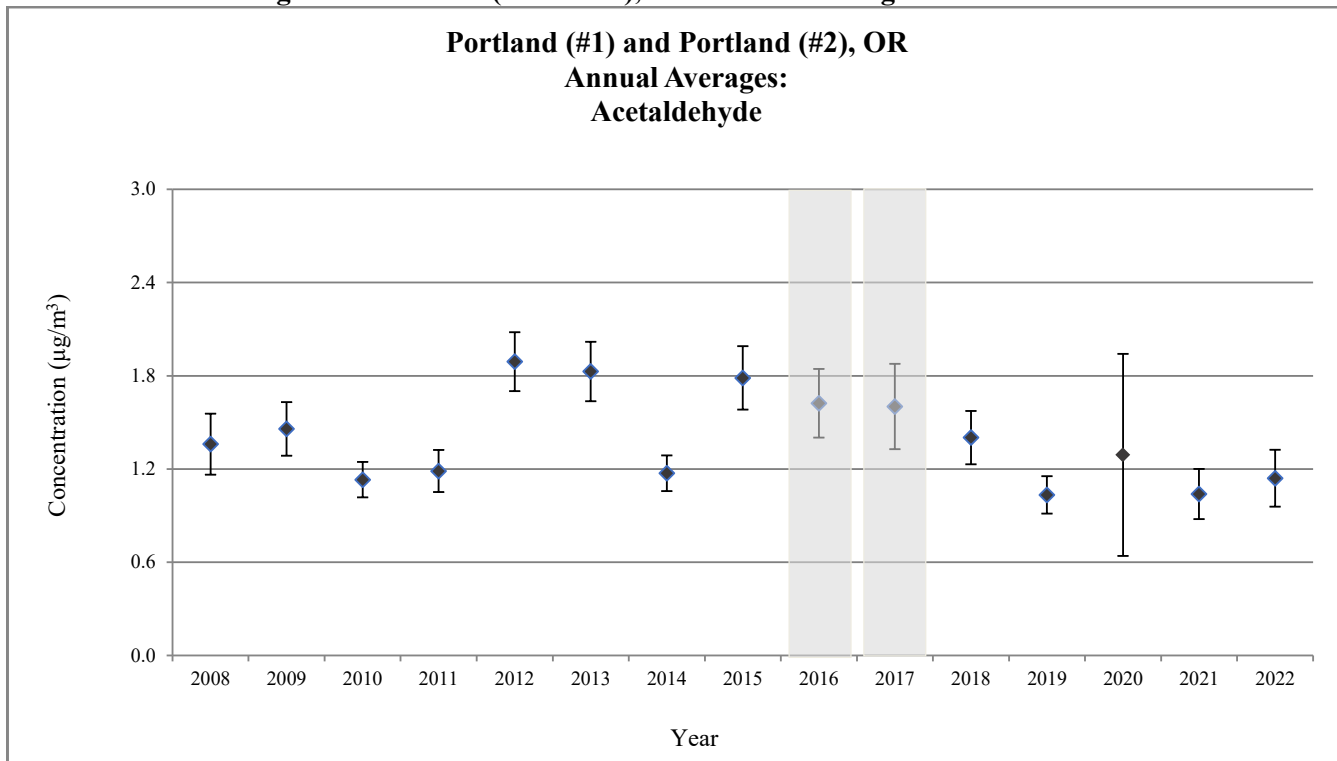
^b ND: No results of this chemical were registered by the laboratory analytical equipment.

Table 5. Analytical Labs Supporting this Site

Pollutant Group	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
VOCs	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ
Carbonyls	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ
PM ₁₀ Metals	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ
PAHs	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ

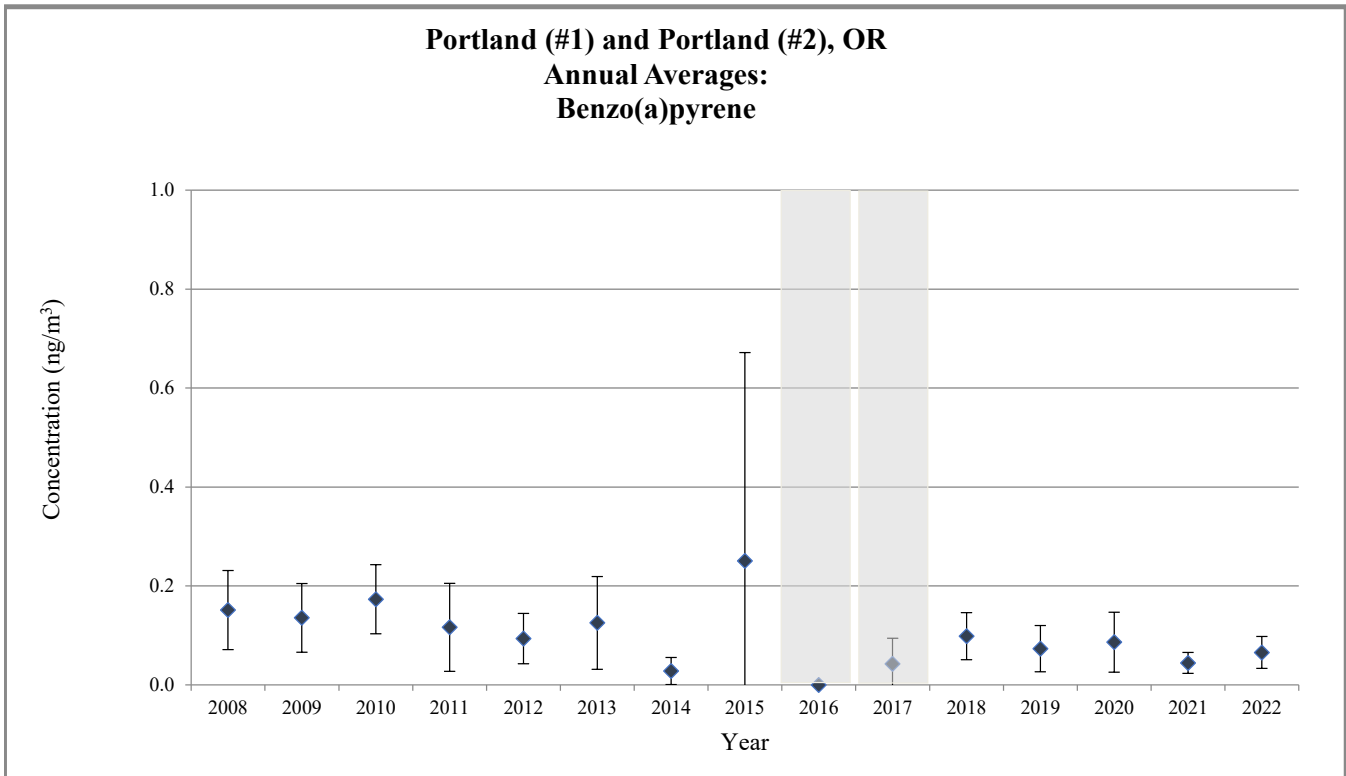
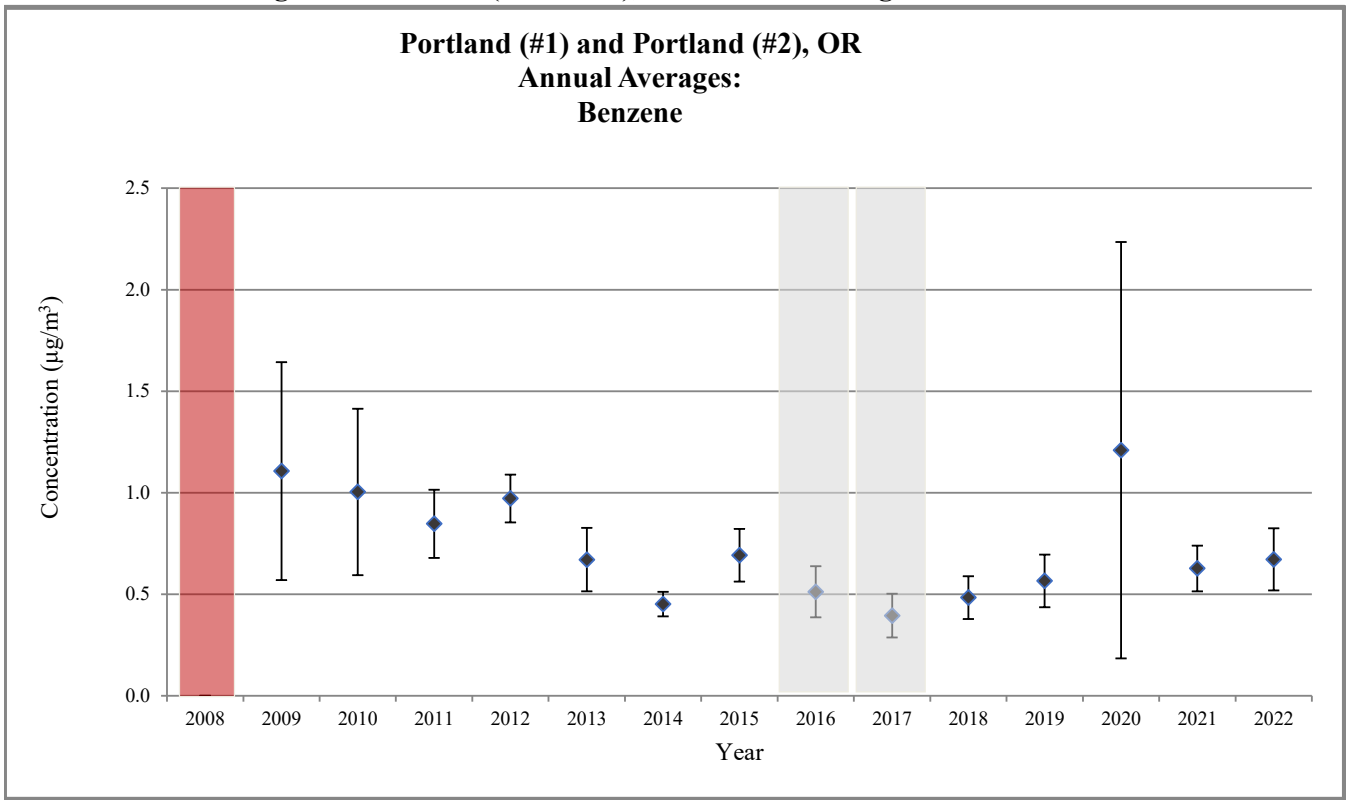
ODEQ: Oregon Department of Environmental Qua

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations





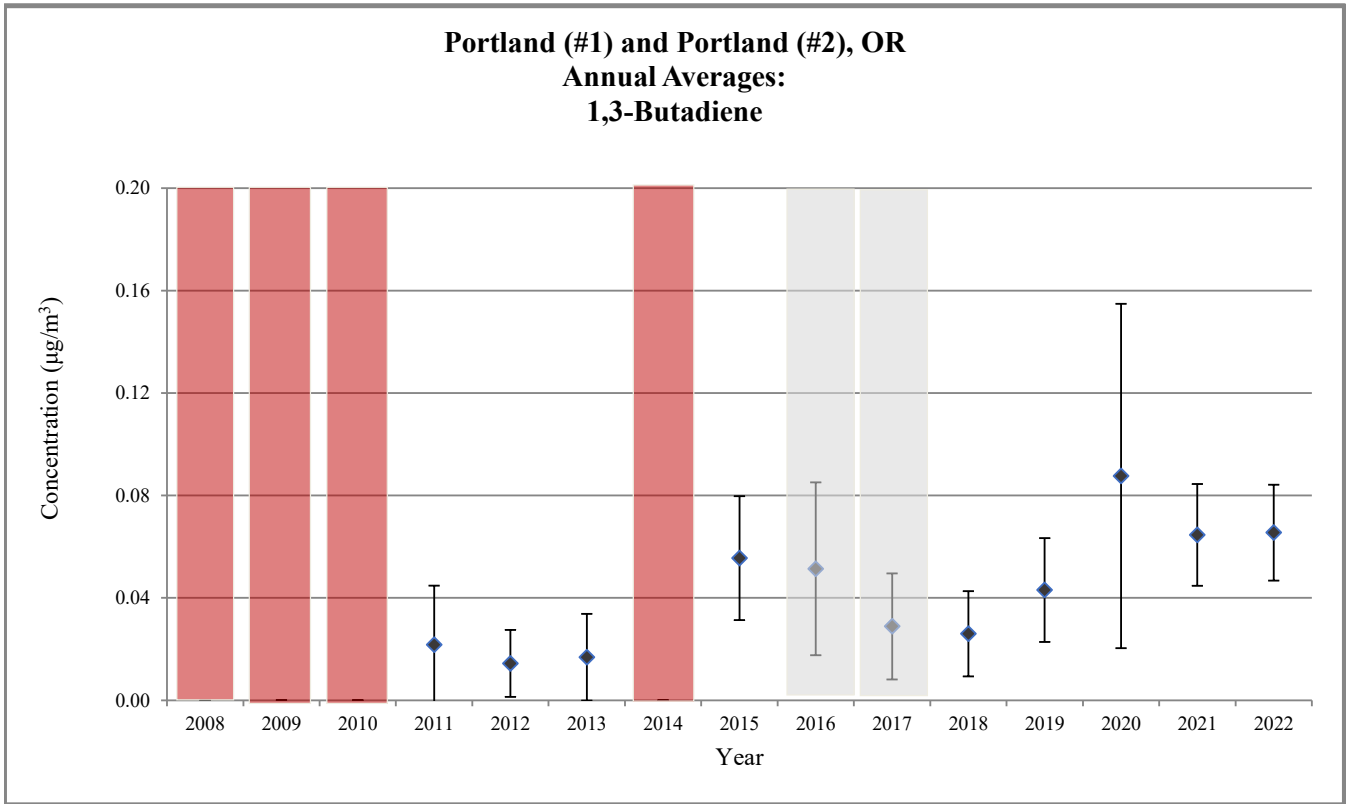
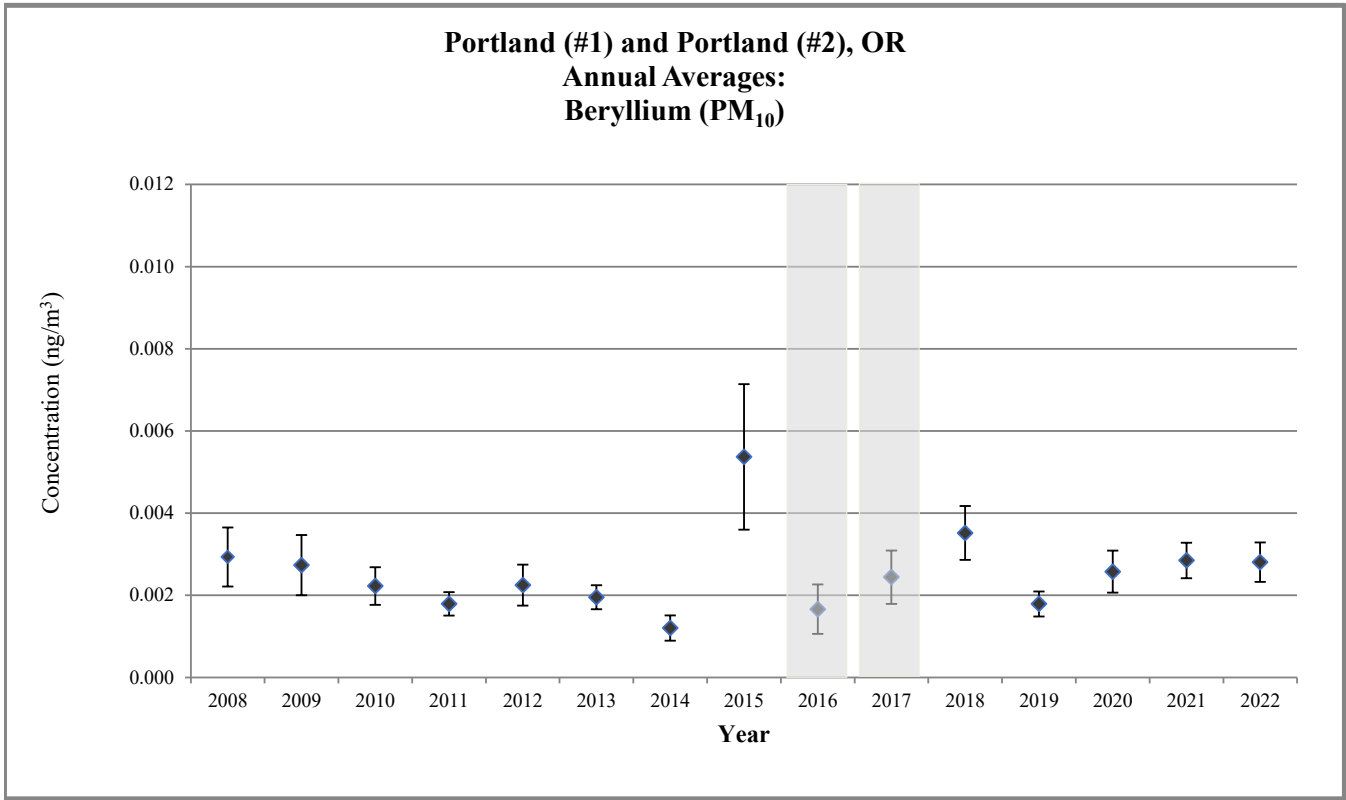
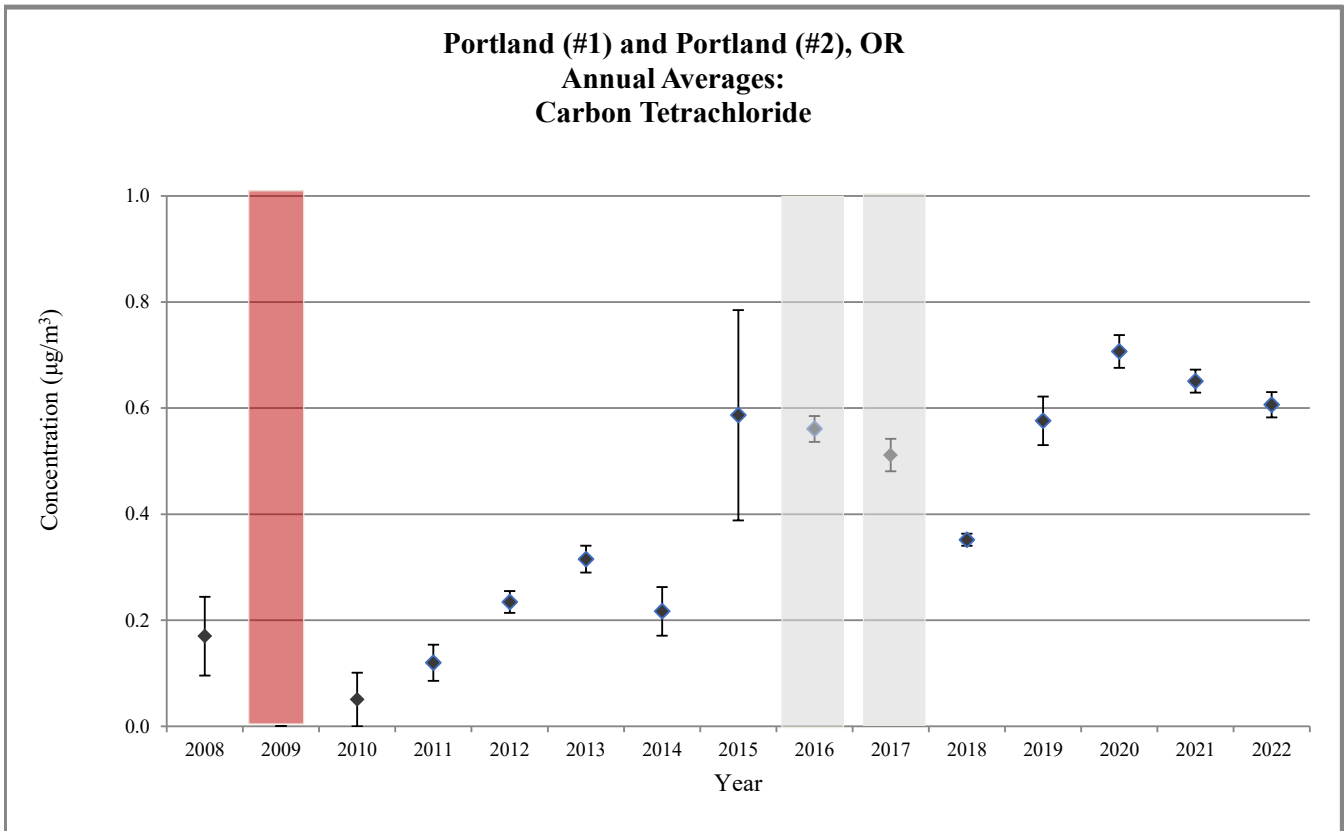
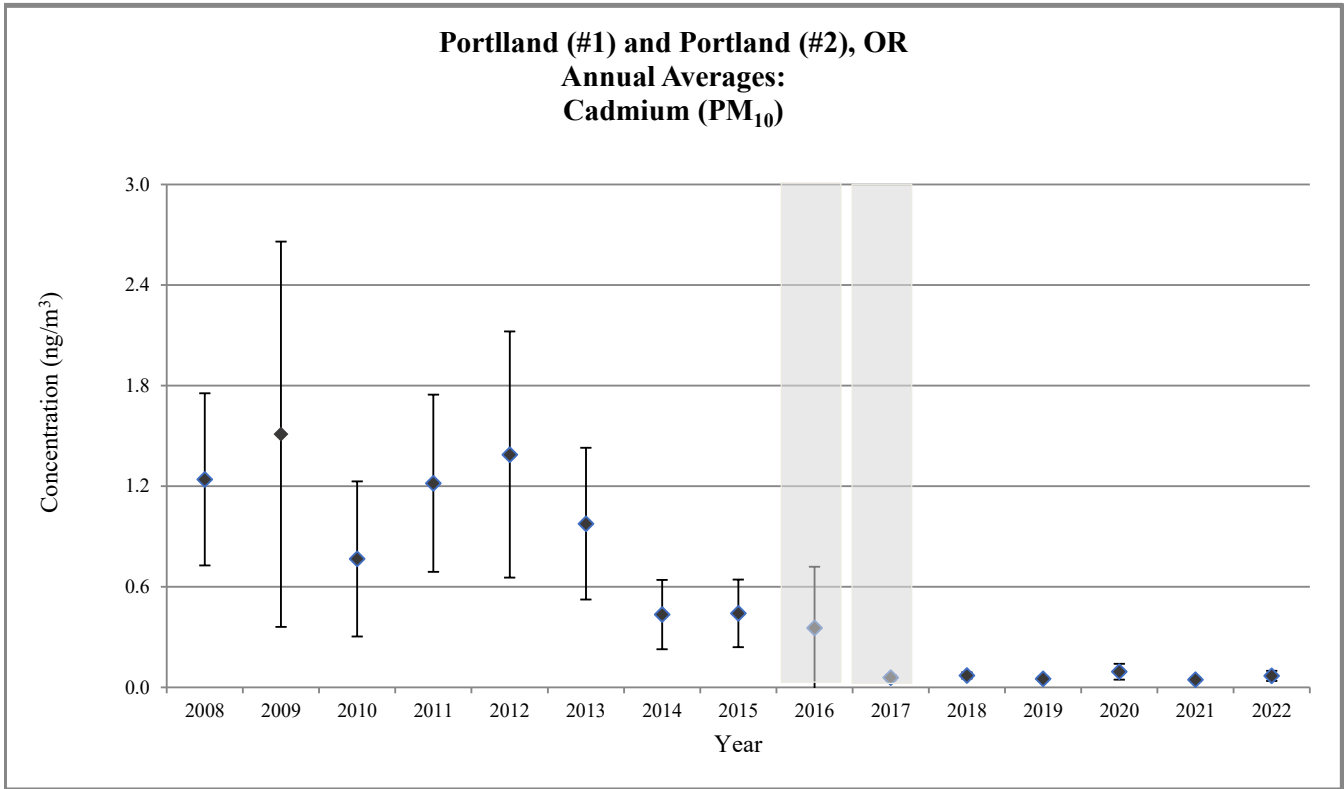
 Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



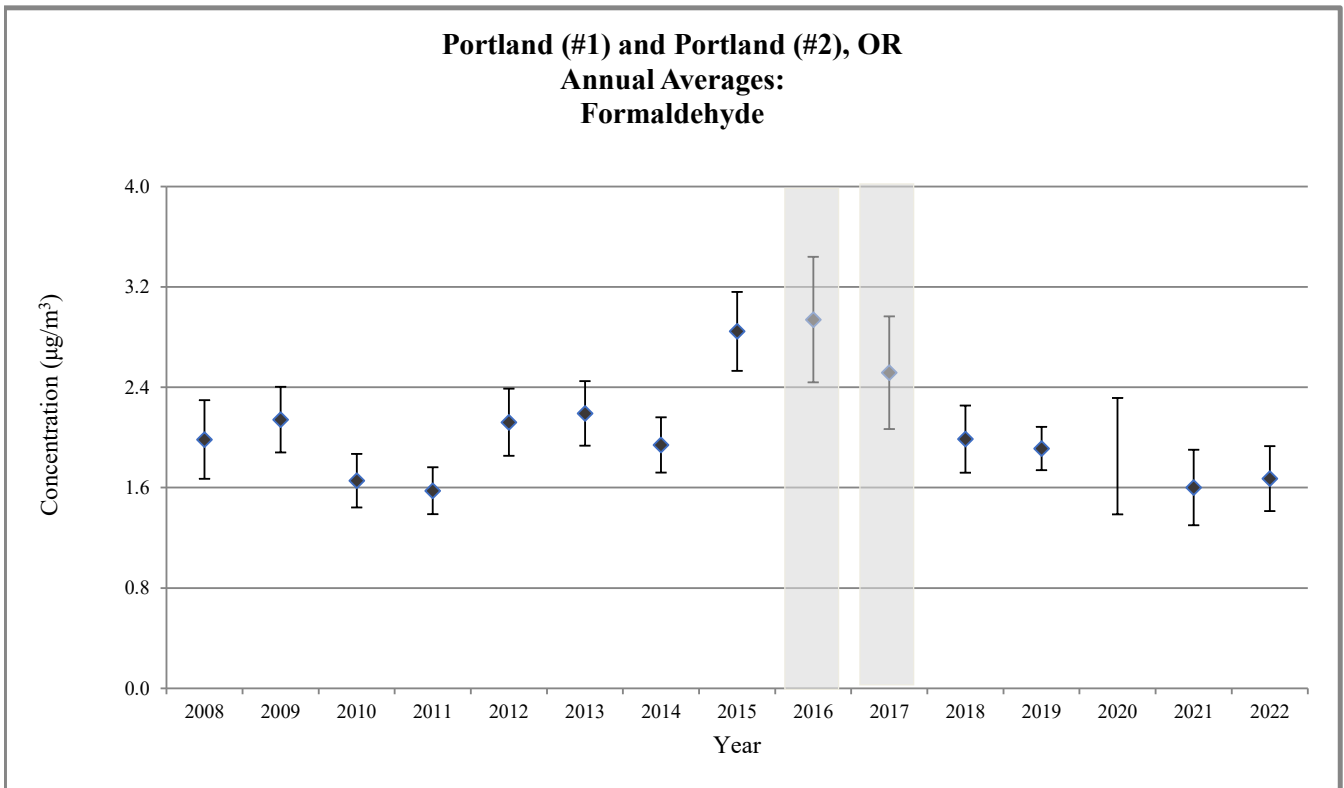
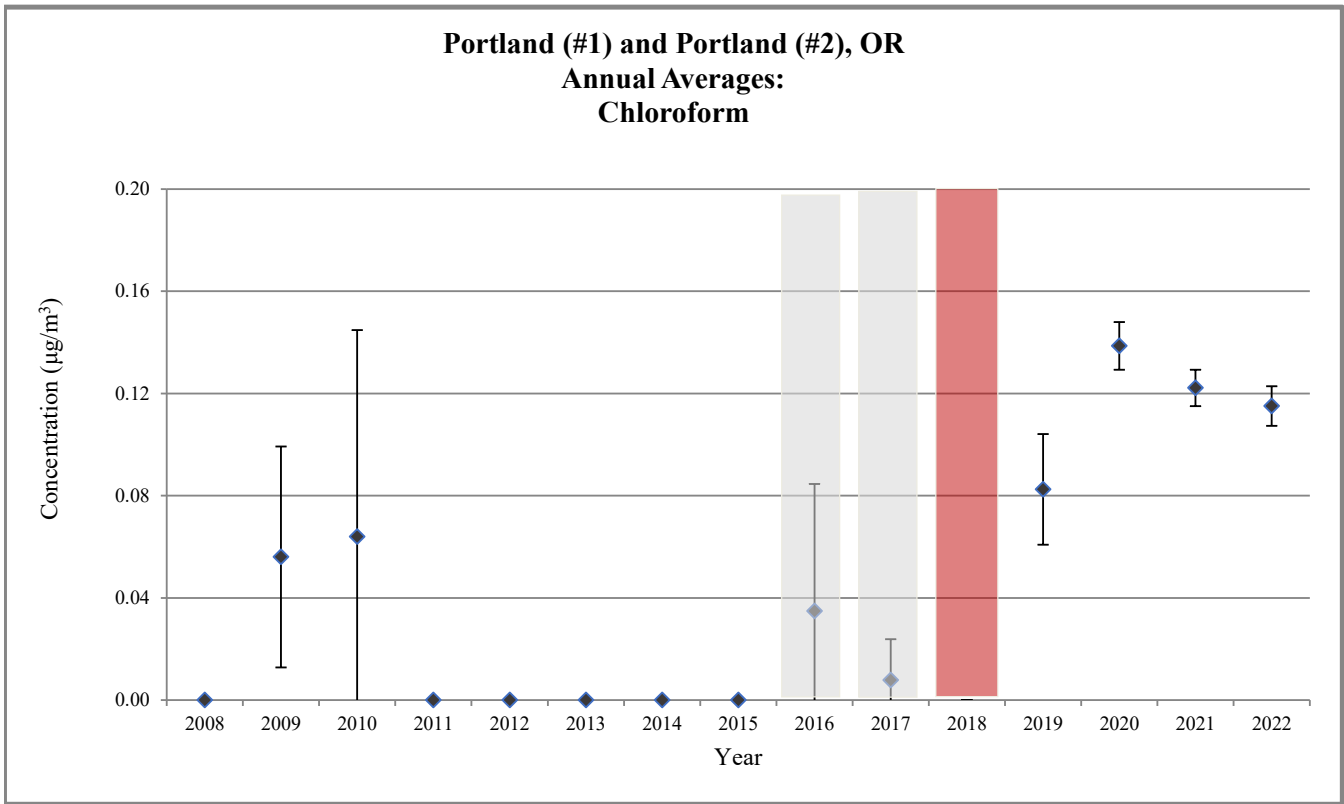
Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



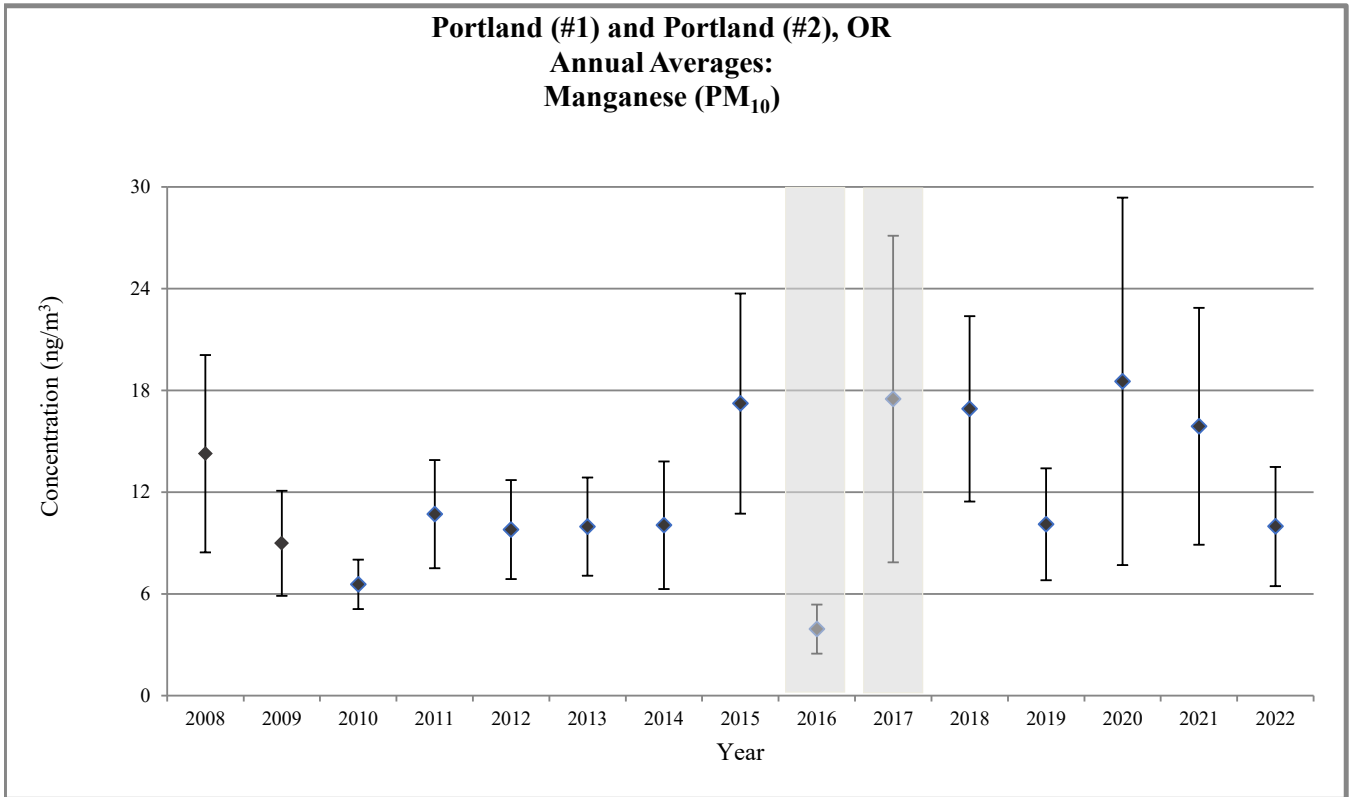
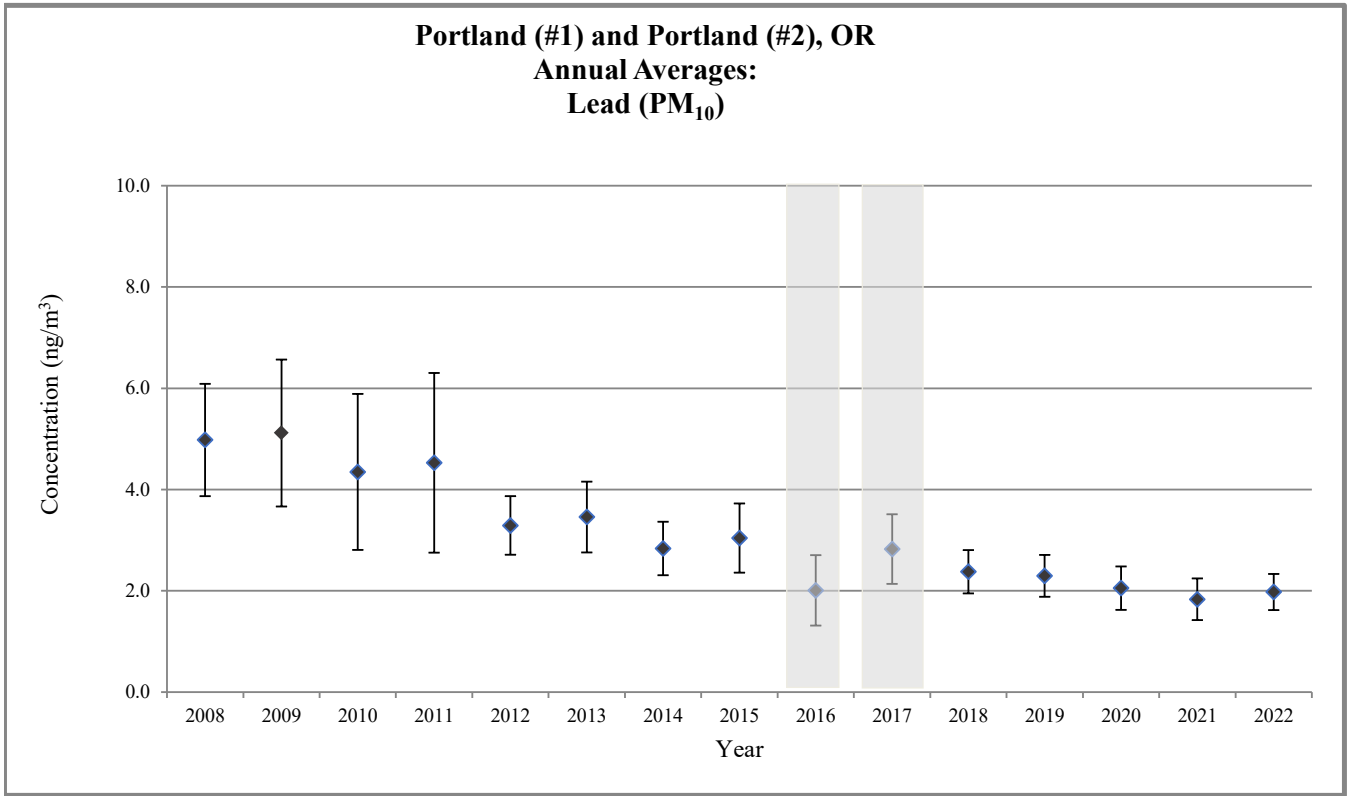
Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



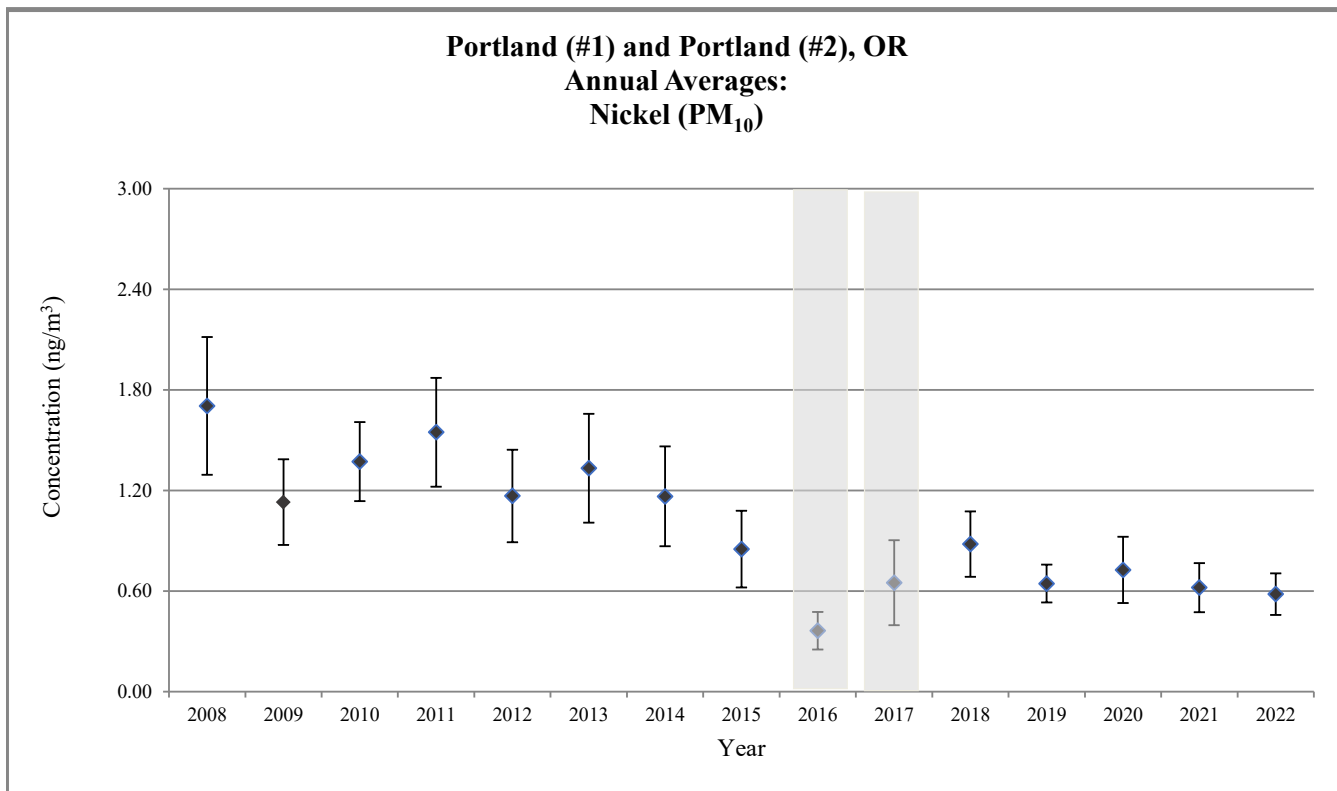
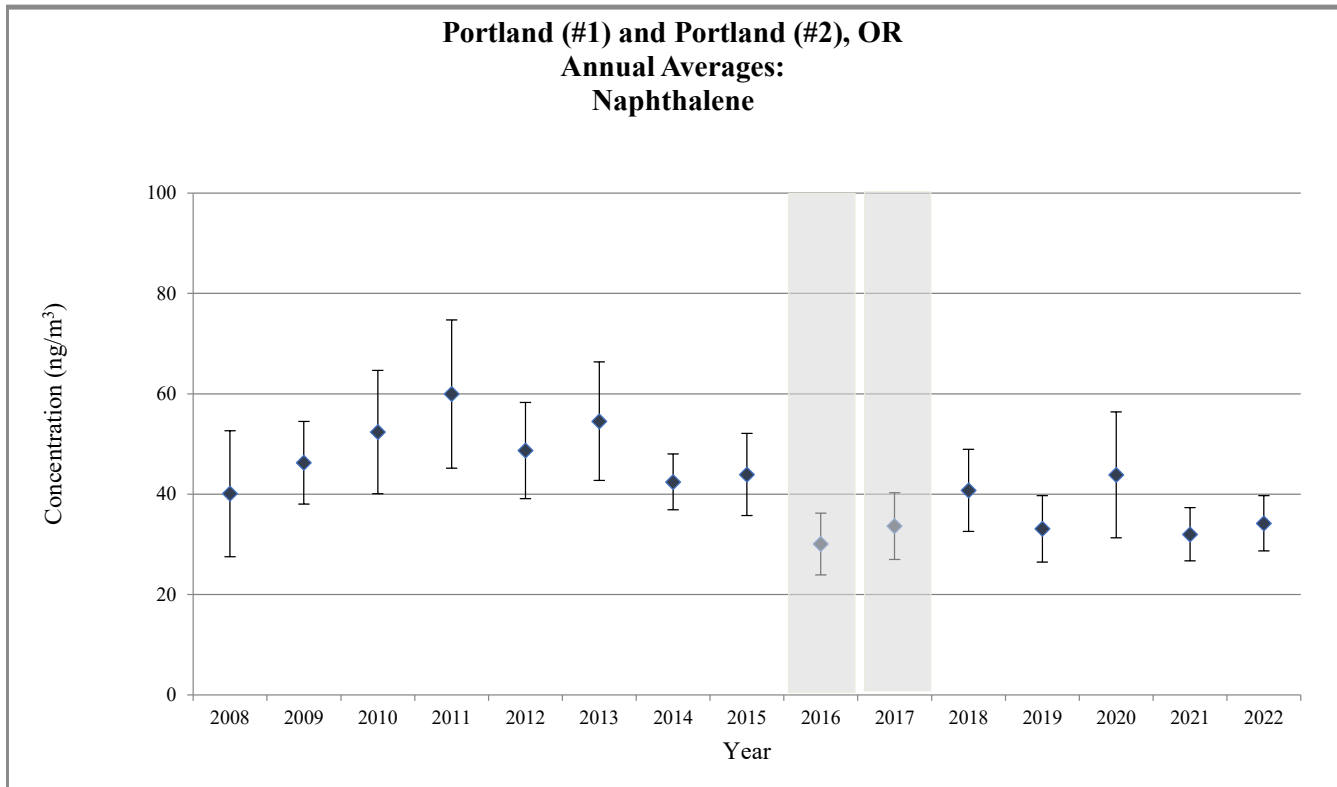
Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



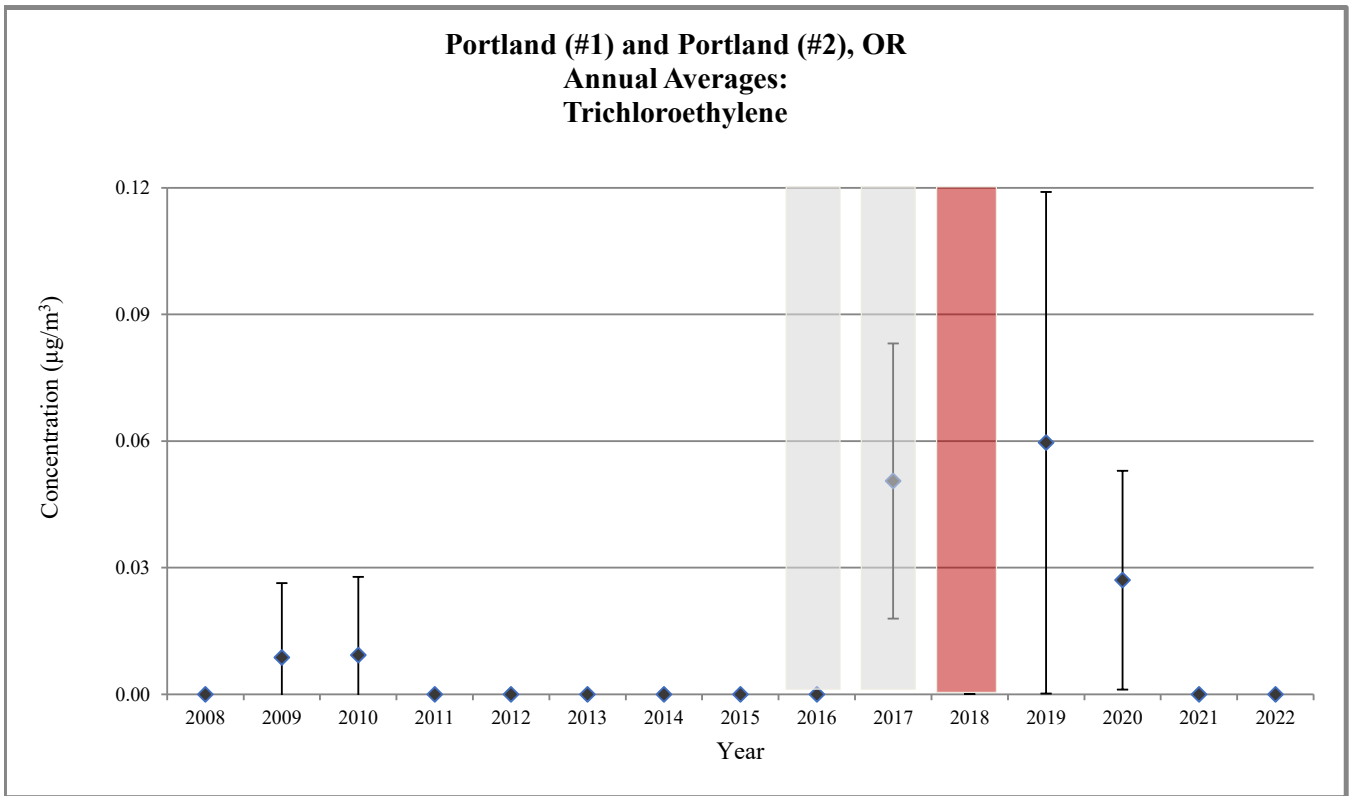
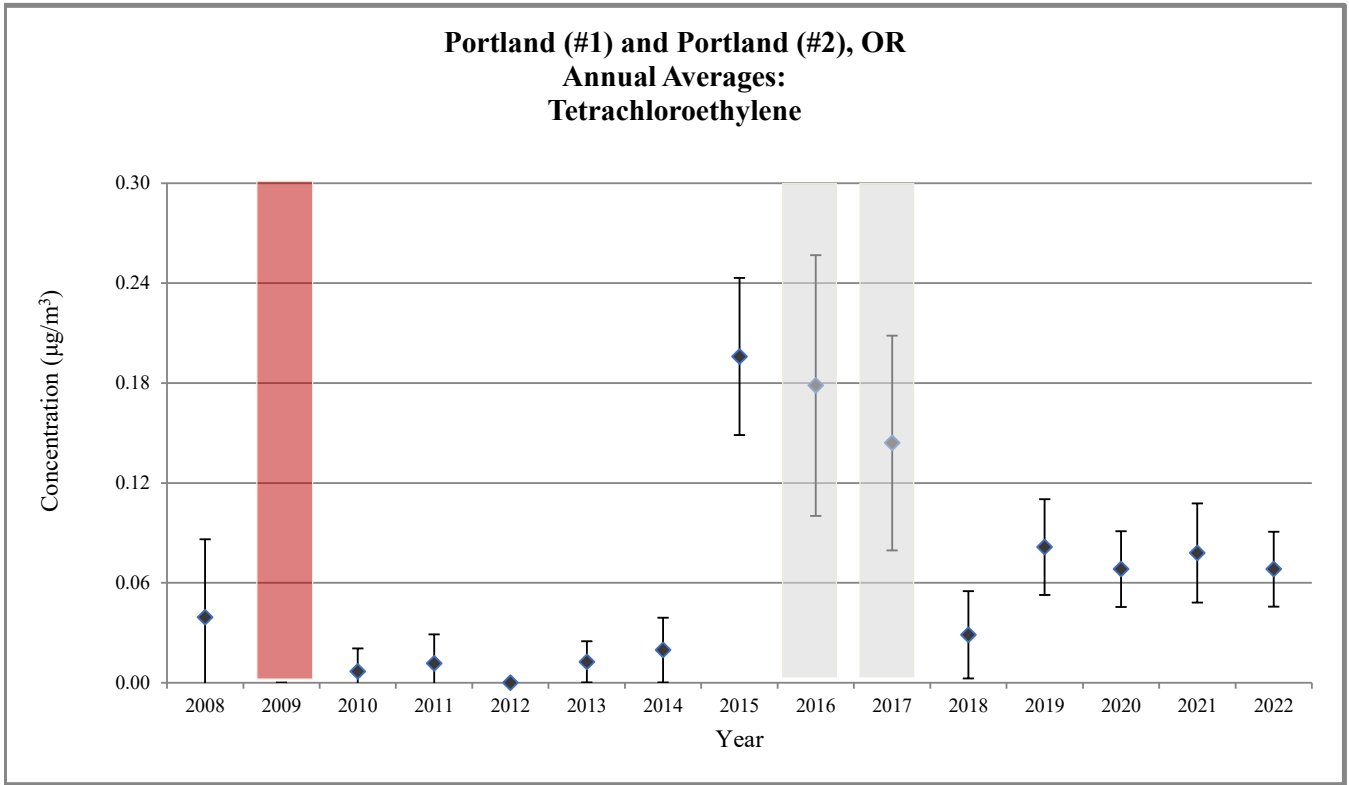
Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



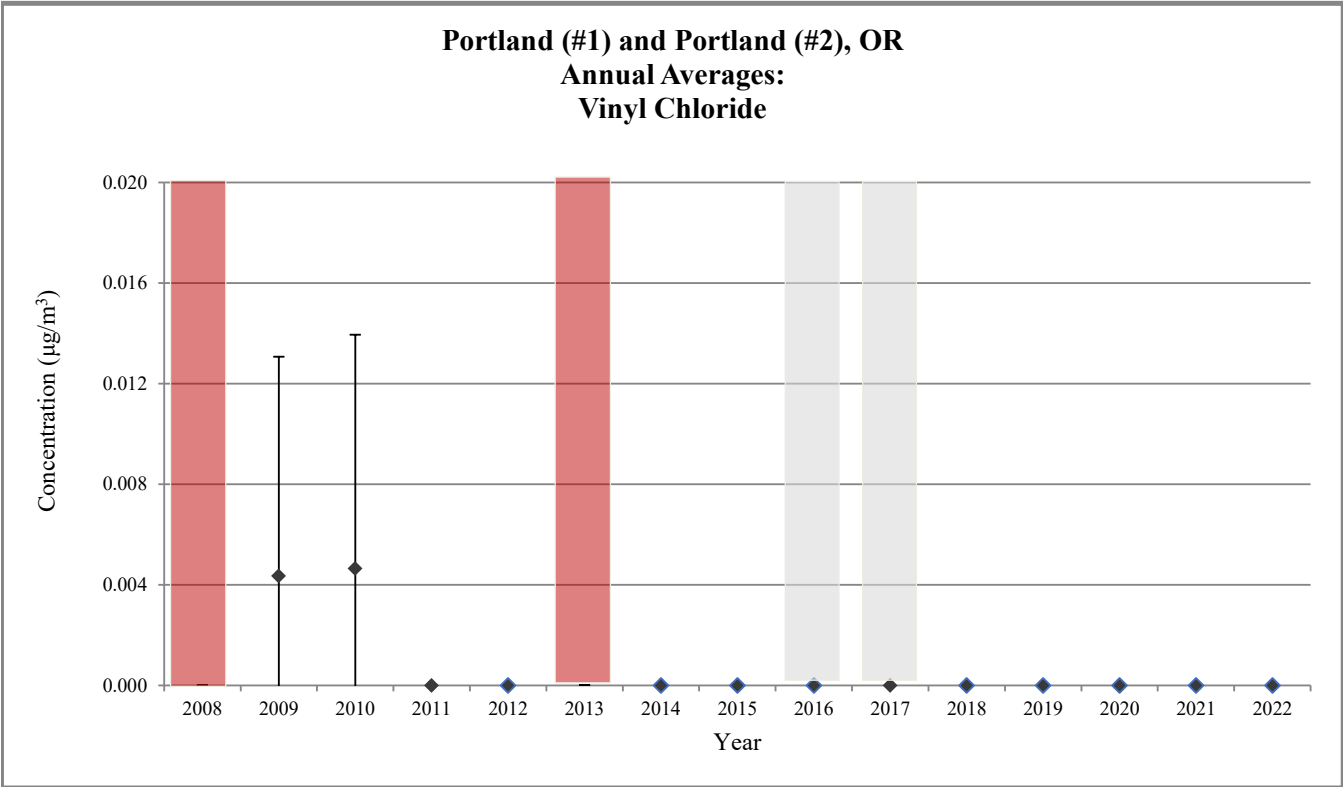
Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations



Sampling began midway through the year.
 Does not meet MQO

Figure 3. Portland (#1 and #2), OR Annual Average Concentrations





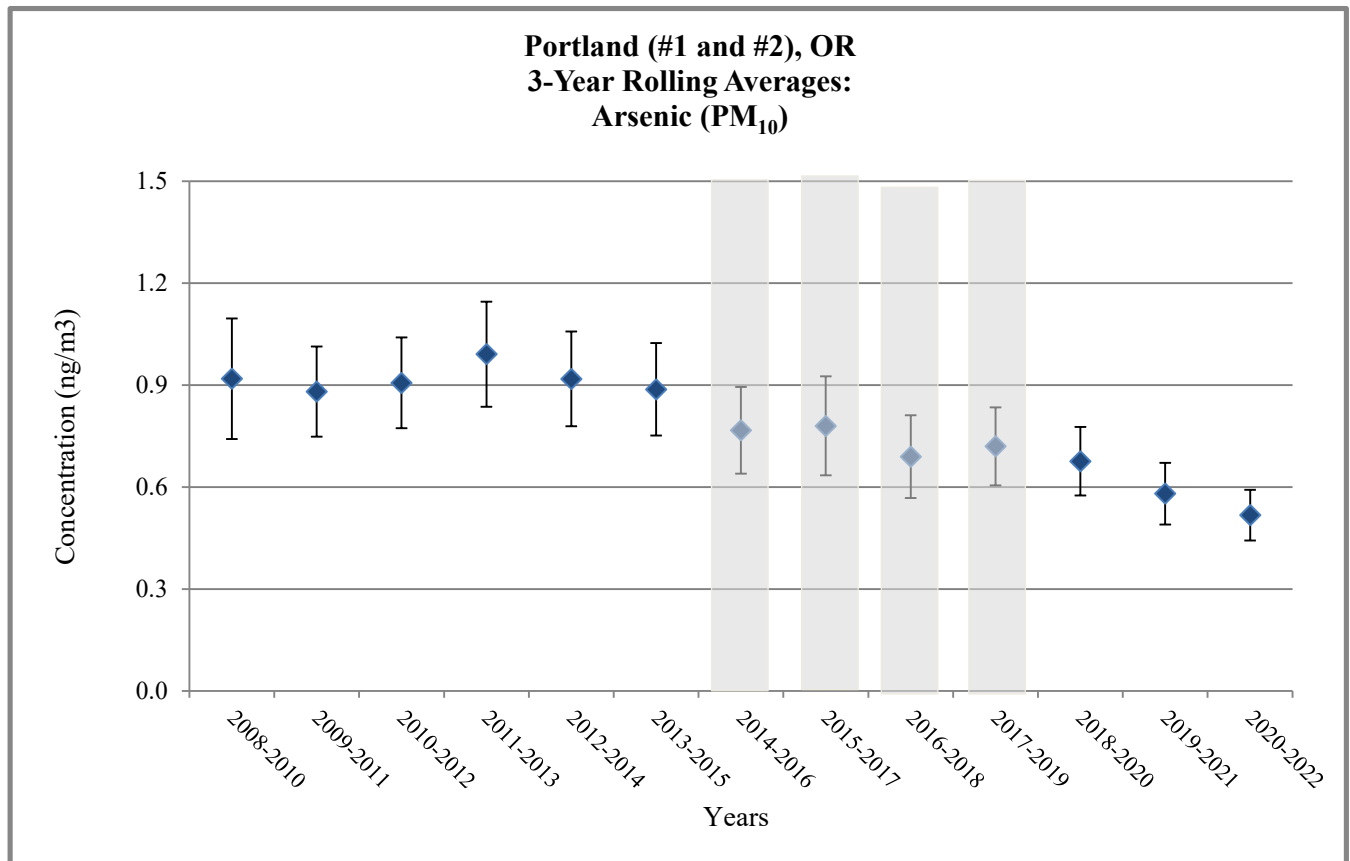
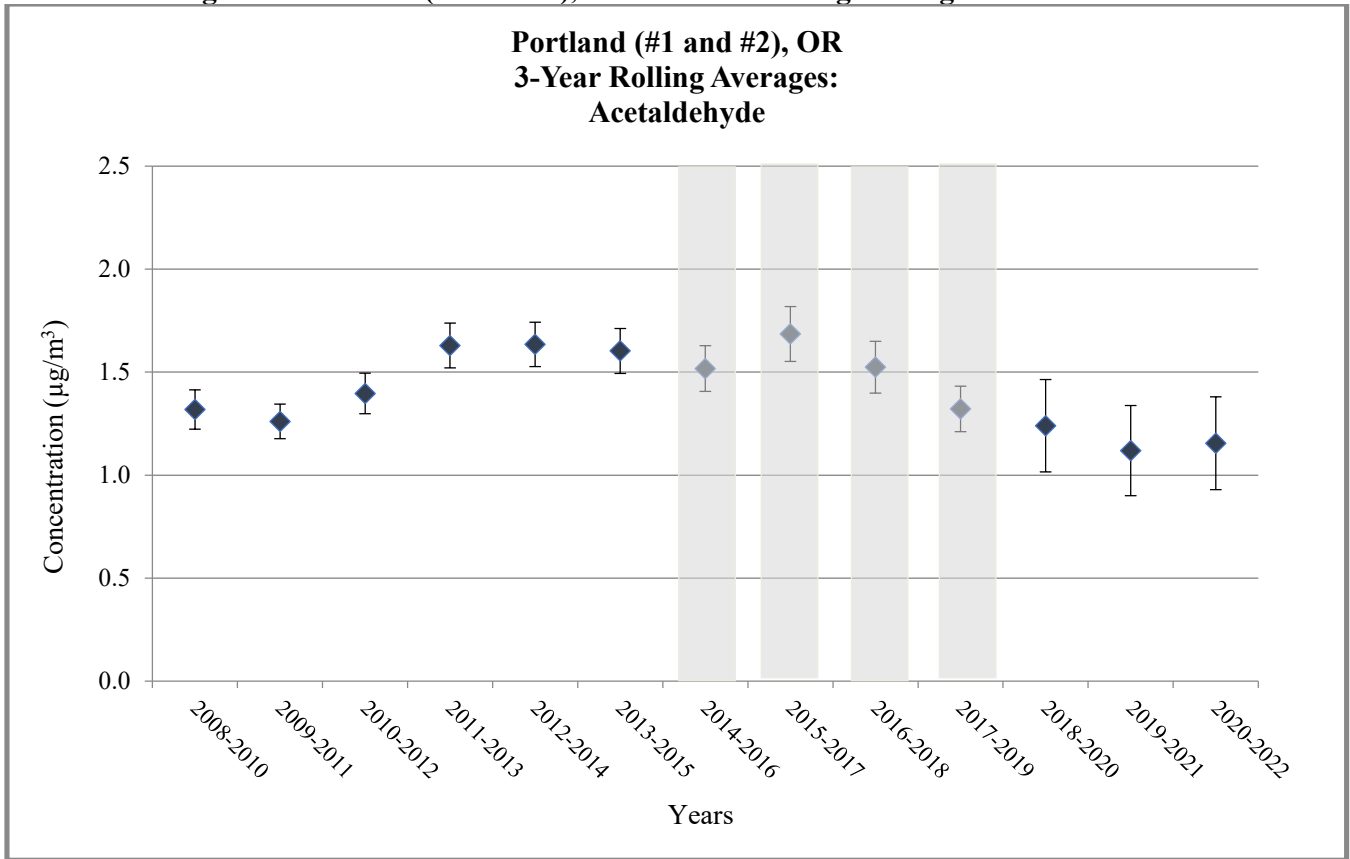
 Sampling began midway through the year.
 Does not meet MQO

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations




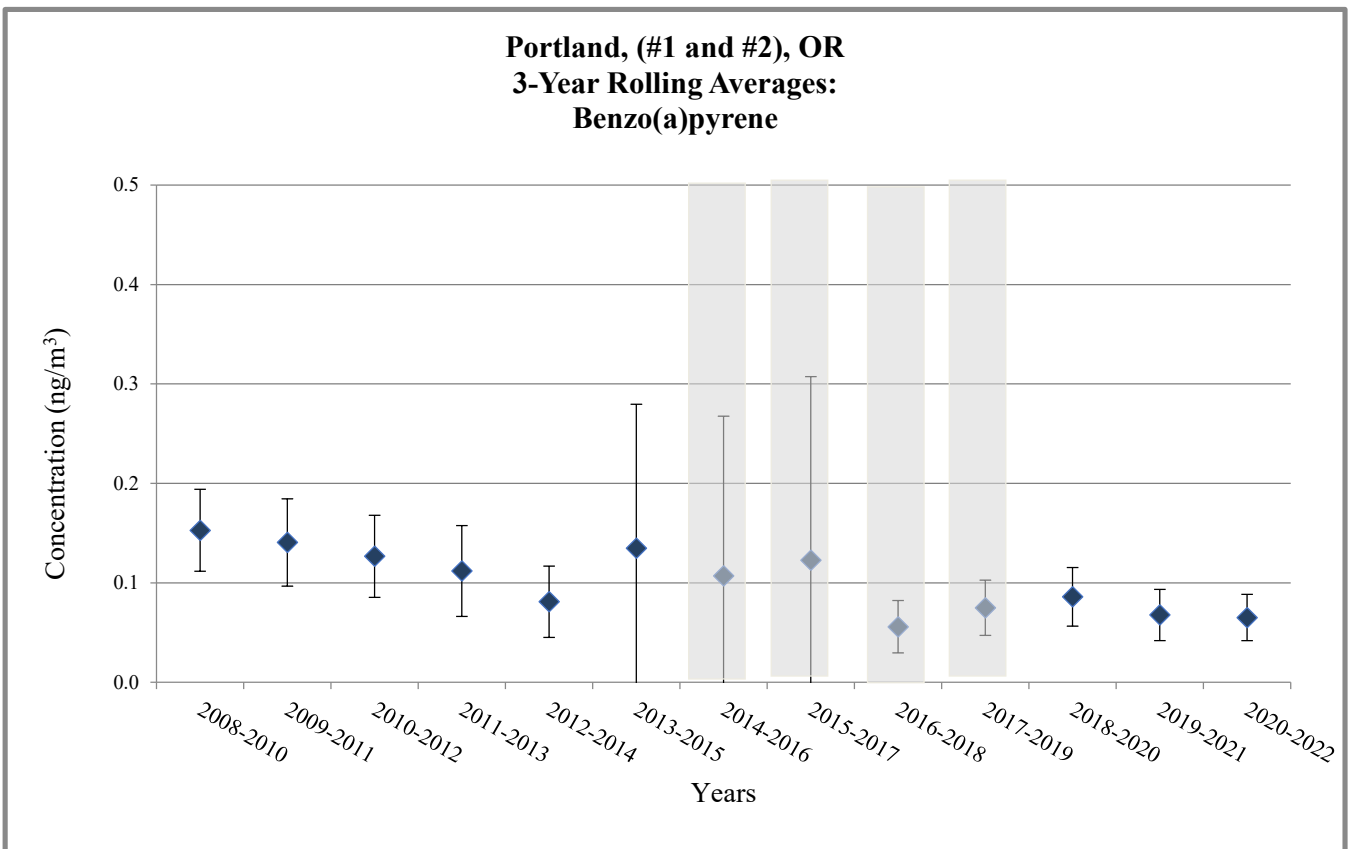
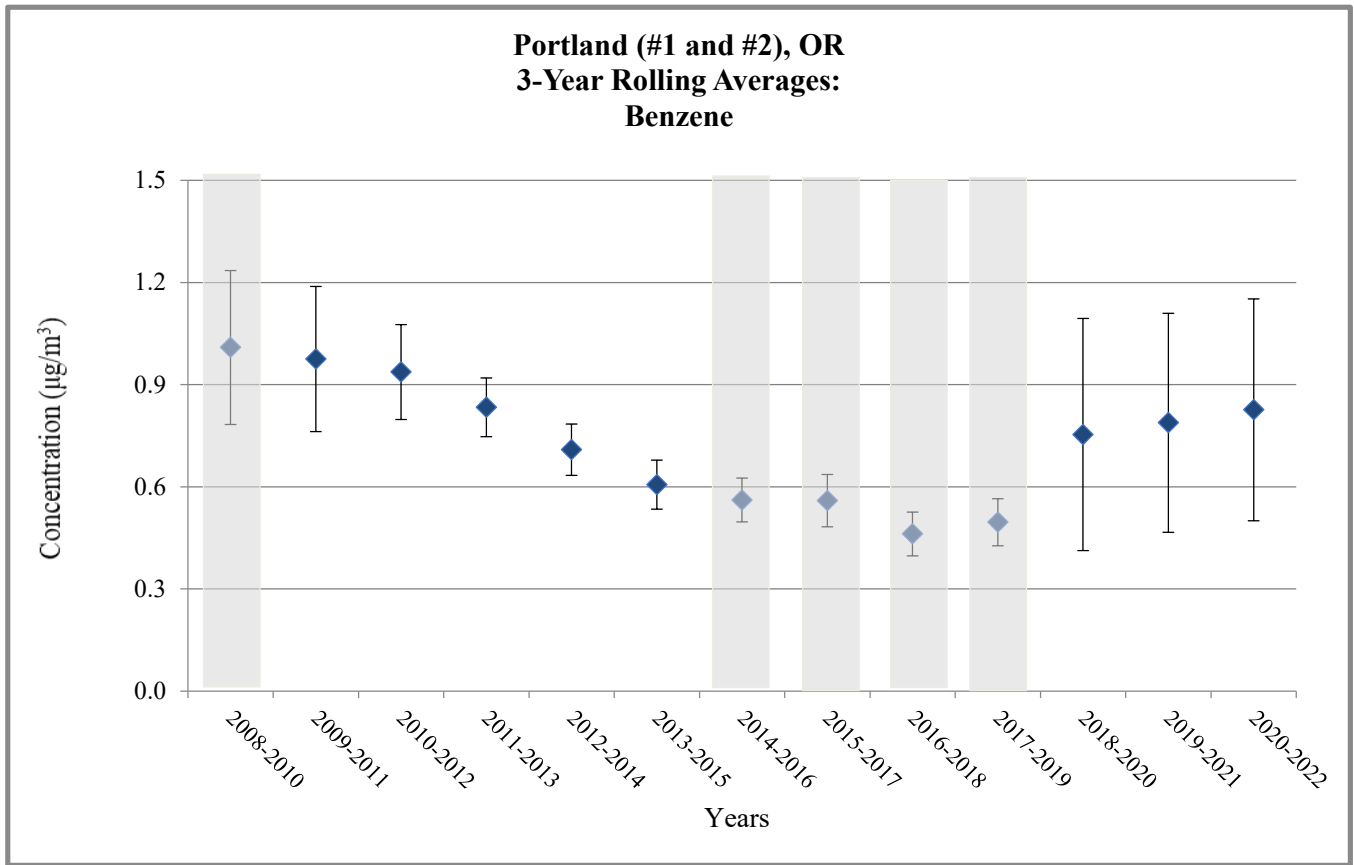
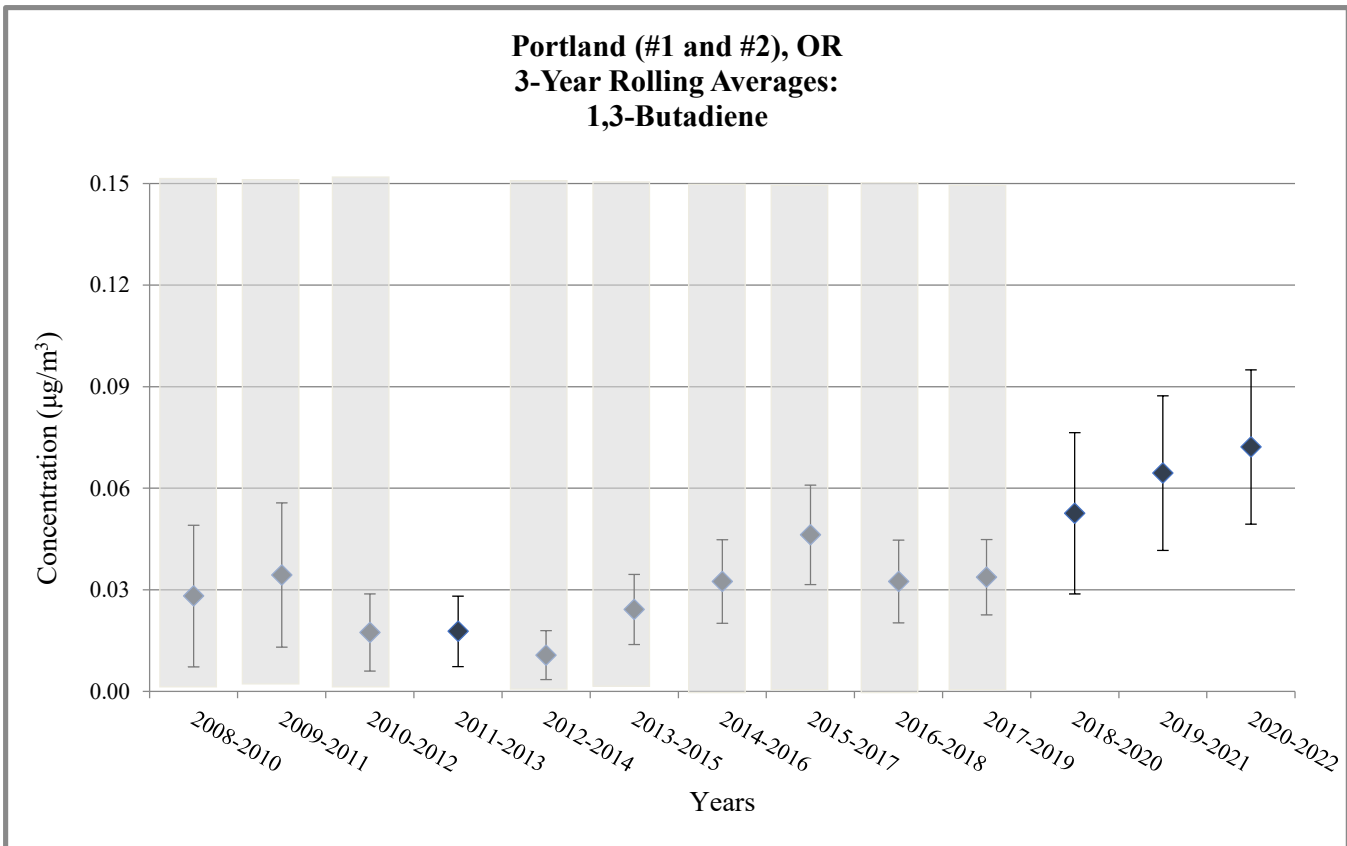
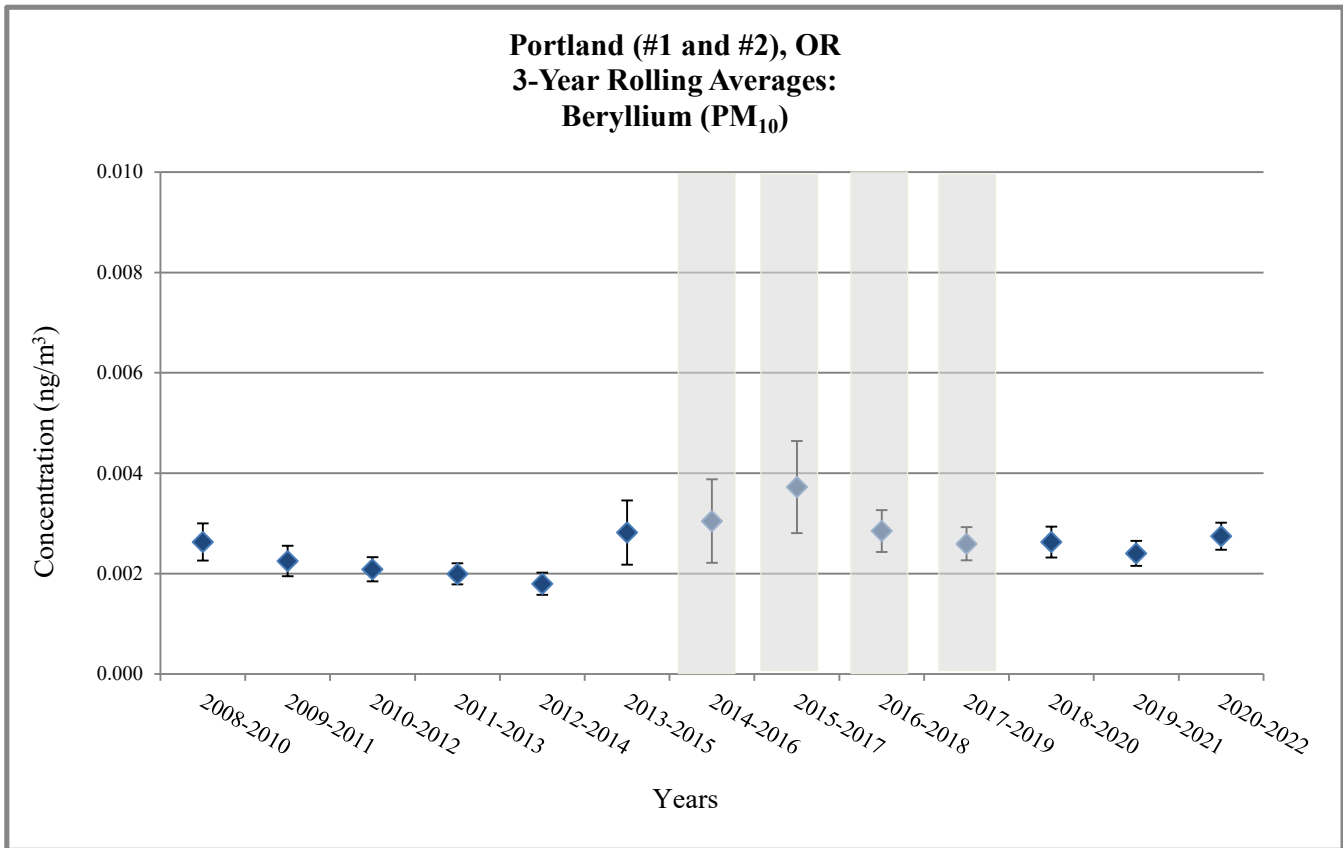
 Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations



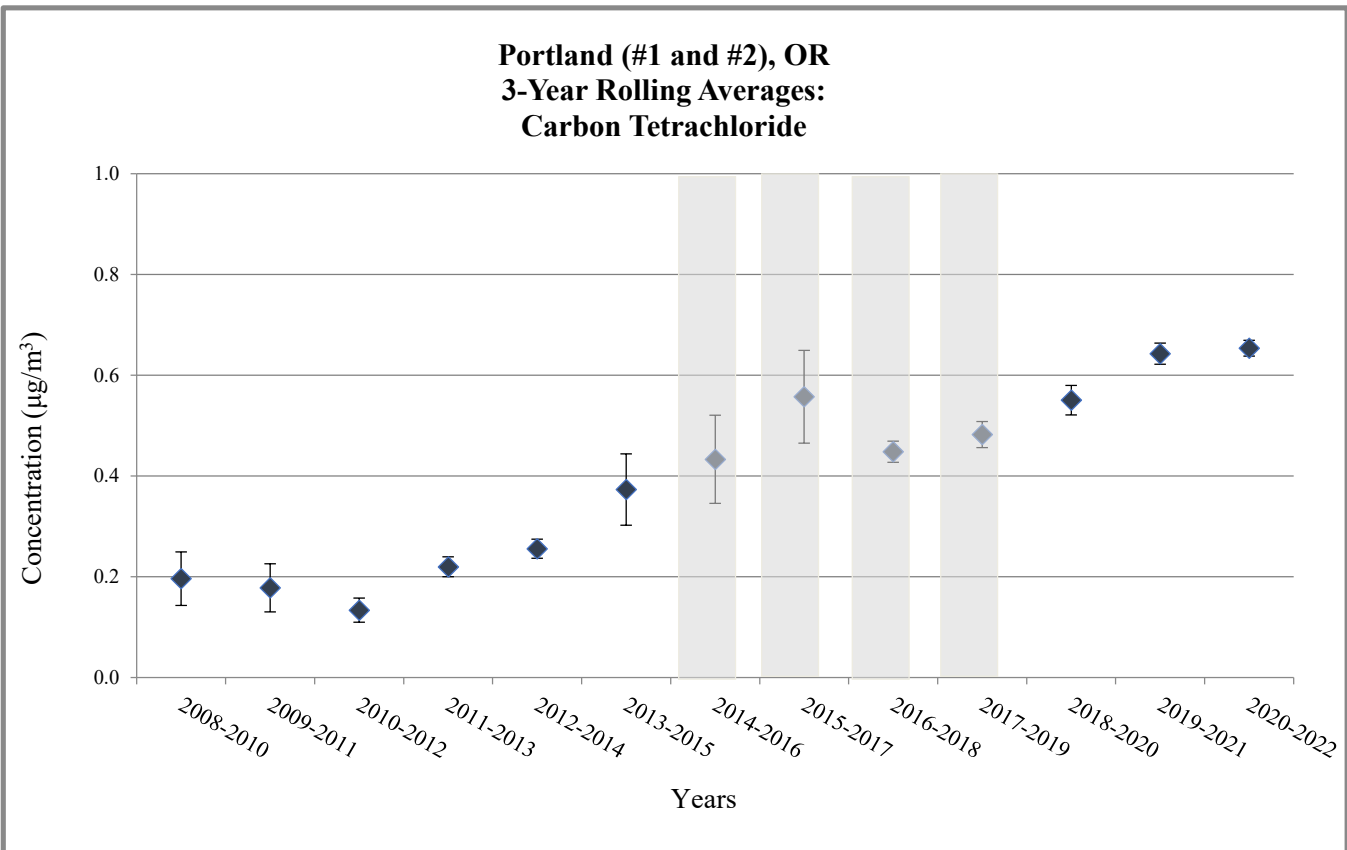
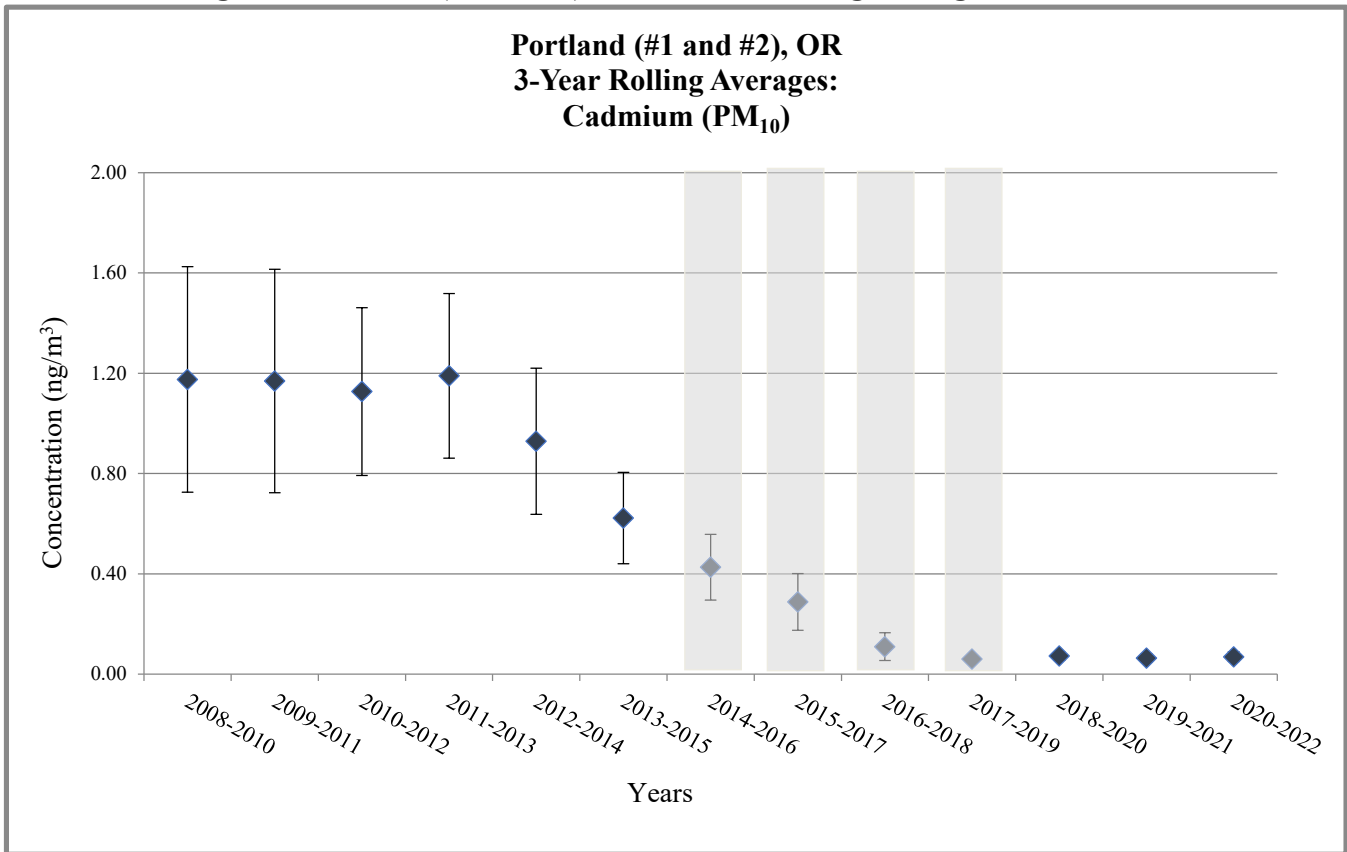
Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations



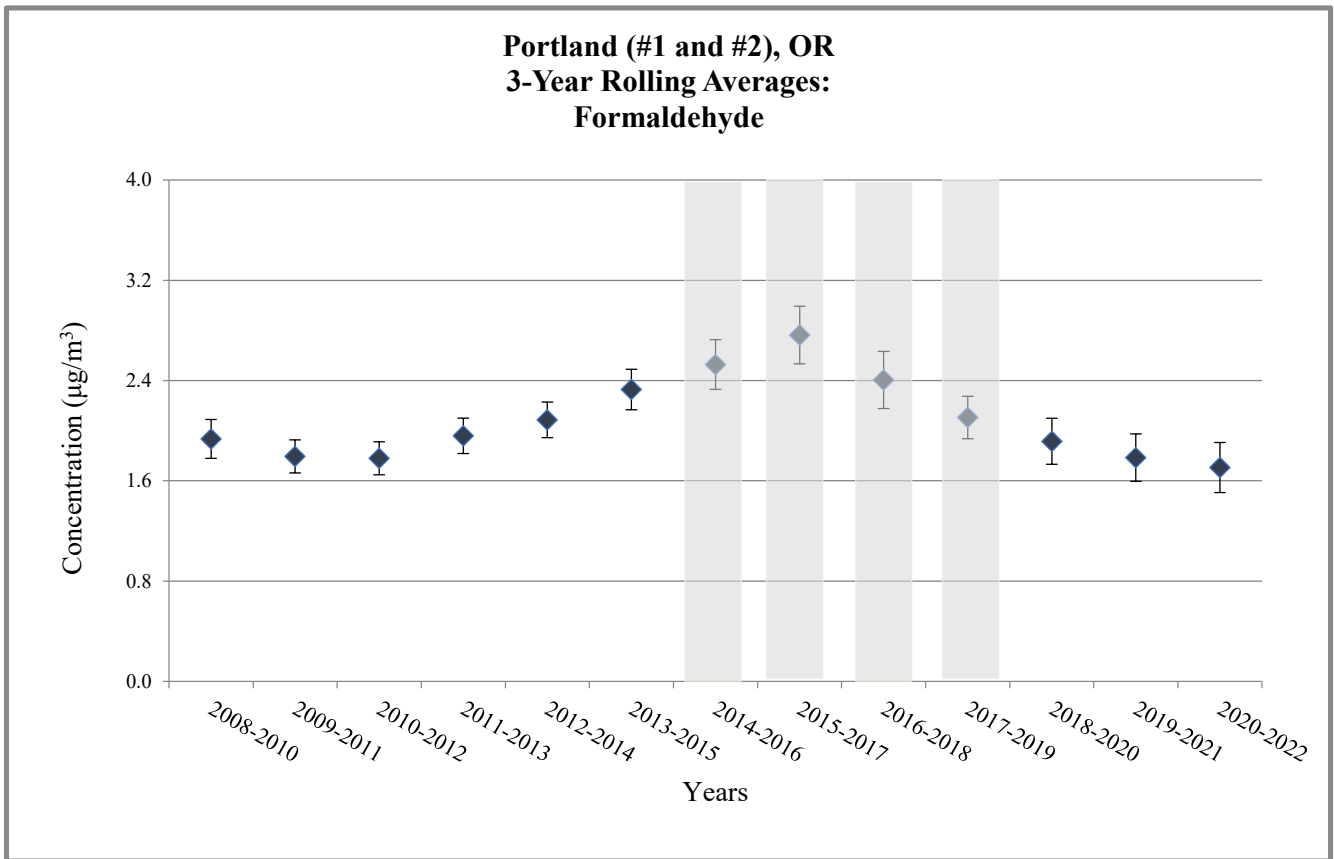
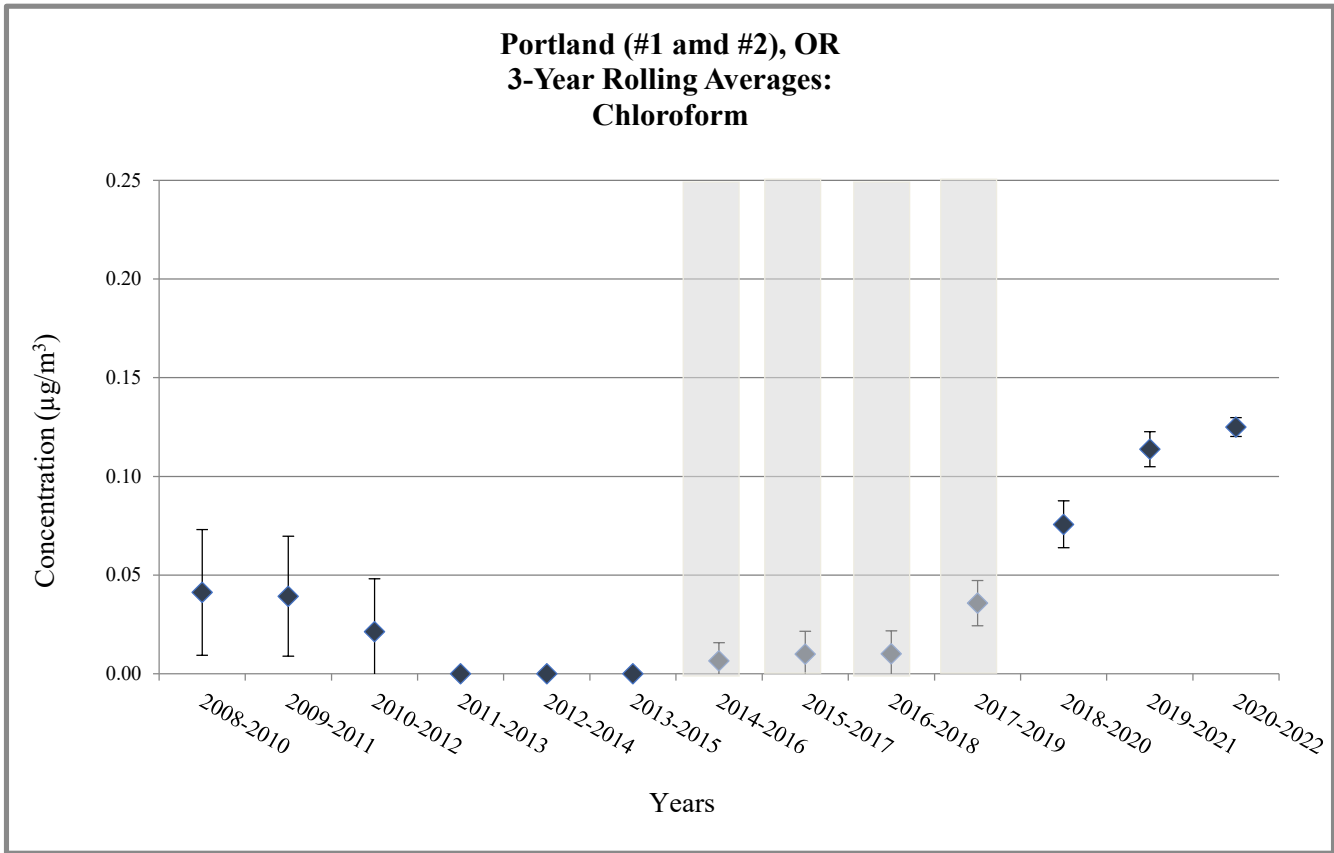
Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations



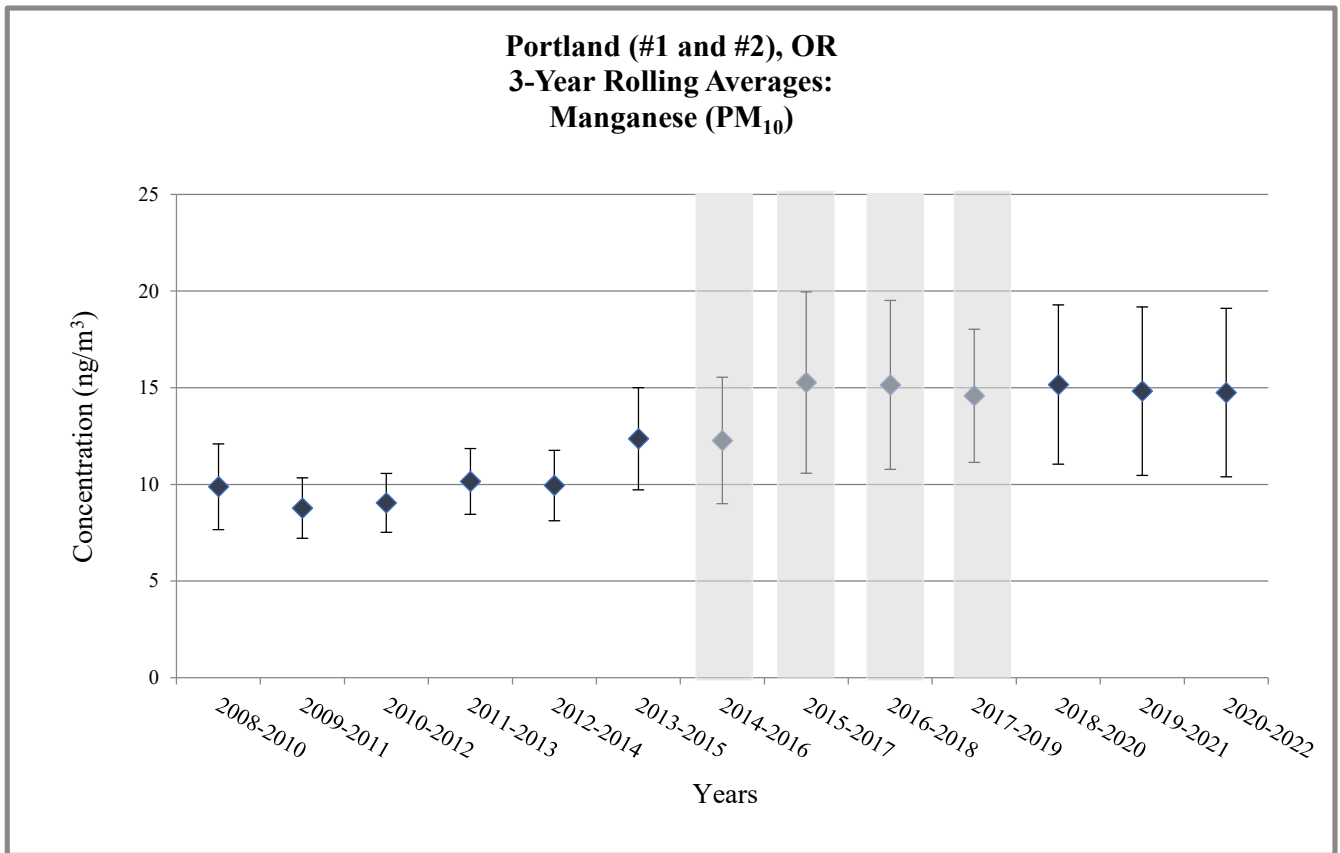
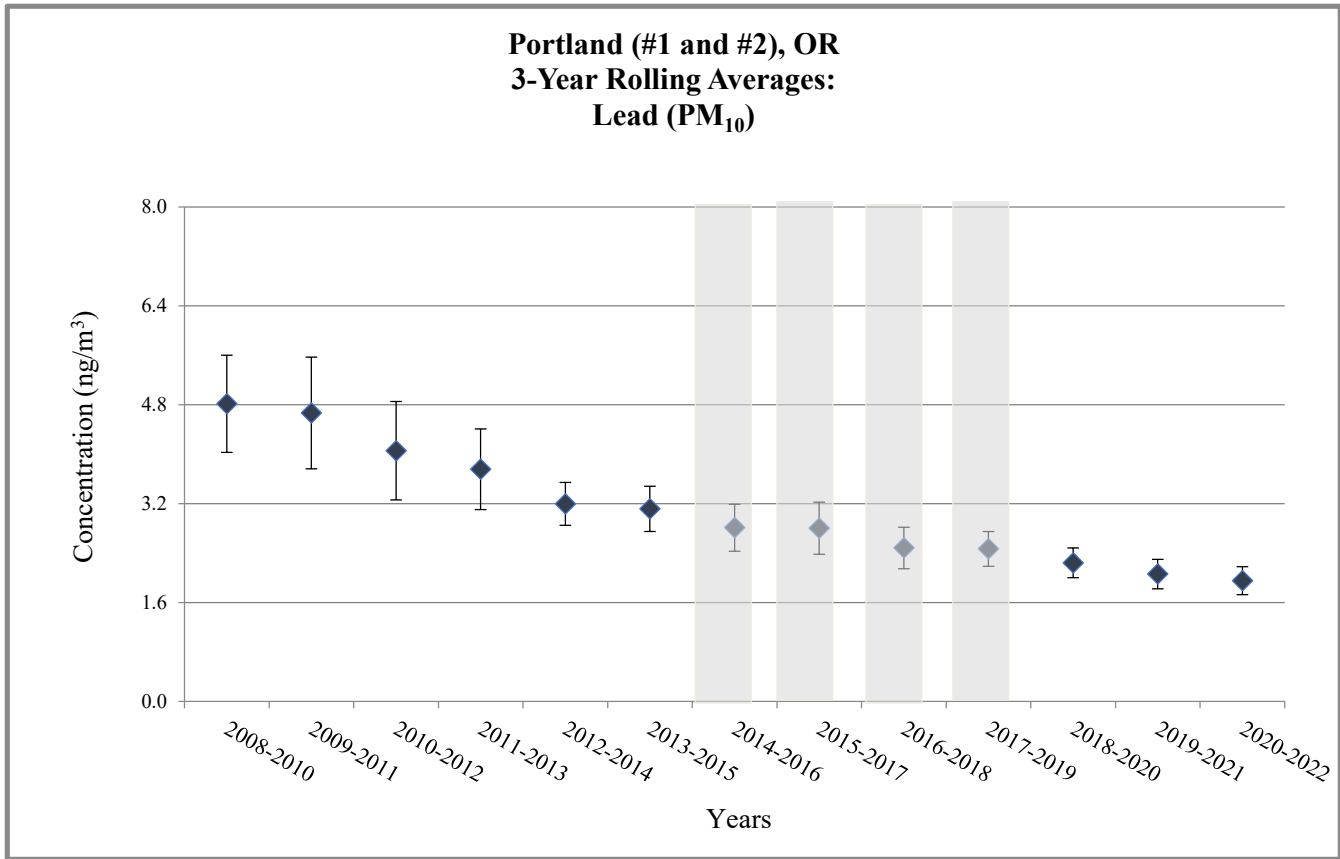
Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations



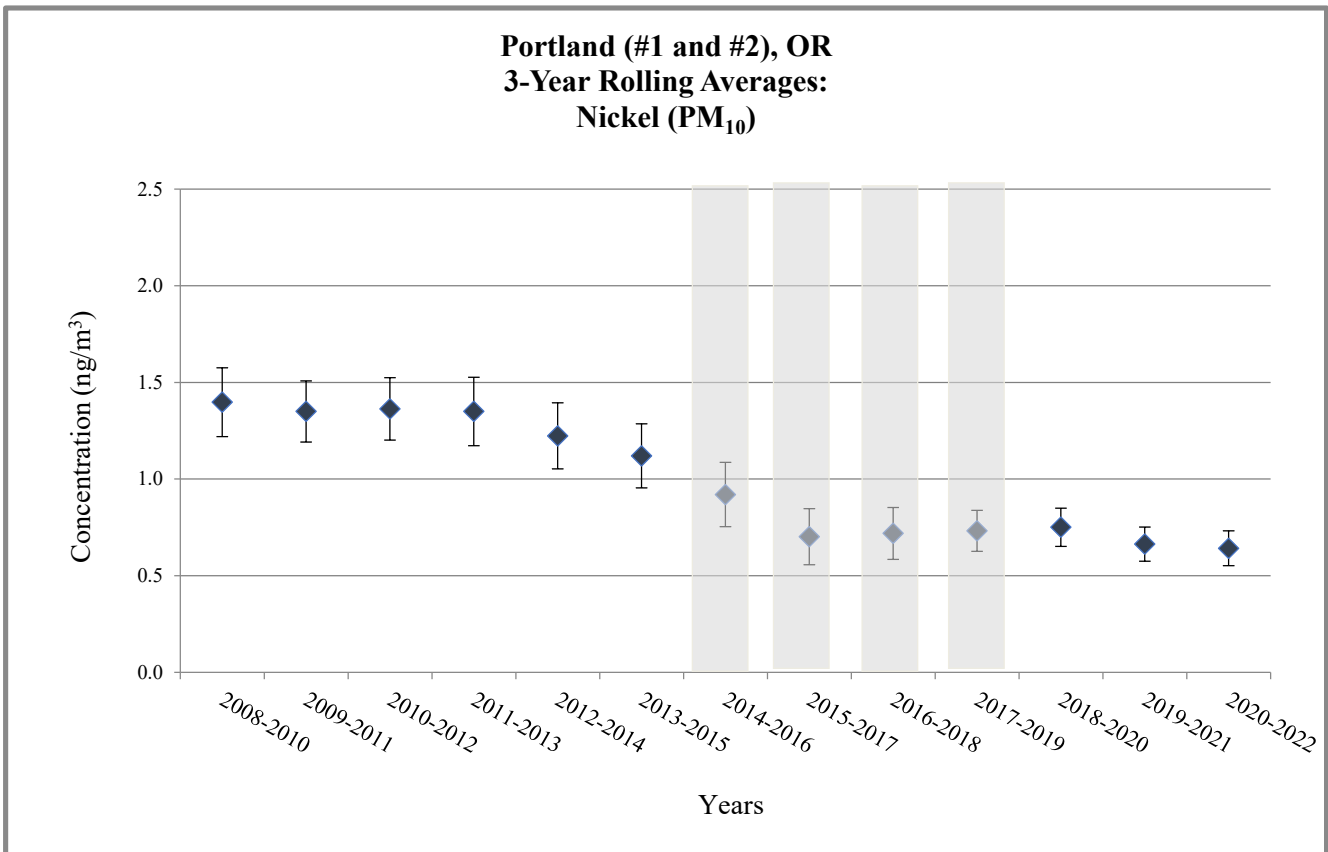
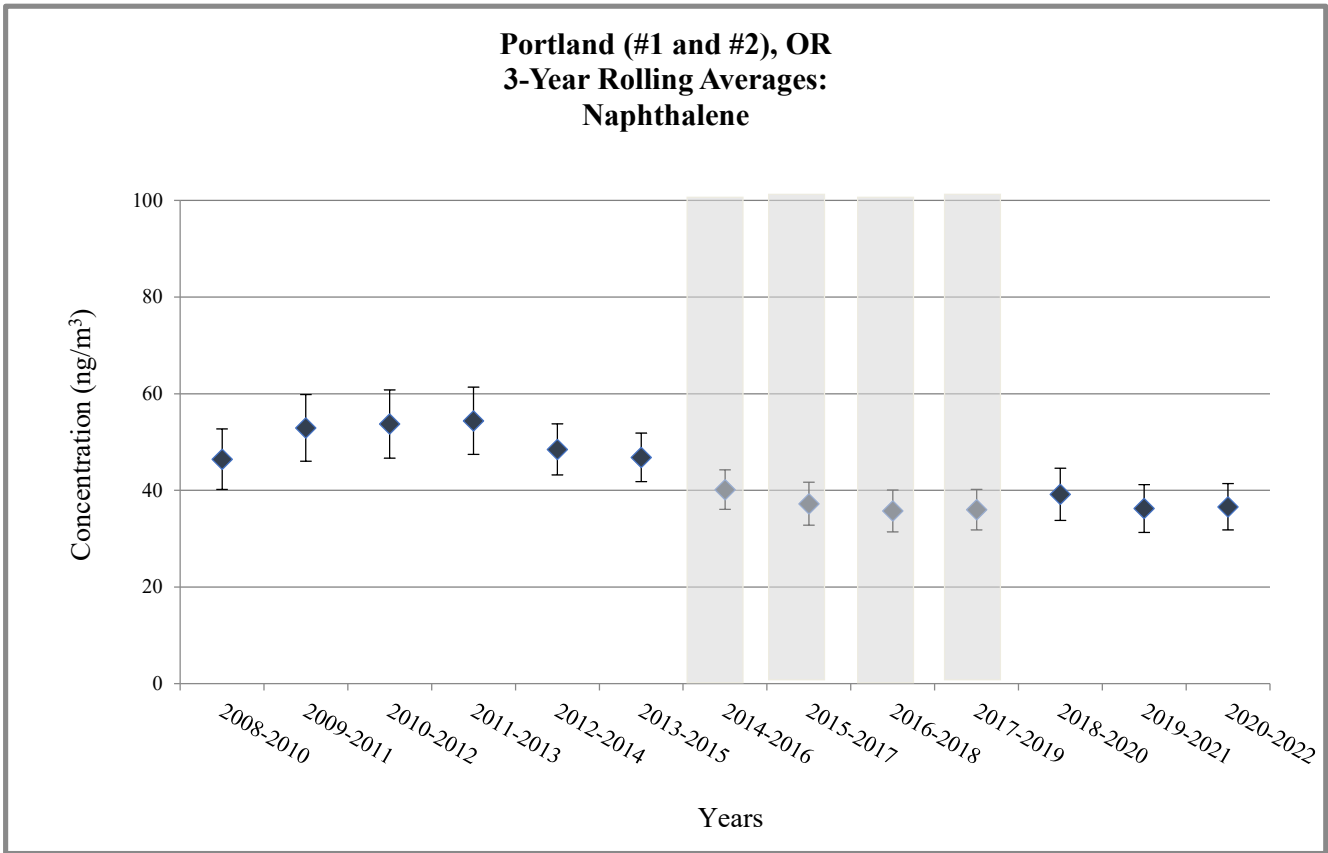
Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations



Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations




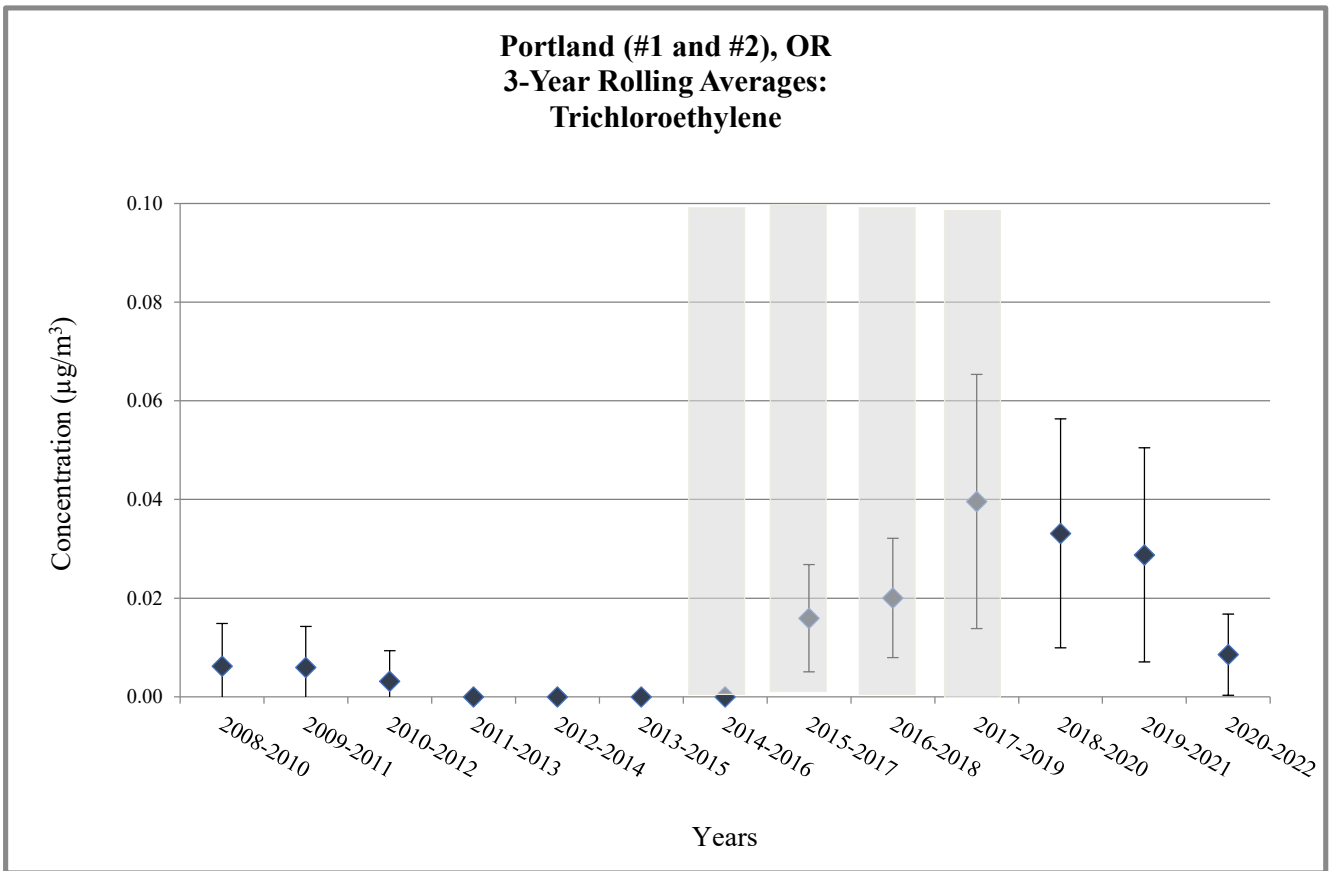
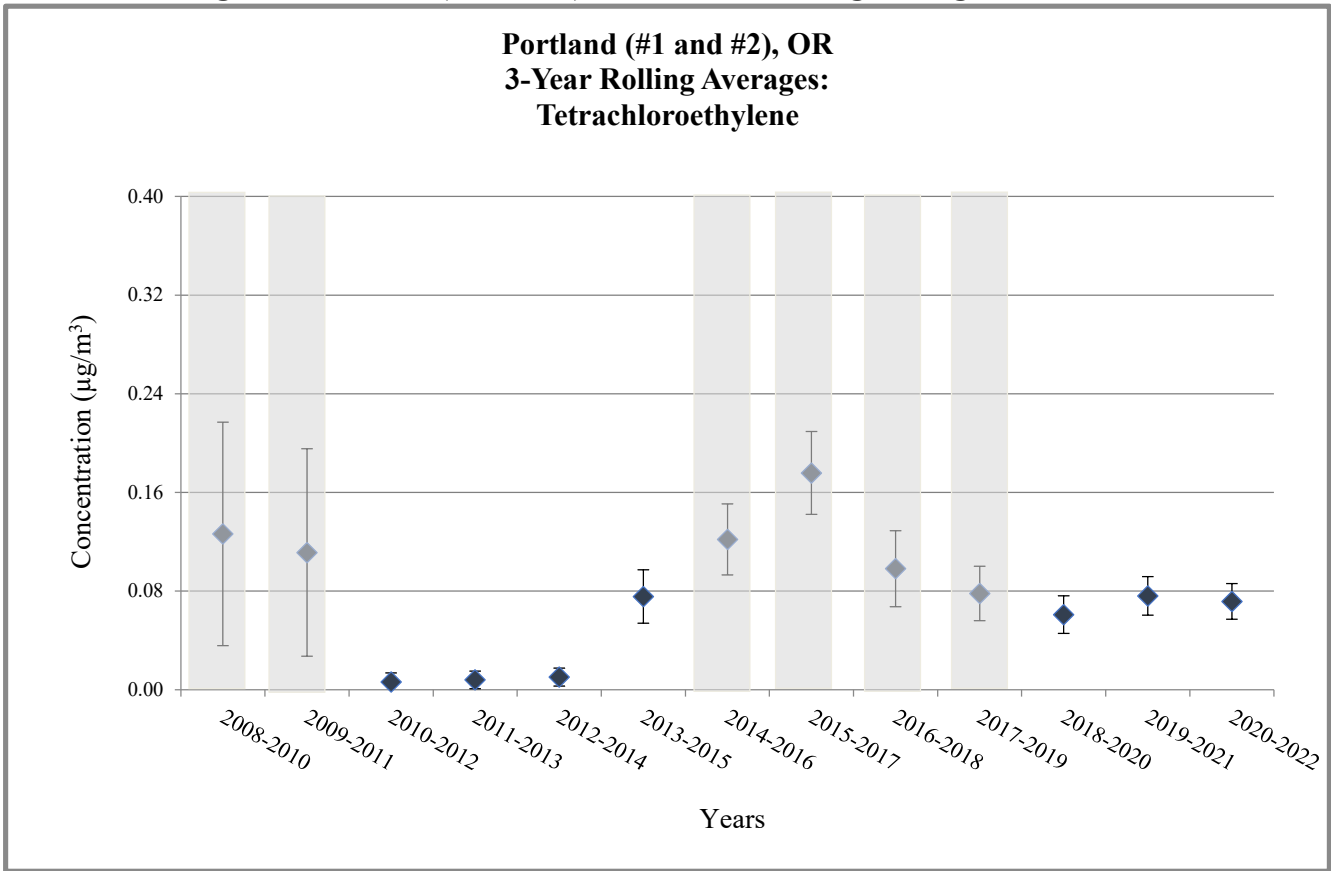
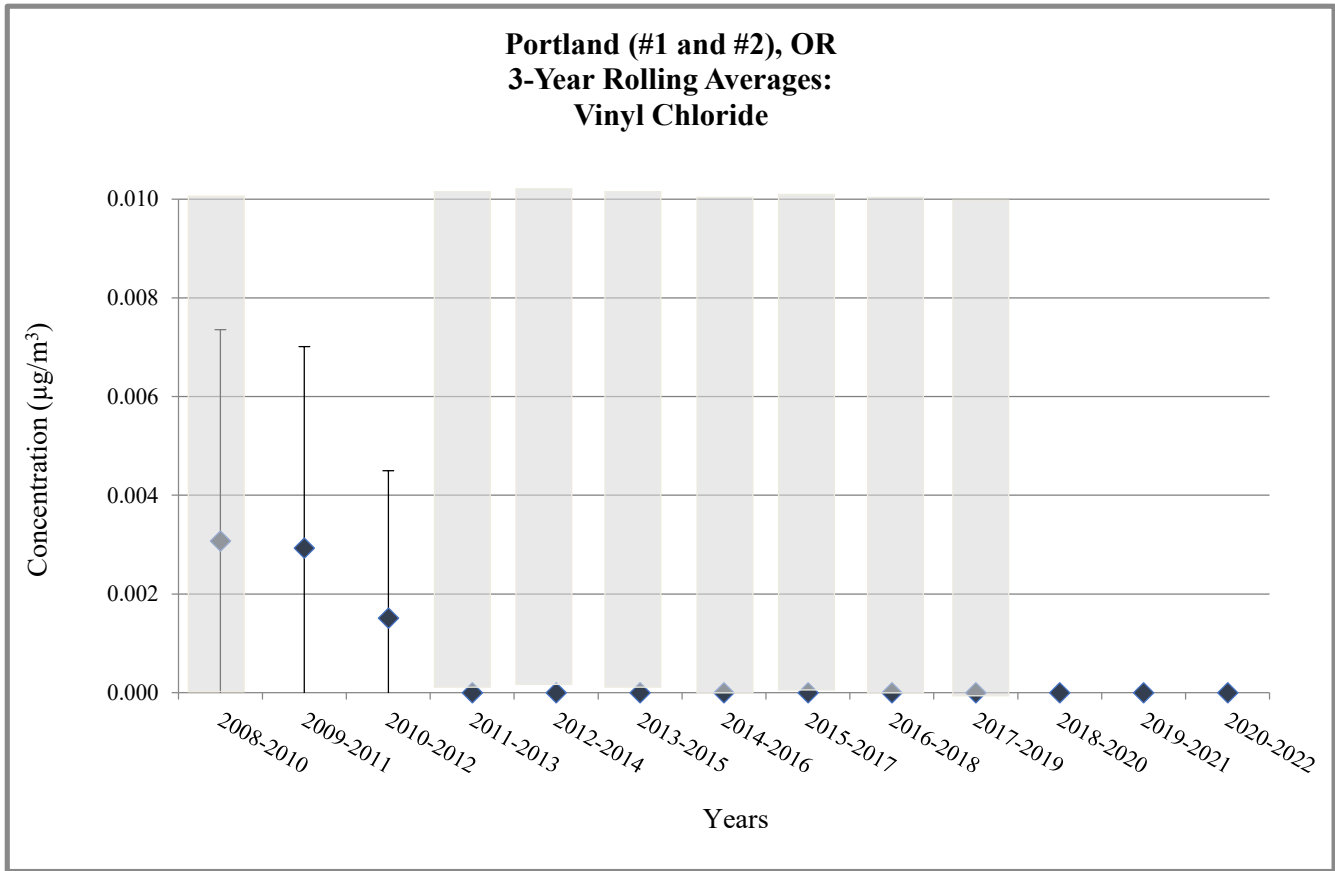
 Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations



Does not meet MQO or wasn't able to collect enough samples

Figure 4. Portland (#1 and #2), OR - 3-Year Rolling Average Concentrations




 Does not meet MQO or wasn't able to collect enough samples

Table 6. NATTS Network Assessment: MQO#1 - Completeness Percentage at Portland, OR

Year	Benzene	Butadiene, 1,3-	Carbon tetrachlorid	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM10)	Beryllium (PM10)	Cadmium (PM10)	Lead (PM10)	Manganese (PM10)	Nickel (PM10)	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM10 Metals						PAHs	
<i>Portland (#1 and #2), OR (AQS Site Code: 41-051-0246/-2010)</i>																	
2008	82	85	89	85	79	85	85	93	100	90	92	90	90	90	92	80	79
2009	77	90	89	89	95	89	90	100	100	97	97	97	97	97	97	92	93
2010	82	95	98	97	102	98	93	95	92	93	93	93	93	93	93	85	87
2011	97	98	98	98	98	97	98	100	100	97	97	97	97	97	97	95	95
2012	95	95	95	95	95	95	95	93	93	95	95	95	95	95	95	90	95
2013	89	89	89	89	89	89	89	100	100	102	102	102	102	102	102	92	92
2014	84	84	84	84	84	84	84	93	93	98	98	98	98	98	98	98	97
2015	87	87	87	87	87	87	87	98	98	98	98	98	98	98	98	100	100
2016	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a
2017	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a	--a
2018	84	84	84	84	84	84	84	95	95	100	100	100	100	100	100	98	93
2019	98	98	98	98	98	98	98	98	98	100	100	100	100	100	100	100	100
2020	90	90	90	90	90	90	90	97	97	98	98	98	98	98	98	98	98
2021	100	100	100	100	100	100	100	102	102	100	100	100	100	100	100	103	103
2022	95	95	95	95	95	95	95	95	95	102	102	102	102	102	102	100	100

	A-rated: ≥85%
	B-rated: Between 75% to 85%
	Does not meet: ≤75%
	-- No data available

^a: The Portland (#1), OR site moved approximately 0.25 miles southwest to Portland (#2), OR in September 2016. The new site opened in March 2017.

Table 7. NATTS Network Assessment: MQO#2 - Reported Method Detection Limits (MDLs) at Portland (#1 and #2), OR

Year	Benzene	Butadiene, 1,3-	Carbon tetrachlorid	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM10)	Beryllium (PM10)	Cadmium (PM10)	Lead (PM10)	Manganese (PM10)	Nickel (PM10)	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM10 Metals						PAHs	
<i>Portland (#1 and #2), OR (AQS Site Code: 41-051-0246/-2010)</i>																	
2008	0.98	2.21	1.85	0.49	1.99	0.54	1.39	0.07	0.07	0.14	0.01	0.06	0.02	0.06	0.15	0.10	0.02
2009	0.98	2.21	1.85	0.49	1.99	0.54	1.39	0.07	0.10	0.14	0.01	0.06	0.02	0.06	0.15	0.26	0.02
2010	0.98	2.21	1.85	0.49	1.99	0.54	1.39	0.04	0.08	0.141	0.01	0.06	0.02	0.06	0.15	0.26	0.03
2011	0.98	0.88	0.37	0.49	0.80	0.54	0.93	0.04	0.09	0.14	0.01	0.06	0.02	0.06	0.15	0.23	0.030
2012	0.98	0.88	0.37	0.49	0.80	0.54	0.93	0.04	0.08	0.13	0.01	0.05	0.02	0.06	0.14	0.20	0.032
2013	0.98	0.88	0.37	0.49	0.80	1.34	0.93	0.06	0.92	0.13	0.01	0.05	0.02	0.06	0.14	0.20	0.05
2014	0.98	0.88	0.37	0.49	0.80	1.34	0.93	0.06	0.92	0.12	0.01	0.05	0.02	0.06	0.14	0.40	0.09
2015	0.98	0.88	0.37	0.49	0.80	1.34	0.93	0.06	0.84	0.10	0.01	0.05	0.02	0.06	0.14	0.41	0.06
2016	0.98	0.88	0.37	0.49	0.80	1.34	0.93	0.06	0.97	0.09	0.01	0.06	0.02	0.14	0.17	0.40	0.06
2017	0.98	0.88	0.37	0.49	0.80	0.94	0.93	0.06	0.91	0.10	0.01	0.06	0.02	0.15	0.17	0.41	0.06
2018	0.98	0.88	0.93	0.49	1.00	0.94	0.93	0.06	0.88	0.17	0.02	0.15	0.03	0.16	0.38	0.44	0.06
2019	0.25	0.22	0.37	0.05	0.40	0.27	0.23	0.06	0.95	0.17	0.02	0.14	0.03	0.16	0.38	0.44	0.06
2020	0.74	0.22	0.37	0.05	0.40	0.81	0.23	0.06	0.75	0.17	0.02	0.14	0.03	0.16	0.38	0.08	0.03
2021	0.74	0.22	0.37	0.05	0.40	0.81	0.23	0.08	0.52	0.18	0.02	0.15	0.03	0.16	0.39	0.08	0.03
2022	0.74	0.22	0.37	0.05	0.40	0.81	0.23	0.10	0.91	0.06	0.01	0.05	0.01	0.03	0.10	0.02	0.01

A-rated: MDL to Target MDL ratio ≤ 1
 B-rated" MDL to Target MDL ratio between 1 and 2
 Does Not Meet MDL to Target MDL ratio >2

Table 8. NATTS Network Assessment: MQO#3 - Bias Percent Difference at Portland, OR

Year	Benzene	Butadiene, 1,3-	Carbon tetrachlorid	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM10)	Beryllium (PM10)	Cadmium (PM10)	Lead (PM10)	Manganese (PM10)	Nickel (PM10)	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM10 Metals						PAHs	
<i>Portland (#1 and #2), OR (AQS Site Code: 41-051-0246/-2010)</i>																	
2008	-36.9	-4.3	-9.1	-36.1	-24.5	-23.3	-42.0	-7.4	8.8	22.2	11.8	13.4	3.7	-23.4	0.0	--a	--a
2009	-31.8	-10.9	-45.9	-26.7	-43.8	-36.8	1.0	-14.3	-10.8	-12.5	-7.1	-8.9	-32.9	-41.9	-32.9	-7.5	-18.3
2010	-12.1	-11.0	-30.6	-41.2	8.6	-14.7	-23.5	2.7	-2.0	12.0	11.6	5.1	-6.0	-2.5	-1.4	-40.7	-42.3
2011	-10.2	-23.2	-13.2	-27.6	-20.4	-18.7	-17.0	-1.8	-3.6	1.4	-8.6	-5.7	-3.3	-5.4	-9.2	-11.1	-32.0
2012	--a	--a	--a	--a	--a	--a	--a	--a	--a	10.8	8.4	8.5	5.0	7.5	-3.3	25.7	-9.0
2013	-24.9	-56.6	-32.4	-27.6	-12.1	-16.8	-46.7	3.7	5.0	-1.0	-2.2	-2.2	-3.6	-13.5	-10.7	-10.2	3.8
2014	11.4	-52.2	5.7	-10.8	13.9	2.4	-31.4	-3.1	0.1	1.9	--b	--b	8.5	4.2	--c	-16.6	-15.7
2015	-16.3	-19.4	16.0	-17.7	5.1	-25.9	-5.6	--a	--a	--a	--a	--a	--a	--a	--a	-23.4	-34.5
2016	-14.3	9.7	27.9	-4.8	17.6	-14.1	0.3	-4.6	-20.0	-7.0	-1.7	-2.8	-5.8	-3.6	15.8	-26.2	-44.3
2017	-31.6	-31.3	9.6	-13.3	-1.4	-32.0	-26.0	7.1	-1.2	-5.1	-3.7	0.3	-1.7	-3.2	16.9	-24.0	-30.7
2018	-29.7	-30.2	-25.6	-35.4	-27.0	-36.2	-34.7	-16.9	-18.5	-8.5	-11.8	-8.7	-7.7	-10.9	7.4	-30.3	-54.4
2019	-23.6	-33.2	-31.7	-30.8	-27.9	-23.9	-36.7	-3.0	7.2	-3.7	-1.9	1.1	7.9	-3.6	4.4	7.0	-6.8
2020	18.8	14.7	27.7	24.3	32.0	31.2	16.7	3.9	16.2	-1.1	-0.6	2.1	5.9	3.5	6.5	-4.7	-10.3
2021	-0.2	4.0	5.6	4.7	7.2	5.0	7.6	-0.7	1.7	0.3	3.6	2.6	-0.2	-0.3	-1.0	13.3	-13.0
2022	0.6	19.3	-2.5	1.2	4.4	-4.8	3.6	2.7	6.1	--a	--a	--a	--a	--a	--a	--a	--a

	A-rated:±25%
	B-rated: Between 25% to 35% or between -25% to -35%
	Does not meet:>35% or <35%
	No data available

^a: No Proficiency Test samples were sent for this pollutant and year.

^b: The Proficiency Test sample for this pollutant was 0; the site reported a concentration as "< MDL", rather than 0. EPA accepted this result.

^c: Although a Proficiency Test sample was sent to the lab supporting this site and year, the results were nullified by EPA due to QA issues.

Table 9. NATTS Network Assessment: MQO#4 - Overall Method Precision %CV at Portland, OR

Year	Benzene	Butadiene, 1,3-	Carbon tetrachlorid	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM10)	Beryllium (PM10)	Cadmium (PM10)	Lead (PM10)	Manganese (PM10)	Nickel (PM10)	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM10 Metals						PAHs	
<i>Portland, OR (AQS Site Code: 41-051-0246/-2010)</i>																	
2008	10.5	--a	0.0	--a	--a	--a	--a	12.1	14.2	5.1	8.1	7.0	3.5	4.2	3.8	5.8	41.0
2009	33.3	0.0	8.9	19.6	19.6	--a	--a	6.7	7.0	8.6	7.9	17.6	8.4	8.7	5.6	13.9	21.8
2010	12.1	--a	0.0	0.0	10.9	--a	--a	12.0	7.8	6.9	12.4	11.1	6.8	15.8	12.5	9.4	24.3
2011	32.0	--a	17.0	--a	70.7	--a	--a	10.8	11.0	4.3	6.6	12.2	7.0	14.0	4.4	4.4	22.7
2012	10.5	4.4	11.1	--a	--a	--a	--a	16.2	20.3	5.6	10.2	17.1	4.1	8.1	4.4	10.4	12.3
2013	7.9	11.5	12.5	--a	7.4	--a	--a	24.4	45.1	4.0	10.1	10.8	4.4	8.9	6.4	2.6	16.6
2014	19.6	--a	30.6	--a	11.1	--a	--a	16.5	23.2	3.8	6.4	8.1	5.8	12.2	4.0	2.5	10.0
2015	15.0	13.9	24.1	--a	18.5	--a	--a	27.9	19.0	6.9	6.5	4.8	4.7	5.8	7.0	6.2	15.4
2016	8.8	10.3	5.9	--a	4.5	--a	--a	20.8	23.8	4.8	0.0	2.7	4.3	2.7	2.5	--a	19.9
2017	5.3	11.7	3.6	--a	5.5	1.5	--a	6.2	5.6	8.1	15.2	13.7	8.2	10.2	10.2	--a	34.7
2018	7.5	16.1	6.5	--a	1.0	--a	--a	20.2	16.8	3.8	6.7	4.5	12.1	3.9	3.5	1.2	22.9
2019	7.2	26.7	6.1	3.1	7.6	1.8	--a	27.9	17.9	8.2	--a	14.4	9.0	14.3	8.3	2.7	14.9
2020	8.6	21.9	7.1	10.7	6.0	0.8	--a	18.3	9.3	3.4	0.0	2.8	8.0	3.9	3.4	5.9	19.4
2021	9.8	23.2	7.1	7.0	12.4	--a	--a	5.2	18.3	6.3	7.4	5.0	13.1	5.6	2.4	10.5	20.0
2022	11.4	26.5	7.5	8.2	10.5	--a	--a	4.7	11.6	15.9	9.0	19.0	24.8	18.6	20.7	9.4	17.3

	Green = precision ≤ 15%
	Yellow = precision > 15% to ≤ 25%
	Red = precision > 25%
	Gray = dataset was not rated

^a: The primary and/or replicate value were less than the MDL, so no calculation could be made.

Table 10. NATTS Network Assessment: MQO#4 - Analytical Method Precision %CV at Portland, OR

Year	Benzene	Butadiene, 1,3-	Carbon tetrachlorid	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM10)	Beryllium (PM10)	Cadmium (PM10)	Lead (PM10)	Manganese (PM10)	Nickel (PM10)	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM10 Metals						PAHs	
<i>Portland (#1 and #2), OR (AQS Site Code: 41-051-0246/-2010)</i>																	
2008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--a	3.2
2009	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2011	--	0.0	7.9	--a	--	--a	--a	--	--	--	--	--	--	--	--	--	--
2012	--b	--a	12.2	--a	--b	--a	--a	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b
2013	--b	--b	--b	--b	--b	--b	--b	15.9	51.7	2.5	20.2	8.3	0.9	8.4	1.0	--b	0.3
2014	14.5	--a	21.9	--a	--a	--a	--a	17.5	17.6	4.3	7.7	6.3	2.9	3.4	3.8	--b	1.0
2015	--b	--b	--b	--b	--b	--b	--b	--b	--b	3.5	3.7	4.4	1.6	1.8	2.6	--b	--b
2016	--b	--b	--b	--b	--b	--b	--b	--b	--b	2.2	0.0	4.5	3.2	2.5	2.6	--b	--b
2017	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b	--b
2018	2.4	0.0	2.1	--a	0.0	0.0	--a	0.0	0.1	5.8	--a	--a	1.8	4.4	5.4	0.0	22.8
2019	3.8	1.1	2.7	1.9	5.0	1.0	--a	7.5	15.9	0.7	--a	2.1	0.9	0.4	0.6	0.0	7.8
2020	2.6	13.5	3.8	5.5	4.0	1.6	--a	20.5	5.8	0.5	0.0	1.2	0.8	0.8	0.9	0.4	6.2
2021	4.9	9.9	3.2	3.1	10.5	--a	--a	3.7	5.6	0.0	--a	0.0	0.0	0.0	0.0	3.4	8.7
2022	8.0	9.6	2.8	4.8	6.2	--a	--a	4.1	9.2	0.0	0.0	0.0	0.0	0.0	0.0	9.1	12.6

	A-rated: ≤ 15% CV
	B-rated: Between 15%CV to 25% CV
	Does Not Meet: >25% CV or did not report Precision (required in the NATTS Workplan Template since 2012)
	-- No data available

^a: The primary and/or replicate value were less than the MDL, so no calculation could be made.

^b: Per the NATTS Workplan template, analytical replicates were required to be reported to AQS for this sampling year.

Appendix A: Equipment Inventory

Pollutant Type	Year(s)	Manufacturer/Model, Extraction Type, and Year
<i>Sampling Equipment</i>		
Carbonyls	2008-2016	Custom-built (Year Deployed: <1989)
	2016-2022	ARA Instruments Model CARB-A (Year Deployed: 2016)
PAHs	2008-2010	Tisch Environmental TE-1000 PUF Sampler (Year Deployed: 1998)
	2011-2022	Tisch Environmental TE-309-BL PUF Plus (Year Deployed: 2011)
PM ₁₀ Metals	2008-2009	Andersen Hi-Volume PM10 Sampler (Year Deployed: <1994)
	2010-2012	Andersen PM10 model GMW Sampler (Year Deployed: 2010)
	2013-2022	Tisch Environmental TE-PM10PLUS-BL PM10 Plus (Year Deployed: 2013)
VOCs	2008-2010	SIS Canister Cleaning System AGS-1 A (Year Deployed: <1989)
	2011-2018	Entech 1800 Dual Channel Field Sampler (Year Deployed: 2011)
	2019-2022	Custom Built (Year Deployed: 2019)
<i>Analytical Equipment</i>		
Carbonyls	2008-2022	HP/Agilent HPLC 1100 with variable wavelength detection (Year Deployed: <2000)
PAHs	2008-2014	HP/Agilent 6890/5973 GC/MS (Year Deployed: 2000)
	2015-2022	Agilent 7890/5975 GC/MS (Year deployed 2015)
PM ₁₀ Metals	2008-2010	Thermo/VG Elemental PQ ExCell ICP-MS (Year Deployed: 2001)
	2011	Thermo/VG Elemental PQ ExCell ICP-MS (Year Deployed: 2001); Agilent 7500 ICPMS (~2011)
	2012-2014	Agilent 7500 ICPMS (Year Depolyed: 2011)
	2015-2022	Agilent 7700 ICPMS (Year Deployed: 2015)
VOCs	2008-2014	HP/Agilent 5890/5971 GC/MS (Year Deployed: <2000)
	2015-2022	Agilent 6890/5975 GC/MS (Year Deployed 2015)
<i>Preconcentrator Equipment</i>		
VOCs	2008-2010	Teledyne TekMar, AUTOCAN (Year Deployed: <2002)
	2011-2018	Entech Model 7100A, Entech 7150 (Year Deployed: 2011)
	2019-2022	Entech Model 7200, Entech 7016D (Year Deployed: 2019)
<i>Standards Preparation Equipment</i>		
VOCs	2008-2012	Unknown (dynamic dilution) (Year Deployed: <2000)
	2013-2018	Entech 4600 (dynamic dilution) (Year Deployed: unknown)
	2019-2022	Entech 4700 (dynamic dilution) (Year Deployed: 2019)
<i>Canister Cleaning Equipment</i>		
VOCs	2008-2010	Entech 3100 (Hot), Entech 3100A (Hot) (Year Deployed: 2005)
	2011-2014	Entech 3100A (Hot) (Year Deployed: 2005)
	2011-2022	Entech 3100A (Hot) (Year Deployed: 2005)
<i>PM₁₀ Extraction Equipment</i>		
PM ₁₀ Metals	2008-2014	Branson 8510 (Sonicator) (Year Deployed: 2001)
	2015-2017	Branson 8800, Heated Sonication (Year Deployed: Unknown)
	2018-2022	(Year Deployed: 2018)
<i>PAHs Extraction Equipment</i>		
PAHs	2008-2022	glassware (Soxhlet) (Year Deployed: NA)