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, PM_{10} Metals, and VOCs
    - Chromium VI ended in in 2014
- For the NATTS Network Assessment (2008-2018):
    - 1 of 18 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 2016 and 2017.
        - Only chromium VI was included in the national analysis since sampling ended prior to the relocation.
    - 150 of 161 pollutant datasets were suitable for trends analysis
    - Annual Average and 3-Year Rolling Average Concentrations were generally flat over time, with the exception of a few pollutants (benzene, cadmium (PM_{10}), lead (PM_{10})).
    - 100% Reporting of Datasets

- Method Quality Objectives (MQO): 2008-2018
    - Completeness: Met 85% completeness in 141 of 161 pollutant datasets
    - Method Detection Limits: Met MDL Target Ratio of 1.00 in 181 of 197 pollutant datasets
    - Bias: Met ±25% for 125 of 168 pollutant datasets
    - Overall Method Precision: Met ≤15% CV for 120 of 157 pollutant datasets
    - Analytical Method Precision: Met ≤15% CV for 46 of 113 pollutant datasets

- Analytical Laboratories for 2018

VOC	Carbonyl	PM_{10} Metals	Chromium VI	PAHs
ODEQ	ODEQ	ODEQ	NA	ODEQ

- Equipment Year Deployed

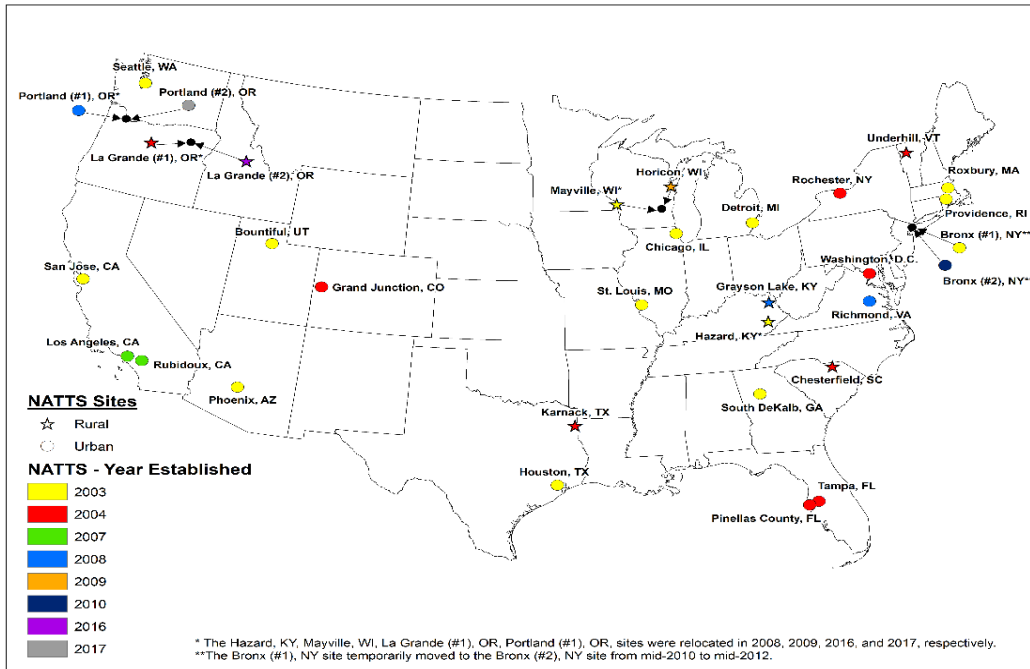| Equipment Type	VOC	Carbonyl	PM_{10} Metals	Chromium VI	PAHs
Sampler	2011	1989	2013	1998	1998
Analytical	2000	2000	2001	2000	2000
Preconcentrator	2011	NA	NA	NA	NA
Standards Preparation	Unknown	NA	NA	NA	NA
Canister Cleaning	2005	NA	NA	NA	NA
Extraction	NA	NA	2001	2005	Unknown

National Summary: NATTS data were collected at 27 locations across the United States, with sites beginning in 2003 or later (Figure 1) for 19 core HAPs. Over 528,000 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., 2013-2015 vs. 2016-2018) to determine if the NATTS Trends DQO was being met:

To be able to detect a a15 percent difference (trend) between the annual mean concentrations of successive 3-year periods within acceptable levels of decision error.

Of the 19 core HAPs. 18 were assessed for the NATTS Trends DQO. Due to sampling and analytical issues, acrolein was not considered for trends analysis (Table 2). This assessment showed that across the network, 15 of those 18 pollutants were decreasing between the 3-year blocks, while two of those pollutants were increasing between the 3-year blocks. One pollutant did not exhibit a trend.

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

Pollutant Group	A-rated #	A-rated %	B-rated #	B-rated %	Does Not Meet #	Does Not Meet %
VOCs	1,452	53%	737	27%	555	20%
Carbonyls	523	67%	193	25%	66	8%
PM$_{10}$ Metals	1,418	61%	685	30%	213	9%
Chromium VI	159	74%	29	13%	27	13%
PAHs	410	74%	124	22%	18	3%
Total = 6,609	3,962	60%	1,768	27%	879	13%

Table 2. Three-Year Block Averages for National Trends

Pollutant	Units	# Sites	Block 1	Block 2	% Difference
Acetaldehyde	µg/m^3	19	1.51	1.39	-7.7%
Arsenic (PM$_{10}$)	ng/m^3	21	0.71	0.68	-3.2%
Benzene	µg/m^3	19	0.65	0.59	-10.2%
Benzo(a)pyrene	ng/m^3	21	0.113	0.087	-23.2%
Beryllium (PM$_{10}$)	ng/m^3	20	0.012	0.009	-26.4%
Butadiene, 1,3-	µg/m^3	19	0.071	0.063	-10.9%
Cadmium (PM$_{10}$)	ng/m^3	21	0.170	0.097	-43.0%
Carbon Tetrachloride	µg/m^3	15	0.59	0.56	-4.7%
Chloroform	µg/m^3	20	0.256	0.255	-0.4%
Chromium VI	ng/m^3	18	0.029	0.026	-7.7%
Formaldehyde	µg/m^3	19	2.77	2.68	-3.3%
Lead (PM$_{10}$)	ng/m^3	21	3.08	2.81	-8.9%
Manganese (PM$_{10}$)	ng/m^3	20	8.06	7.93	-1.6%
Naphthalene	ng/m^3	20	66.70	51.08	-23.4%
Nickel (PM$_{10}$)	ng/m^3	19	1.28	1.05	-18.0%
Tetrachloroethylene	µg/m^3	19	0.149	0.174	17.2%
Trichloroethylene	µg/m^3	19	0.020	0.022	10.7%
Vinyl Chloride	µg/m^3	17	0.0051	0.0048	-5.5%

Figure 1. NATTS Site and Year Established

* The Hazard, KY, Mayville, WI, La Grande (#1), OR, Portland (#1), OR, sites were relocated in 2008, 2009, 2016, and 2017, respectively.
**The Bronx (#1), NY site temporarily moved to the Bronx (#2), NY site from mid-2010 to mid-2012.

Site Information

Region	10
NATTS Site Type	Urban
County	Multonomah
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
10-Mile Population	766,082

Figure 2. NATTS Site Location
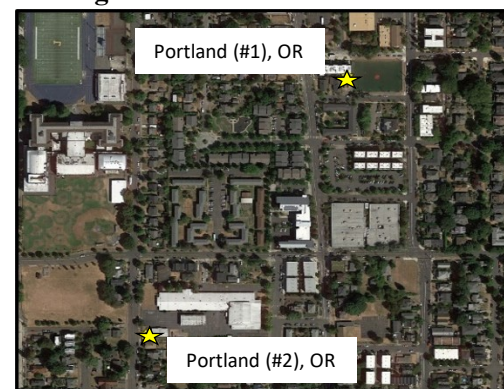
Pollutant Datasets Evaluation: Suitable for Trends (Y=yes; Y(T)=yes, and used for DQO Trends; N=No; "--"=not rated

Final Pollutant Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Acetaldehyde	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Arsenic (PM_{10})	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Benzene	N^b	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Benzo(a)pyrene	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Beryllium (PM_{10})	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Butadiene, 1,3-	N^c	N^c	N^c	Y	Y	Y	N^b	Y	a	a	Y
Cadmium (PM_{10})	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Carbon tetrachloride	Y	N^b	Y	Y	Y	Y	Y	Y	a	a	Y
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	a	a	N^b
Chromium VI	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	--	--	--	--
Formaldehyde	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Lead (PM_{10})	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Manganese (PM_{10})	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Naphthalene	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Nickel (PM_{10})	Y	Y	Y	Y	Y	Y	Y	Y	a	a	Y
Tetrachloroethylene	Y	N^b	Y	Y	Y	Y	Y	Y	a	a	Y
Trichloroethylene	Y	Y	Y	Y	Y	Y	Y	Y	a	a	N^b
Vinyl chloride	N^b	Y	Y	Y	Y	$N^{b,d}$	Y	Y	a	a	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 ± 35%.

[c]: Reported MDL to NATTS Target Ratio greater than 2.0.

[d]: Analytical precision data (required since 2012) was not reported to EPA or AQS for this pollutant.

Table 3. NATTS Network Assessment Data (2003-2018) - 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	$\mu g/m^3$	Urban	15,704	100%	1.77 ± 0.02	0.50	0.66	0.97	1.45	2.19	3.24	4.04
	$\mu g/m^3$	Rural	4,930	100%	1.20 ± 0.04	0.36	0.46	0.65	0.93	1.38	2.02	2.76
	$\mu g/m^3$	All Sites	20,634	100%	1.63 ± 0.02	0.44	0.58	0.86	1.31	2.00	3.02	3.86
Arsenic (PM$_{10}$)	ng/m^3	Urban	14,968	97%	0.89 ± 0.04	0.10	0.19	0.34	0.58	0.99	1.70	2.41
	ng/m^3	Rural	4,622	96%	0.49 ± 0.02	0.04	0.08	0.17	0.35	0.59	0.94	1.28
	ng/m^3	All Sites	19,590	97%	0.79 ± 0.03	0.06	0.14	0.29	0.52	0.89	1.54	2.19
Benzene	$\mu g/m^3$	Urban	15,984	99%	0.86 ± 0.01	0.25	0.30	0.43	0.66	1.05	1.64	2.21
	$\mu g/m^3$	Rural	2,494	95%	0.43 ± 0.02	0.04	0.13	0.21	0.33	0.52	0.78	1.01
	$\mu g/m^3$	All Sites	18,478	99%	0.81 ± 0.01	0.19	0.26	0.39	0.61	0.98	1.55	2.09
Benzo(a)pyrene	ng/m^3	Urban	12,336	70%	0.096 ± 0.004	ND	ND	ND	0.04	0.11	0.24	0.37
	ng/m^3	Rural	3,179	36%	0.067 ± 0.009	ND	ND	ND	ND	0.02	0.13	0.37
	ng/m^3	All Sites	15,515	63%	0.090 ± 0.004	ND	ND	ND	0.03	0.10	0.23	0.37
Beryllium (PM$_{10}$)	ng/m^3	Urban	15,783	75%	0.051 ± 0.006	ND	ND	0.00003	0.005	0.018	0.050	0.101
	ng/m^3	Rural	4,687	49%	0.023 ± 0.003	ND	ND	ND	ND	0.005	0.017	0.072
	ng/m^3	All Sites	20,470	69%	0.045 ± 0.005	ND	ND	ND	0.003	0.012	0.049	0.100
Butadiene, 1,3-	$\mu g/m^3$	Urban	15,388	81%	0.092 ± 0.002	ND	ND	0.025	0.058	0.114	0.215	0.302
	$\mu g/m^3$	Rural	2,185	29%	0.012 ± 0.001	ND	ND	ND	ND	0.017	0.046	0.059
	$\mu g/m^3$	All Sites	17,573	75%	0.082 ± 0.002	ND	ND	ND	0.049	0.104	0.199	0.287
Cadmium (PM$_{10}$)	ng/m^3	Urban	16,360	92%	0.21 ± 0.02	ND	0.01	0.05	0.09	0.17	0.42	0.63
	ng/m^3	Rural	4,684	87%	0.10 ± 0.01	ND	ND	0.03	0.06	0.11	0.20	0.29
	ng/m^3	All Sites	21,044	91%	0.18 ± 0.01	ND	0.01	0.04	0.08	0.16	0.35	0.56
Carbon Tetrachloride	$\mu g/m^3$	Urban	14,713	99%	0.569 ± 0.003	0.361	0.433	0.496	0.562	0.651	0.737	0.798
	$\mu g/m^3$	Rural	2,189	92%	0.534 ± 0.016	ND	0.180	0.402	0.537	0.633	0.727	0.798
	$\mu g/m^3$	All Sites	16,902	98%	0.565 ± 0.003	0.304	0.408	0.490	0.559	0.649	0.736	0.798
Chloroform	$\mu g/m^3$	Urban	16,068	87%	0.265 ± 0.022	ND	ND	0.093	0.132	0.217	0.420	0.668
	$\mu g/m^3$	Rural	3,802	43%	0.052 ± 0.003	ND	ND	ND	ND	0.095	0.144	0.230
	$\mu g/m^3$	All Sites	19,870	79%	0.224 ± 0.018	ND	ND	0.064	0.113	0.196	0.364	0.586
Chromium VI	ng/m^3	Urban	8,414	74%	0.036 ± 0.002	ND	ND	ND	0.020	0.042	0.081	0.120
	ng/m^3	Rural	2,586	41%	0.018 ± 0.004	ND	ND	ND	ND	0.017	0.031	0.051
	ng/m^3	All Sites	11,000	66%	0.032 ± 0.001	ND	ND	ND	0.016	0.036	0.073	0.114

Table 3. NATTS Network Assessment Data (2003-2018) - 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	$\mu g/m^3$	Urban	16,118	100%	3.11 ± 0.04	0.66	0.99	1.60	2.47	3.84	5.63	7.25
	$\mu g/m^3$	Rural	5,002	100%	2.22 ± 0.05	0.53	0.68	1.06	1.69	2.74	4.19	5.45
	$\mu g/m^3$	All Sites	21,120	100%	2.90 ± 0.04	0.61	0.86	1.43	2.29	3.59	5.38	6.96
Lead (PM_{10})	ng/m^3	Urban	16,366	100%	4.21 ± 0.13	0.72	0.98	1.55	2.64	4.56	8.35	11.90
	ng/m^3	Rural	4,680	99%	2.10 ± 0.16	0.37	0.50	0.84	1.41	2.37	3.91	5.36
	ng/m^3	All Sites	21,046	99%	3.74 ± 0.11	0.55	0.80	1.31	2.31	4.04	7.41	10.56
Manganese (PM_{10})	ng/m^3	Urban	16,141	100%	9.80 ± 0.32	1.09	1.51	2.52	4.92	10.21	20.10	30.08
	ng/m^3	Rural	4,627	99%	3.96 ± 0.14	0.46	0.73	1.36	2.57	4.75	8.54	12.13
	ng/m^3	All Sites	20,768	100%	8.50 ± 0.25	0.85	1.23	2.15	4.18	8.89	17.98	26.70
Naphthalene	ng/m^3	Urban	12,332	100%	74.63 ± 1.14	15.62	21.27	33.55	55.89	94.64	150.05	196.16
	ng/m^3	Rural	3,301	100%	24.47 ± 1.38	3.74	4.73	7.74	13.86	26.25	50.88	79.17
	ng/m^3	All Sites	15,633	100%	64.04 ± 1.00	6.58	10.92	23.37	45.59	83.31	137.54	181.75
Nickel (PM_{10})	ng/m^3	Urban	16,125	97%	1.85 ± 0.05	0.25	0.41	0.67	1.11	2.00	3.52	5.27
	ng/m^3	Rural	4,623	85%	0.65 ± 0.08	ND	ND	0.10	0.28	0.64	1.15	1.89
	ng/m^3	All Sites	20,748	94%	1.58 ± 0.04	ND	0.15	0.47	0.92	1.73	3.14	4.74
Tetrachloroethylene	$\mu g/m^3$	Urban	15,612	86%	0.25 ± 0.01	ND	ND	0.06	0.13	0.25	0.48	0.74
	$\mu g/m^3$	Rural	2,272	36%	0.09 ± 0.04	ND	ND	ND	ND	0.04	0.08	0.16
	$\mu g/m^3$	All Sites	17,884	79%	0.23 ± 0.01	ND	ND	0.04	0.11	0.22	0.44	0.70
Trichloroethylene	$\mu g/m^3$	Urban	15,843	41%	0.040 ± 0.002	ND	ND	ND	ND	0.051	0.107	0.164
	$\mu g/m^3$	Rural	3,388	13%	0.021 ± 0.003	ND	ND	ND	ND	ND	0.017	0.250
	$\mu g/m^3$	All Sites	19,231	36%	0.037 ± 0.002	ND	ND	ND	ND	0.041	0.105	0.167
Vinyl Chloride	$\mu g/m^3$	Urban	14,778	19%	0.0044 ± 0.0003	ND	ND	ND	ND	ND	0.0137	0.0257
	$\mu g/m^3$	Rural	2,444	8%	0.0040 ± 0.0009	ND	ND	ND	ND	ND	ND	0.0156
	$\mu g/m^3$	All Sites	17,222	17%	0.0043 ± 0.0003	ND	ND	ND	ND	ND	0.0126	0.0254

[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), OR and Portland (#2), OR Combined

Analyte	Units	# Data Records	% Detection	Arithmetic Mean[a]	Percentile Value[b]						
					5th	10th	25th	50th	75th	90th	95th
Acetaldehyde	$\mu g/m^3$	604	100%	1.49 ± 0.06	0.65	0.75	0.99	1.34	1.83	2.34	2.79
Arsenic (PM$_{10}$)	ng/m^3	594	100%	0.87 ± 0.08	0.14	0.18	0.29	0.56	1.12	1.93	2.65
Benzene	$\mu g/m^3$	531	94%	0.75 ± 0.07	ND	0.16	0.33	0.55	0.94	1.45	1.99
Benzo(a)pyrene	ng/m^3	582	21%	0.12 ± 0.05	ND	ND	ND	ND	ND	0.40	0.56
Beryllium (PM$_{10}$)	ng/m^3	595	96%	0.0026 ± 0.0002	0.0002	0.0006	0.001	0.002	0.003	0.005	0.008
Butadiene, 1,3-	$\mu g/m^3$	550	12%	0.026 ± 0.008	ND	ND	ND	ND	ND	0.114	0.184
Cadmium (PM$_{10}$)	ng/m^3	594	99%	0.808 ± 0.169	0.020	0.027	0.051	0.123	0.523	2.347	3.987
Carbon Tetrachloride	$\mu g/m^3$	553	69%	0.292 ± 0.028	ND	ND	ND	0.283	0.449	0.589	0.658
Chloroform	$\mu g/m^3$	550	3%	0.014 ± 0.010	ND	ND	ND	ND	ND	ND	ND
Chromium VI	ng/m^3	520	40%	0.027 ± 0.004	ND	ND	ND	ND	0.045	0.074	0.103
Formaldehyde	$\mu g/m^3$	606	100%	2.12 ± 0.09	0.87	1.00	1.33	1.87	2.58	3.51	4.34
Lead (PM$_{10}$)	ng/m^3	594	100%	3.63 ± 0.32	0.78	1.10	1.60	2.61	4.37	6.87	9.04
Manganese (PM$_{10}$)	ng/m^3	594	100%	11.81 ± 1.44	1.11	1.47	2.68	5.86	12.79	29.60	44.27
Naphthalene	ng/m^3	582	99%	45.70 ± 3.04	11.50	15.64	23.43	34.66	55.36	86.20	111.91
Nickel (PM$_{10}$)	ng/m^3	595	99%	1.16 ± 0.09	0.14	0.22	0.44	0.83	1.48	2.62	3.68
Tetrachloroethylene	$\mu g/m^3$	553	18%	0.081 ± 0.029	ND	ND	ND	ND	ND	0.222	0.444
Trichloroethylene	$\mu g/m^3$	550	2%	0.006 ± 0.004	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	$\mu g/m^3$	549	0%	0.0009 ± 0.0013	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
VOCs	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ
Carbonyls	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
Chromium VI	ODEQ	ODEQ	ODEQ	CHLBNT	CHLBNT	CHLBNT	CHLBNT	--	--	--	--
PAHs	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ	ODEQ

--: Not Applicable

WSLH: Wisonson State Laboratory of Hygiene

ERG: Eastern Research Group, Inc.

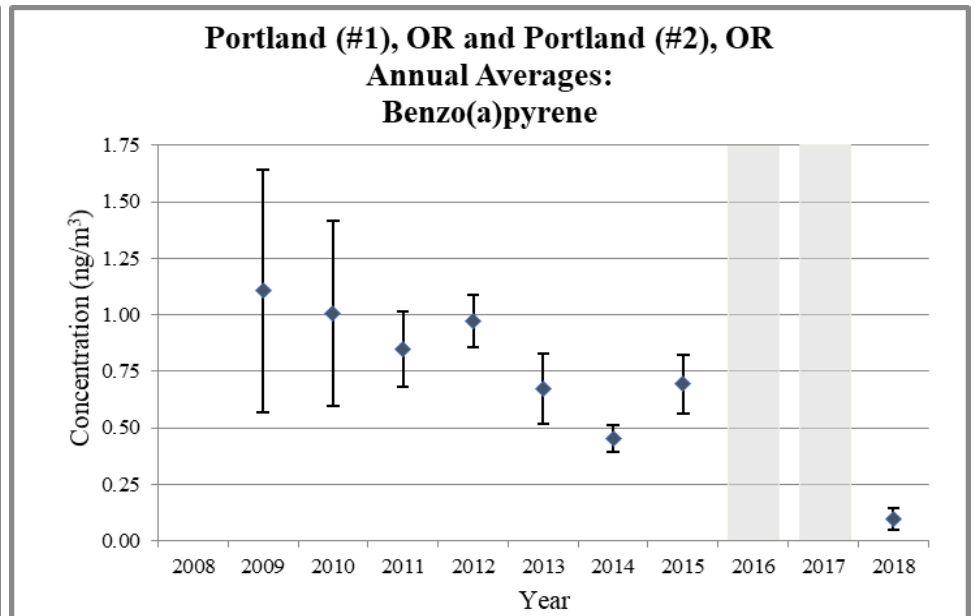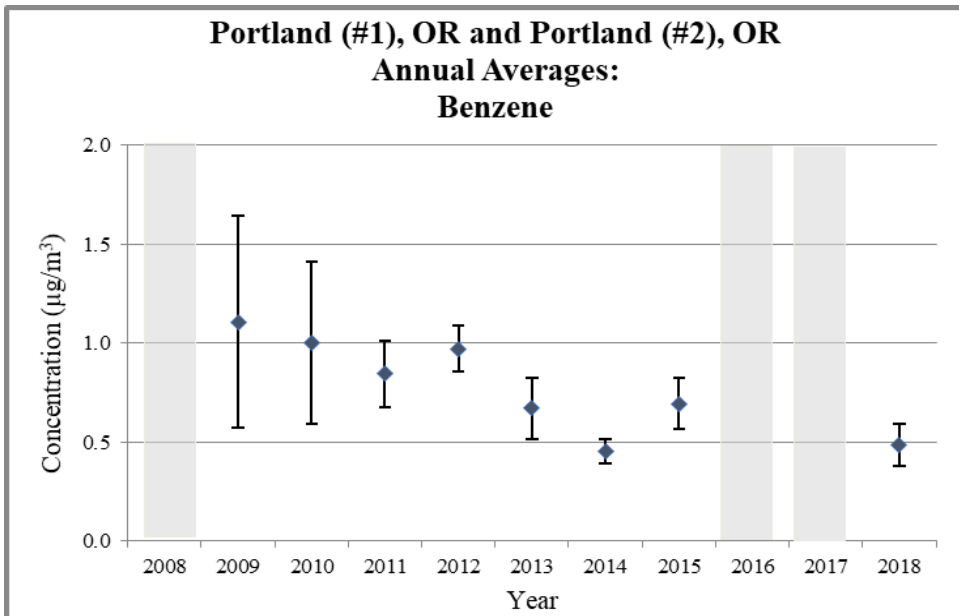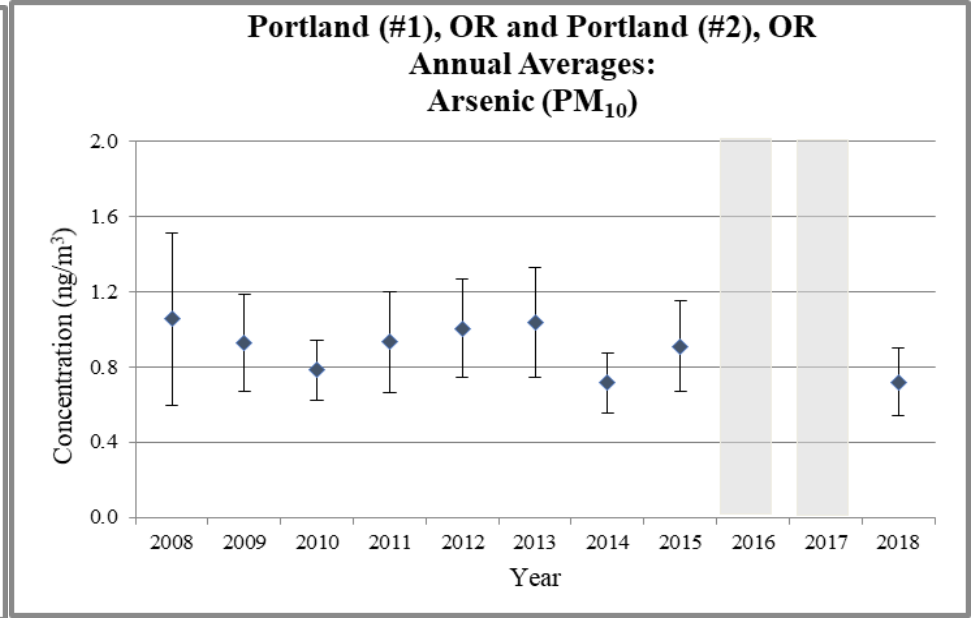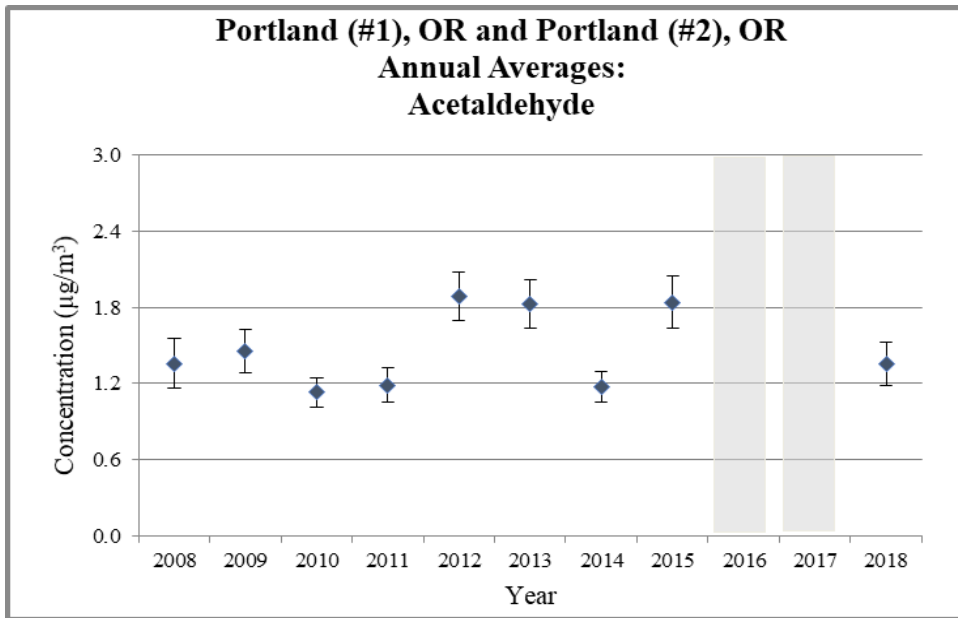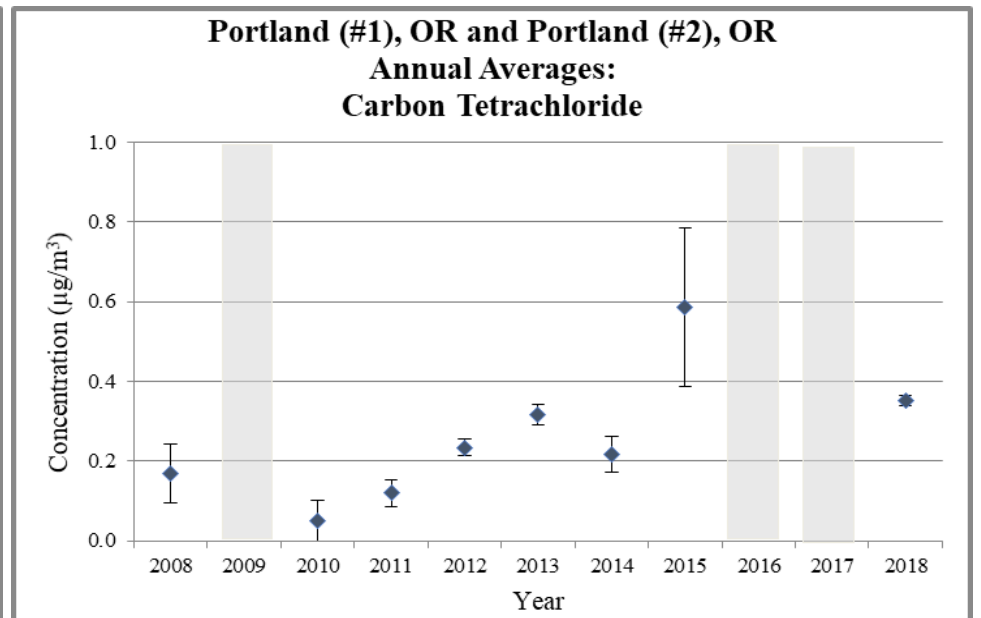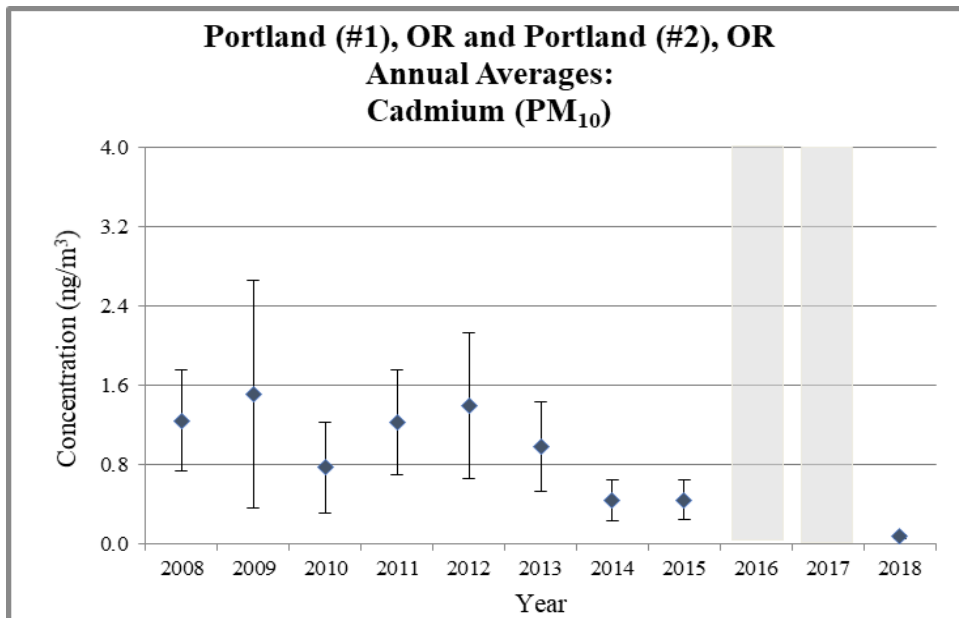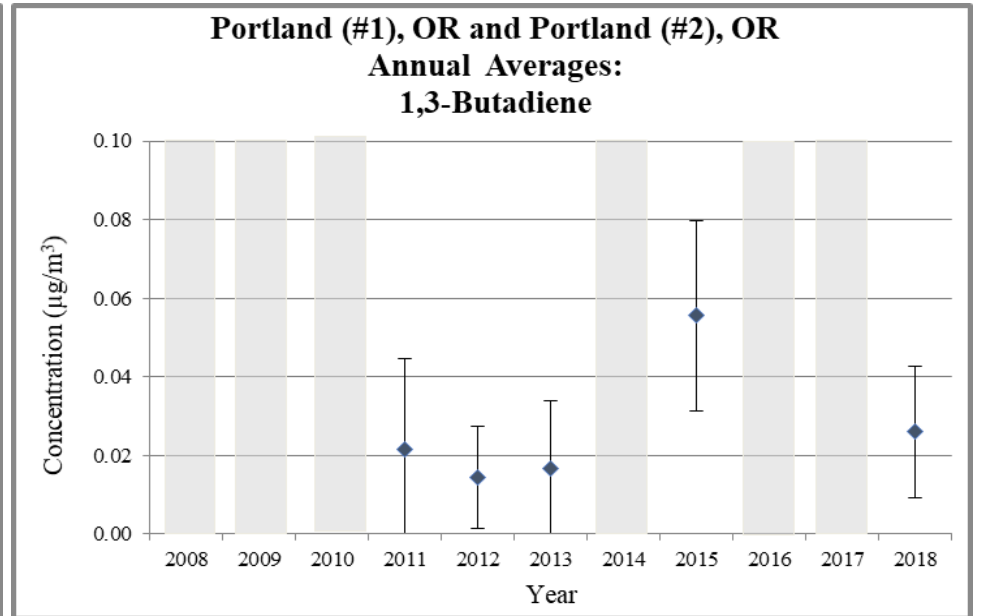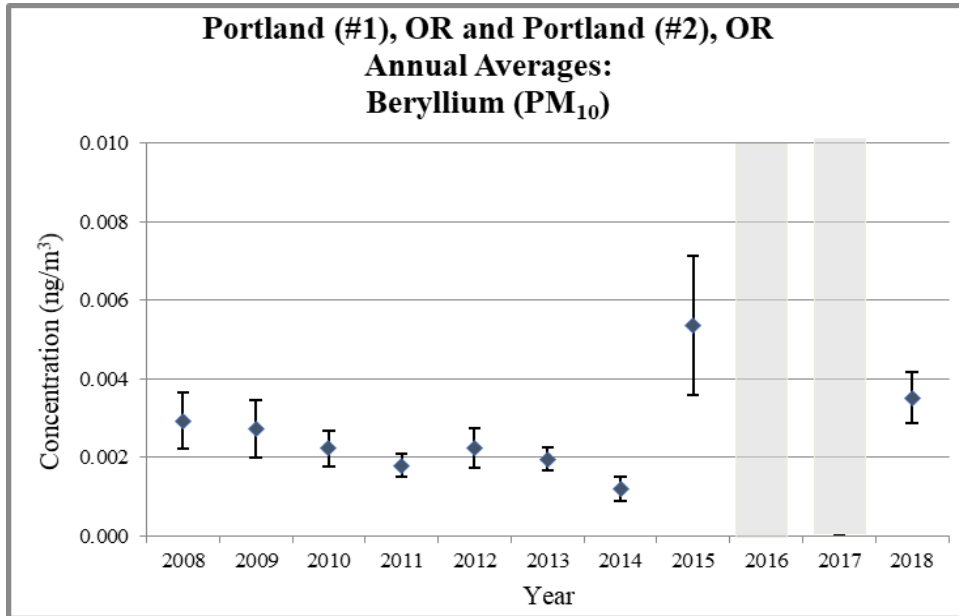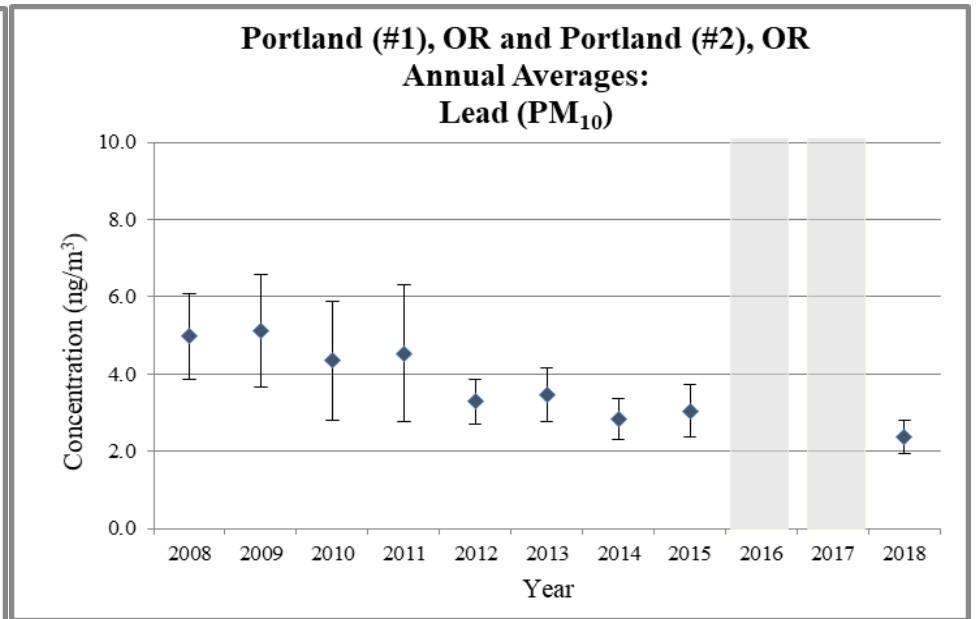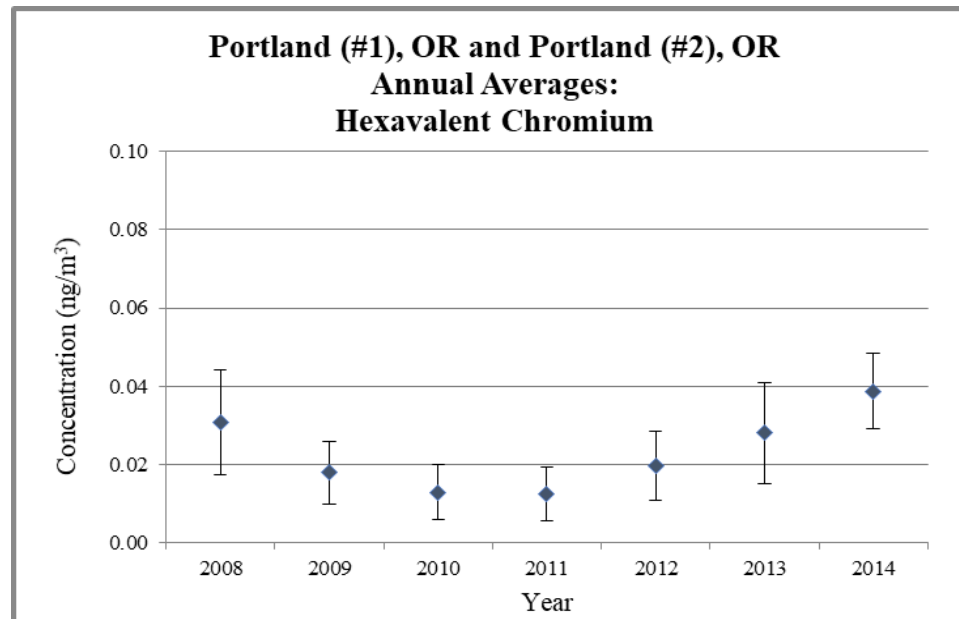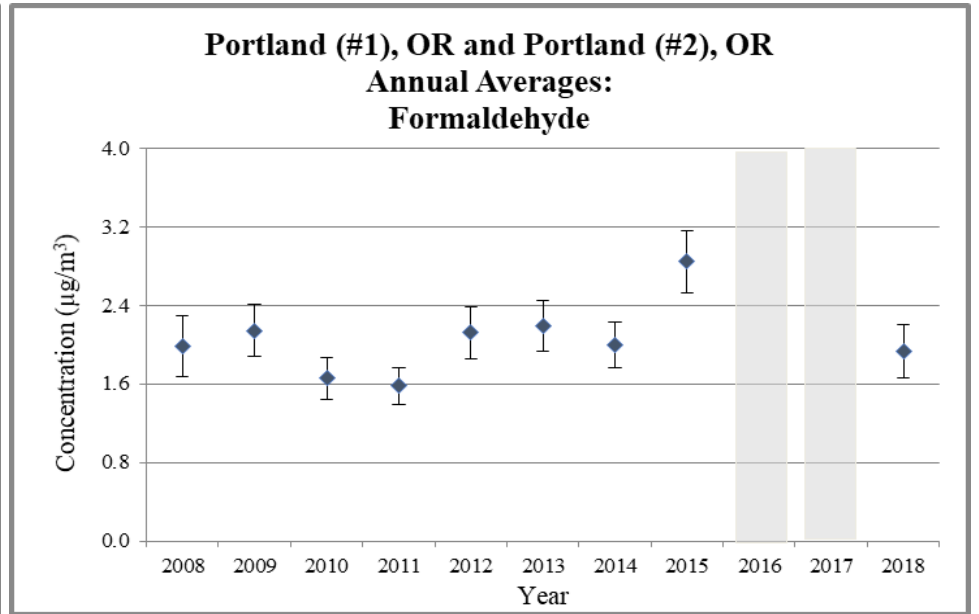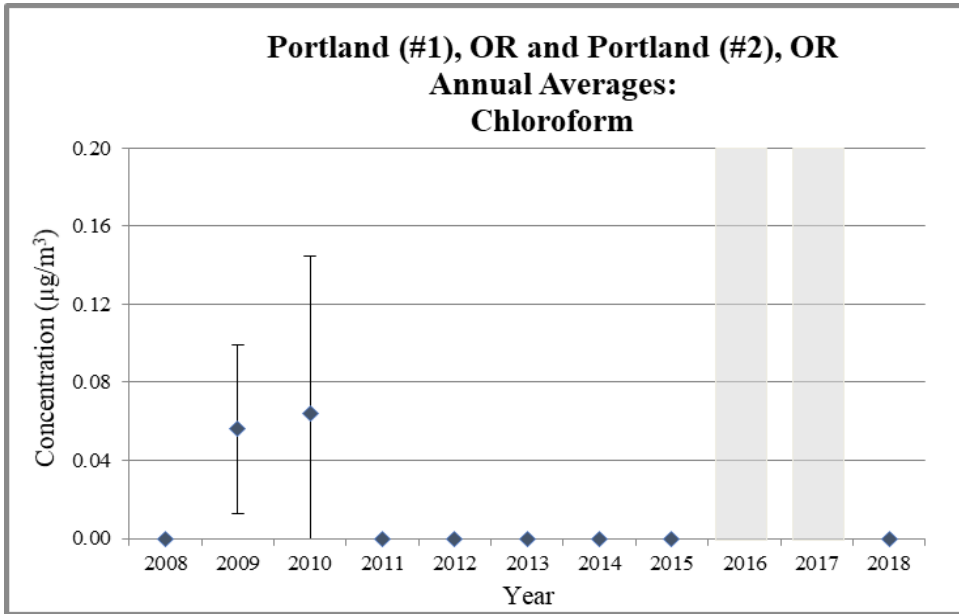Figure 3. Portland (#1), OR and Portland (#2), OR Combined Annual Average Concentrations

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

Portland (#1), OR and Portland (#2), OR Annual Averages: Beryllium (PM$_{10}$)

Portland (#1), OR and Portland (#2), OR Annual Averages: 1,3-Butadiene

Portland (#1), OR and Portland (#2), OR Annual Averages: Cadmium (PM$_{10}$)

Portland (#1), OR and Portland (#2), OR Annual Averages: Carbon Tetrachloride

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

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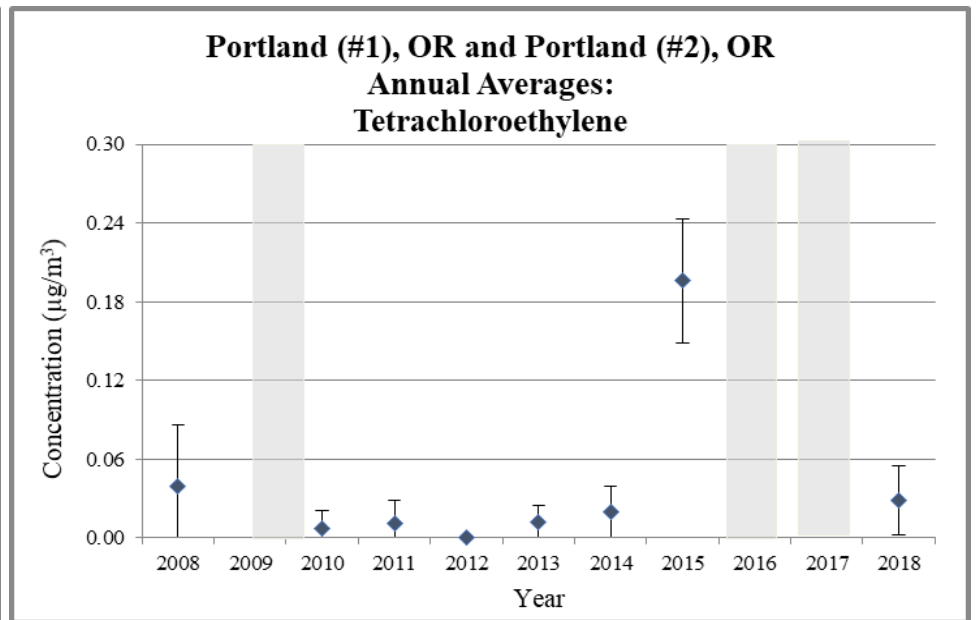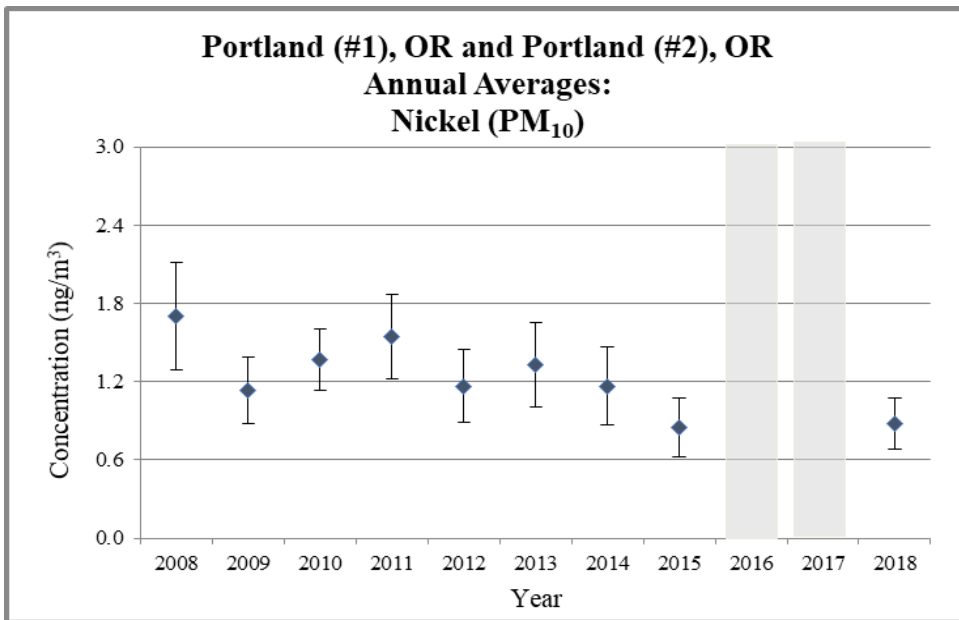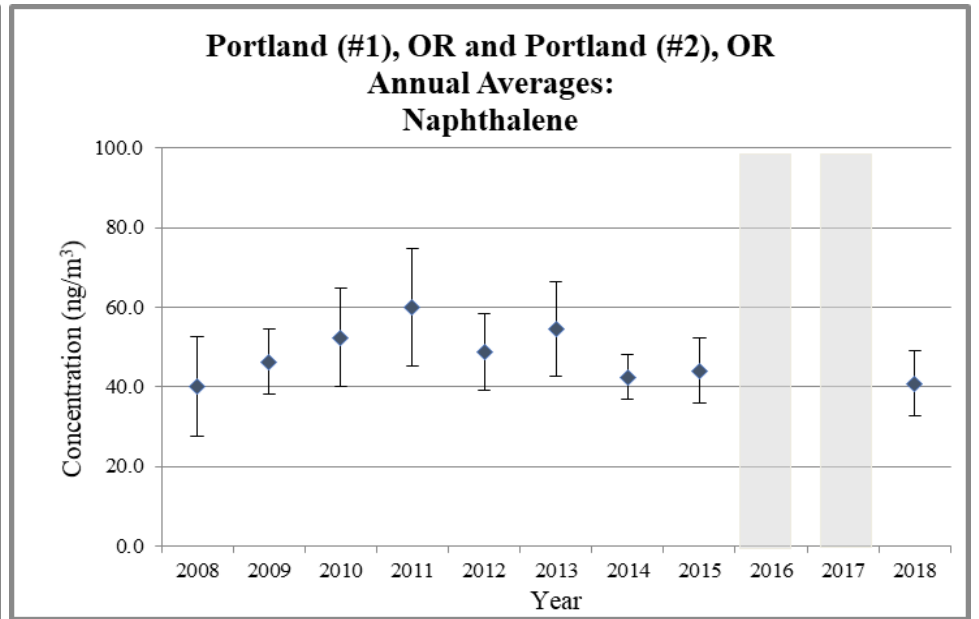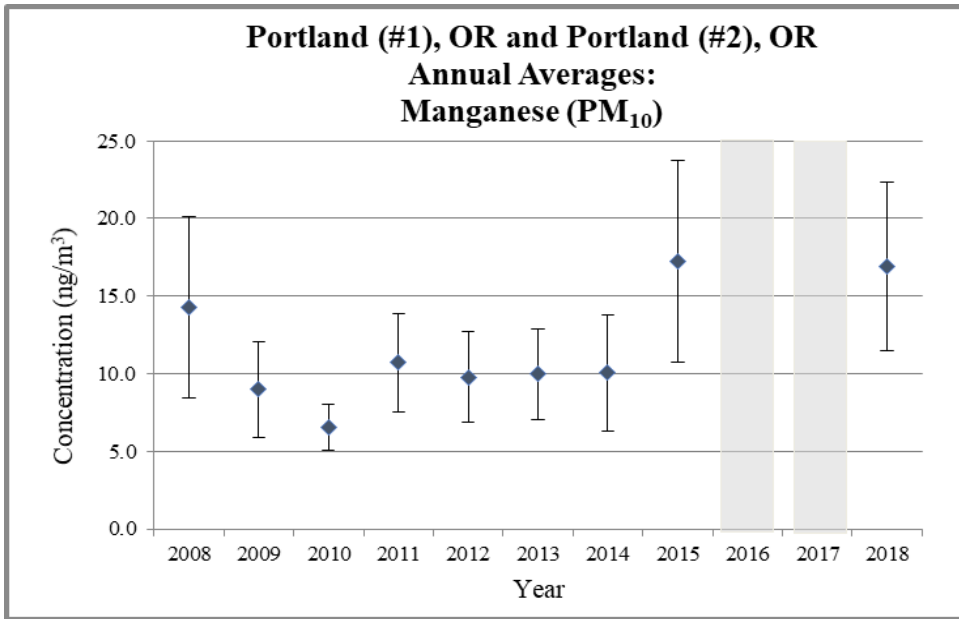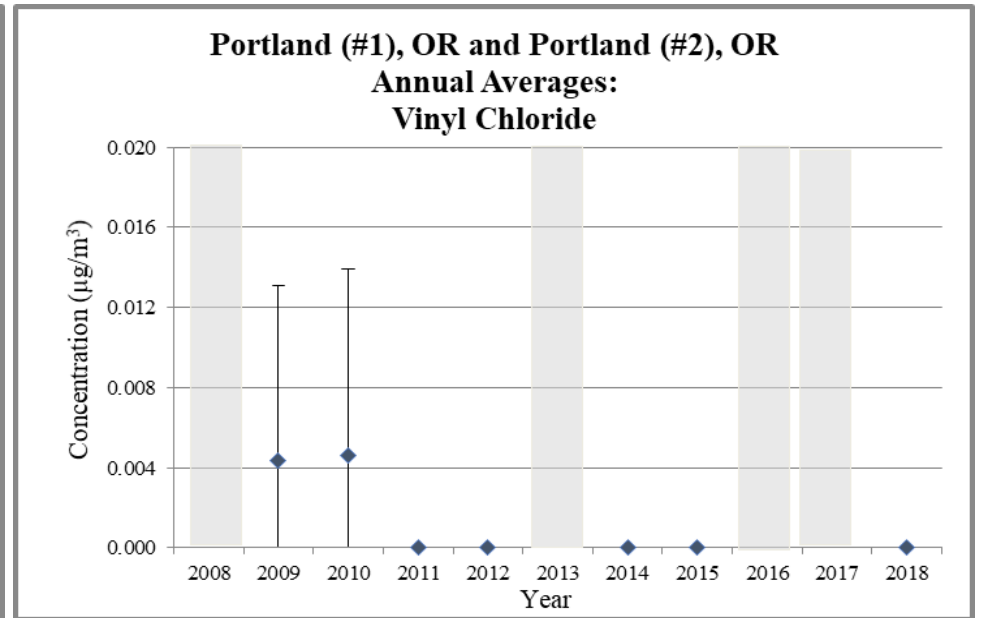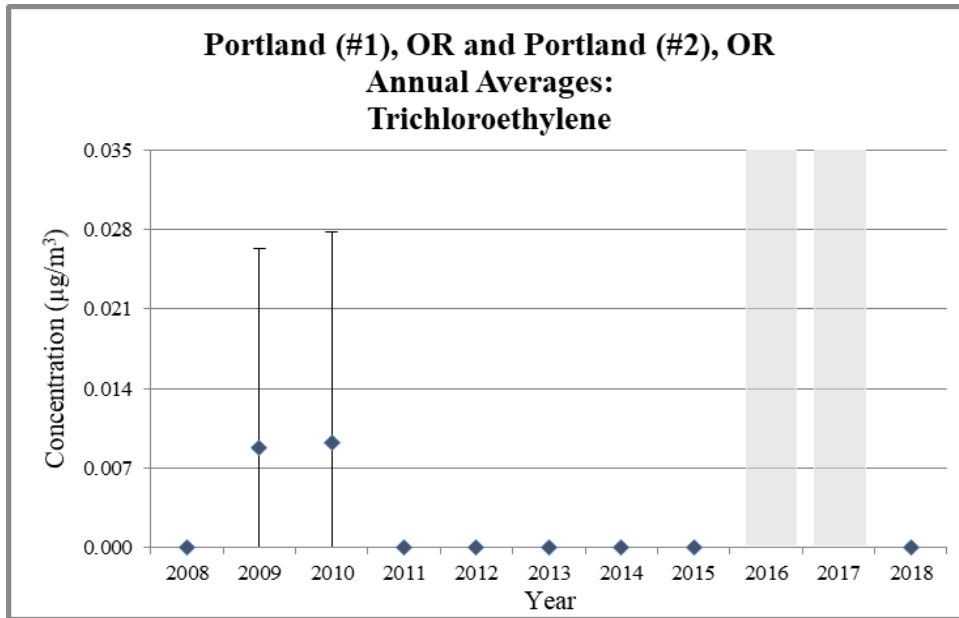
Figure 3. Portland (#1), OR and Portland (#2), OR Combined Annual Average Concentrations

Does not meet MQO

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Acetaldehyde

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Arsenic (PM$_{10}$)

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Benzene

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Benzo(a)pyrene

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Beryllium (PM₁₀)
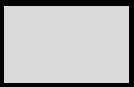

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
1,3-Butadiene

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Cadmium (PM$_{10}$)

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
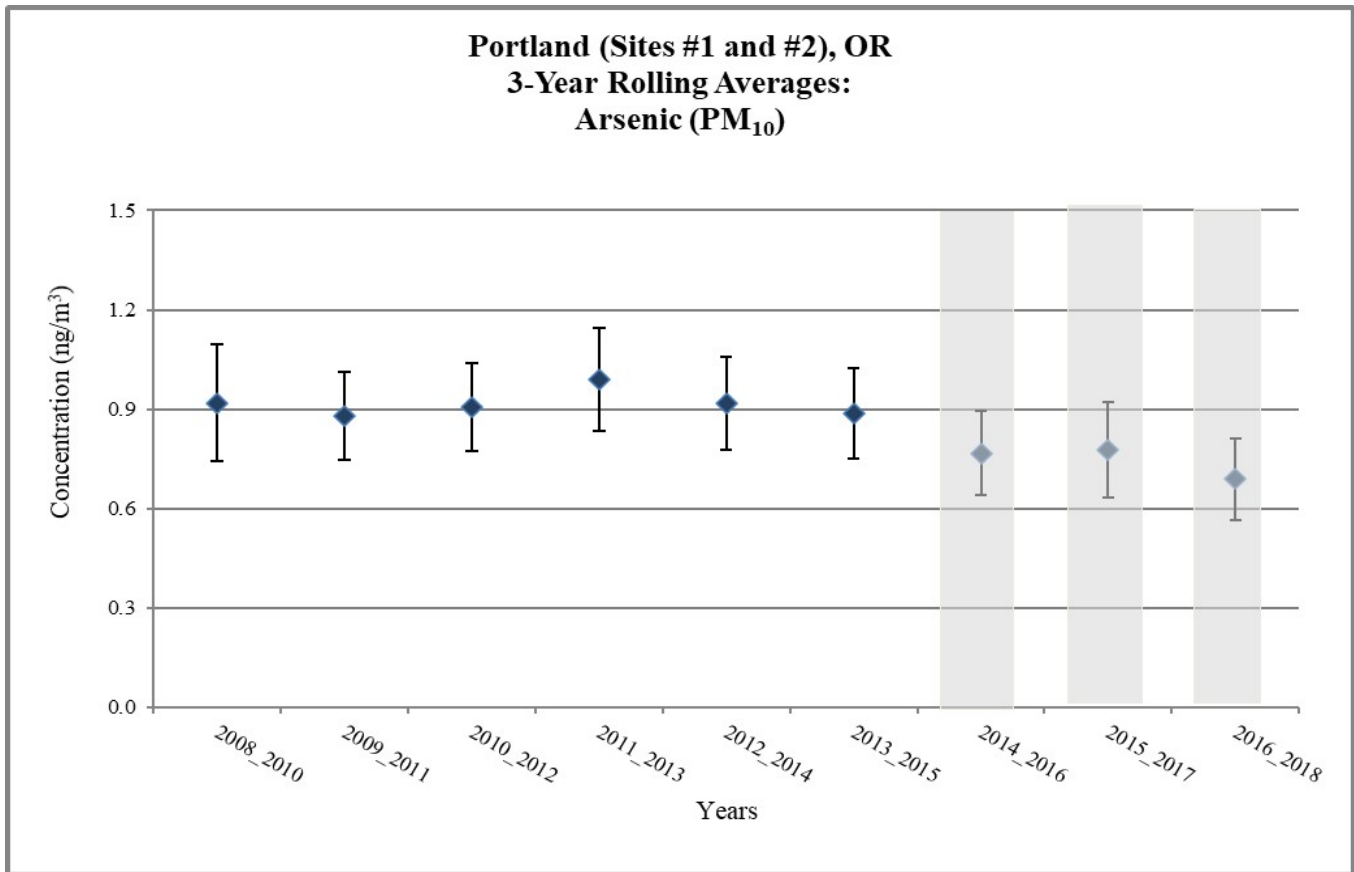Carbon Tetrachloride

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Chloroform

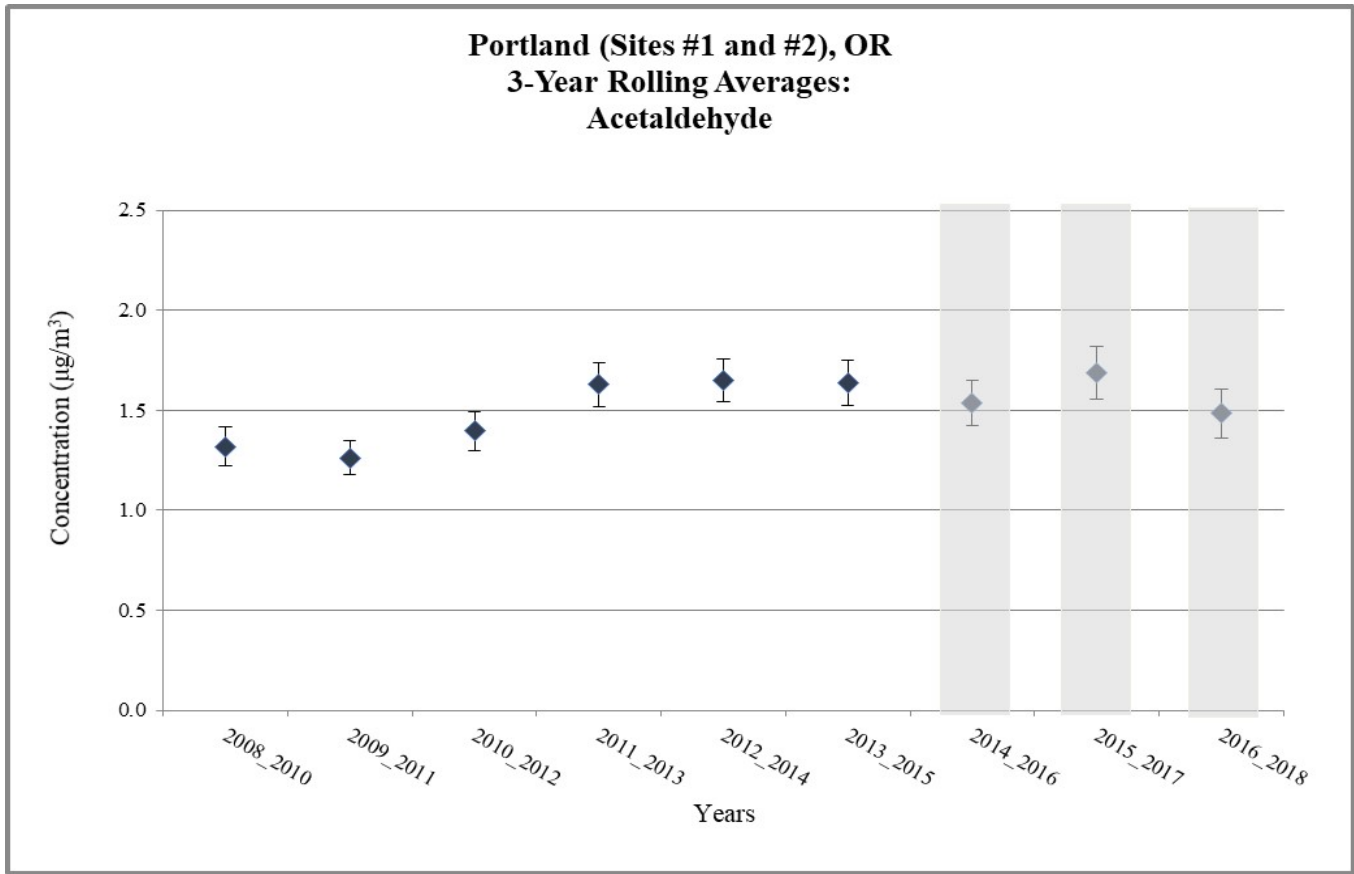
Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Formaldehyde

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Hexavalent Chromium

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
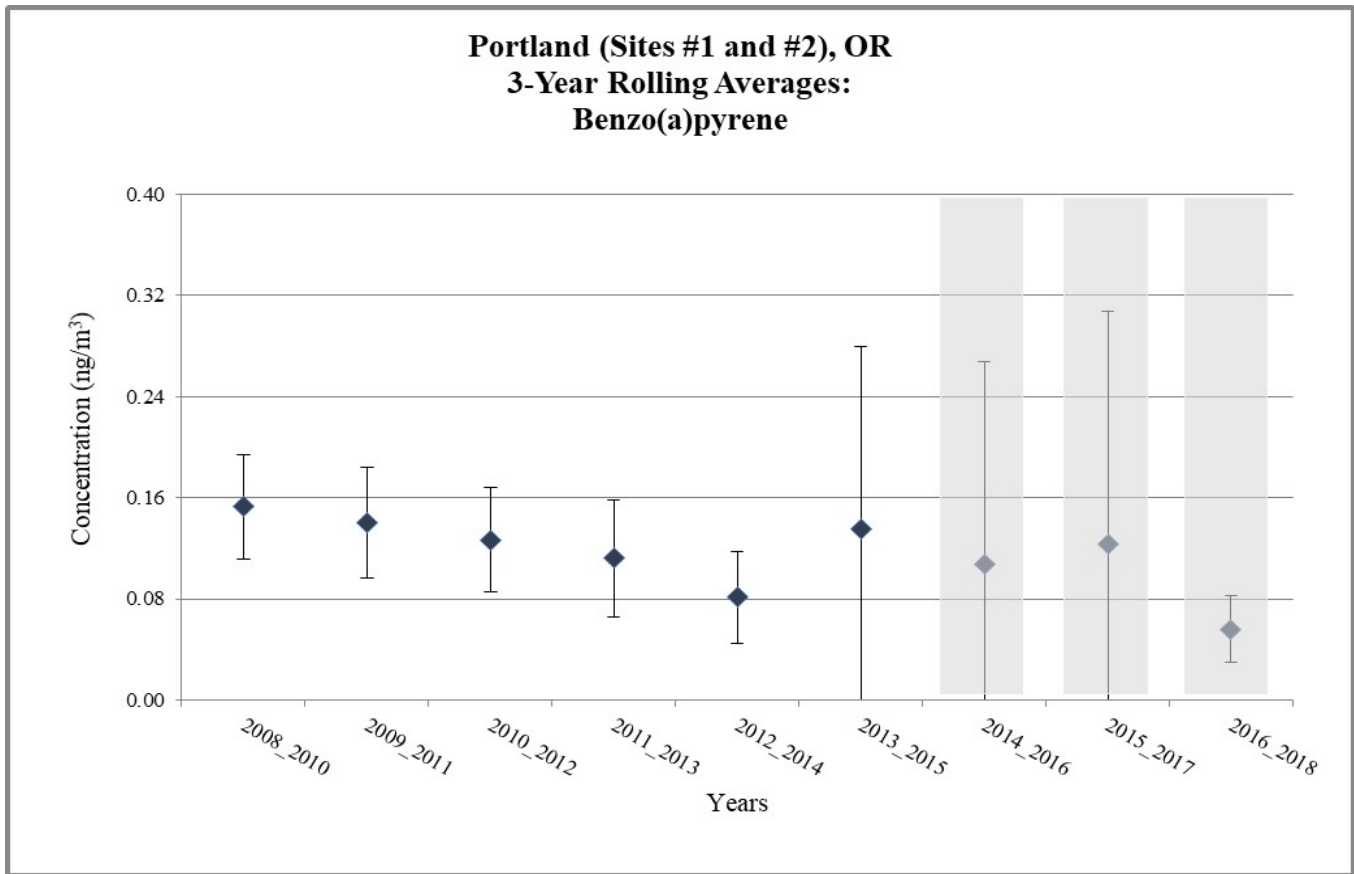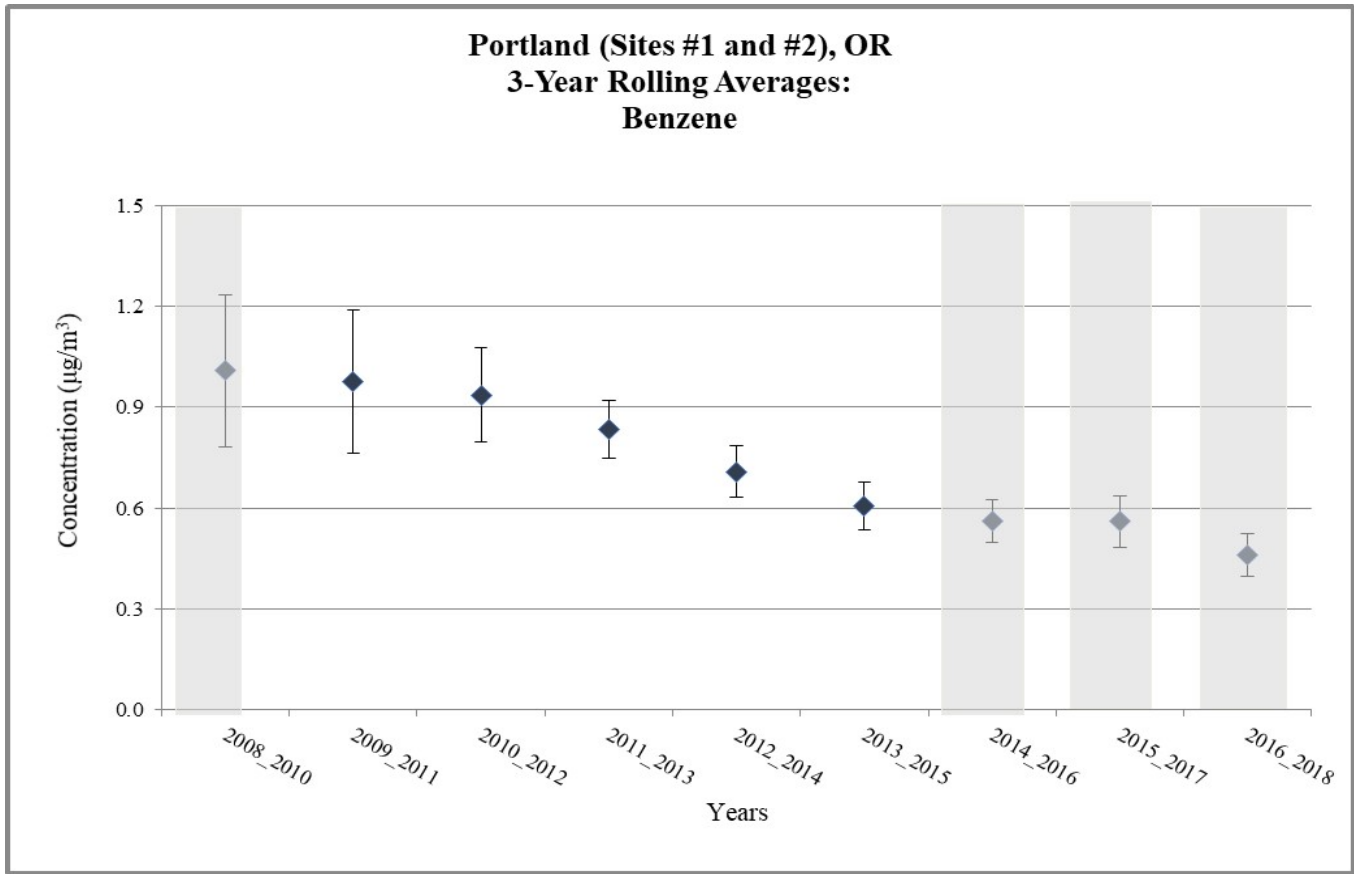Lead (PM$_{10}$)

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Manganese (PM₁₀)

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Naphthalene

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

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Nickel (PM₁₀)

Portland (Sites #1 and #2), OR
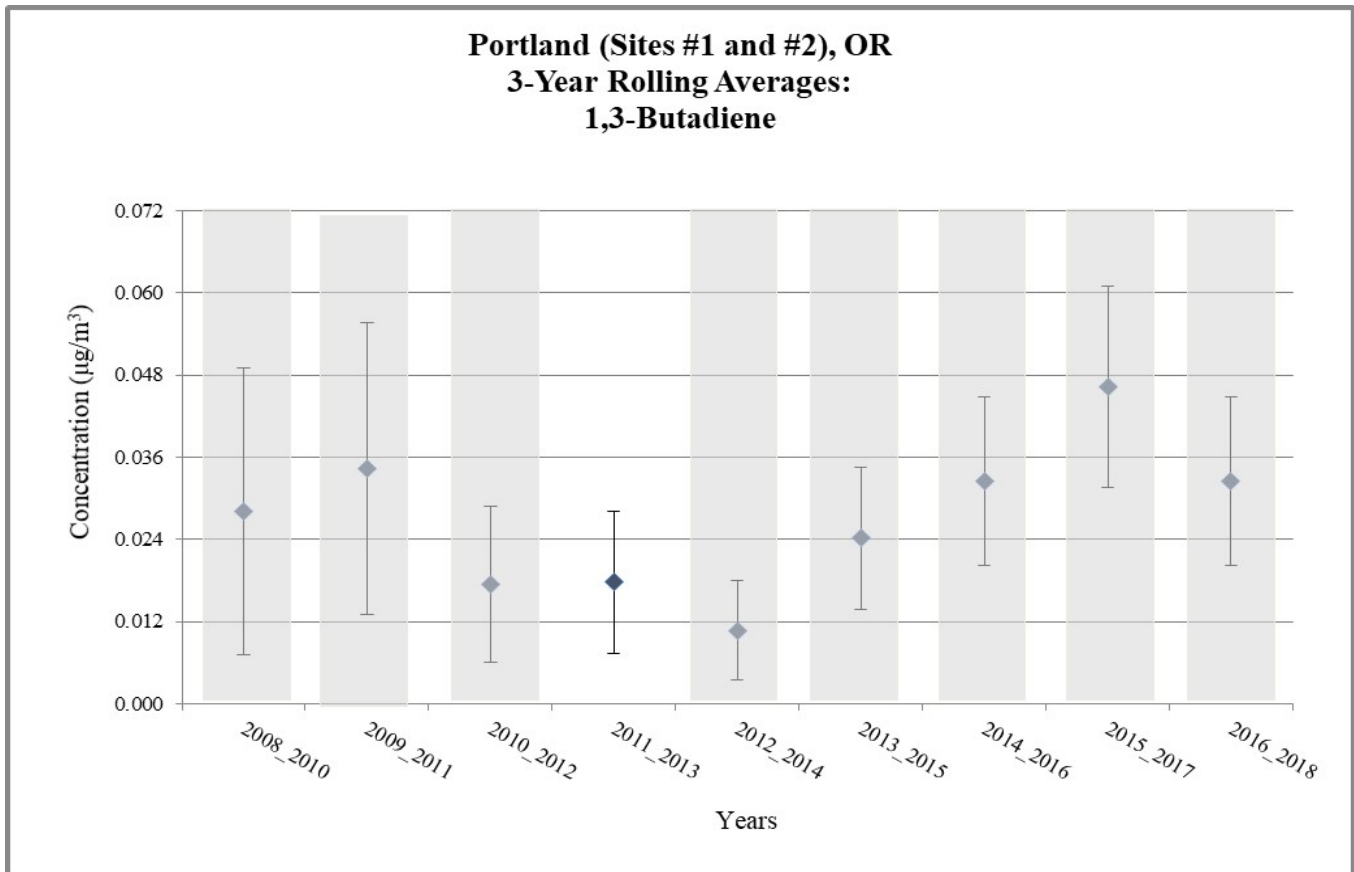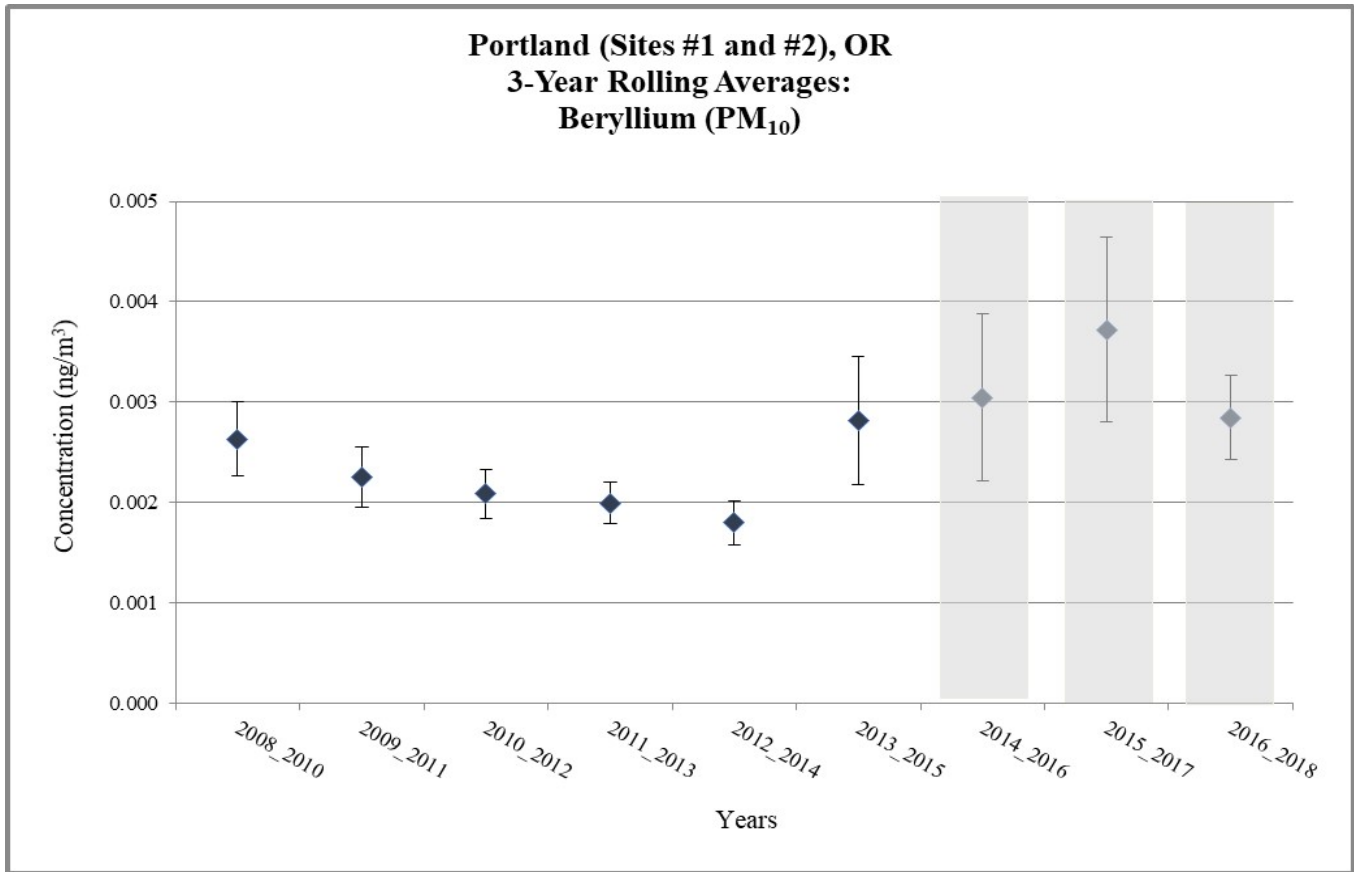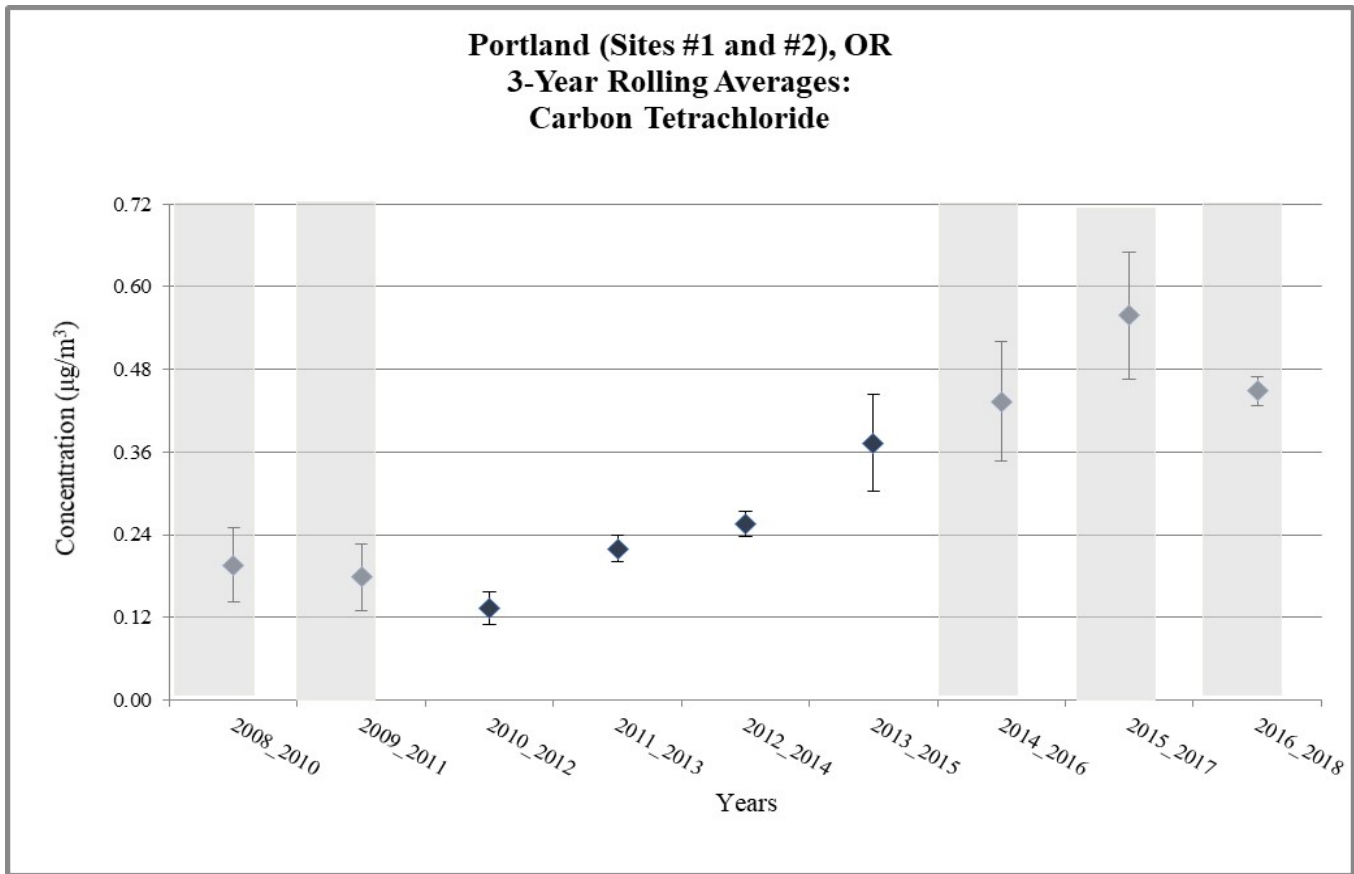3-Year Rolling Averages:
Tetrachloroethylene

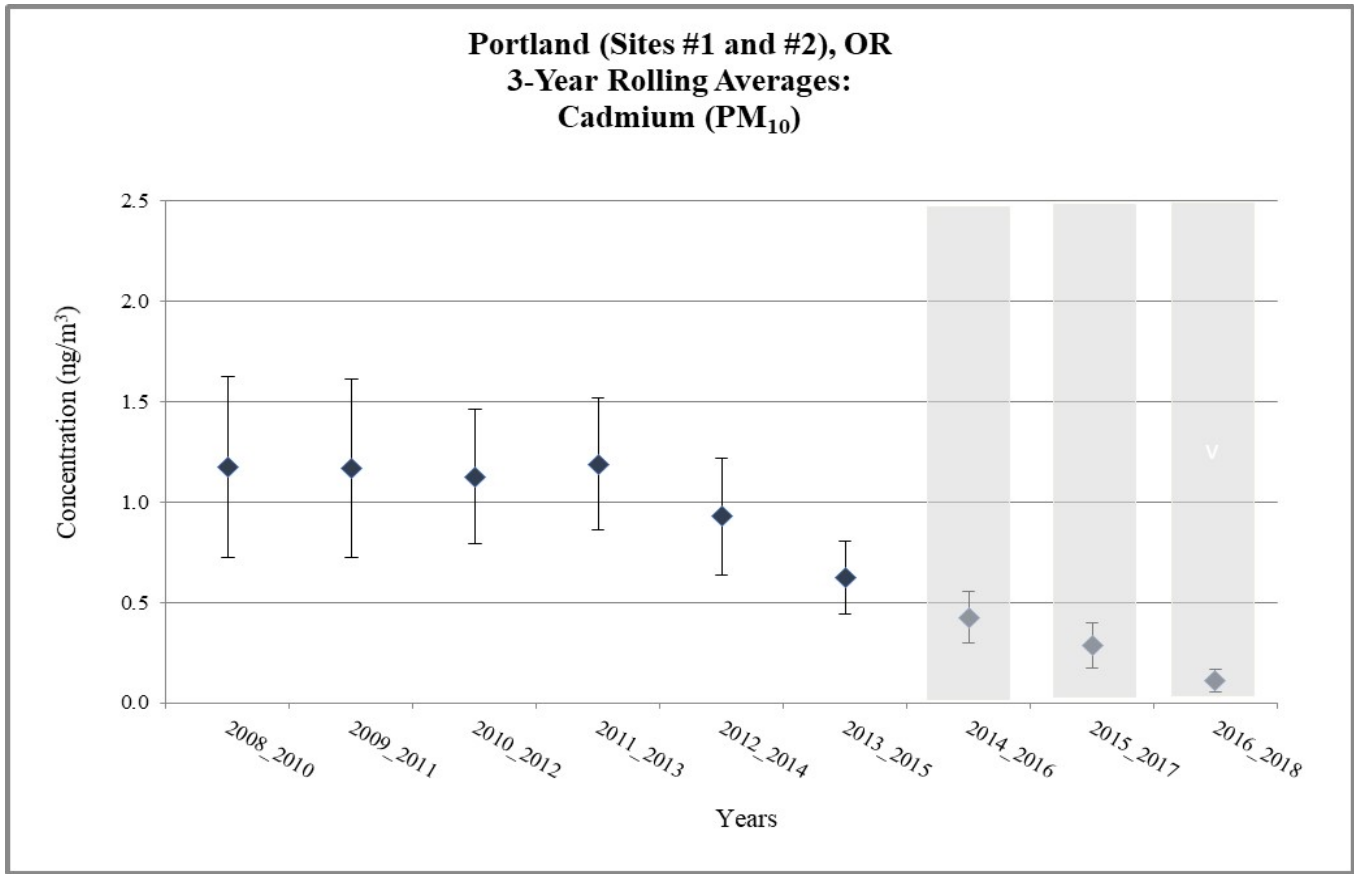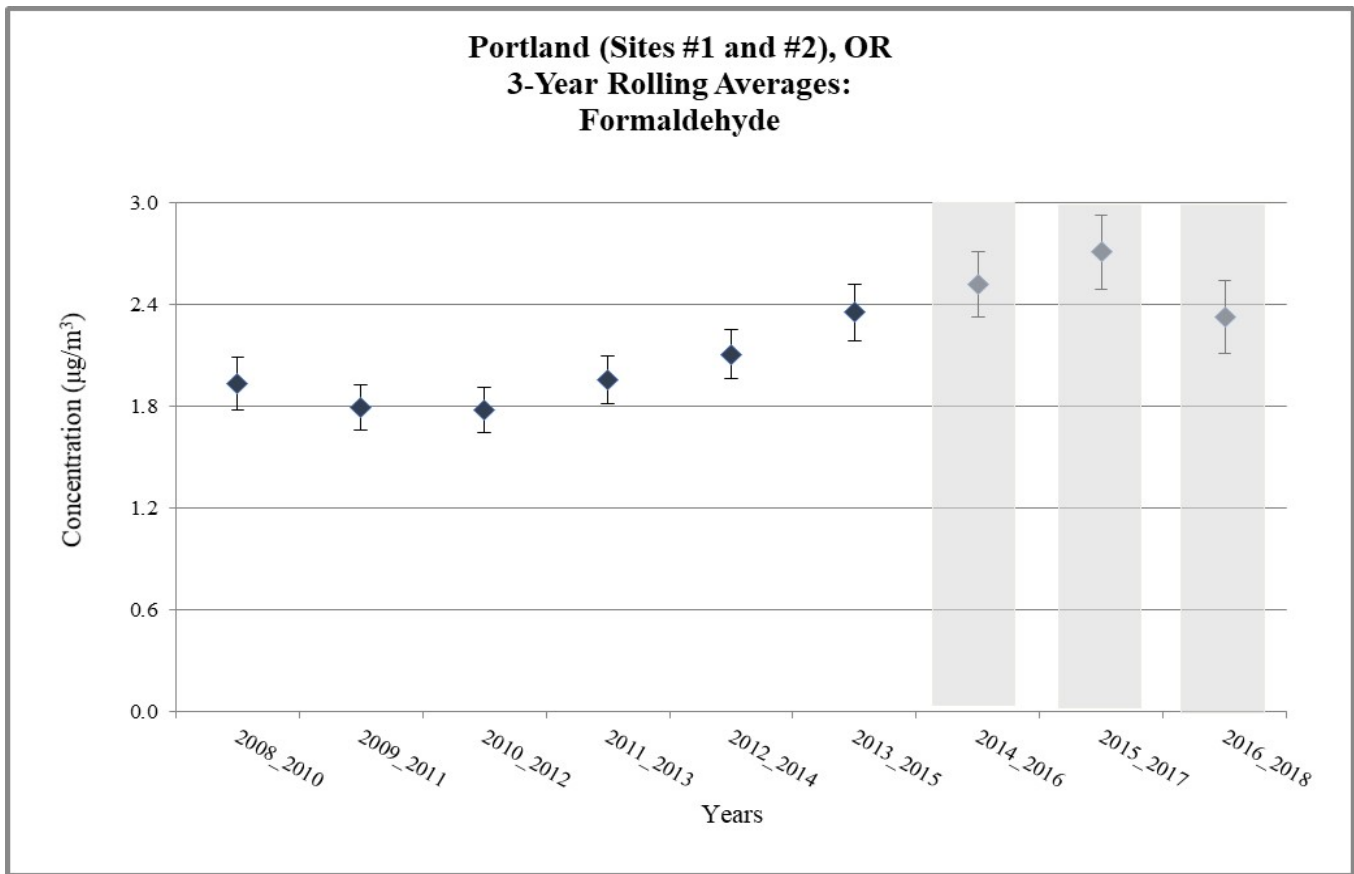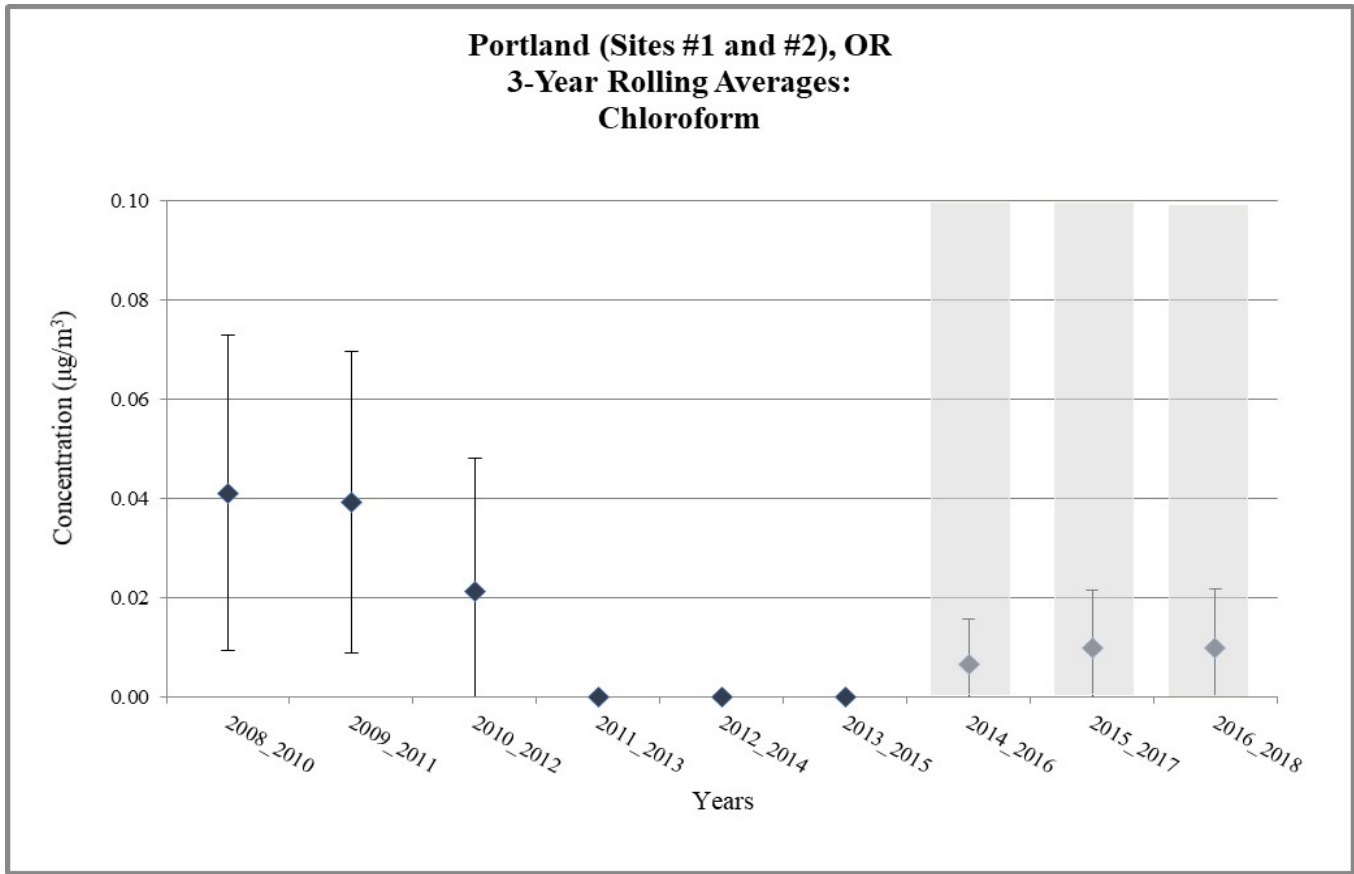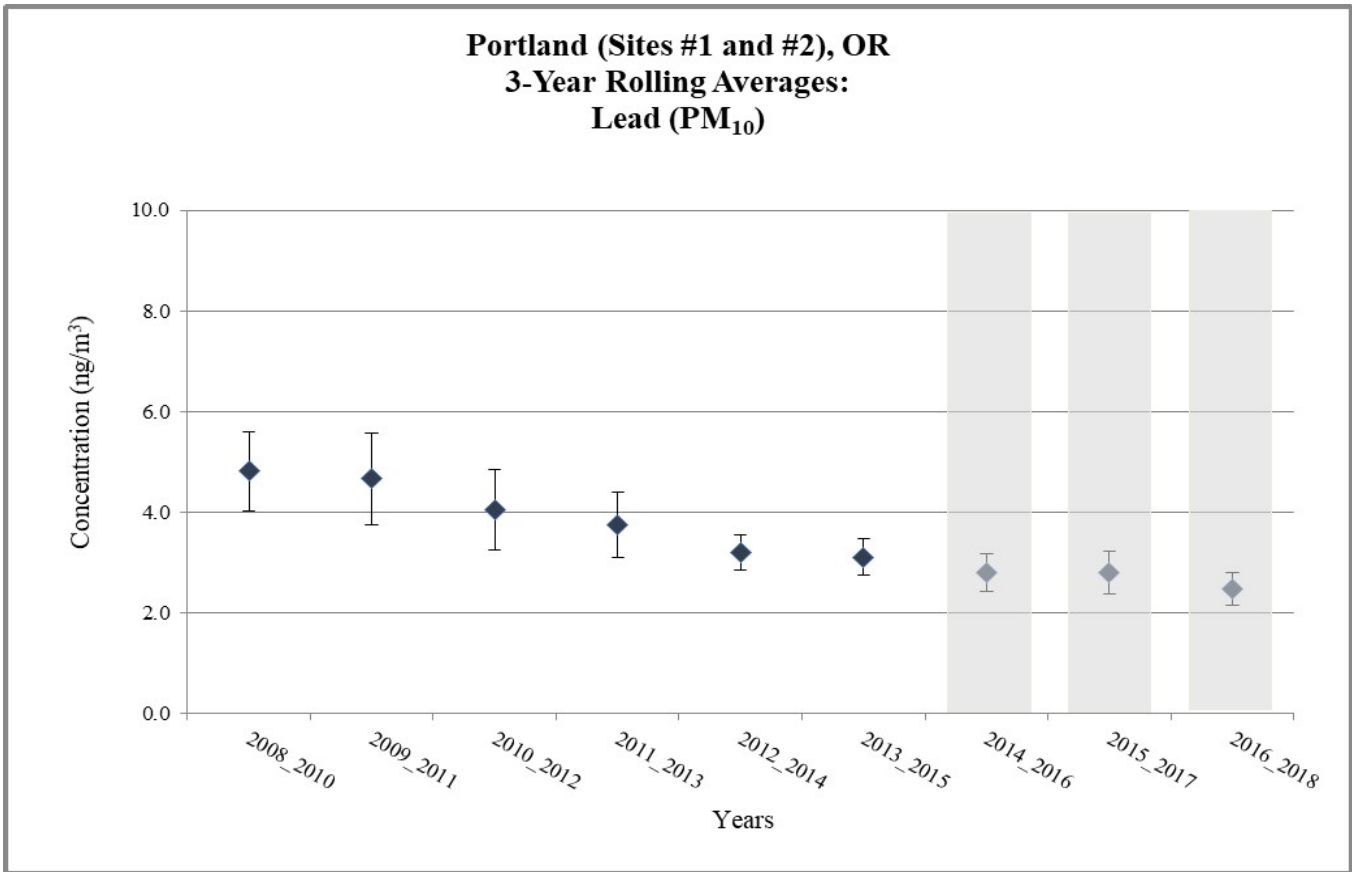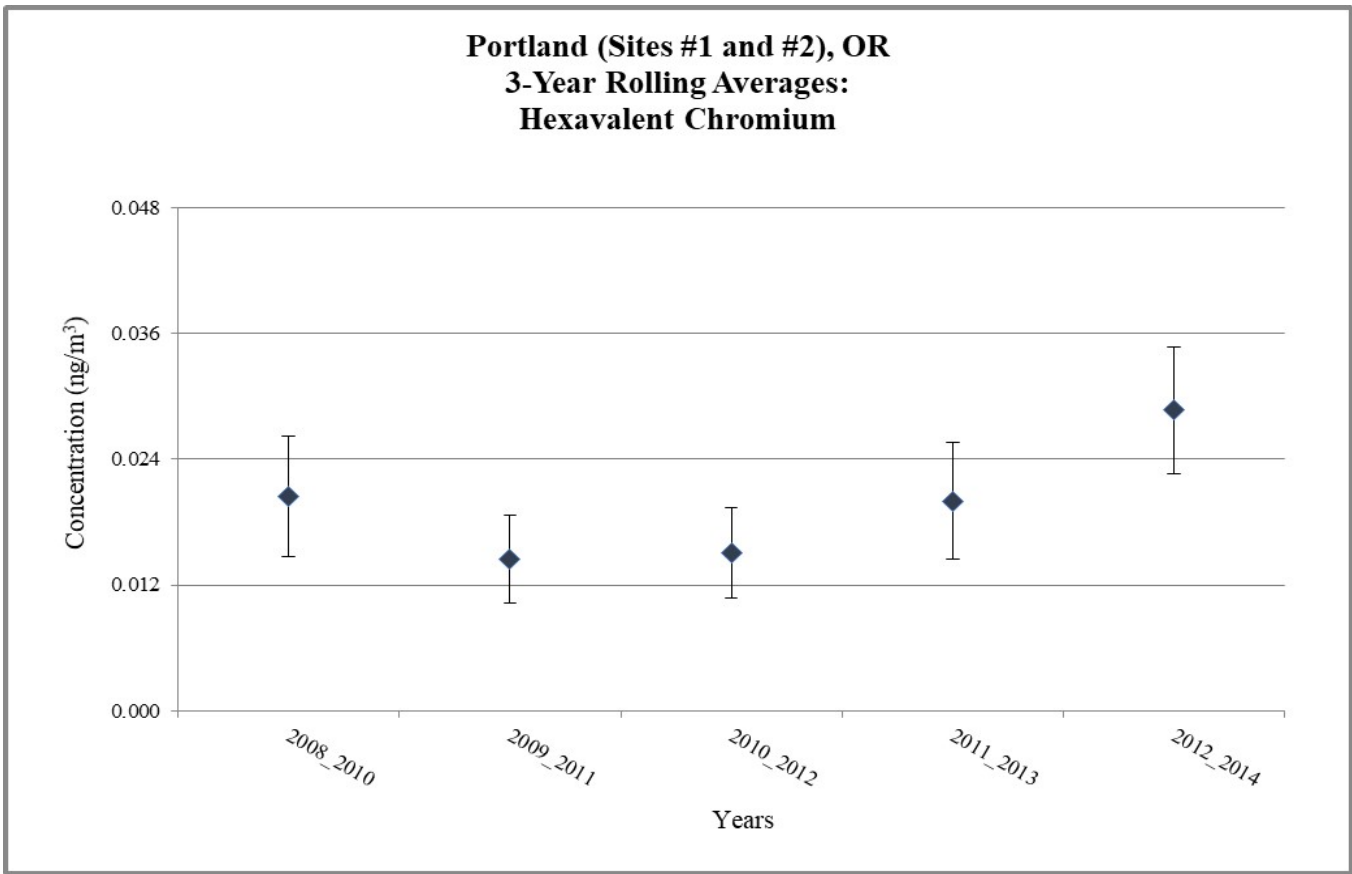**Figure 4. Portland (#1), OR and Portland (#2), OR Combined - 3-Year Rolling Average Concentrations**
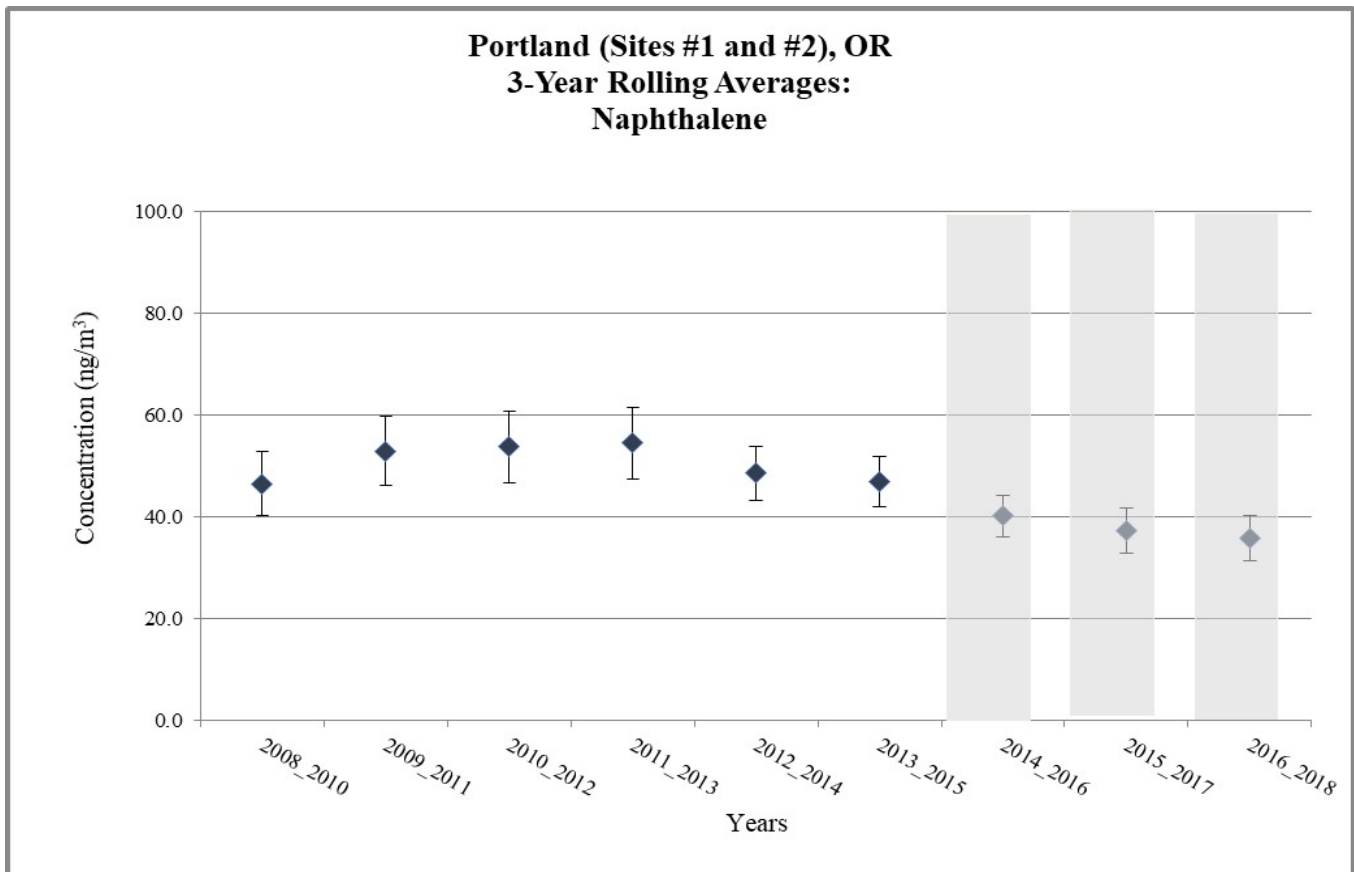

Portland (Sites #1 and #2), OR
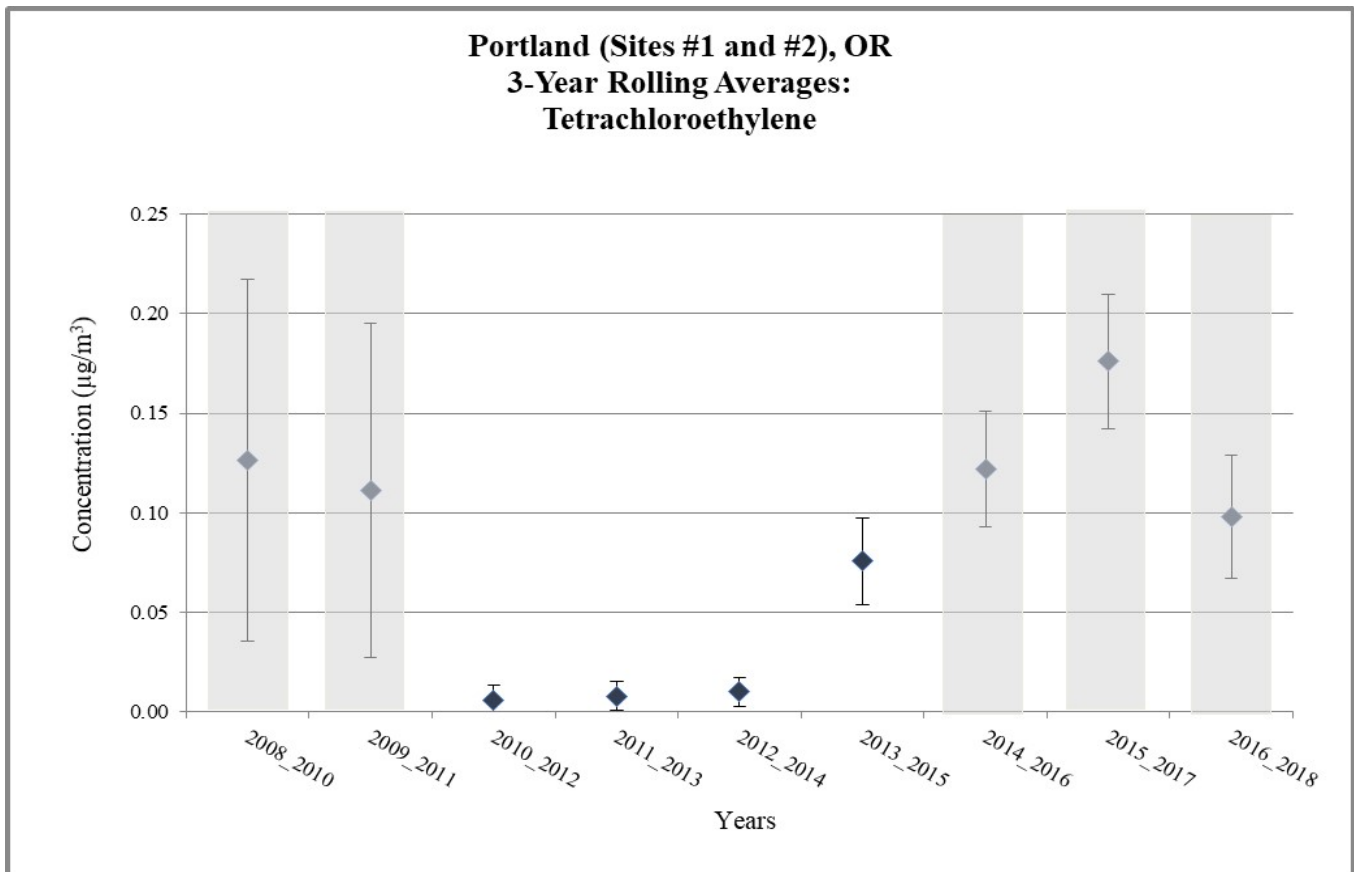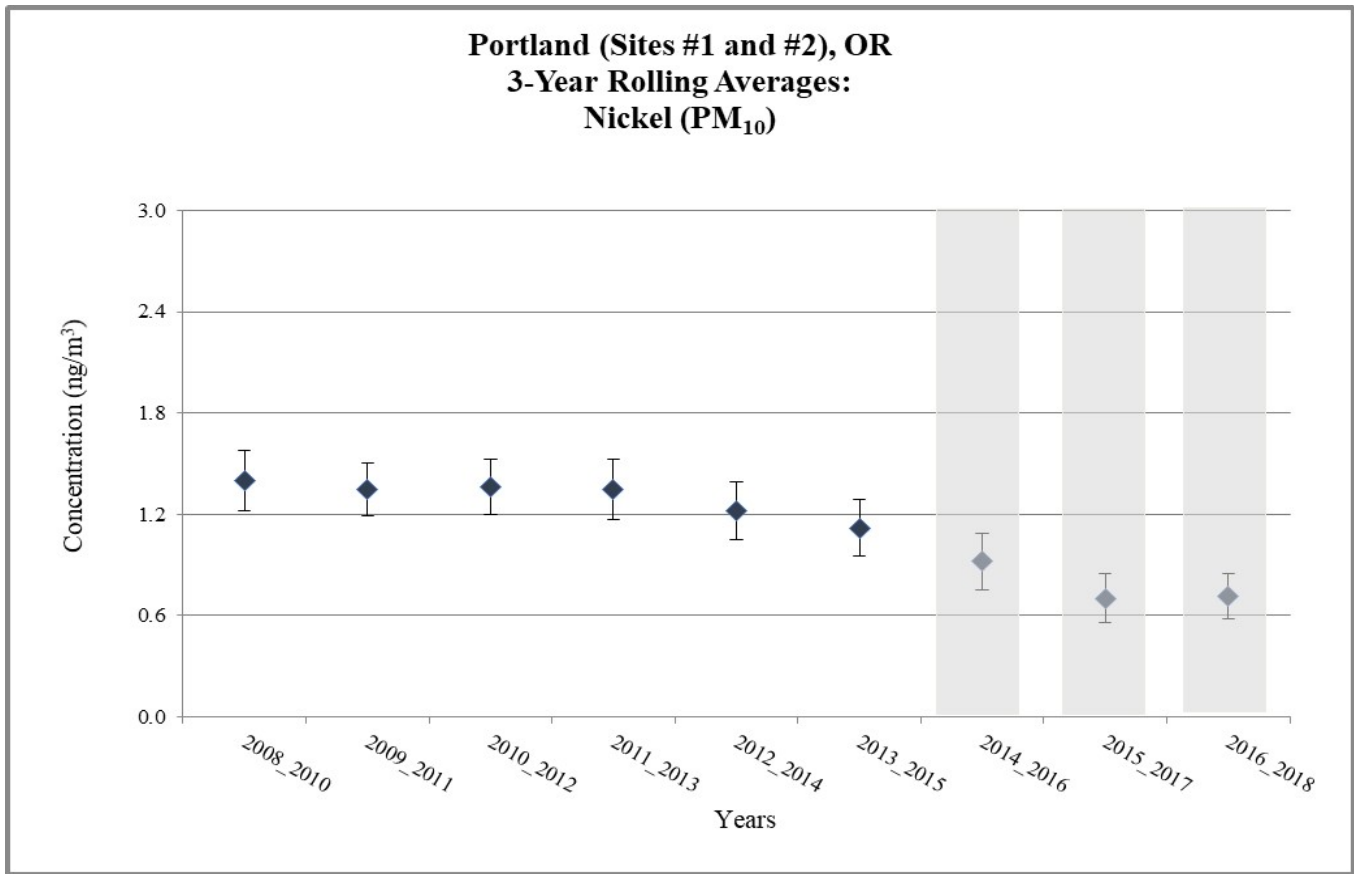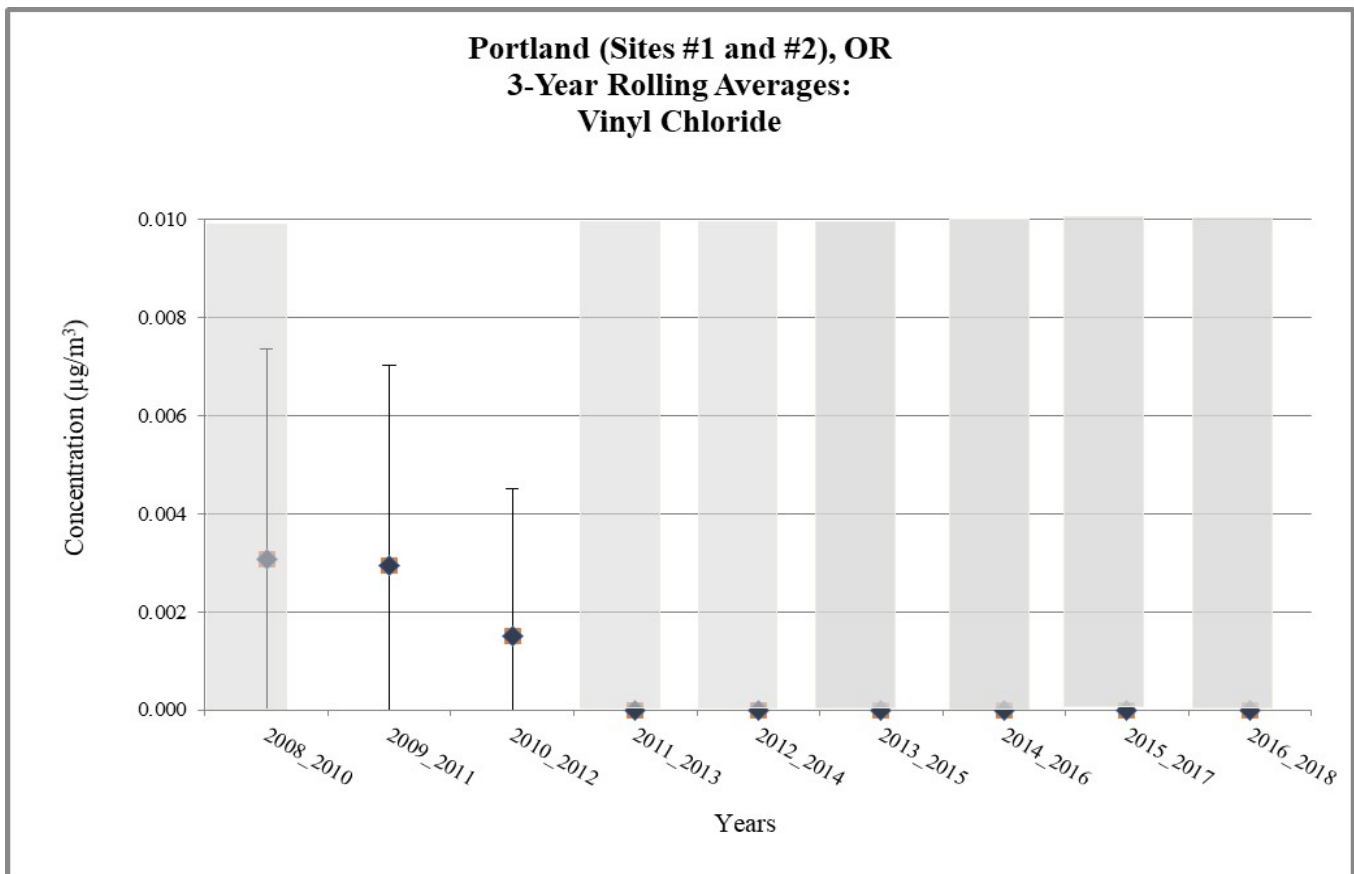3-Year Rolling Averages:
Trichloroethylene

Portland (Sites #1 and #2), OR
3-Year Rolling Averages:
Vinyl Chloride

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

Table 6. NATTS Network Assessment: MQO#1 - Completeness Percentage at Portland (#1), OR and Portland (#2), OR Combined

Pollutant Group	Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyl	Acetaldehyde	93	100	95	100	93	100	85	98	a	a	95
Carbonyl	Formaldehyde	100	100	92	100	93	100	85	98	a	a	95
Chromium VI	Chromium VI	95	100	97	98	98	97	95	97	--	--	--
PAH	Benzo(a)pyrene	80	92	85	95	90	92	98	100	a	a	98
PAH	Naphthalene	79	93	87	95	95	92	97	100	a	a	93
PM$_{10}$ Metals	Arsenic (PM$_{10}$)	90	97	93	97	95	102	98	98	a	a	100
PM$_{10}$ Metals	Beryllium (PM$_{10}$)	92	97	93	97	95	102	98	98	a	a	100
PM$_{10}$ Metals	Cadmium (PM$_{10}$)	90	97	93	97	95	102	98	98	a	a	100
PM$_{10}$ Metals	Lead (PM$_{10}$)	90	97	93	97	95	102	98	98	a	a	100
PM$_{10}$ Metals	Manganese (PM$_{10}$)	90	97	93	97	95	102	98	98	a	a	100
PM$_{10}$ Metals	Nickel (PM$_{10}$)	92	97	93	97	95	102	98	98	a	a	100
VOC	Benzene	82	77	82	97	95	89	84	87	a	a	84
VOC	Butadiene, 1,3-	85	90	95	98	95	89	84	87	a	a	84
VOC	Carbon tetrachloride	89	89	98	98	95	89	84	87	a	a	84
VOC	Chloroform	85	89	97	98	95	89	84	87	a	a	84
VOC	Tetrachloroethylene	79	95	102	98	95	89	84	87	a	a	84
VOC	Trichloroethylene	85	89	98	97	95	89	84	87	a	a	84
VOC	Vinyl chloride	85	90	93	98	95	89	84	87	a	a	84

[green]	A-rated: ≥85%
[yellow]	B-rated: Between 75% to 85%
[red]	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), OR and Portland (#2), OR Combined

Pollutant Group	Pollutant Name	Target MDL	Units	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyl	Acetaldehyde	0.45	$\mu g/m^3$	0.07	0.07	0.04	0.04	0.04	0.061	0.06	0.06	0.04	0.06	0.06
Carbonyl	Formaldehyde	0.98/0.08[a]	$\mu g/m^3$	0.07	0.10	0.08	0.09	0.08	0.98	0.96	0.83	0.67	0.91	0.83
Chromium VI	Chromium VI	0.08	ng/m^3	0.39	0.40	0.40	0.40	0.40	0.40	0.39	--	--	--	--
PAH	Benzo(a)pyrene	0.91	ng/m^3	0.10	0.26	0.26	0.23	0.20	0.20	0.40	0.41	0.40	0.41	0.44
PAH	Naphthalene	29.00	ng/m^3	0.02	0.02	0.03	0.03	0.03	0.05	0.09	0.06	0.06	0.06	0.06
PM_{10} Metals	Arsenic (PM_{10})	0.23	ng/m^3	0.14	0.14	0.14	0.14	0.13	0.13	0.12	0.10	0.09	0.10	0.17
PM_{10} Metals	Beryllium (PM_{10})	0.42	ng/m^3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.009	0.009	0.020
PM_{10} Metals	Cadmium (PM_{10})	0.56	ng/m^3	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.15
PM_{10} Metals	Lead (PM_{10})	15.0	ng/m^3	0.022	0.021	0.022	0.021	0.020	0.020	0.019	0.020	0.023	0.024	0.027
PM_{10} Metals	Manganese (PM_{10})	5.0	ng/m^3	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.14	0.15	0.16
PM_{10} Metals	Nickel (PM_{10})	2.1	ng/m^3	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.17	0.17	0.38
VOC	Benzene	0.13	$\mu g/m^3$	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
VOC	Butadiene, 1,3-	0.10	$\mu g/m^3$	2.21	2.21	2.21	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
VOC	Carbon tetrachloride	0.17	$\mu g/m^3$	1.85	1.85	1.85	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.93
VOC	Chloroform	0.50	$\mu g/m^3$	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
VOC	Tetrachloroethylene	0.17	$\mu g/m^3$	1.99	1.99	1.99	0.80	0.80	0.80	0.80	0.80	0.80	0.80	1.00
VOC	Trichloroethylene	0.5/0.2[a]	$\mu g/m^3$	0.54	0.54	0.54	0.54	0.54	1.34	1.34	1.34	1.34	0.94	0.94
VOC	Vinyl chloride	0.11	$\mu g/m^3$	1.39	1.39	1.39	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93

	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
--	No data available

[a]: For the 2012 sampling year, the Target MDL for this pollutant was reduced.

Table 8. NATTS Network Assessment: MQO#3 - Bias Percent Difference at Portland (#1), OR and Portland (#2), OR Combined

Pollutant Group	Pollutant Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	-7.4	-14.3	2.7	-1.8	a	3.7	-3.1	a	-4.6	7.1	-16.9
Carbonyls	Formaldehyde	8.8	-10.8	-2.0	-3.6	a	5.0	0.1	a	-20.0	-1.2	-18.5
Chromium VI	Chromium VI	a	5.6[b]	10.5[b]	a	11.0	-21.0	-2.5	--	--	--	--
PAH	Benzo(a)pyrene	a	-7.5	-40.7	-11.1	25.7	-10.2	-16.6	-23.4	-26.2	-24.0	-30.3
PAH	Naphthalene	a	-18.3	-42.3	-32.0	-9.0	3.8	-15.7	-34.5	-44.3	-30.7	-54.4
PM$_{10}$ Metals	Arsenic (PM$_{10}$)	22.2	-12.5	12.0	1.4	10.8	-1.0	1.9	a	-7.0	-5.1	-8.5
PM$_{10}$ Metals	Beryllium (PM$_{10}$)	11.8	-7.1	11.6	-8.6	8.4	-2.2	c	a	-1.7	-3.7	-11.8
PM$_{10}$ Metals	Cadmium (PM$_{10}$)	13.4	-8.9	5.1	-5.7	8.5	-2.2	c	a	-2.8	0.3	-8.7
PM$_{10}$ Metals	Lead (PM$_{10}$)	3.7	-32.9	-6.0	-3.3	5.0	-3.6	8.5	a	-5.8	-1.7	-7.7
PM$_{10}$ Metals	Manganese (PM$_{10}$)	-23.4	-41.9	-2.5	-5.4	7.5	-13.5	4.2	a	-3.6	-3.2	-10.9
PM$_{10}$ Metals	Nickel (PM$_{10}$)	0	-32.9	-1.4	-9.2	-3.3	-10.7	d	a	15.8	16.9	7.4
VOC	Benzene	-36.9	-31.8	-12.1	-10.2	a	-24.9	11.4	-16.3	-14.3	-31.6	-29.7
VOC	Butadiene, 1,3-	-4.3	-10.9	-11.0	-23.2	a	-56.6	-52.2	-19.4	9.7	-31.3	-30.2
VOC	Carbon tetrachloride	-9.1	-45.9	-30.6	-13.2	a	-32.4	5.7	16.0	27.9	9.6	-25.6
VOC	Chloroform	-36.1	-26.7	-41.2	-27.6	a	-27.6	-10.8	-17.7	-4.8	-13.3	-35.4
VOC	Tetrachloroethylene	-24.5	-43.8	8.6	-20.4	a	-12.1	13.9	5.1	17.6	-1.4	-27.0
VOC	Trichloroethylene	-23.3	-36.8	-14.7	-18.7	a	-16.8	2.4	-25.9	-14.1	-32.0	-36.2
VOC	Vinyl chloride	-42.0	1.0	-23.5	-17.0	a	-46.7	-31.4	-5.6	0.3	-26.0	-34.7

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

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

[b]: Proficiency Test results are from the National Contract Lab for EPA's School Air Toxics Monitoring Program. The %Difference was -5.55% in 2009 and 10.53% in 2010.

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

[d]: 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 (#1), OR and Portland (#2), OR Combined

Pollutant Group	Pollutant Name	Overall Method precision % CV										
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	12.1	6.7	12.0	10.8	16.2	24.7	13.9	17.9	21.5	6.2	20.2
Carbonyls	Formaldehyde	14.2	7.0	7.8	11.0	20.3	44.8	25.6	19.2	24.1	5.7	16.8
Chromium VI	Chromium VI	--	a	11.1	11.9	11.6	10.8	10.5	14.6	--	--	--
PAH	Benzo(a)pyrene	5.8	13.9	9.4	4.4	10.4	2.6	2.5	6.2	a	a	1.2
PAH	Naphthalene	41.0	21.8	24.3	22.7	12.3	16.6	10.0	15.4	19.9	34.7	22.9
PM$_{10}$ Metals	Arsenic (PM$_{10}$)	5.1	8.6	6.9	4.3	5.6	4.0	3.8	6.9	4.8	8.1	3.8
PM$_{10}$ Metals	Beryllium (PM$_{10}$)	8.1	7.9	12.4	6.6	10.2	10.1	6.4	6.5	0	15.2	6.7
PM$_{10}$ Metals	Cadmium (PM$_{10}$)	7.0	17.6	11.1	12.2	17.1	10.8	8.1	4.8	2.7	13.7	4.5
PM$_{10}$ Metals	Lead (PM$_{10}$)	3.5	8.4	6.8	7.0	4.1	4.4	5.8	4.7	4.3	8.2	12.1
PM$_{10}$ Metals	Manganese (PM$_{10}$)	4.2	8.7	15.8	14.0	8.1	8.9	12.2	5.8	2.7	10.2	3.9
PM$_{10}$ Metals	Nickel (PM$_{10}$)	3.8	5.6	12.5	4.4	4.4	6.4	4.0	7.0	2.5	10.2	3.5
VOC	Benzene	10.5	33.3	12.1	32.0	10.5	7.9	19.6	15.0	8.8	5.3	7.5
VOC	Butadiene, 1,3-	a	0.0	a	16.7	4.4	11.5	a	13.9	10.3	11.7	16.1
VOC	Carbon tetrachloride	0	8.9	0	17.0	11.1	12.5	30.6	24.1	5.9	3.6	6.5
VOC	Chloroform	a	19.6	0	a	a	a	a	a	a	a	a
VOC	Tetrachloroethylene	a	19.6	10.9	70.7	a	7.4	11.1	18.5	4.5	5.5	1.0
VOC	Trichloroethylene	a	a	a	a	a	a	a	a	a	1.5	a
VOC	Vinyl chloride	a	a	a	a	a	a	a	a	a	a	a

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

[a]: Although both primary and secondary data were reported, both sets of values were less than the MDL. Thus no %CV was calculated.

Table 10. NATTS Network Assessment: MQO#4 - Analytical Precision %CV at Portland (#1), OR and Portland (#2), OR Combined

Pollutant Group	Pollutant Name	Analytical Method precision % CV										
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	--	--	--	--	a	15.9	17.5	a	a	a	0
Carbonyls	Formaldehyde	--	--	--	--	a	51.7	17.6	a	a	a	0.1
Chromium VI	Chromium VI	--	--	--	--	4.2	5.8	7.6	1.2	--	--	--
PAH	Benzo(a)pyrene	b	--	--	--	a	a	a	a	a	a	0
PAH	Naphthalene	3.2	--	--	--	a	0.3	1.0	a	a	a	22.8
PM$_{10}$ Metals	Arsenic (PM$_{10}$)	--	--	--	--	a	2.5	4.3	3.5	2.2	a	5.8
PM$_{10}$ Metals	Beryllium (PM$_{10}$)	--	--	--	--	a	20.2	7.7	3.7	0	a	b
PM$_{10}$ Metals	Cadmium (PM$_{10}$)	--	--	--	--	a	8.3	6.3	4.4	4.5	a	b
PM$_{10}$ Metals	Lead (PM$_{10}$)	--	--	--	--	a	0.9	2.9	1.6	3.2	a	1.8
PM$_{10}$ Metals	Manganese (PM$_{10}$)	--	--	--	--	a	8.4	3.4	1.8	2.5	a	4.4
PM$_{10}$ Metals	Nickel (PM$_{10}$)	--	--	--	--	a	1.0	3.8	2.6	2.6	a	5.4
VOC	Benzene	--	--	--	--	a	a	14.5	a	a	a	2.4
VOC	Butadiene, 1,3-	--	--	--	0	a	a	a	a	a	a	0
VOC	Carbon tetrachloride	--	--	--	7.9	12.2	a	21.9	a	a	a	2.1
VOC	Chloroform	--	--	--	b	b	a	a	a	a	a	b
VOC	Tetrachloroethylene	--	--	--	--	a	a	a	a	a	a	0
VOC	Trichloroethylene	--	--	--	b	b	a	a	a	a	a	0
VOC	Vinyl chloride	--	--	--	b	b	a	a	a	a	a	b

	A-rated:≤ 15% CV
	B-rated: Between 15%CV to25% CV
	Does Not Meet: >25% CV or did not report Precision (required in the NATTS Workplan Template since 2012)
--	No data available

[a]: Per the NATTS Workplan template, analytical replicates were required to be reported to AQS for this sampling year

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

Pollutant Type	Year(s)	Manufacturer/Model, Extraction Type, and Year
		Sampling Equipment
Carbonyls	2008-2014	Custom-built (Year Deployed: <1989)
	2015-2018	WAITING (Year Deployed:)
Chormium VI	2008-2014	Thermo R&P Parisol-FRM2000 Air Sampler (Year Deployed: 1998)
PAHs	2008-2014	Tisch Environmental TE-1000 PUF Sampler (Year Deployed: 1998)
	2015-2018	WAITING (Year Deployed:)
PM$_{10}$ Metals	2008-2011	Andersen Hi-Volume PM10 Sampler (Year Deployed: <1994)
	2012	Andersen PM10 model GMW Sampler (Year Deployed: 2010)
	2013-2014	Tisch Environmental PM10+ Sampler (2 units) (Year Deployed: 2013)
	2015-2018	WAITING (Year Deployed:)
VOCs	2008-2010	SIS Canister Cleaning System AGS-1 A (Year Deployed: <1989)
	2011-2014	Entech 1800 Dual Channel Field Sampler (Year Deployed: 2011)
	2015-2018	WAITING (Year Deployed:)
		Analytical Equipment
Carbonyls	2008-2014	HP/Agilent HPLC 1100 with variable wavelength detection (Year Deployed: <2000)
	2015-2018	WAITING (Year Deployed:)
Chormium VI	2008-2010	Dionex model DX-500 Ion Chromatography (Year Deployed: 2005)
	2011-2014	Dionex model DX-500 Ion Chromatography (Year Deployed: 2005)
PAHs	2008-2014	HP/Agilent 6890/5973 GC/MS (Year Deployed: 2000)
	2015-2018	WAITING (Year Deployed:)
PM$_{10}$ Metals	2008-2014	Thermo/VG Elemental PQ ExCell ICP-MS (Year Deployed: 2001)
	2015-2018	WAITING (Year Deployed:)
VOCs	2008-2014	HP/Agilent 5890/5971 GC/MS (Year Deployed: <2000)
	2015-2018	WAITING (Year Deployed:)
		Preconcentrator Equipment
VOCs	2008-2010	Teledyne TekMar, AUTOCan (Year Deployed: <2002)
	2011-2014	Entech Model 7100A, Entech 7150 (Year Deployed: 2011)
	2015-2018	WAITING (Year Deployed:)
		Standards Preparation Equipment
VOCs	2008-2012	UNKNOWN (dynamic dilution) (Year Deployed: unknown)
	2013-2014	Entech 4600 (dynamic dilution) (Year Deployed: unknown)
	2015-2018	WAITING (Year Deployed:)
		Canister Cleaning Equipment
VOCs	2008-2010	Entech 3100 (Hot), Entech 3100A (Hot) (Year Deployed: 2005)
	2011-2014	Entech 3100A (Hot) (Year Deployed: 2005)
	2015-2018	WAITING (Year Deployed:)
		PM$_{10}$ Extraction Equipment
PM$_{10}$ Metals	2008-2014	Branson 8510 (Sonicator) (Year Deployed: 2001)
	2015-2018	WAITING (Year Deployed:)
		Chromium VI Extraction Equipment
Chormium VI	2008-2013	Branson Sonicator (Year Deployed: 2005)
	2010-2014	Branson 8510 (Sonicator) (Year Deployed: 2005)
		PAHs Extraction Equipment
PAHs	2008-2014	glassware (Soxhlet) (Year Deployed: NA)
	2015-2018	WAITING (Year Deployed:)