

## Pinellas County, FL NATTS Network Assessment Review

- Established 2004: Carbonyls, PM<sub>10</sub> Metals, and VOCs
  - Chromium VI added in 2008; ended in in 2013
  - PAHs added in 2008
- For the NATTS Network Assessment (2004-2018):
  - 16 of 18 Method Quality Objective (MQO) Core HAPs were included in the national trends
    - Chromium VI: Only had 5 consecutive years of suitable datasets
    - Nickel (PM<sub>10</sub>): Bias Percent Difference was outside  $\pm 35\%$  for 2013
  - 231 of 236 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, 1,3-butadiene, cadmium (PM<sub>10</sub>), naphthalene, nickel (PM<sub>10</sub>), and vinyl chloride).
  - 100% Reporting of Datasets
- Method Quality Objectives (MQO): 2004-2018
  - Completeness: Met 85% completeness in 232 of 236 pollutant datasets
  - Method Detection Limits: Met MDL Target Ratio of 1.00 in 239 of 253 pollutant datasets
  - Bias: Met  $\pm 25\%$  for 215 of 223 pollutant datasets
  - Overall Method Precision: Met  $\leq 15\%$  CV for 101 of 117 pollutant datasets
  - Analytical Method Precision: Met  $\leq 15\%$  CV for 139 of 176 pollutant datasets
- Analytical Laboratories for 2018

VOC	Carbonyl	PM <sub>10</sub> Metals	Chromium VI	PAHs
PCDEM	ERG	EPCHC	NA	ERG

- Equipment Year Deployed

Equipment Type	VOC	Carbonyl	PM <sub>10</sub> Metals	Chromium VI	PAHs
Sampler	2018	2016	2016	2005	2016
Analytical	2016	2018	2014	2001	2014
Preconcentrator	2014	NA	NA	NA	NA
Standards Preparation	2007	NA	NA	NA	NA
Canister Cleaning	2016	NA	NA	NA	NA
Extraction	NA	NA	2006	2011	2004

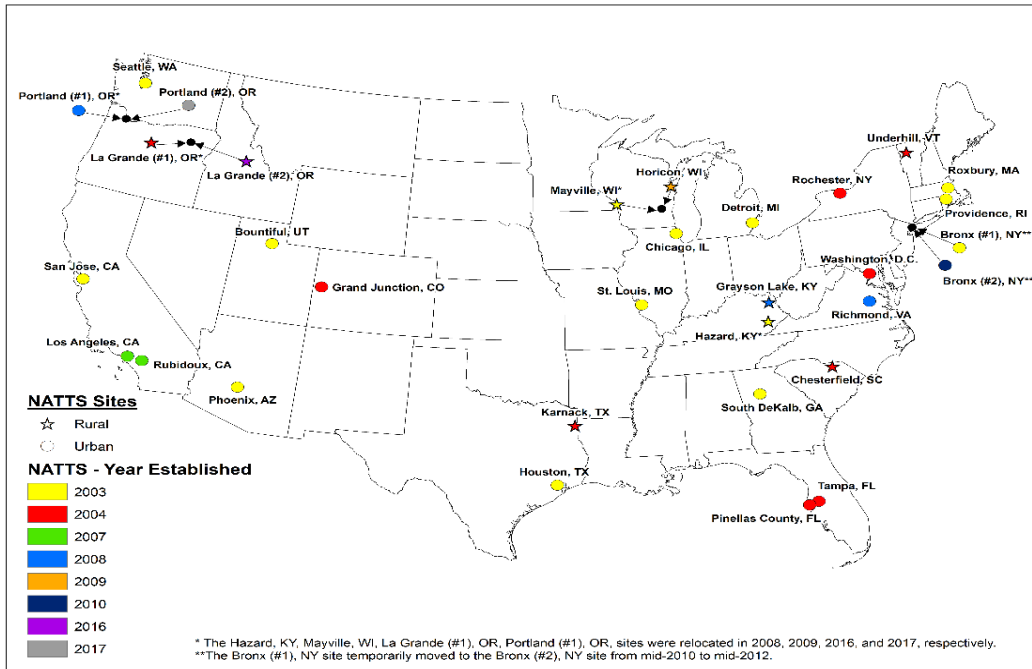
**National Summary:** NATTS data were collected at 27 locations across the United States, with sites beginning in 2003 or later (Figure 1) for 19 core HAPs. Over 528,000 concentrations (primary, secondary, and replicate) were generated and analyzed for this assessment. Pollutant datasets were scored 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 15 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.

**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	1,452	53%	737	27%	555	20%
Carbonyls	523	67%	193	25%	66	8%
PM <sub>10</sub> 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 <sup>3</sup>	19	1.51	1.39	-7.7%
Arsenic (PM <sub>10</sub> )	ng/m <sup>3</sup>	21	0.71	0.68	-3.2%
Benzene	µg/m <sup>3</sup>	19	0.65	0.59	-10.2%
Benzo(a)pyrene	ng/m <sup>3</sup>	21	0.113	0.087	-23.2%
Beryllium (PM <sub>10</sub> )	ng/m <sup>3</sup>	20	0.012	0.009	-26.4%
Butadiene, 1,3-	µg/m <sup>3</sup>	19	0.071	0.063	-10.9%
Cadmium (PM <sub>10</sub> )	ng/m <sup>3</sup>	21	0.170	0.097	-43.0%
Carbon Tetrachloride	µg/m <sup>3</sup>	15	0.59	0.56	-4.7%
Chloroform	µg/m <sup>3</sup>	20	0.256	0.255	-0.4%
Chromium VI	ng/m <sup>3</sup>	18	0.029	0.026	-7.7%
Formaldehyde	µg/m <sup>3</sup>	19	2.77	2.68	-3.3%
Lead (PM <sub>10</sub> )	ng/m <sup>3</sup>	21	3.08	2.81	-8.9%
Manganese (PM <sub>10</sub> )	ng/m <sup>3</sup>	20	8.06	7.93	-1.6%
Naphthalene	ng/m <sup>3</sup>	20	66.70	51.08	-23.4%
Nickel (PM <sub>10</sub> )	ng/m <sup>3</sup>	19	1.28	1.05	-18.0%
Tetrachloroethylene	µg/m <sup>3</sup>	19	0.149	0.174	17.2%
Trichloroethylene	µg/m <sup>3</sup>	19	0.020	0.022	10.7%
Vinyl Chloride	µg/m <sup>3</sup>	17	0.0051	0.0048	-5.5%

NATTS Monitoring Site Report: Pinellas County, FL

Site Information

Region	4
NATTS Site Type	Urban
County	Pinellas
AQS Site Code	12-103-0026
NATTS Operating Agency	Pinellas County Dept. Env. Man.
Latitude	27.850041
Longitude	-82.71459
AQS Land Use	Residential
AQS Location Setting	Suburban
10-Mile Population	929,048

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	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Acetaldehyde	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Arsenic (PM <sub>10</sub> )	--	N <sup>a</sup>	N <sup>a</sup>	N <sup>a</sup>	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Benzene	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Benzo(a)pyrene	--	--	--	--	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Beryllium (PM <sub>10</sub> )	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Butadiene, 1,3-	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Cadmium (PM <sub>10</sub> )	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Carbon tetrachloride	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Chloroform	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Chromium VI	--	--	--	--	--	Y	Y	Y	Y	--	--	--	--	--	--
Formaldehyde	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Lead (PM <sub>10</sub> )	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Manganese (PM <sub>10</sub> )	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Naphthalene	--	--	--	--	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Nickel (PM <sub>10</sub> )	--	Y	N <sup>a</sup>	Y	Y	Y	Y	Y	Y	N <sup>b</sup>	Y	Y	Y	Y	Y
Tetrachloroethylene	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Trichloroethylene	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Vinyl chloride	--	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)

<sup>a</sup>: Reported MDL to NATTS Target Ratio greater than 2.0

<sup>b</sup>: Bias % Difference was outside ± 35% for 2013; Analytical Precision data was not reported to EPA for 2013.

**Table 3. NATTS Network Assessment Data (2003-2018) - National Distribution Statistics By Type<sup>a</sup>**

Analyte	Units	Site Type	# Data Records	% Detections	Arithmetic Mean <sup>b</sup>	Percentile Value <sup>c</sup>						
						5th	10th	25th	50th	75th	90th	95th
Acetaldehyde	µg/m <sup>3</sup>	Urban	15,704	100%	1.77 ± 0.02	0.50	0.66	0.97	1.45	2.19	3.24	4.04
	µg/m <sup>3</sup>	Rural	4,930	100%	1.20 ± 0.04	0.36	0.46	0.65	0.93	1.38	2.02	2.76
	µg/m <sup>3</sup>	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 <sub>10</sub> )	ng/m <sup>3</sup>	Urban	14,968	97%	0.89 ± 0.04	0.10	0.19	0.34	0.58	0.99	1.70	2.41
	ng/m <sup>3</sup>	Rural	4,622	96%	0.49 ± 0.02	0.04	0.08	0.17	0.35	0.59	0.94	1.28
	ng/m <sup>3</sup>	All Sites	19,590	97%	0.79 ± 0.03	0.06	0.14	0.29	0.52	0.89	1.54	2.19
Benzene	µg/m <sup>3</sup>	Urban	15,984	99%	0.86 ± 0.01	0.25	0.30	0.43	0.66	1.05	1.64	2.21
	µg/m <sup>3</sup>	Rural	2,494	95%	0.43 ± 0.02	0.04	0.13	0.21	0.33	0.52	0.78	1.01
	µg/m <sup>3</sup>	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 <sup>3</sup>	Urban	12,336	70%	0.096 ± 0.004	ND	ND	ND	0.04	0.11	0.24	0.37
	ng/m <sup>3</sup>	Rural	3,179	36%	0.067 ± 0.009	ND	ND	ND	ND	0.02	0.13	0.37
	ng/m <sup>3</sup>	All Sites	15,515	63%	0.090 ± 0.004	ND	ND	ND	0.03	0.10	0.23	0.37
Beryllium (PM <sub>10</sub> )	ng/m <sup>3</sup>	Urban	15,783	75%	0.051 ± 0.006	ND	ND	0.00003	0.005	0.018	0.050	0.101
	ng/m <sup>3</sup>	Rural	4,687	49%	0.023 ± 0.003	ND	ND	ND	ND	0.005	0.017	0.072
	ng/m <sup>3</sup>	All Sites	20,470	69%	0.045 ± 0.005	ND	ND	ND	0.003	0.012	0.049	0.100
Butadiene, 1,3-	µg/m <sup>3</sup>	Urban	15,388	81%	0.092 ± 0.002	ND	ND	0.025	0.058	0.114	0.215	0.302
	µg/m <sup>3</sup>	Rural	2,185	29%	0.012 ± 0.001	ND	ND	ND	ND	0.017	0.046	0.059
	µg/m <sup>3</sup>	All Sites	17,573	75%	0.082 ± 0.002	ND	ND	ND	0.049	0.104	0.199	0.287
Cadmium (PM <sub>10</sub> )	ng/m <sup>3</sup>	Urban	16,360	92%	0.21 ± 0.02	ND	0.01	0.05	0.09	0.17	0.42	0.63
	ng/m <sup>3</sup>	Rural	4,684	87%	0.10 ± 0.01	ND	ND	0.03	0.06	0.11	0.20	0.29
	ng/m <sup>3</sup>	All Sites	21,044	91%	0.18 ± 0.01	ND	0.01	0.04	0.08	0.16	0.35	0.56
Carbon Tetrachloride	µg/m <sup>3</sup>	Urban	14,713	99%	0.569 ± 0.003	0.361	0.433	0.496	0.562	0.651	0.737	0.798
	µg/m <sup>3</sup>	Rural	2,189	92%	0.534 ± 0.016	ND	0.180	0.402	0.537	0.633	0.727	0.798
	µg/m <sup>3</sup>	All Sites	16,902	98%	0.565 ± 0.003	0.304	0.408	0.490	0.559	0.649	0.736	0.798
Chloroform	µg/m <sup>3</sup>	Urban	16,068	87%	0.265 ± 0.022	ND	ND	0.093	0.132	0.217	0.420	0.668
	µg/m <sup>3</sup>	Rural	3,802	43%	0.052 ± 0.003	ND	ND	ND	ND	0.095	0.144	0.230
	µg/m <sup>3</sup>	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 <sup>3</sup>	Urban	8,414	74%	0.036 ± 0.002	ND	ND	ND	0.020	0.042	0.081	0.120
	ng/m <sup>3</sup>	Rural	2,586	41%	0.018 ± 0.004	ND	ND	ND	ND	0.017	0.031	0.051
	ng/m <sup>3</sup>	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<sup>a</sup>**

Analyte	Units	Site Type	# Data Records	% Detections	Arithmetic Mean <sup>b</sup>	Percentile Value <sup>c</sup>						
						5th	10th	25th	50th	75th	90th	95th
Formaldehyde	µg/m <sup>3</sup>	Urban	16,118	100%	3.11 ± 0.04	0.66	0.99	1.60	2.47	3.84	5.63	7.25
	µg/m <sup>3</sup>	Rural	5,002	100%	2.22 ± 0.05	0.53	0.68	1.06	1.69	2.74	4.19	5.45
	µg/m <sup>3</sup>	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 <sub>10</sub> )	ng/m <sup>3</sup>	Urban	16,366	100%	4.21 ± 0.13	0.72	0.98	1.55	2.64	4.56	8.35	11.90
	ng/m <sup>3</sup>	Rural	4,680	99%	2.10 ± 0.16	0.37	0.50	0.84	1.41	2.37	3.91	5.36
	ng/m <sup>3</sup>	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 <sub>10</sub> )	ng/m <sup>3</sup>	Urban	16,141	100%	9.80 ± 0.32	1.09	1.51	2.52	4.92	10.21	20.10	30.08
	ng/m <sup>3</sup>	Rural	4,627	99%	3.96 ± 0.14	0.46	0.73	1.36	2.57	4.75	8.54	12.13
	ng/m <sup>3</sup>	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 <sup>3</sup>	Urban	12,332	100%	74.63 ± 1.14	15.62	21.27	33.55	55.89	94.64	150.05	196.16
	ng/m <sup>3</sup>	Rural	3,301	100%	24.47 ± 1.38	3.74	4.73	7.74	13.86	26.25	50.88	79.17
	ng/m <sup>3</sup>	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 <sub>10</sub> )	ng/m <sup>3</sup>	Urban	16,125	97%	1.85 ± 0.05	0.25	0.41	0.67	1.11	2.00	3.52	5.27
	ng/m <sup>3</sup>	Rural	4,623	85%	0.65 ± 0.08	ND	ND	0.10	0.28	0.64	1.15	1.89
	ng/m <sup>3</sup>	All Sites	20,748	94%	1.58 ± 0.04	ND	0.15	0.47	0.92	1.73	3.14	4.74
Tetrachloroethylene	µg/m <sup>3</sup>	Urban	15,612	86%	0.25 ± 0.01	ND	ND	0.06	0.13	0.25	0.48	0.74
	µg/m <sup>3</sup>	Rural	2,272	36%	0.09 ± 0.04	ND	ND	ND	ND	0.04	0.08	0.16
	µg/m <sup>3</sup>	All Sites	17,884	79%	0.23 ± 0.01	ND	ND	0.04	0.11	0.22	0.44	0.70
Trichloroethylene	µg/m <sup>3</sup>	Urban	15,843	41%	0.040 ± 0.002	ND	ND	ND	ND	0.051	0.107	0.164
	µg/m <sup>3</sup>	Rural	3,388	13%	0.021 ± 0.003	ND	ND	ND	ND	ND	0.017	0.250
	µg/m <sup>3</sup>	All Sites	19,231	36%	0.037 ± 0.002	ND	ND	ND	ND	0.041	0.105	0.167
Vinyl Chloride	µg/m <sup>3</sup>	Urban	14,778	19%	0.0044 ± 0.0003	ND	ND	ND	ND	ND	0.0137	0.0257
	µg/m <sup>3</sup>	Rural	2,444	8%	0.0040 ± 0.0009	ND	ND	ND	ND	ND	ND	0.0156
	µg/m <sup>3</sup>	All Sites	17,222	17%	0.0043 ± 0.0003	ND	ND	ND	ND	ND	0.0126	0.0254

<sup>a</sup> Statistics presented are from pollutant datasets which were suitable for trends.

<sup>b</sup> 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.

<sup>c</sup> ND: No results of this chemical were registered by the laboratory analytical equipment.

**Table 4. Summary Statistics for Pinellas County, FL**

Analyte	Units	# Data Records	% Detection	Arithmetic Mean <sup>a</sup>	Percentile Value <sup>b</sup>						
					5th	10th	25th	50th	75th	90th	95th
Acetaldehyde	µg/m <sup>3</sup>	852	100%	1.87 ± 0.14	0.70	0.79	1.05	1.46	2.21	3.24	4.07
Arsenic (PM <sub>10</sub> )	ng/m <sup>3</sup>	855	100%	1.72 ± 0.18	0.23	0.27	0.61	1.03	2.09	3.50	4.78
Benzene	µg/m <sup>3</sup>	862	100%	0.70 ± 0.03	0.24	0.28	0.36	0.53	0.88	1.35	1.68
Benzo(a)pyrene	ng/m <sup>3</sup>	645	88%	0.06 ± 0.01	ND	ND	0.03	0.04	0.06	0.10	0.17
Beryllium (PM <sub>10</sub> )	ng/m <sup>3</sup>	844	94%	0.050 ± 0.004	ND	0.002	0.005	0.030	0.098	0.102	0.106
Butadiene, 1,3-	µg/m <sup>3</sup>	862	99%	0.097 ± 0.006	0.024	0.027	0.039	0.065	0.113	0.204	0.279
Cadmium (PM <sub>10</sub> )	ng/m <sup>3</sup>	860	99%	0.101 ± 0.009	0.020	0.025	0.045	0.080	0.099	0.180	0.230
Carbon Tetrachloride	µg/m <sup>3</sup>	862	100%	0.510 ± 0.004	0.442	0.455	0.475	0.503	0.534	0.573	0.590
Chloroform	µg/m <sup>3</sup>	862	100%	0.195 ± 0.007	0.093	0.100	0.118	0.154	0.248	0.346	0.403
Chromium VI	ng/m <sup>3</sup>	306	72%	0.020 ± 0.003	ND	ND	ND	0.015	0.024	0.042	0.050
Formaldehyde	µg/m <sup>3</sup>	852	100%	2.39 ± 0.29	0.70	0.90	1.29	1.88	2.66	3.44	4.02
Lead (PM <sub>10</sub> )	ng/m <sup>3</sup>	864	100%	2.02 ± 0.12	0.44	0.63	1.06	1.52	2.53	3.50	4.85
Manganese (PM <sub>10</sub> )	ng/m <sup>3</sup>	864	100%	2.73 ± 0.18	0.68	0.85	1.25	1.94	3.10	4.99	7.43
Naphthalene	ng/m <sup>3</sup>	645	100%	67.64 ± 4.40	18.66	22.63	30.40	47.88	84.86	142.76	177.53
Nickel (PM <sub>10</sub> )	ng/m <sup>3</sup>	859	100%	2.20 ± 0.12	0.45	0.55	0.91	1.85	2.83	4.38	5.53
Tetrachloroethylene	µg/m <sup>3</sup>	861	95%	0.139 ± 0.011	0.020	0.040	0.061	0.101	0.162	0.239	0.340
Trichloroethylene	µg/m <sup>3</sup>	861	31%	0.021 ± 0.003	ND	ND	ND	ND	0.027	0.094	0.109
Vinyl Chloride	µg/m <sup>3</sup>	862	19%	0.0035 ± 0.0006	ND	ND	ND	ND	ND	0.0129	0.0235

<sup>a</sup>: 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.

<sup>b</sup>ND: No results of this chemical were registered by the laboratory analytical equipment.

**Table 5. Analytical Labs Supporting this Site**

Pollutant Group	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
VOCs	--	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM	PCDEM
Carbonyls	--	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG
PM <sub>10</sub> Metals	--	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC	EPCHC
Chromium VI	--	--	--	--	--	ERG	ERG	ERG	ERG	ERG	ERG	--	--	--	--	--
PAHs	--	--	--	--	--	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG

--: Not Applicable

PCDEM: Pinellas County Department of Environmental Management

EPCHC: Environmental Protection Commission of Hillsborough County

ERG: Eastern Research Group, Inc.

Figure 3. Pinellas County, FL Annual Average Concentrations

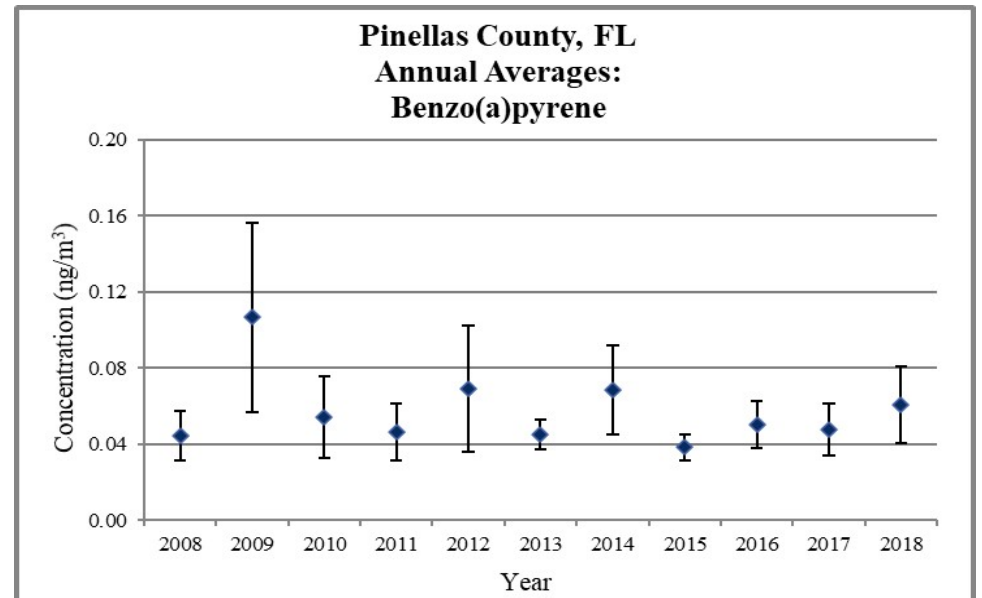
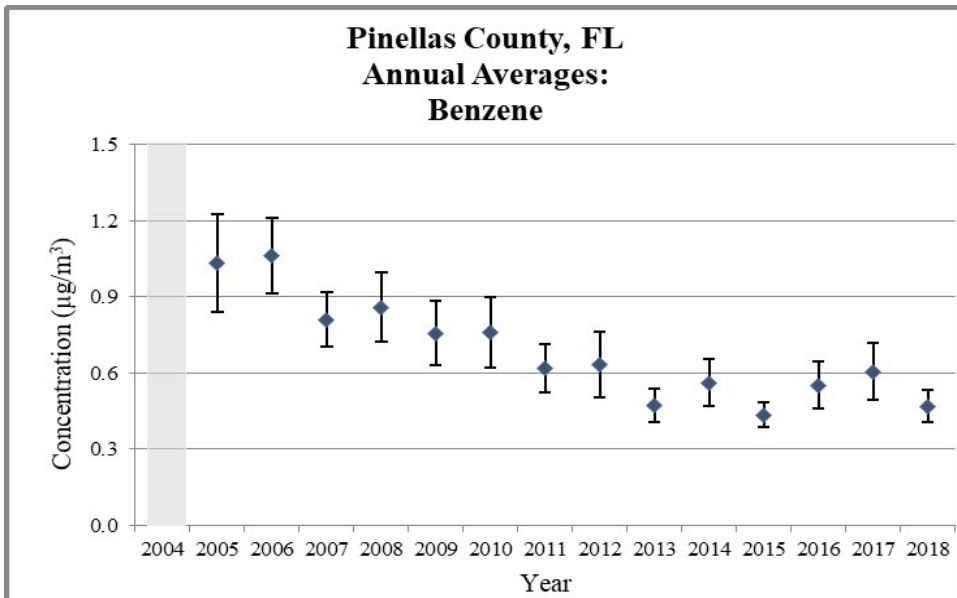
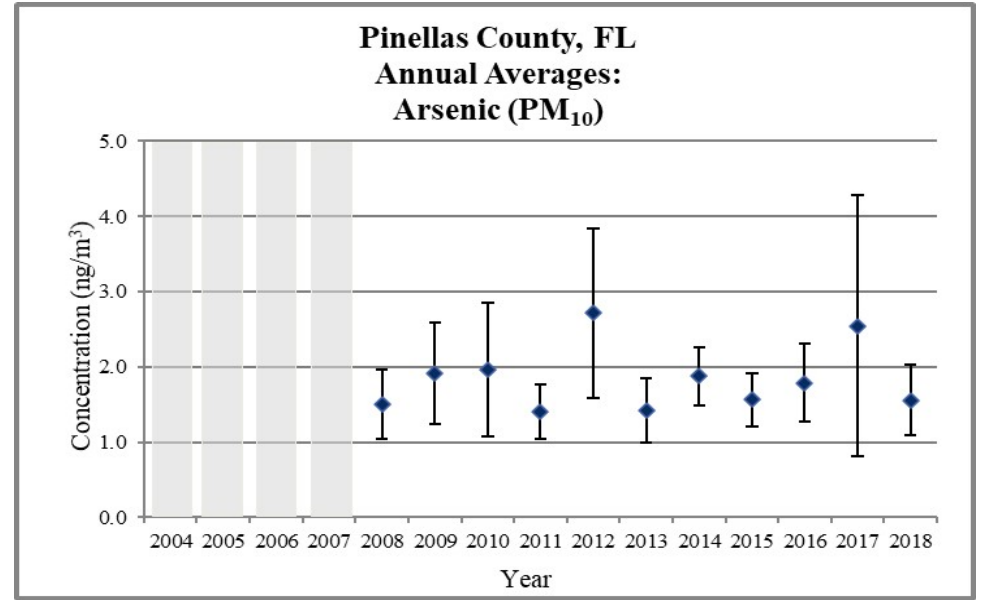
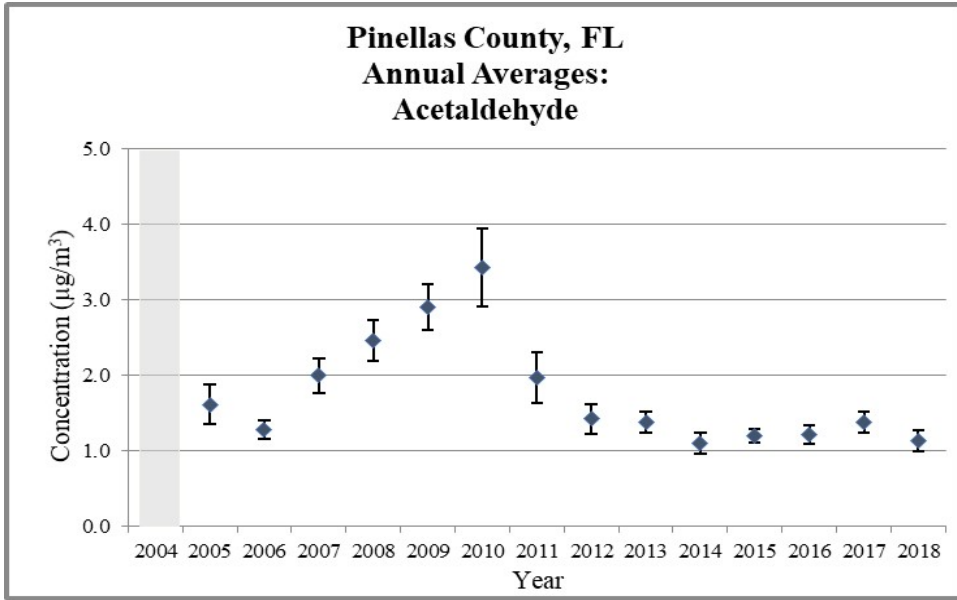


Figure 3. Pinellas County, FL Annual Average Concentrations

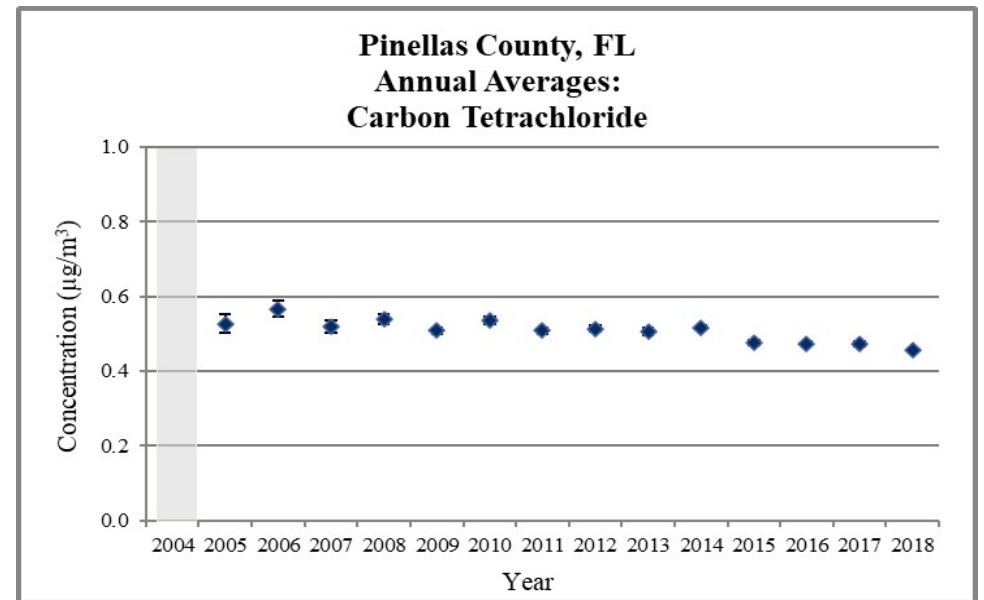
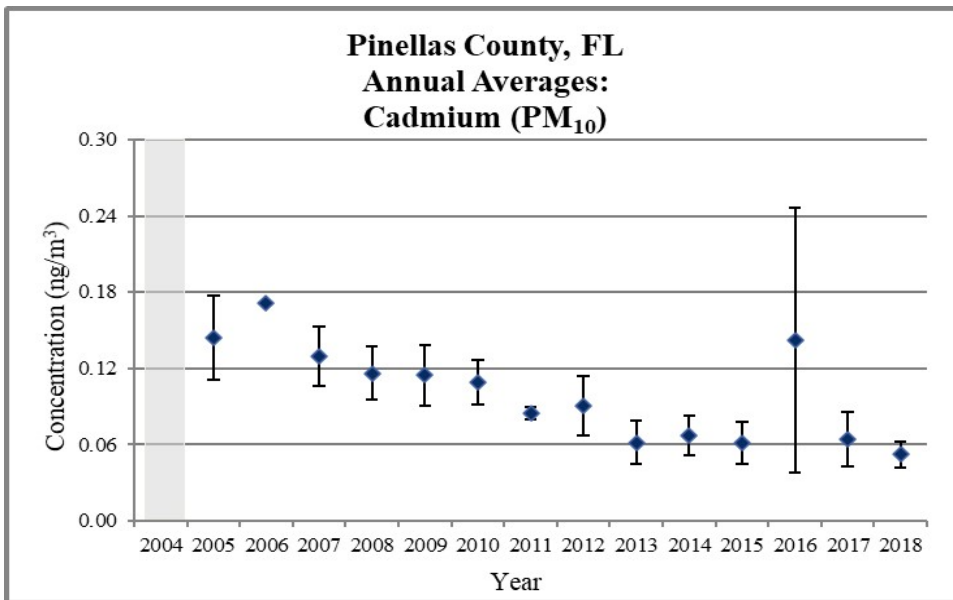
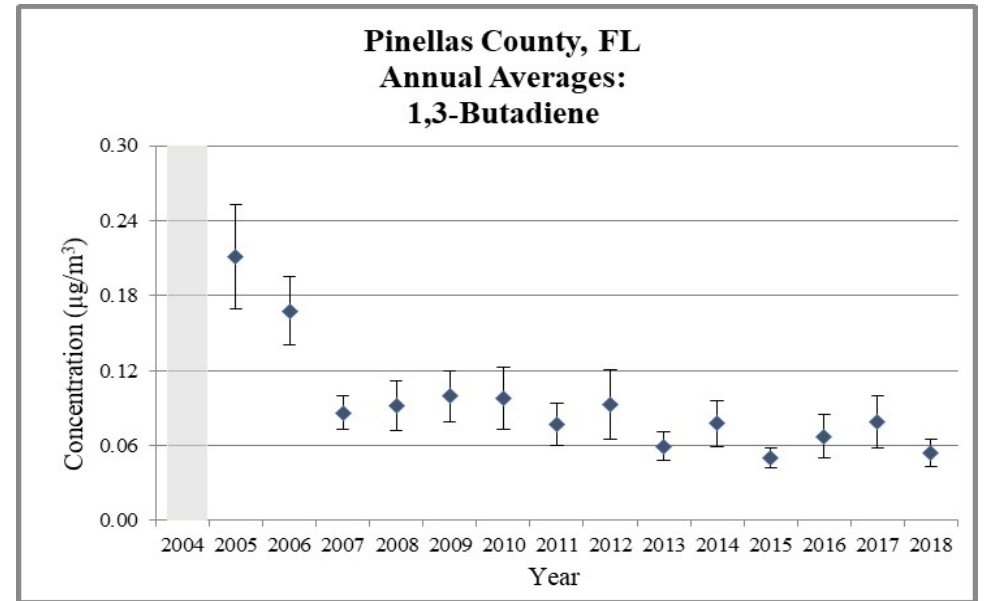
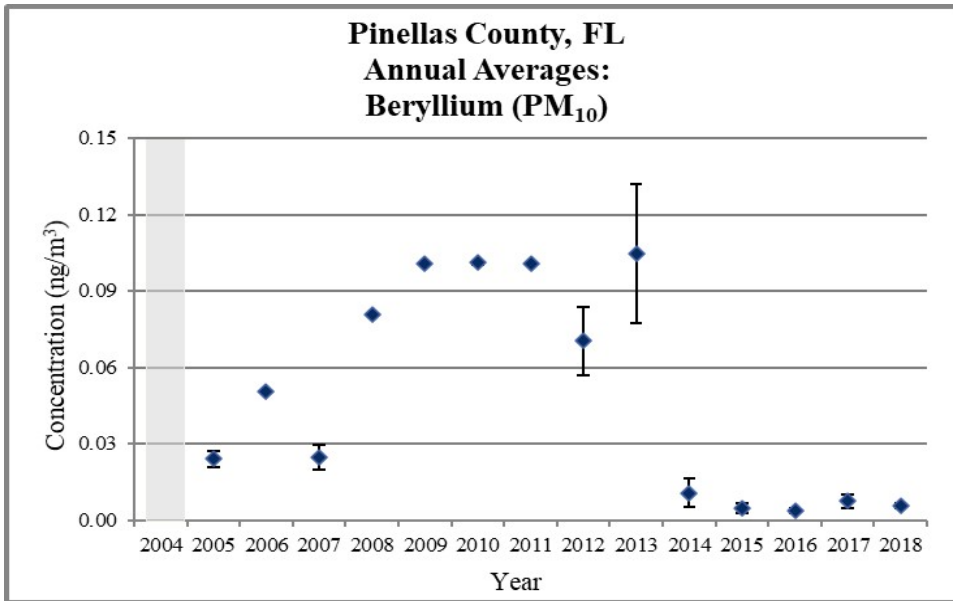




Figure 3. Pinellas County, FL Annual Average Concentrations

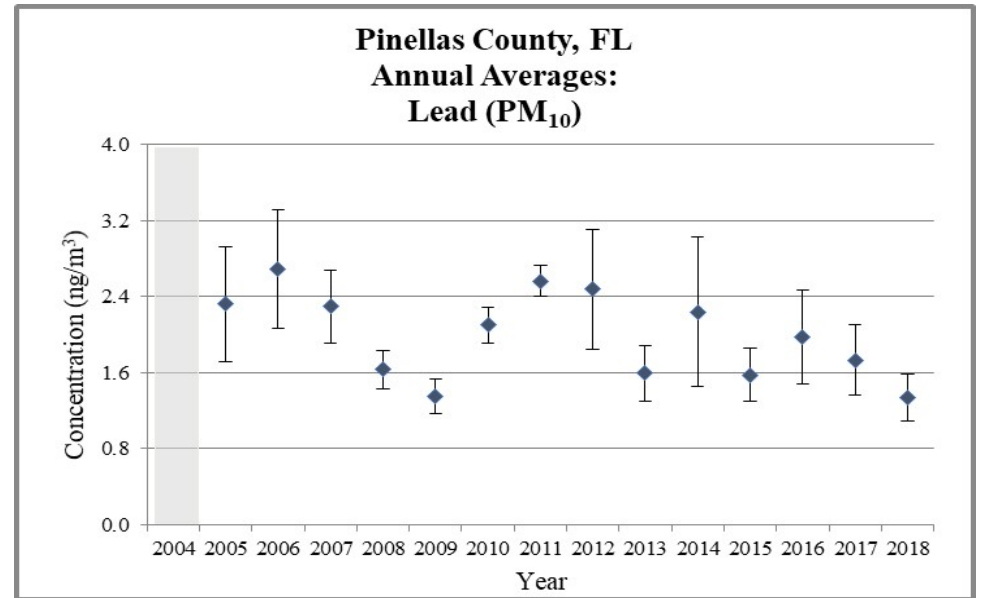
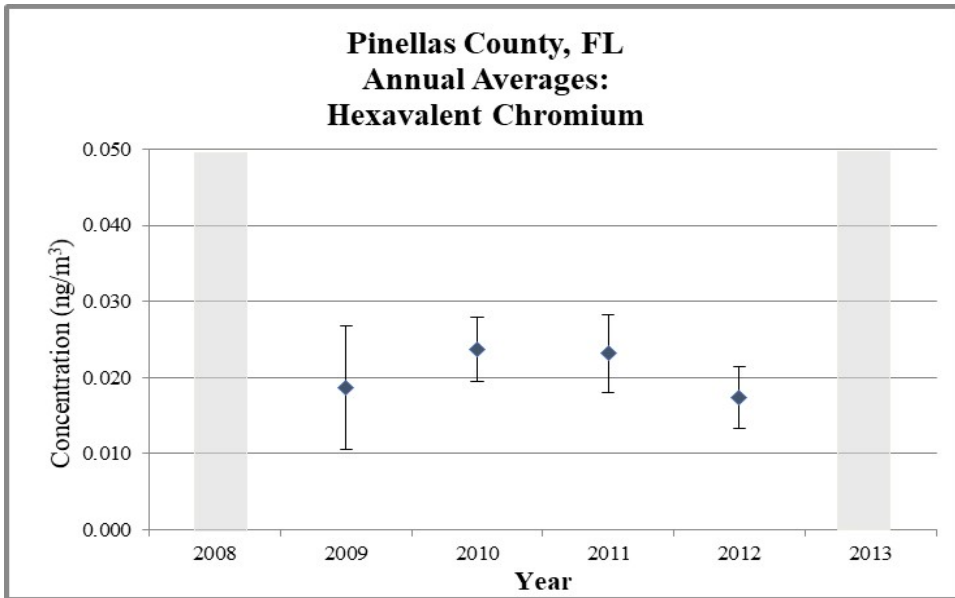
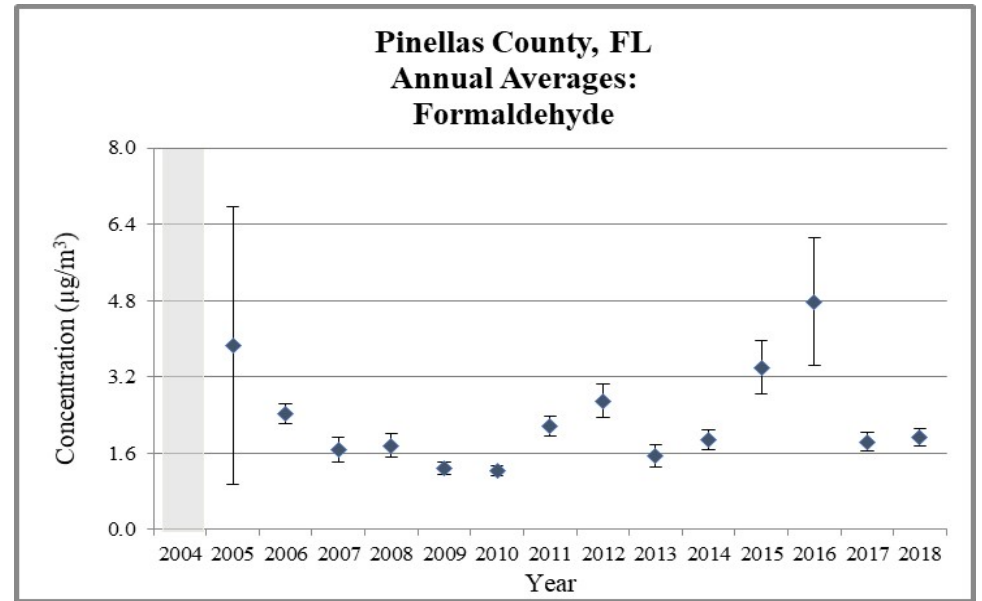
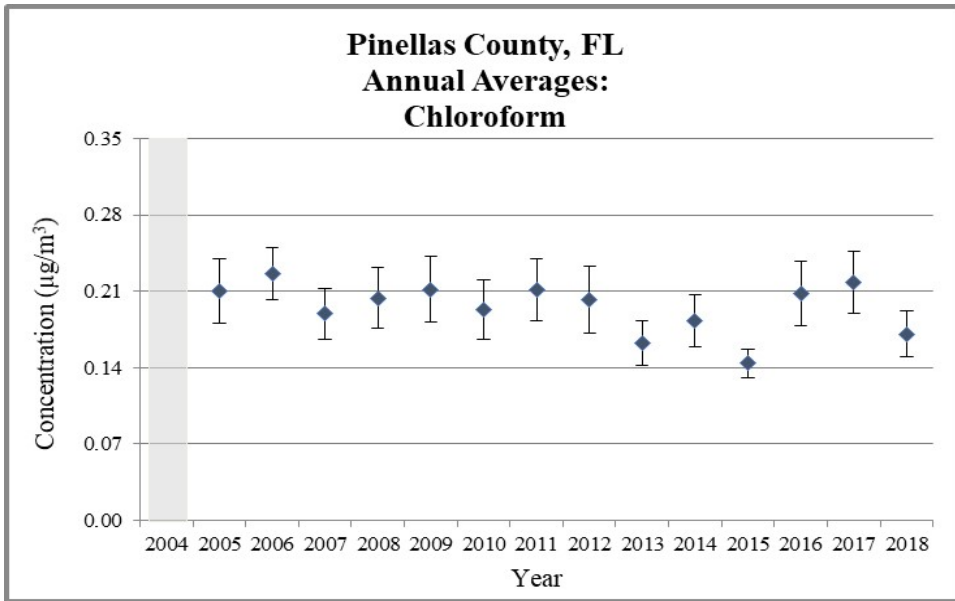


Figure 3. Pinellas County, FL Annual Average Concentrations

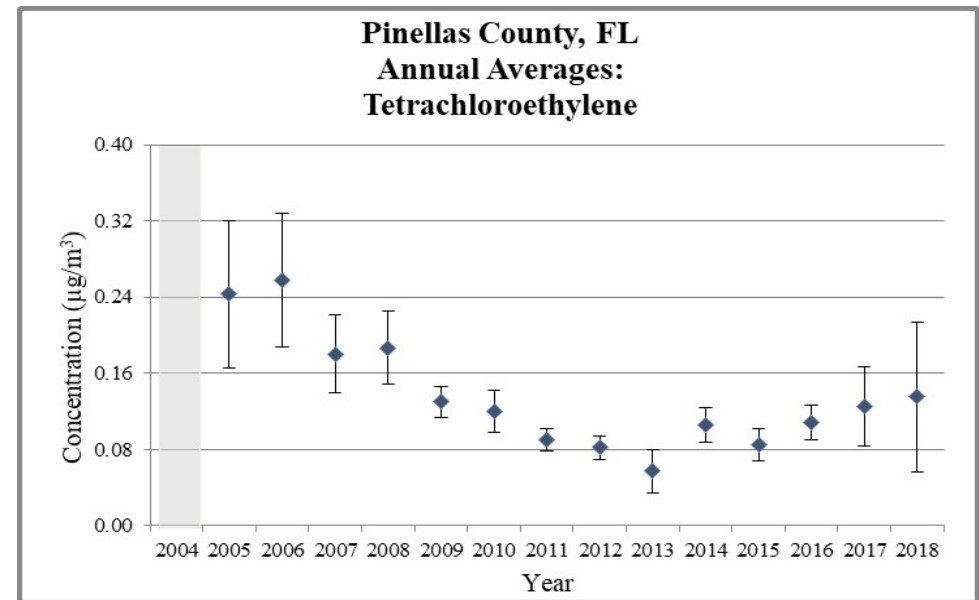
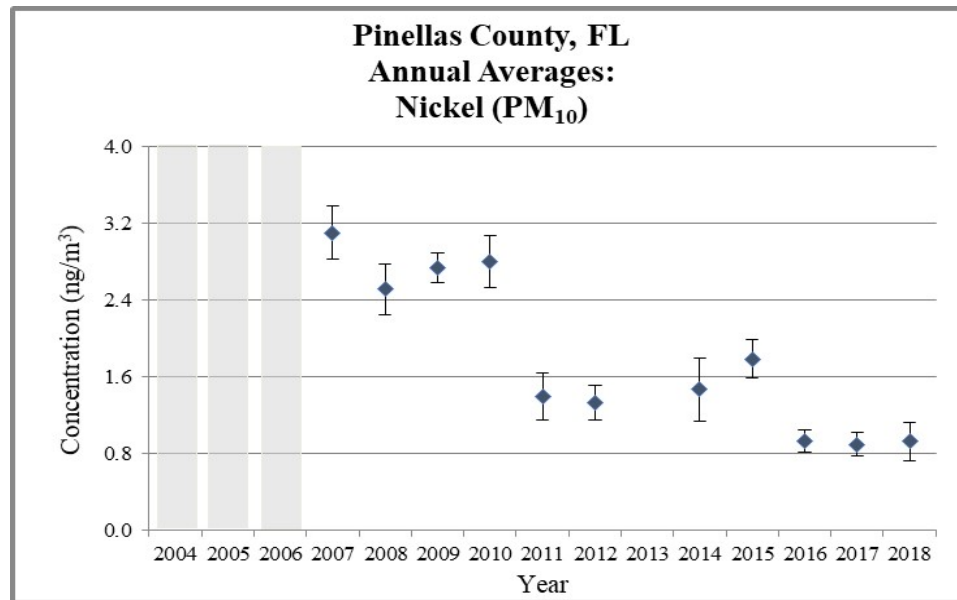
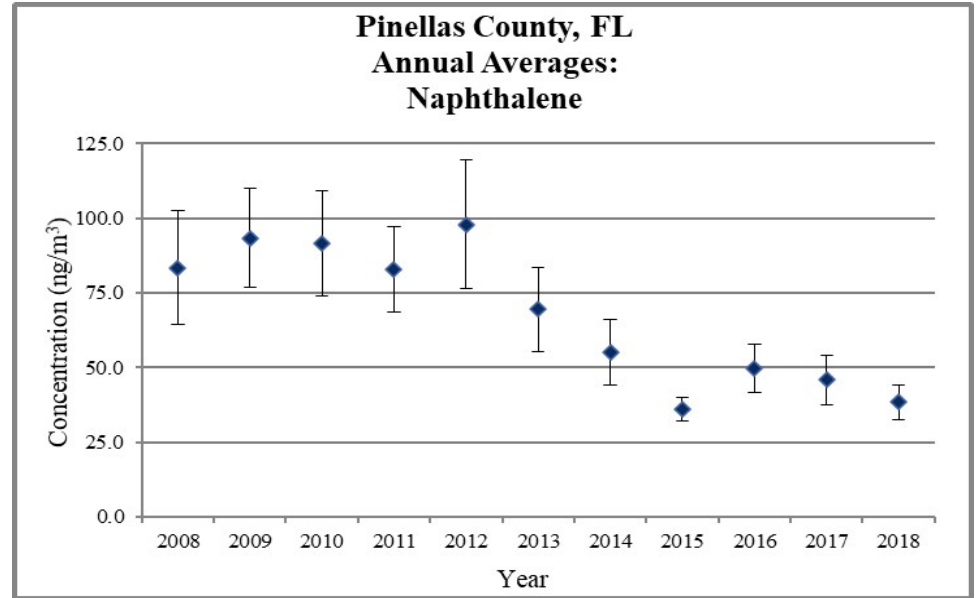
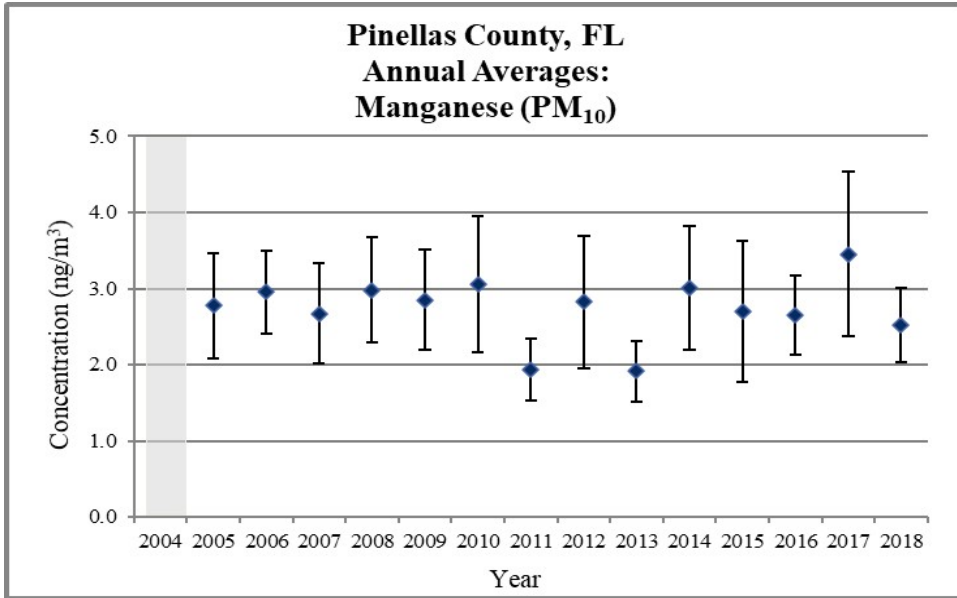
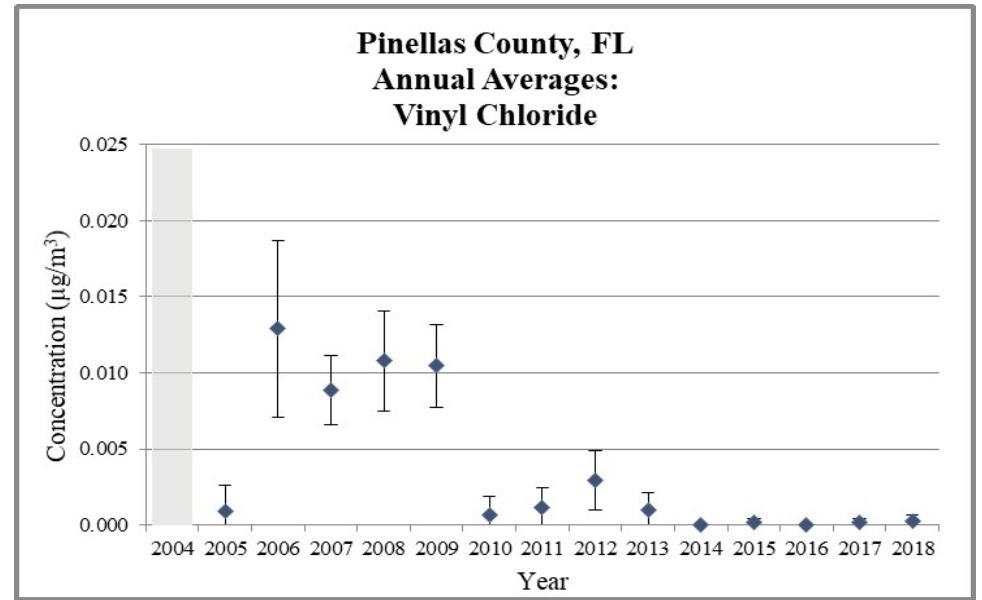
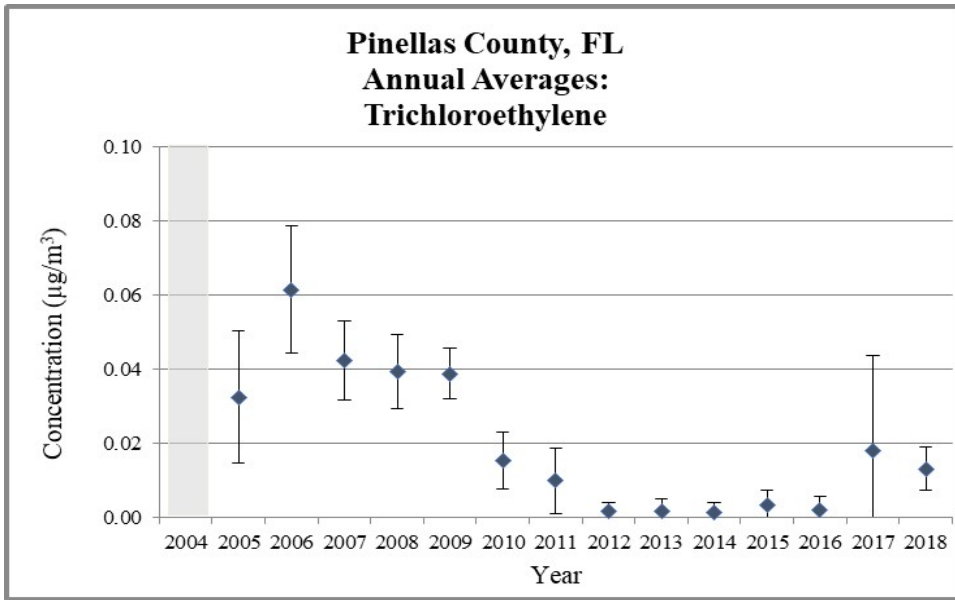


Figure 3. Pinellas County, FL Annual Average Concentrations



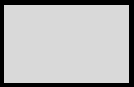
 Does not meet MQO

Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

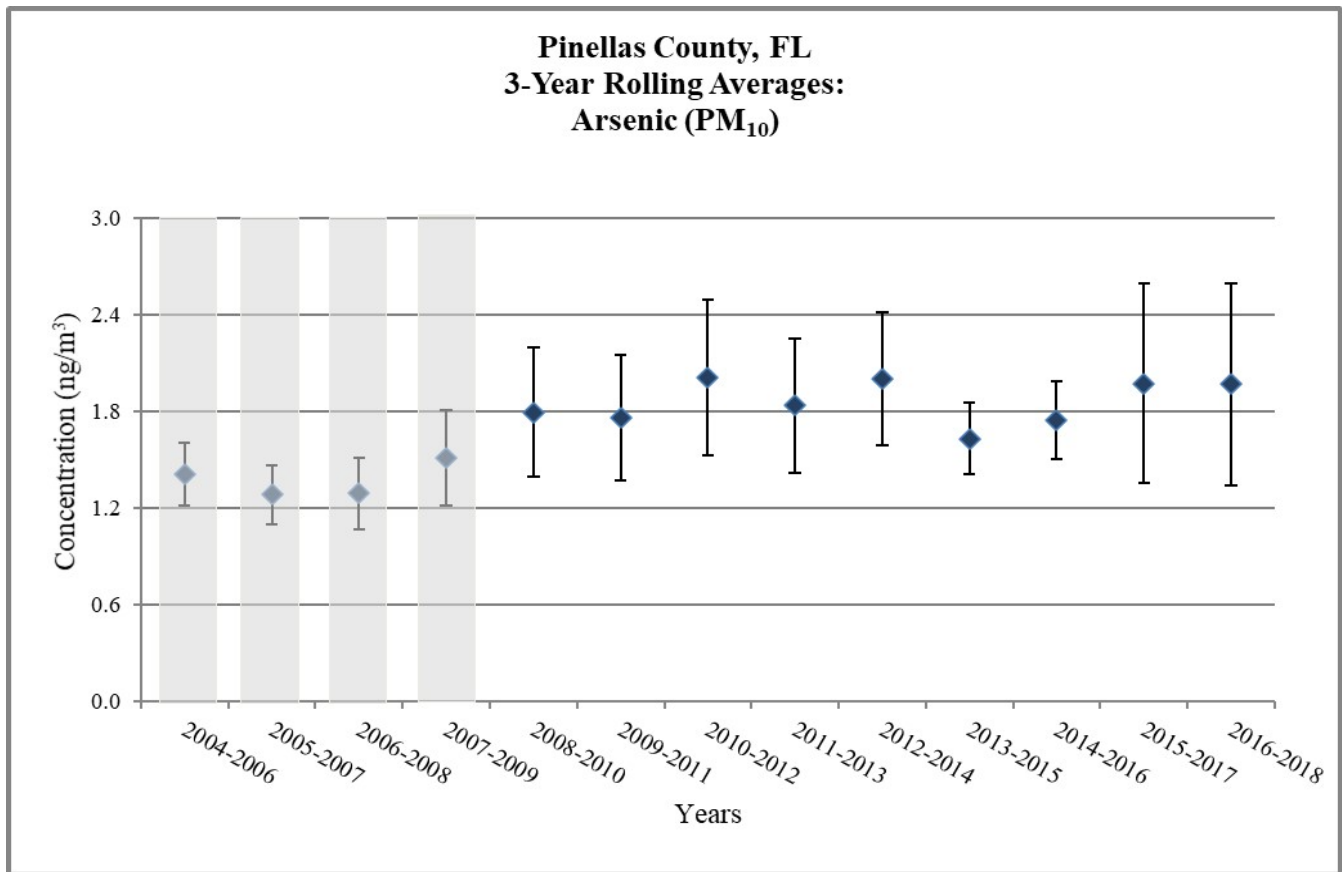
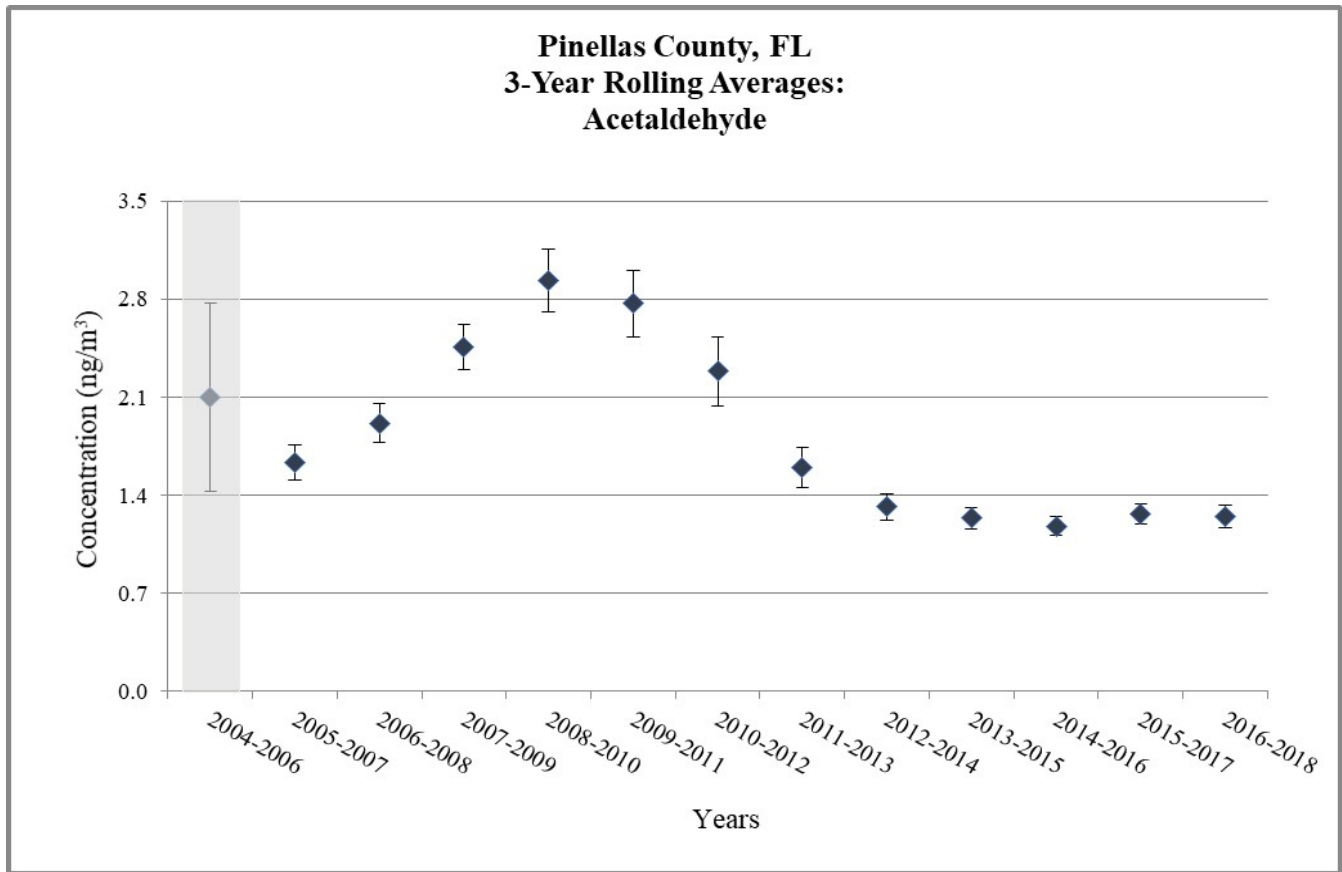


Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

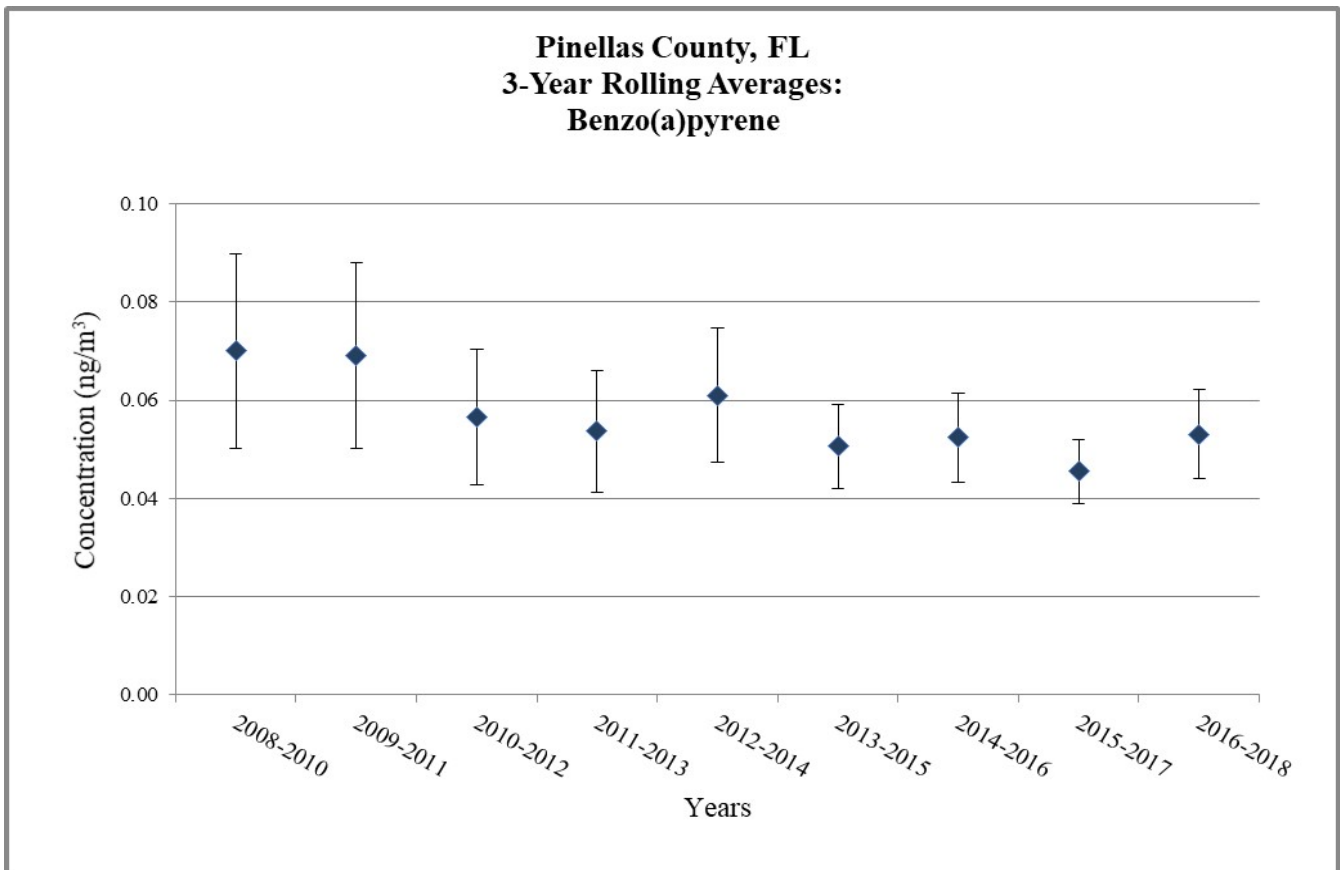
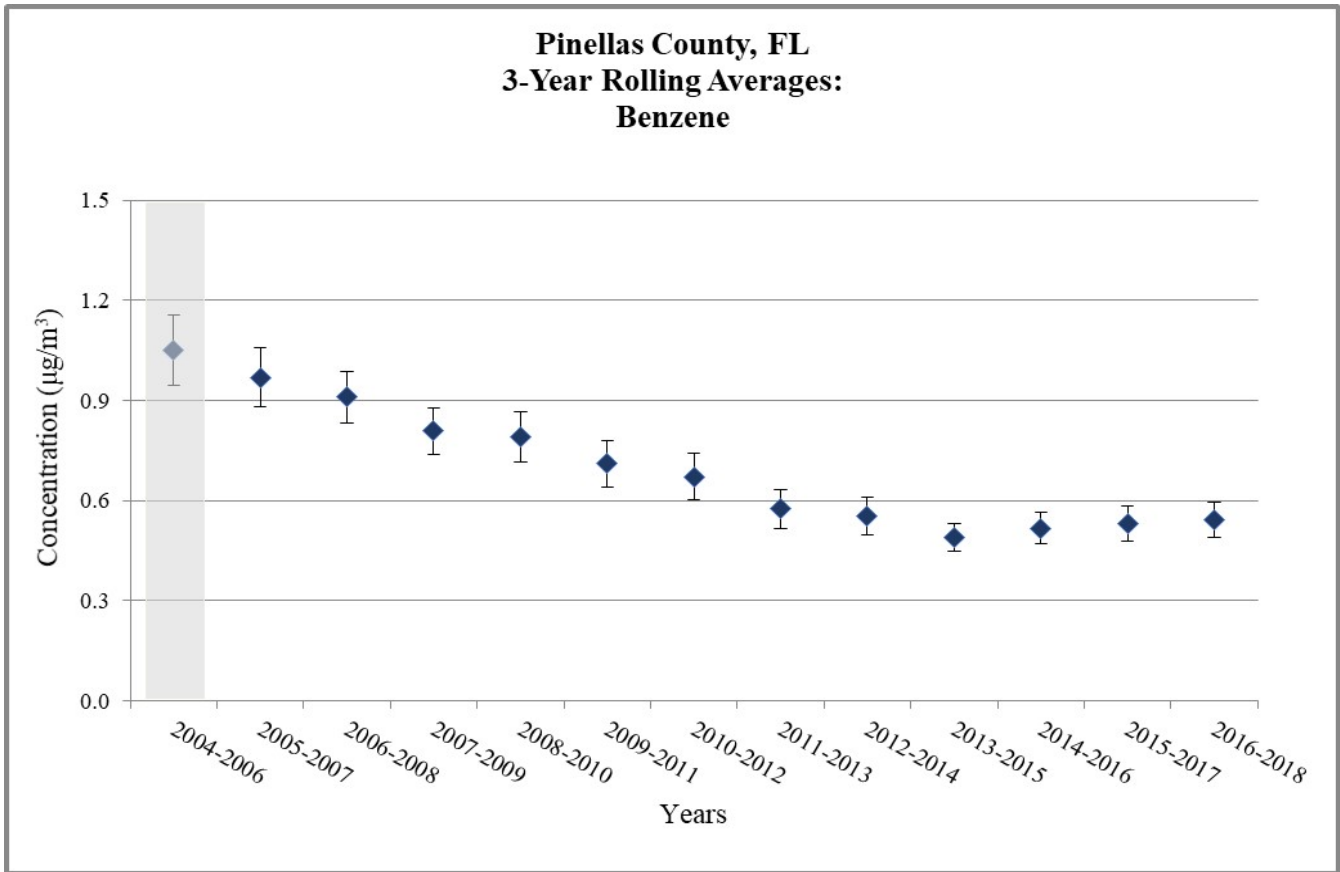


Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

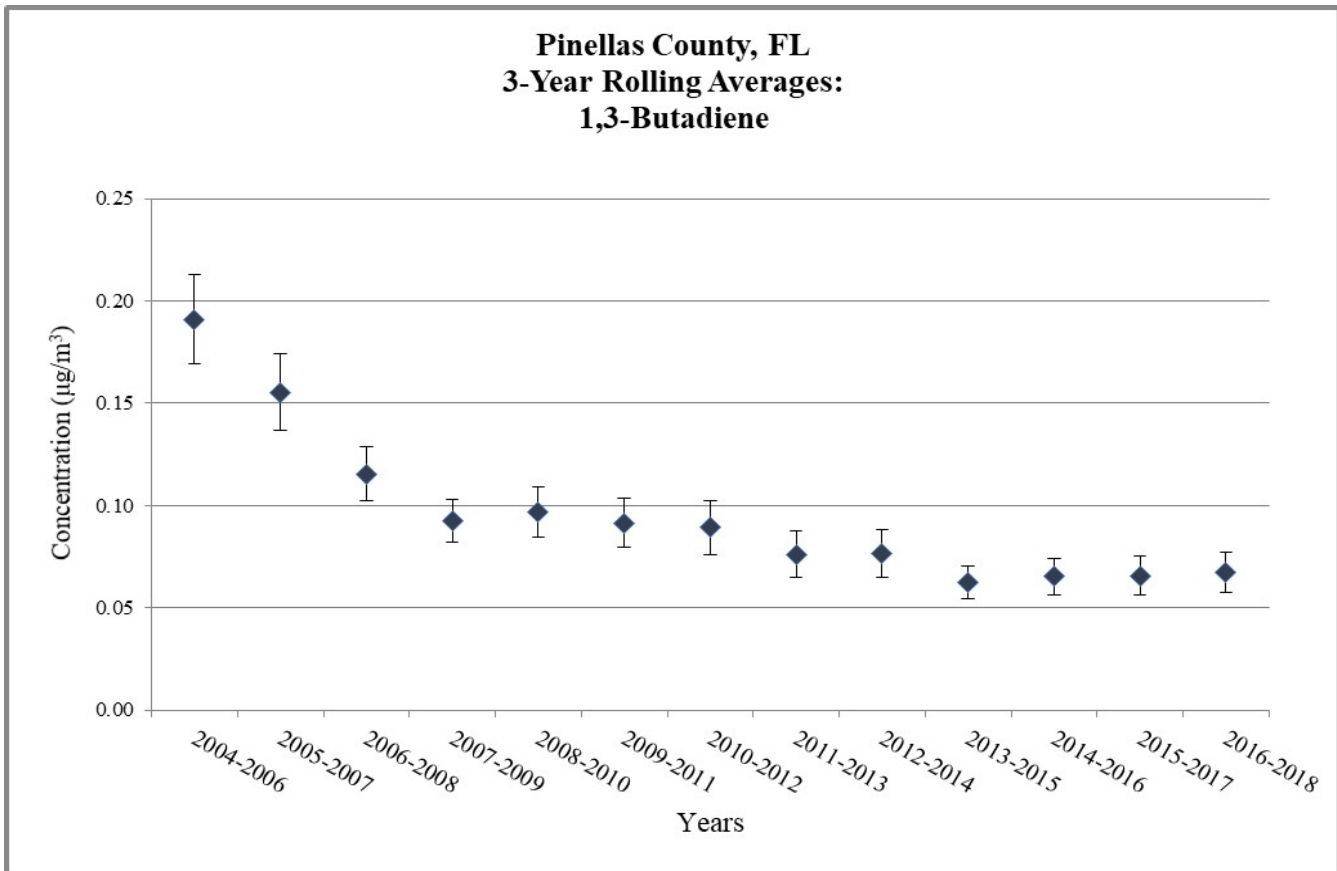
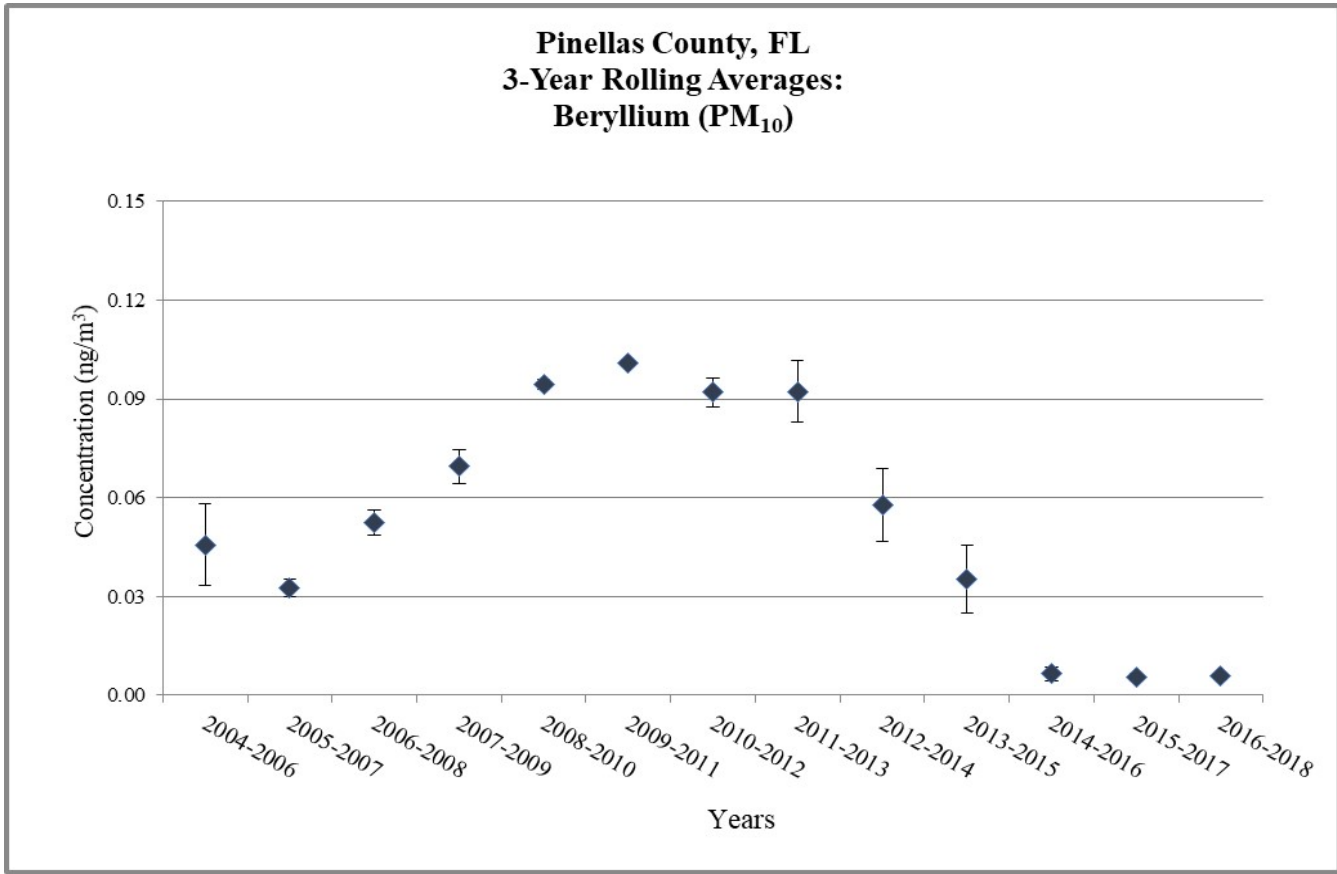


Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

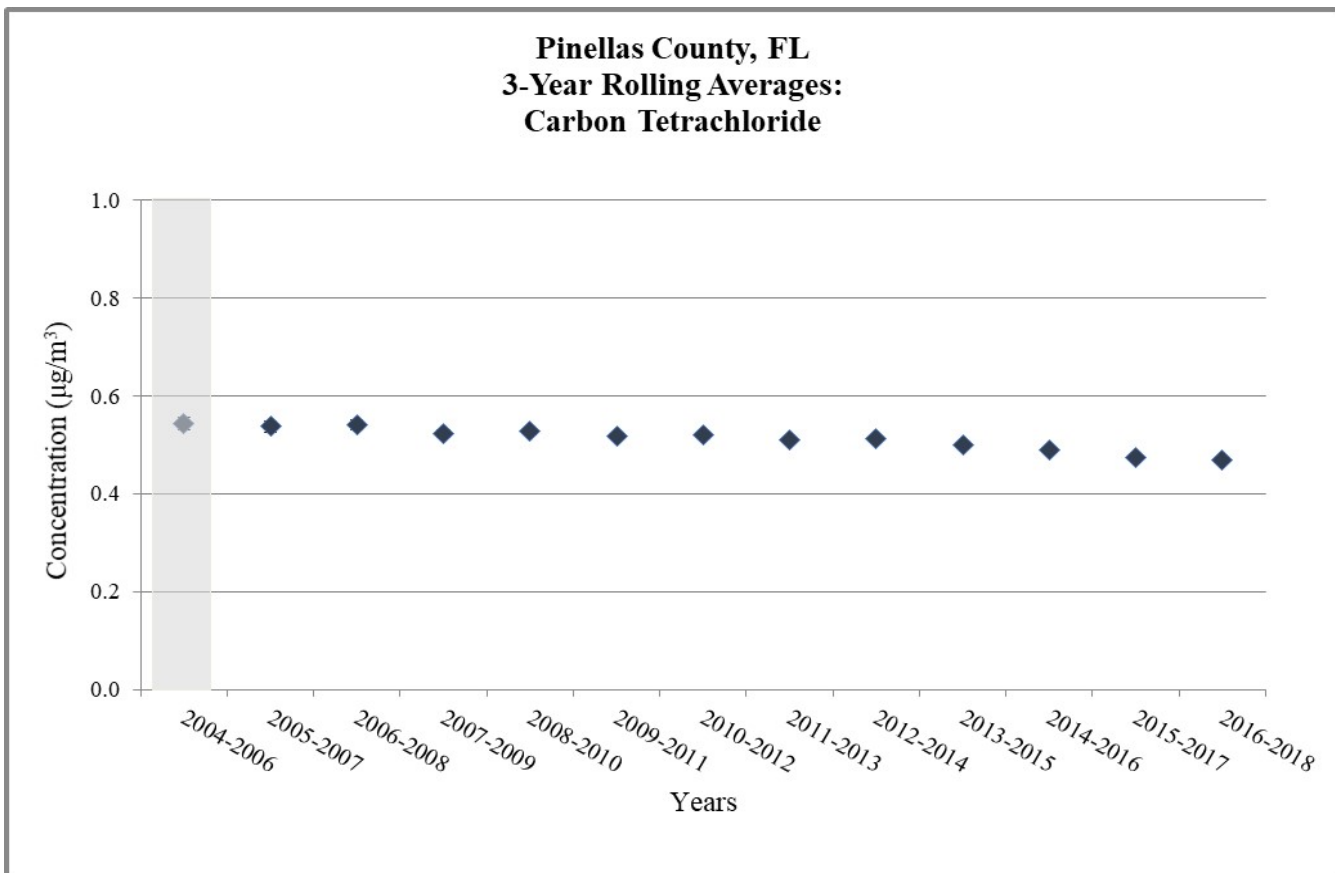
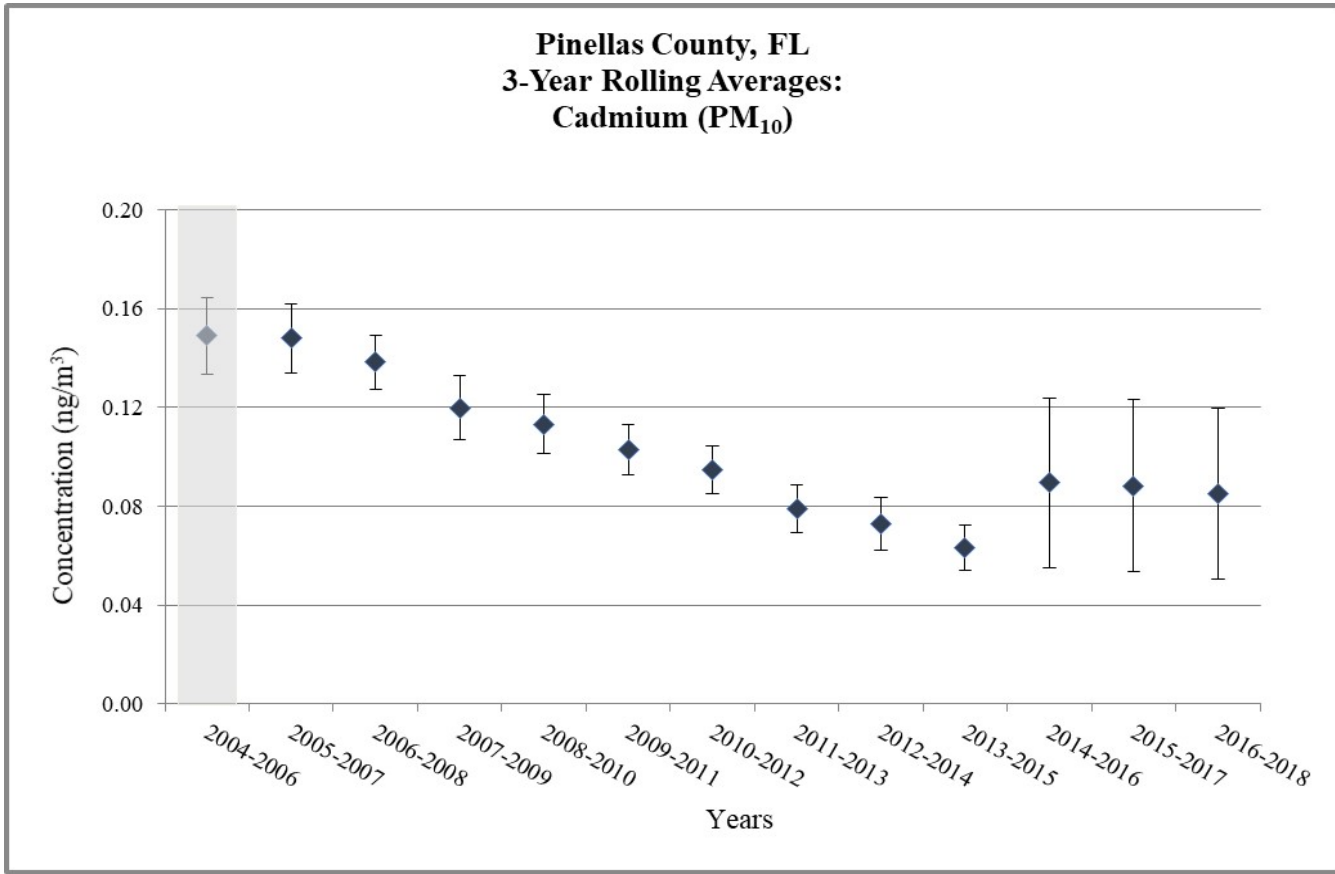


Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

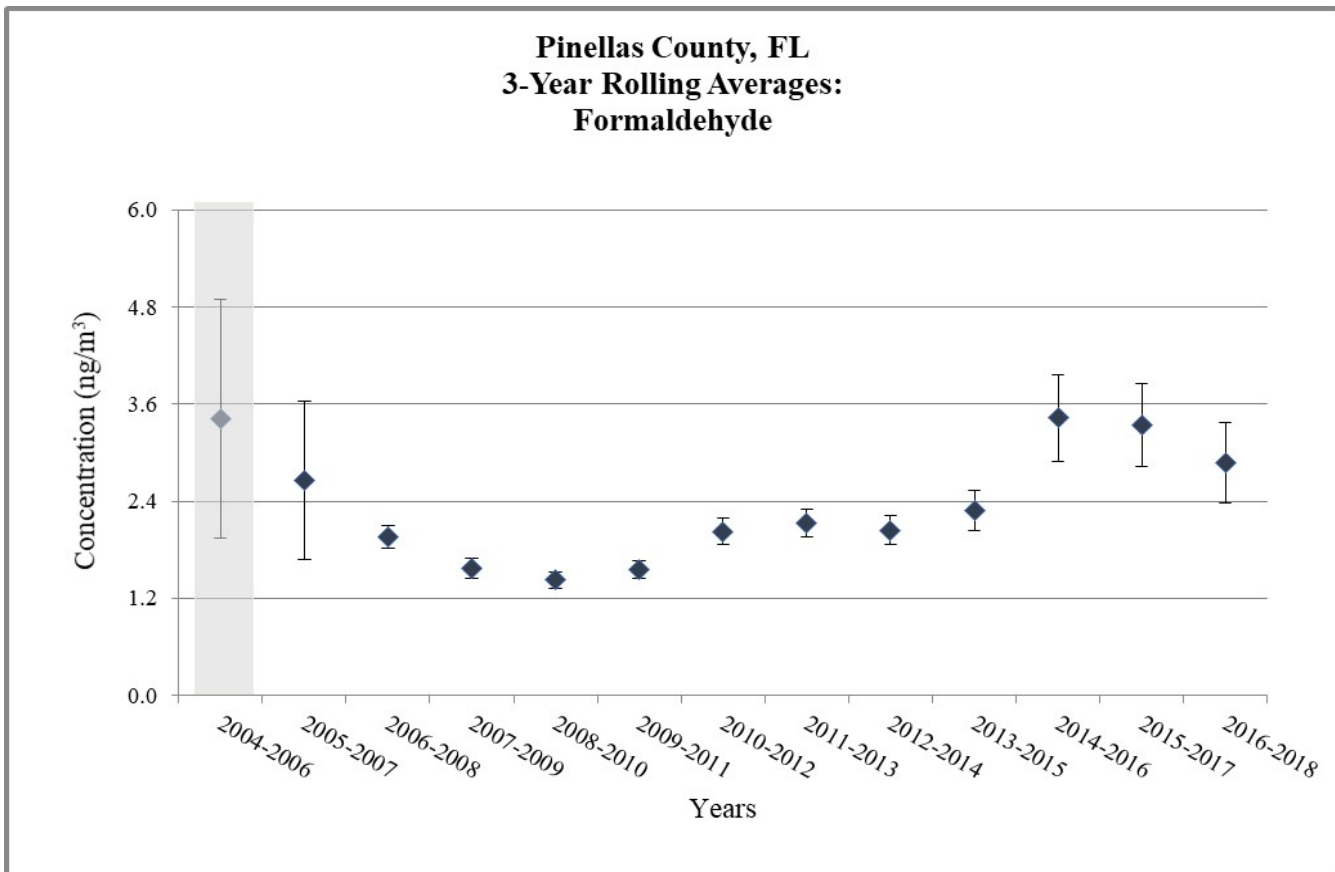
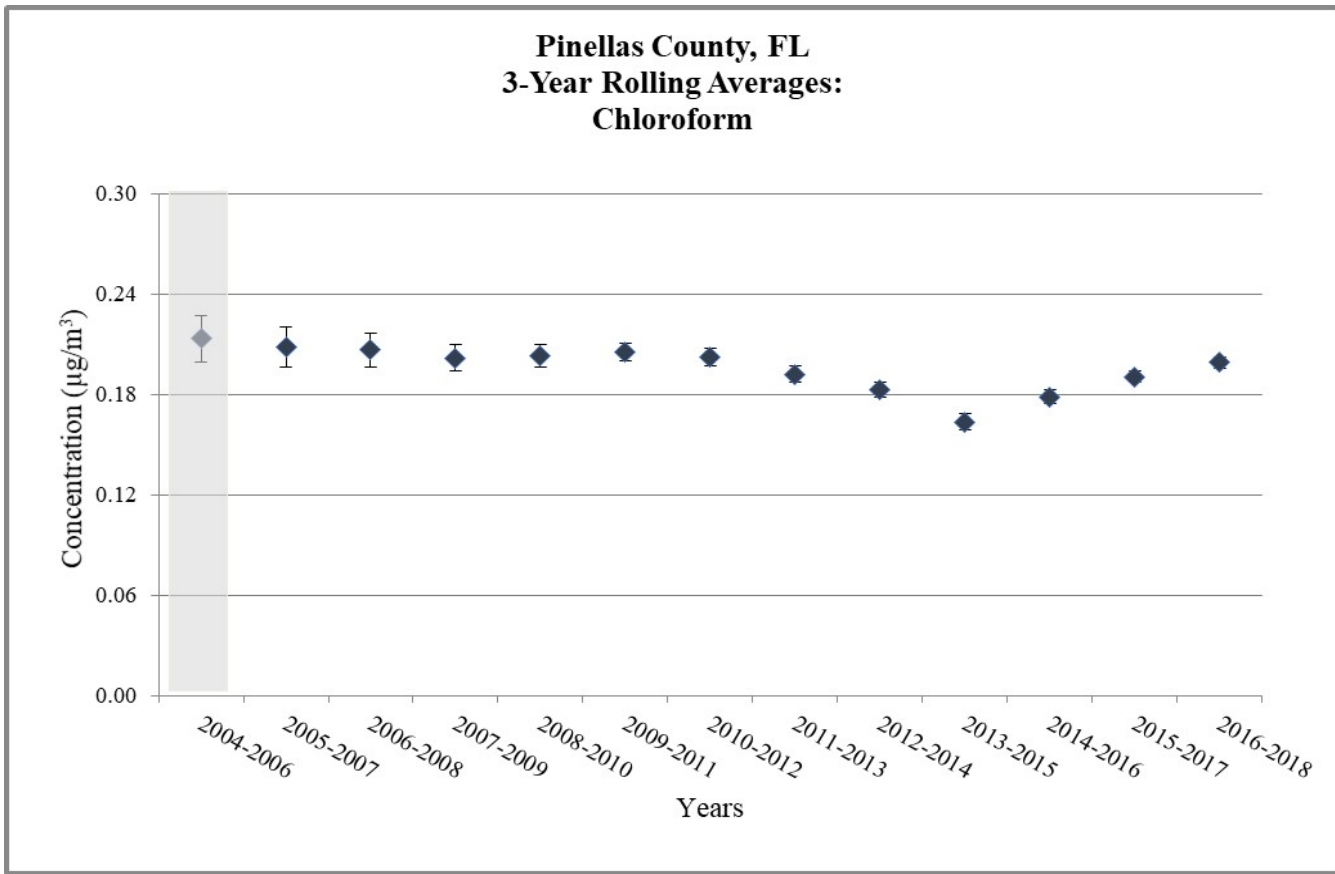




Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

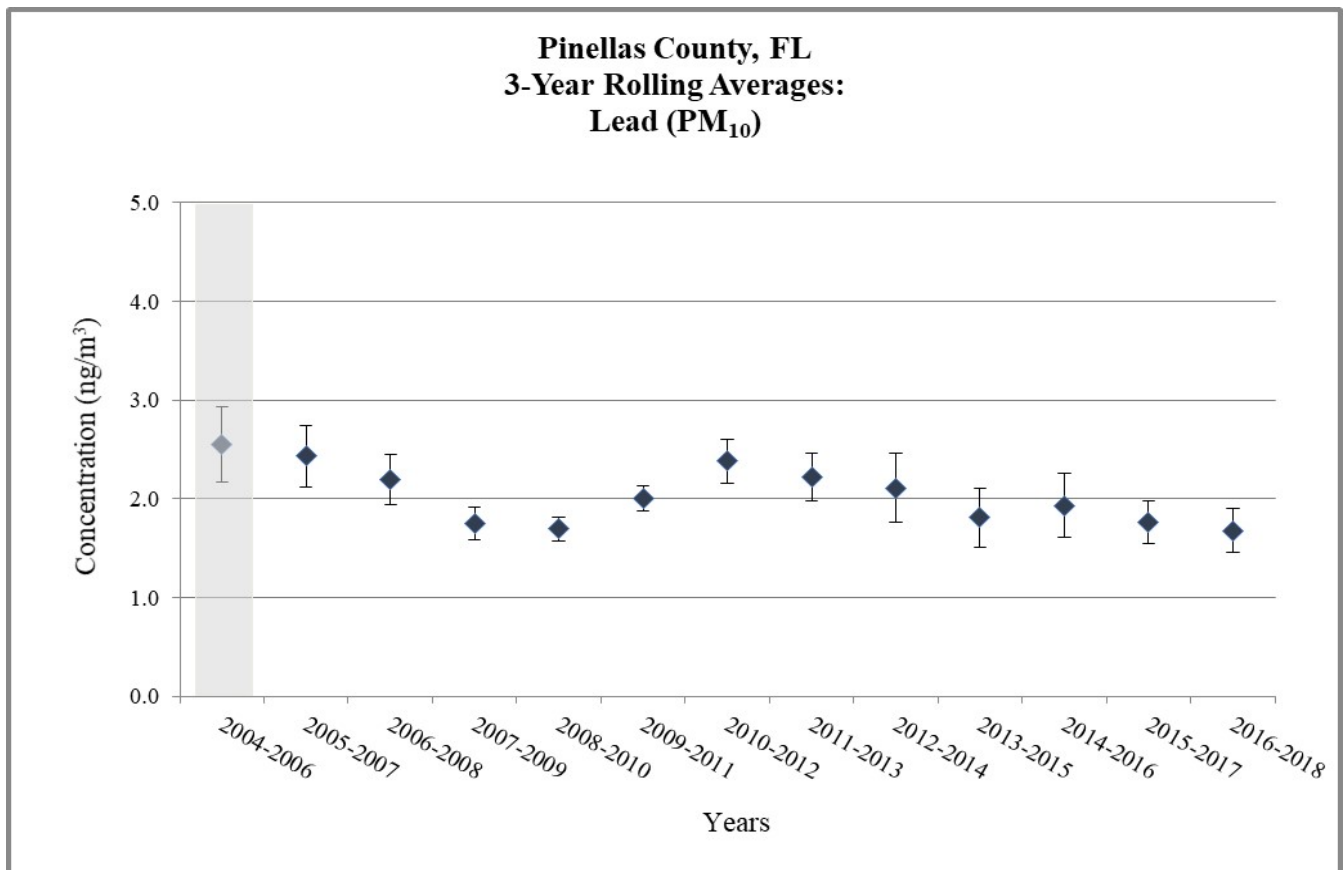
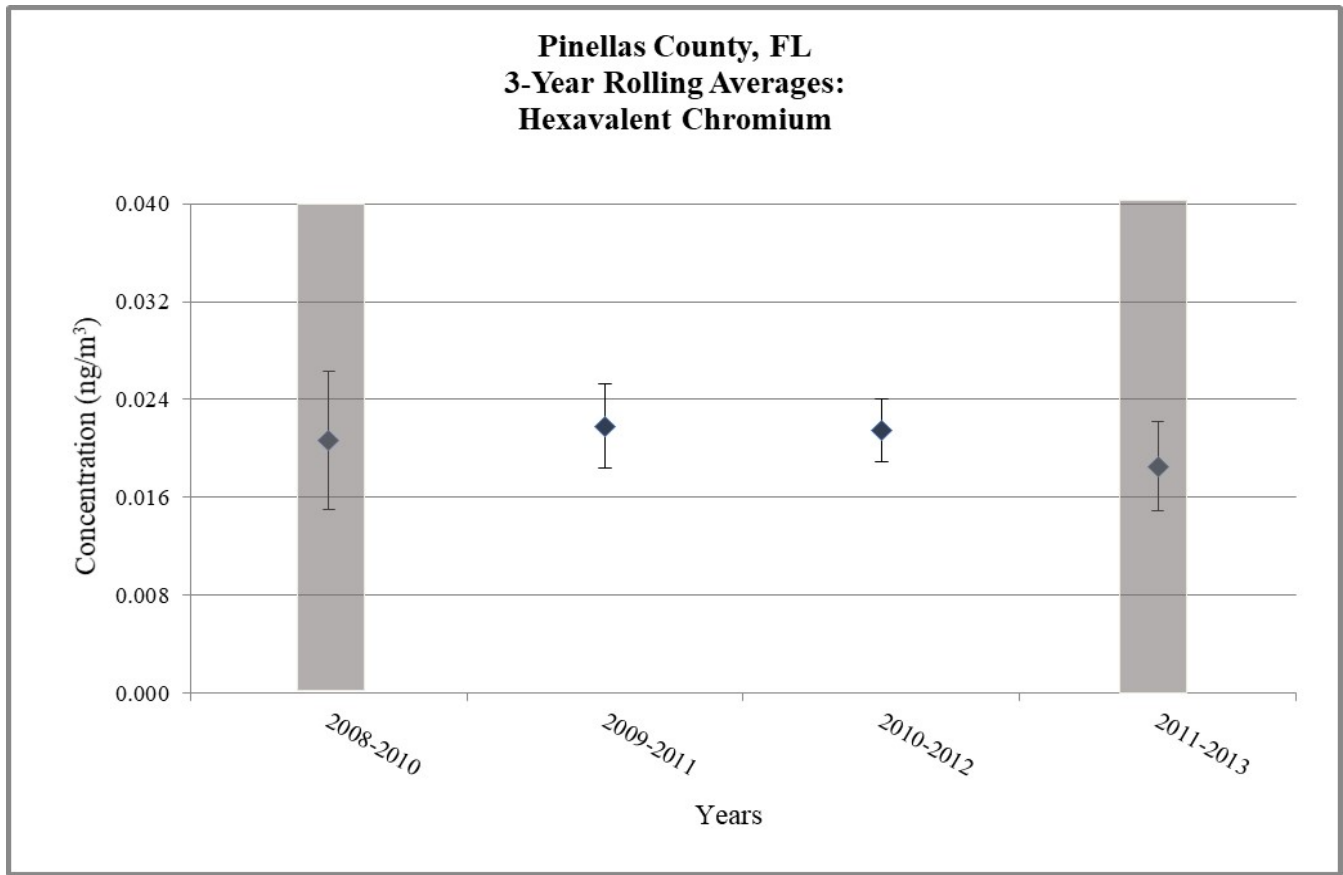


Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations

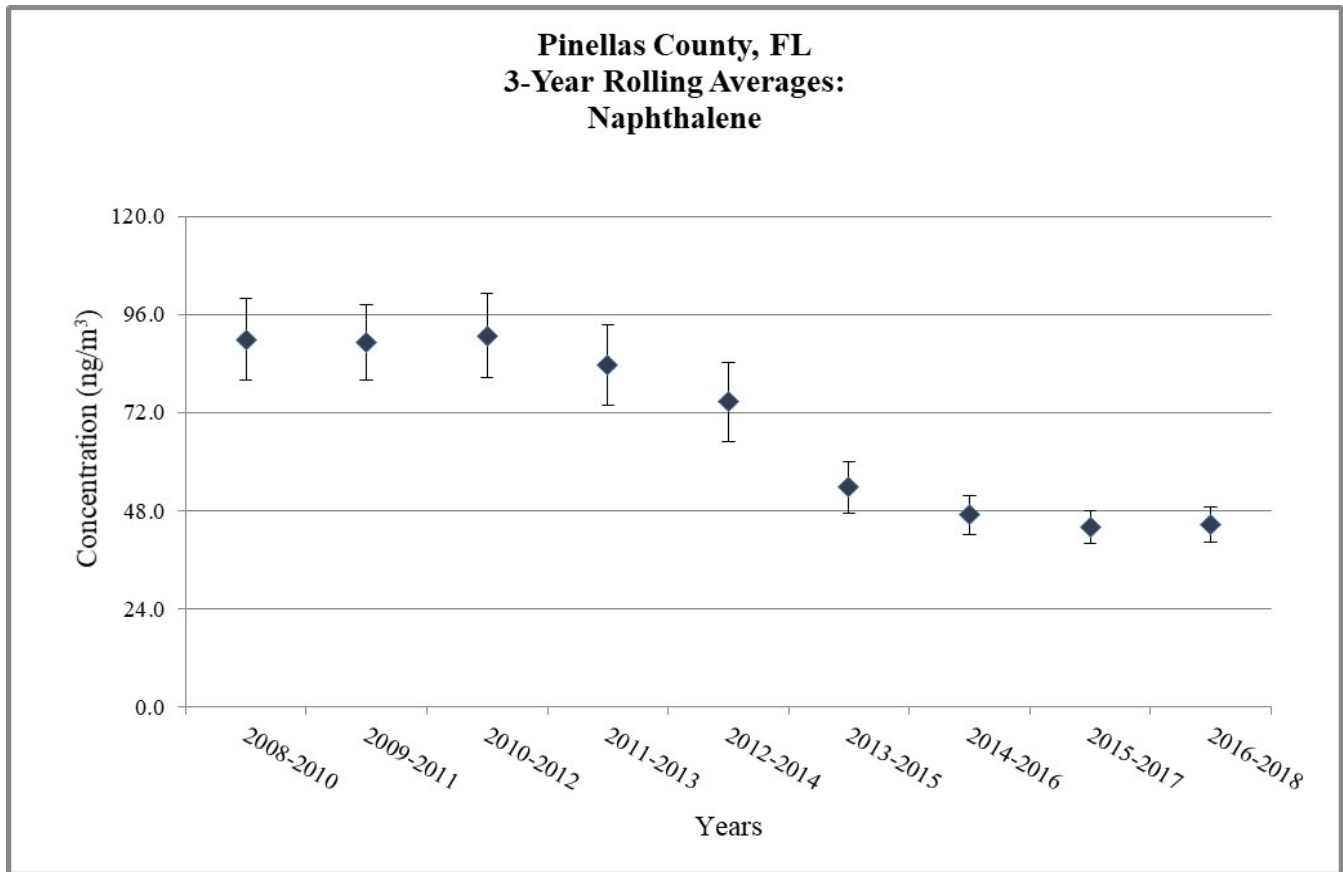
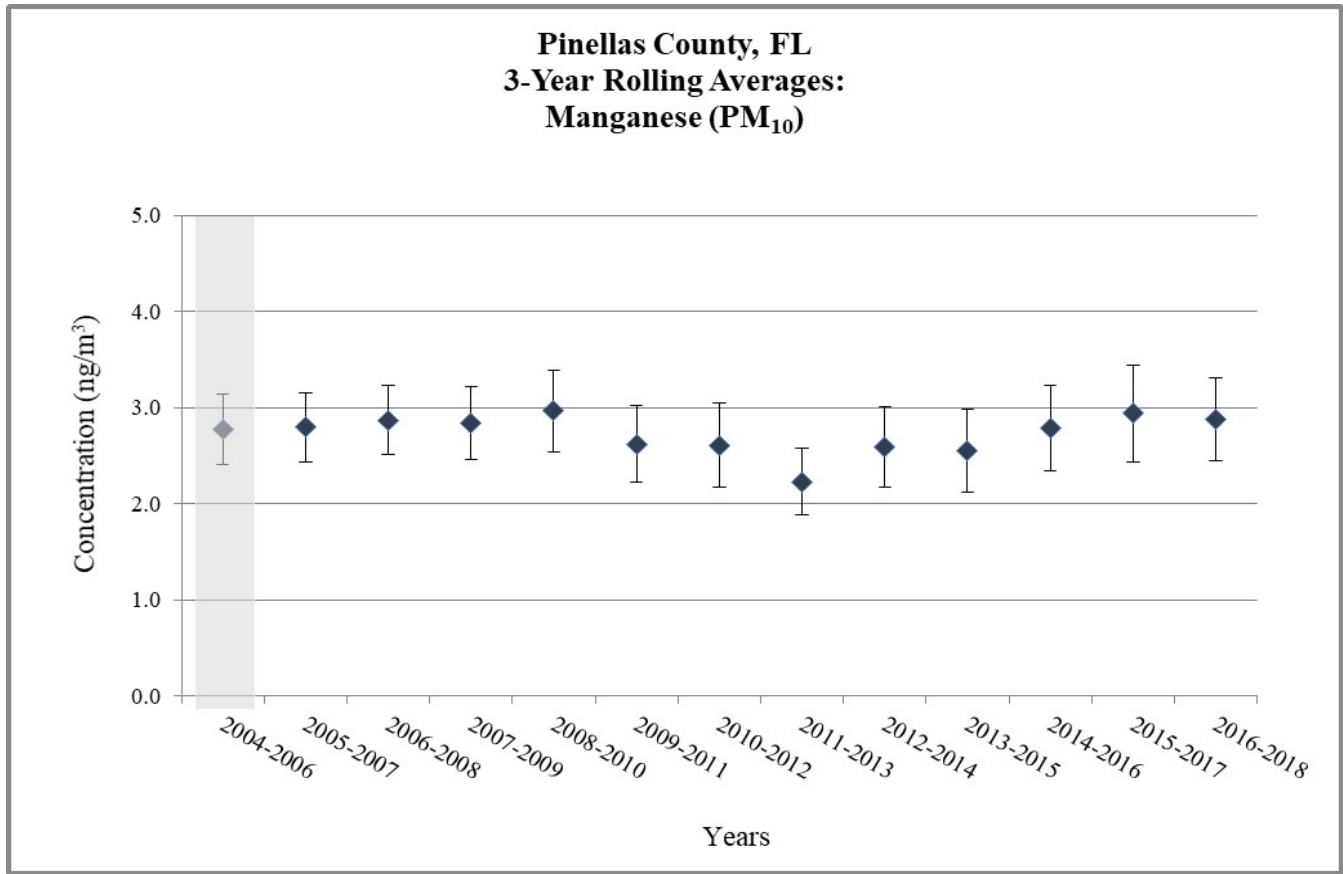
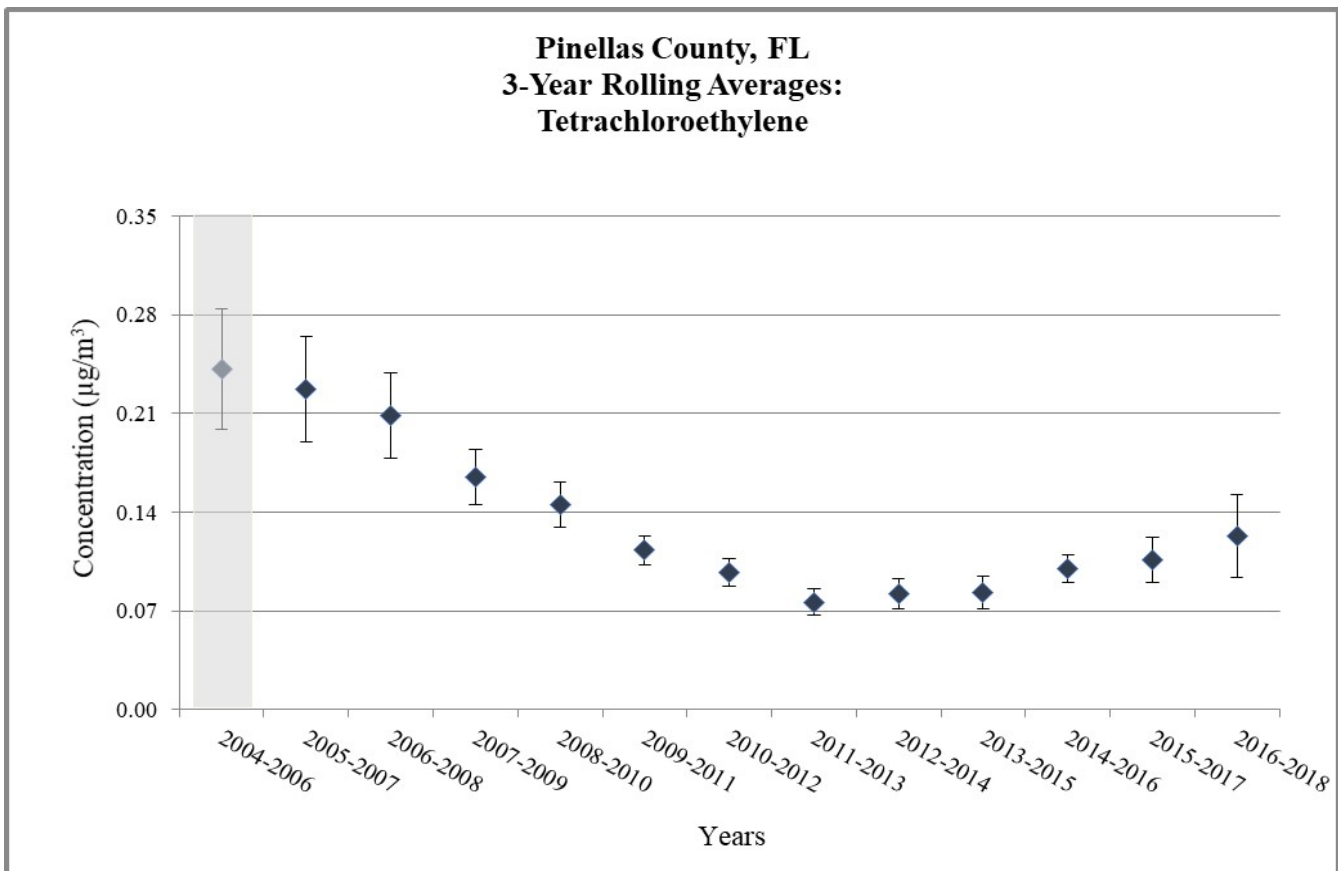
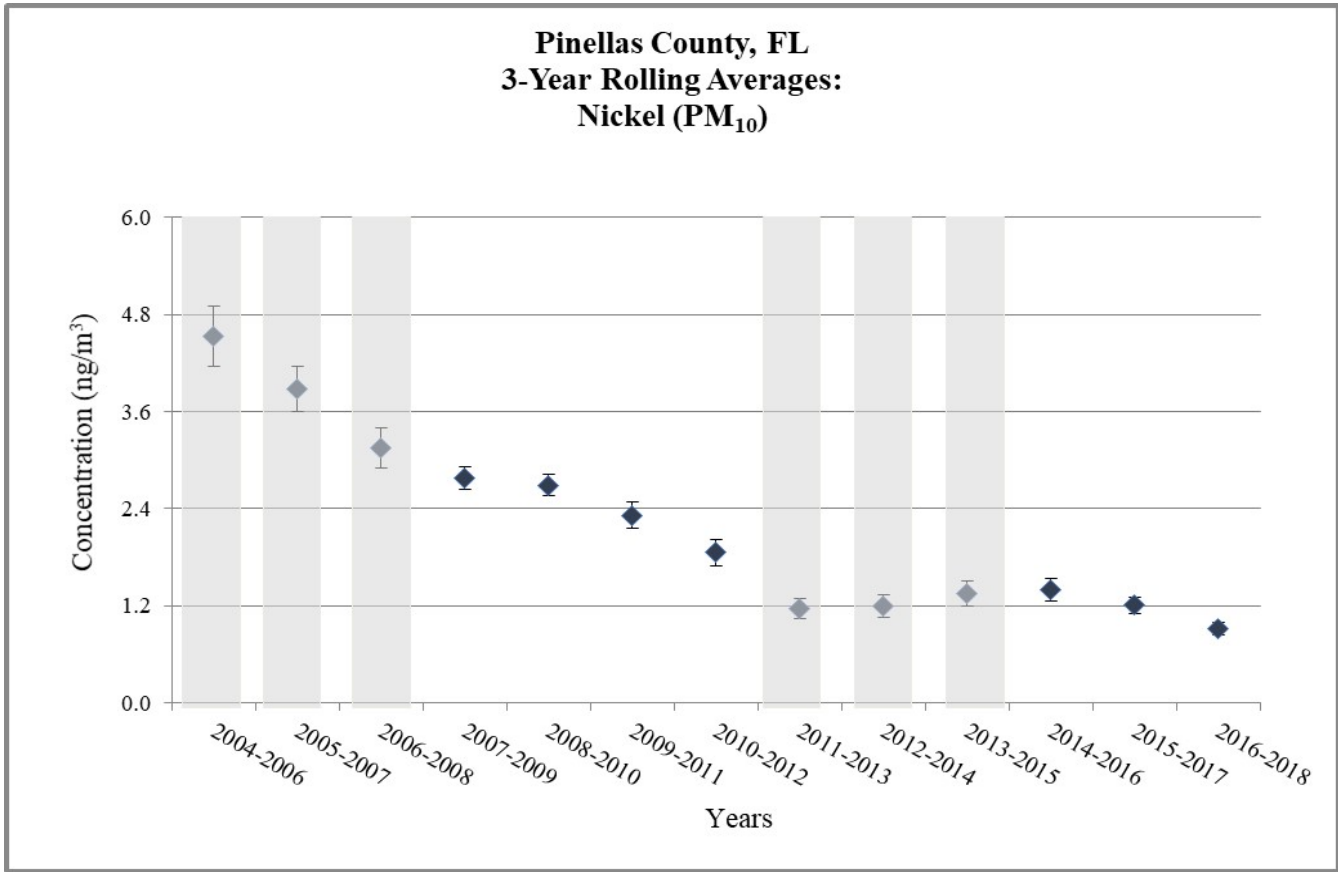
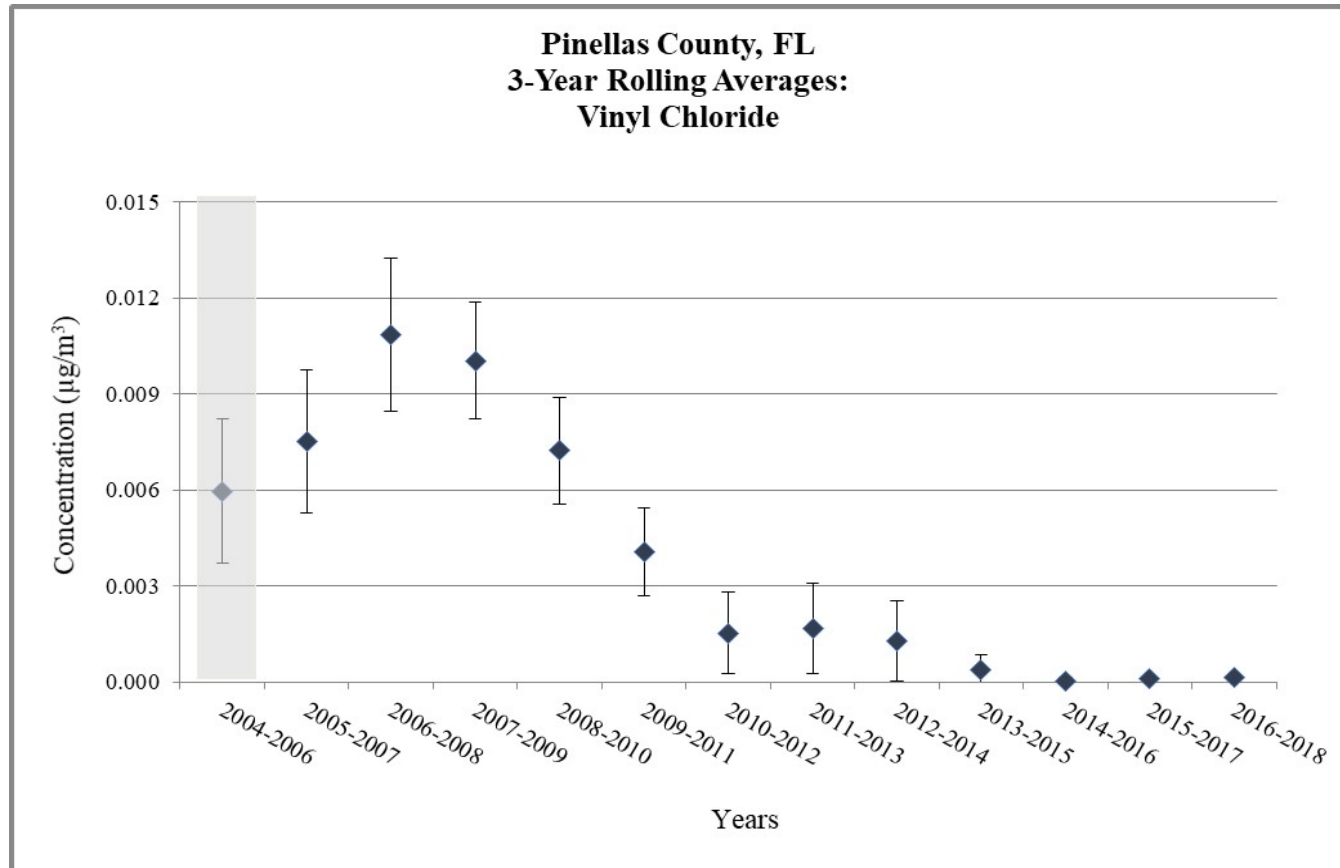
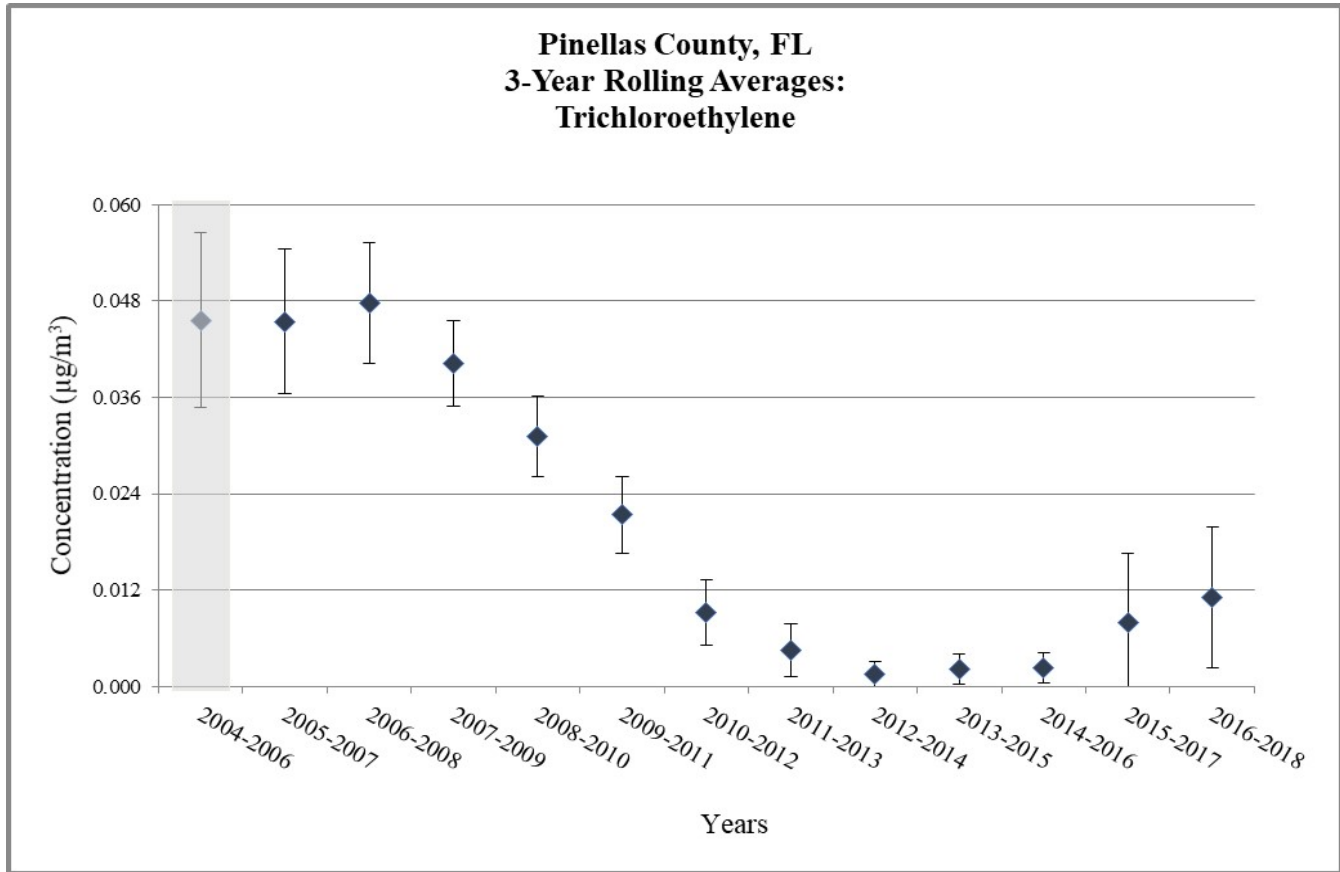


Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations



**Figure 4. Pinellas County, FL - 3-Year Rolling Average Concentrations**



Concentrations not included in Analysis

**Table 6. NATTS Network Assessment: MQO#1 - Completeness Percentage at Pinellas County, FL**

Pollutant Group	Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyl	Acetaldehyde	--	100	98	100	98	100	100	100	97	98	82	97	97	97	90
Carbonyl	Formaldehyde	--	100	98	100	98	100	100	100	97	98	82	97	97	97	90
Chromium VI	Chromium VI	--	--	--	--	--	100	100	102	98	--	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	98	100	97	100	100	97	95	98	97	93	100
PAH	Naphthalene	--	--	--	--	98	100	97	100	100	97	95	98	97	93	100
PM <sub>10</sub> Metals	Arsenic (PM <sub>10</sub> )	--	100	93	97	98	100	100	98	90	89	100	100	95	100	98
PM <sub>10</sub> Metals	Beryllium (PM <sub>10</sub> )	--	100	93	97	98	100	100	98	82	79	100	100	95	100	98
PM <sub>10</sub> Metals	Cadmium (PM <sub>10</sub> )	--	100	93	97	98	100	100	98	93	93	100	100	95	100	98
PM <sub>10</sub> Metals	Lead (PM <sub>10</sub> )	--	100	93	97	98	100	100	98	98	95	100	100	95	100	98
PM <sub>10</sub> Metals	Manganese (PM <sub>10</sub> )	--	100	93	97	98	100	100	98	98	95	100	100	95	100	98
PM <sub>10</sub> Metals	Nickel (PM <sub>10</sub> )	--	100	93	97	98	100	100	98	95	90	100	100	95	100	98
VOC	Benzene	--	100	98	100	98	100	102	100	93	95	100	97	98	97	95
VOC	Butadiene, 1,3-	--	100	98	100	98	100	102	100	93	95	100	97	98	97	95
VOC	Carbon tetrachloride	--	100	98	100	98	100	102	100	93	95	100	97	98	97	95
VOC	Chloroform	--	100	98	100	98	100	102	100	93	95	100	97	98	97	95
VOC	Tetrachloroethylene	--	100	98	98	98	100	102	100	93	95	100	97	98	97	95
VOC	Trichloroethylene	--	100	98	100	98	100	102	100	93	95	100	97	98	97	95
VOC	Vinyl chloride	--	100	98	100	98	100	102	100	93	95	100	97	98	97	95

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

**Table 7. NATTS Network Assessment: MQO#2 - Reported Method Detection Limits (MDLs) at Pinellas County, FL**

Pollutant Group	Pollutant Name	Target MDL	Units	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyl	Acetaldehyde	0.45	µg/m <sup>3</sup>	0.06	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.024	0.02	0.02	0.02	0.07	0.07
Carbonyl	Formaldehyde	0.98/0.08 <sup>a</sup>	µg/m <sup>3</sup>	0.021	0.019	0.006	0.006	0.011	0.009	0.004	0.01	0.01	0.17	0.14	0.15	0.12	0.60	0.67
Chromium VI	Chromium VI	0.08	ng/m <sup>3</sup>	--	--	--	--	0.08	0.05	0.01	0.05	0.04	0.05	--	--	--	--	--
PAH	Benzo(a)pyrene	0.91	ng/m <sup>3</sup>	--	--	--	--	0.07	0.06	0.04	0.05	0.06	0.06	0.02	0.11	0.05	0.02	0.01
PAH	Naphthalene	29.00	ng/m <sup>3</sup>	--	--	--	--	0.014	0.008	0.035	0.004	0.005	0.007	0.009	0.004	0.020	0.061	0.056
PM <sub>10</sub> Metals	Arsenic (PM <sub>10</sub> )	0.23	ng/m <sup>3</sup>	8.26	5.65	5.65	2.43	1.65	2.00	2.00	2.00	2.00	2.00	0.87	0.48	0.11	0.14	0.14
PM <sub>10</sub> Metals	Beryllium (PM <sub>10</sub> )	0.42	ng/m <sup>3</sup>	0.08	0.08	0.22	0.05	0.36	0.48	0.48	0.48	0.48	0.48	0.21	0.54	0.033	0.010	0.010
PM <sub>10</sub> Metals	Cadmium (PM <sub>10</sub> )	0.56	ng/m <sup>3</sup>	0.10	0.29	0.55	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.07	0.36	0.05	0.01	0.01
PM <sub>10</sub> Metals	Lead (PM <sub>10</sub> )	15.0	ng/m <sup>3</sup>	0.05	0.05	0.05	0.03	0.05	0.07	0.07	0.07	0.07	0.07	0.02	0.03	0.02	0.00	0.00
PM <sub>10</sub> Metals	Manganese (PM <sub>10</sub> )	5.0	ng/m <sup>3</sup>	0.02	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.02	0.02
PM <sub>10</sub> Metals	Nickel (PM <sub>10</sub> )	2.1	ng/m <sup>3</sup>	1.38	0.76	2.19	0.29	0.88	0.44	0.44	0.44	0.44	0.44	0.29	0.05	0.05	0.34	0.12
VOC	Benzene	0.13	µg/m <sup>3</sup>	0.49	0.49	0.49	0.47	0.27	0.49	0.10	0.22	0.15	0.10	0.17	0.05	0.05	0.15	0.27
VOC	Butadiene, 1,3-	0.10	µg/m <sup>3</sup>	0.66	0.66	0.88	0.86	0.44	0.53	0.15	0.33	0.29	0.24	0.20	0.22	0.11	0.07	0.38
VOC	Carbon tetrachloride	0.17	µg/m <sup>3</sup>	0.74	0.74	1.11	0.96	0.37	0.81	0.19	0.26	0.19	0.19	0.30	0.07	0.07	0.11	0.19
VOC	Chloroform	0.50	µg/m <sup>3</sup>	0.20	0.20	0.20	0.24	0.12	0.17	0.06	0.07	0.05	0.03	0.07	0.02	0.02	0.02	0.08
VOC	Tetrachloroethylene	0.17	µg/m <sup>3</sup>	0.80	0.80	0.80	1.12	0.24	0.72	0.20	0.20	0.16	0.16	0.24	0.08	0.12	0.24	0.12
VOC	Trichloroethylene	0.5/0.2 <sup>a</sup>	µg/m <sup>3</sup>	0.32	0.21	0.21	0.27	0.11	0.21	0.08	0.10	0.04	0.13	0.24	0.08	0.05	0.08	0.24
VOC	Vinyl chloride	0.11	µg/m <sup>3</sup>	0.70	0.70	0.93	0.91	0.51	0.46	0.14	0.37	0.30	0.26	0.28	0.09	0.14	0.12	0.19

	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

<sup>a</sup>: For the 2012 sampling year, the Target MDL for this pollutant was reduced.

**Table 8. NATTS Network Assessment: MQO#3 - Bias Percent Difference at Pinellas County, FL**

Pollutant Group	Pollutant Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	1.0	8.9	-0.8	-1.9	24.6	-10.1	0.7	3.0	a	0.1	-4.3	a	-5.4	3.6	-8.7
Carbonyls	Formaldehyde	-0.9	0.8	-13.2	-3.2	14.4	-7.8	-2.8	-3.4	a	-0.5	-2.2	a	-19.1	-5.3	-3.7
Chromium VI	Chromium VI	--	--	--	--	a	5.6 <sup>b</sup>	10.5 <sup>b</sup>	a	19.5	-6.5	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	a	-1.7	-2.3	-2.1	25.2	-5.7	-16.3	-14.2	-10.5	-22.4	-14.8
PAH	Naphthalene	--	--	--	--	a	-7.7	-17.1	-13.9	21.4	25.5	0.7	-11.4	-9.5	-11.6	-20.7
PM <sub>10</sub> Metals	Arsenic (PM <sub>10</sub> )	c	20.4	4.7	8.1	-2.8	12.5	1.0	24.7	3.1	-17.4	0.6	a	-1.8	-4.4	1.3
PM <sub>10</sub> Metals	Beryllium (PM <sub>10</sub> )	c	13.6	7.7	18.6	0.0	37.3	3.0	-7.0	9.3	23.1	d	a	2.1	-3.4	-1.1
PM <sub>10</sub> Metals	Cadmium (PM <sub>10</sub> )	c	11.2	1.6	4.1	1.2	24.1	0.0	-4.6	7.0	1.8	d	a	2.0	-2.0	3.1
PM <sub>10</sub> Metals	Lead (PM <sub>10</sub> )	c	4.6	-2.6	-6.1	-11.0	-3.8	-8.8	0.6	16.9	-20.5	0.5	a	1.9	-4.1	-3.8
PM <sub>10</sub> Metals	Manganese (PM <sub>10</sub> )	c	3.8	-1.4	-14.4	-27.8	4.8	-4.9	-1.1	13.8	-3.6	4.7	a	-0.3	-6.4	2.2
PM <sub>10</sub> Metals	Nickel (PM <sub>10</sub> )	c	13.7	14.9	-8.5	2.1	12.9	7.1	-5.4	21.9	-75.7	e	a	36.0	15.2	13.6
VOC	Benzene	-10.1	7.6	-6.0	-21.5	1.8	-9.1	-10.9	6.0	a	-0.5	2.1	-8.1	-4.8	-1.2	-2.9
VOC	Butadiene, 1,3-	-33.6	6.9	2.4	-8.5	17.1	-6.8	29.4	3.1	a	-3.2	-3.9	-6.0	-4.7	-2.0	-7.3
VOC	Carbon tetrachloride	-4.8	15.2	-6.6	-9.8	0.0	-9.6	-9.6	2.2	a	-6.3	2.6	3.3	10.5	-1.7	-8.6
VOC	Chloroform	-14.8	10.5	-8.8	-17.6	-7.0	-13.1	-16.6	-10.8	a	-6.0	1.1	-7.8	-5.1	-0.5	-3.3
VOC	Tetrachloroethylene	-9.9	-2.4	-15.4	-23.7	-15.9	-11.3	-23.5	8.4	a	-2.5	0.5	-15.5	-8.6	-0.5	-4.1
VOC	Trichloroethylene	-7.4	-4.4	23.9	-15.3	-4.7	-10.3	-17.1	-1.3	a	3.6	3.5	-16.7	-10.2	-1.9	1.3
VOC	Vinyl chloride	-23.5	-0.5	-2.8	-15.4	-11.4	-5.8	0.9	-2.1	a	-6.0	5.1	-6.4	-8.3	-6.3	-7.2

A-rated:±25%

B-rated: Between 25% to 35% or between -25% to -35%

Does not meet:>35% or <35%

-- No data available

<sup>a</sup>: No Proficiency Test samples were sent for this pollutant and year.

<sup>b</sup>: 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.

<sup>c</sup>: Pollutant was sampled at this site and year, but no bias data were reported.

<sup>d</sup>: The Proficiency Test sample for this pollutant was 0; the site reported a concentration as "< MDL", rather than 0. EPA accepted this result.is applied to these.

<sup>e</sup>: 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 Pinellas County, FL**

Pollutant Group	Pollutant Name	Overall Method precision % CV														
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	18.9	1.6	6.1	5.4	2.3	6.0	3.0	2.6	4.2	3.4	3.1	--	--	6.8	8.5
Carbonyls	Formaldehyde	15.4	5.4	6.1	2.7	3.8	4.6	1.9	2.6	5.3	14.9	3.4	--	--	8.2	12.9
Chromium VI	Chromium VI	--	--	--	--	9.3	7.5	15.9	10.8	21.0	82.4	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAH	Naphthalene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PM <sub>10</sub> Metals	Arsenic (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PM <sub>10</sub> Metals	Beryllium (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PM <sub>10</sub> Metals	Cadmium (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PM <sub>10</sub> Metals	Lead (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PM <sub>10</sub> Metals	Manganese (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PM <sub>10</sub> Metals	Nickel (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOC	Benzene	12.4	6.4	8.3	5.2	3.5	3.7	5.8	9.2	1.6	1.9	9.6	3.5	13.7	5.0	3.9
VOC	Butadiene, 1,3-	22.8	15.9	12.0	9.9	10.9	10.4	15.3	11.9	6.2	11.1	3.7	9.2	11.4	10.8	3.8
VOC	Carbon tetrachloride	10.5	10.3	9.1	5.3	6.3	5.0	3.8	3.5	1.8	2.1	4.5	1.8	2.8	1.7	2.5
VOC	Chloroform	15.9	13.4	13.7	15.0	6.9	26.2	14.3	10.2	8.3	4.7	10.5	2.5	20.9	3.1	4.7
VOC	Tetrachloroethylene	16.1	10.5	13.3	5.1	8.2	7.8	10.9	20.0	10.4	4.9	16.8	29.0	31.2	10.4	6.4
VOC	Trichloroethylene	a	0	0	0	4.8	6.4	8.9	a	--	a	8.8	0	0	0	a
VOC	Vinyl chloride	a	a	a	a	a	a	a	a	a	a	--	a	a	a	a

	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

<sup>a</sup>: 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 Pinellas County, FL**

Pollutant Group	Pollutant Name	Analytical Method precision % CV														
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	1.8	0.8	0.3	0.9	0.9	0.7	0.5	0.7	0.6	0.8	1.4	2.8	3.2	1.8	0.5
Carbonyls	Formaldehyde	1.3	2.2	0.6	1.0	0.6	1.2	1.0	0.6	1.6	1.9	2.2	2.7	3.6	0.5	0.6
Chromium VI	Chromium VI	--	--	--	--	8.3	5.6	11.7	7.1	3.4	7.9	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	--	--	--	--	3.7	a	4.4	a	a	1.3	1.9
PAH	Naphthalene	--	--	--	--	--	--	--	--	0.9	3.5	5.2	2.7	0.4	1.4	0.8
PM <sub>10</sub> Metals	Arsenic (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	b	b	b	b	5.6	2.8	3.8
PM <sub>10</sub> Metals	Beryllium (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	b	b	b	b	a	3.9	24.3
PM <sub>10</sub> Metals	Cadmium (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	b	b	b	b	9.6	7.0	3.6
PM <sub>10</sub> Metals	Lead (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	b	b	b	b	3.4	12.4	7.7
PM <sub>10</sub> Metals	Manganese (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	b	b	b	b	2.1	2.9	2.3
PM <sub>10</sub> Metals	Nickel (PM <sub>10</sub> )	--	--	--	--	--	--	--	--	b	b	b	b	20.8	18.0	3.3
VOC	Benzene	5.1	5.7	4.0	3.9	3.2	3.3	4.5	4.1	3.4	3.6	1.7	1.4	1.0	3.0	3.4
VOC	Butadiene, 1,3-	15.4	13.5	7.3	6.5	9.8	8.7	13.2	13.7	8.9	8.8	9.8	9.0	10.3	5.4	12.6
VOC	Carbon tetrachloride	8.2	9.1	4.8	5.8	3.5	3.5	3.7	3.2	1.6	3.4	3.8	1.4	1.3	2.0	2.6
VOC	Chloroform	11.1	13.6	10.2	8.9	5.2	11.2	11.7	7.3	7.2	5.4	7.4	4.0	2.5	5.5	5.3
VOC	Tetrachloroethylene	11.4	13.3	16.2	3.9	6.1	4.9	16.5	12.6	8.6	13.2	10.5	12.8	6.0	7.5	6.5
VOC	Trichloroethylene	a	16.2	18.4	0	11.4	a	7.7	93.4	b	a	0	16.8	0	15.1	14.1
VOC	Vinyl chloride	a	a	a	a	a	a	15.7	a	a	a	a	a	a	a	a

	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

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

<sup>b</sup>: Per the NATTS Workplan template, analytical replicates were required to be reported to AQS for this sampling year

**Appendix A. Equipment Inventory**

<b>Pollutant Type</b>	<b>Year(s)</b>	<b>Manufacturer/Model, Extraction Type, and Year</b>
<b><i>Sampling Equipment</i></b>		
Carbonyls	2004	ERG custom-made Model C (Year Deployed: 2004)
	2005-2015	ERG custom-made Model C-4 (Year Deployed: 2004)
	2016-2018	ERG custom-made Model C-17 (Year Deployed: 2016)
Chromium VI	2008-2010	ERG Chromium VI sampler (Year Deployed: 2008)
	2011-2013	ERG Chromium VI sampler (2 units) (Year Deployed: 2008)
PAHs	2008-2015	Tisch Environmental TE-1000 PUF Sampler (Year Deployed: 2008)
	2016-2018	Tisch PUF Hi-Vol (Year Deployed: 2016)
PM <sub>10</sub> Metals	2004-2010	Andersen Hi-Volume PM10 Sampler (Year Deployed: 1992)
	2011-2015	General Metal Works Model SSI PM10 Sampler (Year Deployed: 2003)
	2016-2018	General Metal Works Hi-Vol (Year Deployed: 2016)
VOCs	2004-2010	Custom-built (Year Deployed: 2001)
	2011-2017	Custom-built Veriflo model SC423XL (Year Deployed: 2004)
	2018	ATEC 2200 (Year Deployed: 2018)
<b><i>Analytical Equipment</i></b>		
Carbonyls	2004-2017	Waters Alliance 2695 HPLC /model 2487 Dual Absorbance (Year Deployed: 2003)
	2018	Waters Alliance e2695 HPLC /model 2489 Dual Absorbance UV/Vis (Year Deployed: 2018)
Chromium VI	2008-2013	Dionex 300 ion chromatography system (Year Deployed: 2001)
PAHs	2008-2013	HP/Agilent 5890/5971 GC/MS (Year Deployed: 2008)
	2014-2018	HP/Agilent 7890B/5975C GC/MS (Year Deployed: 2014)
PM <sub>10</sub> Metals	2004-2013	PE Optima 2000 ICP-OES (Year Deployed: 2001)
	2014-2018	Perkin-Elmer NexION 300X ICP-MS (Year Deployed: 2014)
VOCs	2004-2013	HP/Agilent 6890/5973 GC/MS (Year Deployed: 2001)
	2014-2015	HP/Agilent 7890/5975 GC/MS (Year Deployed: 2014)
	2016-2018	Agilent 7890A/5975C GC/MS (Year Deployed: 2016)
<b><i>Preconcentrator Equipment</i></b>		
VOCs	2004-2005	Entech 7100 (Dynamic Dilution) (Year Deployed: 2001)
	2006-2013	Entech 7100A (Year Deployed: 2006)
	2014-2018	Entech 7200 (Year Deployed: 2014)
<b><i>Standards Preparation Equipment</i></b>		
VOCs	2004-2006	Ashcroft pressure gauge (Pressure Dilution) (Year Deployed: 2003)
	2007-2018	Heise Digital Gauge (dynamic dilution) (Year Deployed: 2007)
<b><i>Canister Cleaning Equipment</i></b>		
VOCs	2004	Entech 3000 (Hot) (Year Deployed: 1997)
	2005-2015	Entech 3100A (Hot) (Year Deployed: 2005)
	2016-2018	Entech 3100 (Hot) (Year Deployed: 2005)
<b><i>PM<sub>10</sub> Extraction Equipment</i></b>		
PM <sub>10</sub> Metals	2004-2006	Thermolyne 2200 (Hotblock) (Year Deployed: 2006)
	2007-2018	SCP Digiprep (Hotblock) (Year Deployed: 2006)
<b><i>Chromium VI Extraction Equipment</i></b>		
Chromium VI	2008-2010	Branson 8510 (Sonicator) (Year Deployed: 2001)
	2011-2011	Branson 8510 Sonicator/ Branson Shaker (Year Deployed: 2001/2011)
	2012-2013	Branson Shaker (Year Deployed: 2011)
<b><i>PAHs Extraction Equipment</i></b>		
PAHs	2008-2018	Dionex -300 (ASE) (Year Deployed: 2004)