

Chesterfield, SC NATTS Network Assessment Review

- Established 2004: Carbonyls, PM₁₀ Metals, and VOCs
 - Chromium VI added in 2005; ended in in 2013
 - PAHs added in 2008
- For the NATTS Network Assessment (2004-2018):
 - 6 of 18 Method Quality Objective (MQO) Core HAPs were included in the national trends
 - Acetaldehyde, Benzo(a)pyrene, Formaldehyde, and Naphthalene: Completeness less than 75% for 2018.
 - Benzene: Reported MDL to NATTS Target MDL ratio greater than 2.0
 - 1,3-Butadiene, Carbon Tetrachloride, Manganese (PM₁₀), Tetrachloroethylene, Trichloroethylene, and Vinyl Chloride: Reported MDL to NATTS Target MDL ratio greater than 2.0, Bias % Difference was outside of ±35%, and Precision PCT CV was greater than 25%.
 - Chloroform: Bias % Difference was outside of ±35%
 - 185 of 248 pollutant datasets were suitable for trends analysis.
 - Annual Average and 3-Year Rolling Average Concentrations were generally flat over time, with the exception of some pollutants (benzene and naphthalene)
 - 100% Reporting of Datasets
- Method Quality Objectives (MQO): 2004-2018
 - Completeness: Met 85% completeness in 237 of 248 pollutant datasets
 - Method Detection Limits: Met MDL Target Ratio of 1.00 in 174 of 256 pollutant datasets
 - Bias: Met ±25% for 174 of 220 pollutant datasets
 - Overall Method Precision: Met ≤15% CV for 51 of 157 pollutant datasets
 - Analytical Method Precision: Met ≤15% CV for 20 of 98 pollutant datasets
- Analytical Laboratories for 2018

VOC	Carbonyl	PM ₁₀ Metals	Chromium VI	PAHs
SCDHEC	SCDHEC	SCDHEC	NA	SCDHEC

- Equipment Year Deployed

Equipment Type	VOC	Carbonyl	PM ₁₀ Metals	Chromium VI	PAHs
Sampler	2001	2018	1989	2008	2001
Analytical	2016	2003	2015	2001	2000
Preconcentrator	2015	NA	NA	NA	NA
Standards Preparation	2014	NA	NA	NA	NA
Canister Cleaning	2018	NA	NA	NA	NA
Extraction	NA	NA	2011	2011	2015

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

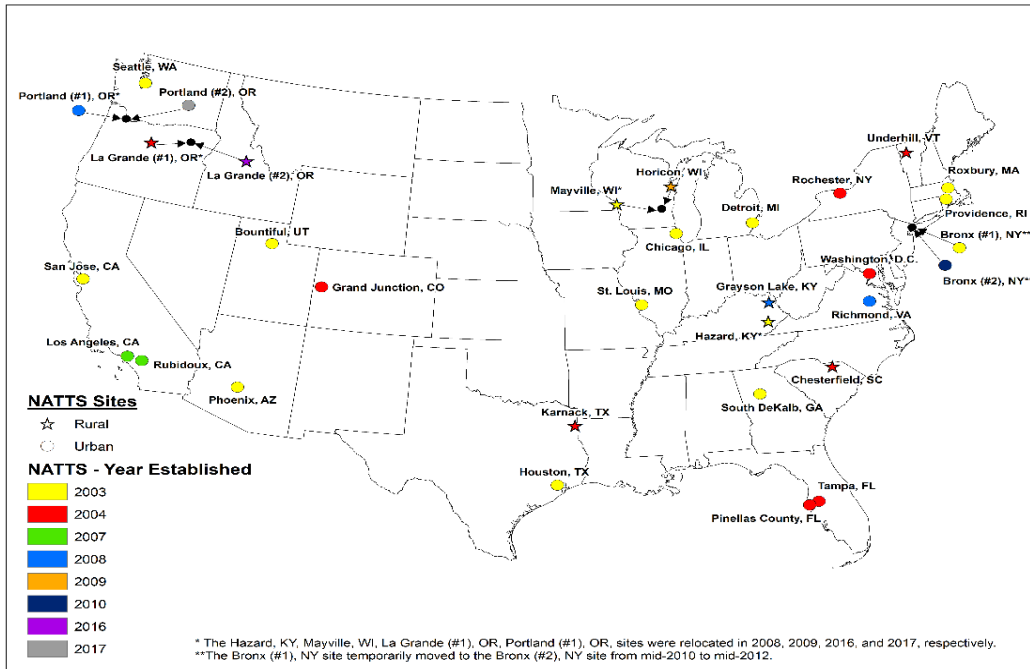


Table 1. NATTS Network Assessment: Count and Percentage of Suitable Datasets by Pollutant Group

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 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

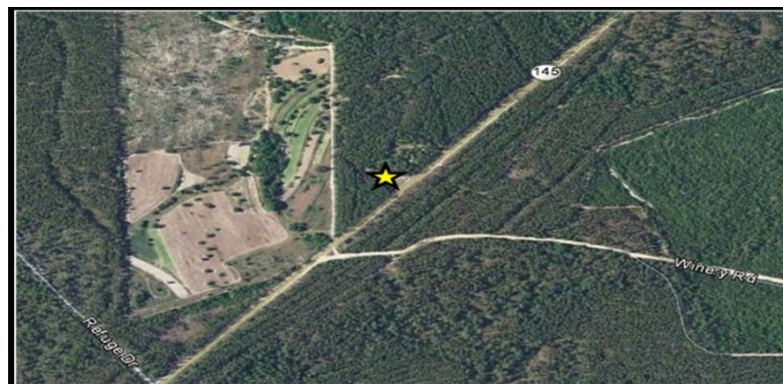
Pollutant	Units	# Sites	Block 1	Block 2	% Difference
Acetaldehyde	µg/m ³	19	1.51	1.39	-7.7%
Arsenic (PM ₁₀)	ng/m ³	21	0.71	0.68	-3.2%
Benzene	µg/m ³	19	0.65	0.59	-10.2%
Benzo(a)pyrene	ng/m ³	21	0.113	0.087	-23.2%
Beryllium (PM ₁₀)	ng/m ³	20	0.012	0.009	-26.4%
Butadiene, 1,3-	µg/m ³	19	0.071	0.063	-10.9%
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%

NATTS Monitoring Site Report: Chesterfield, SC

Site Information

Region	4
NATTS Site Type	Rural
County	Chesterfield
AQS Site Code	45-025-0001
NATTS Operating Agency	SC Dept. Health & Env. Control
Latitude	34.615367
Longitude	-80.198789
AQS Land Use	Forest
AQS Location Setting	Rural
10-Mile Population	46,197

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	Y	Y	Y	Y	Y	N ^a
Arsenic (PM ₁₀)	N ^b	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Benzene	--	N ^b	N ^b	N ^b	N ^b	N ^b	N ^b	Y	Y	Y	Y	Y	Y	N ^b	N ^b
Benzo(a)pyrene	--	--	--	--	Y	Y	Y	Y	Y	Y	N ^{c,d}	Y	Y	Y	N ^a
Beryllium (PM ₁₀)	Y	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	N ^b	N ^b	N ^b	N ^c	N ^{b,d}	N ^{b,d}	N ^{b,d}	N ^{b,d}	N ^{b,d}	N ^b	N ^{b,d}
Cadmium (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Carbon tetrachloride	--	N ^b	N ^b	N ^b	N ^b	N ^b	N ^b	N ^c	Y	Y	Y	Y	Y	N ^b	N ^{b,d}
Chloroform	--	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N ^c
Chromium VI	--	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	--	--	--	--	--	--
Formaldehyde	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N ^a
Lead (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Manganese (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N ^c	Y	Y	Y	Y
Naphthalene	--	--	--	--	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N ^a
Nickel (PM ₁₀)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)	Y(T)
Tetrachloroethylene	--	N ^b	N ^b	N ^b	N ^b	N ^b	N ^b	Y	Y	Y	Y	Y	N ^c	N ^b	N ^{b,d}
Trichloroethylene	--	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N ^b	N ^{b,d}
Vinyl chloride	--	N ^b	N ^b	N ^b	N ^b	N ^b	N ^b	Y	Y	N ^{c,d}	Y	Y	N ^c	N ^b	N ^{b,d}

^a: Completeness was less than 75% based on 1-in-6 day sampling.

^b: Reported MDL to NATTS Target Ratio greater than 2.0

^c: Bias % Difference was outside ± 35%.

^d: Bias % Difference was outside ± 35%; Precision PCT CV was greater than 25%.

^e: 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	µg/m ³	Urban	15,704	100%	1.77 ± 0.02	0.50	0.66	0.97	1.45	2.19	3.24	4.04
	µg/m ³	Rural	4,930	100%	1.20 ± 0.04	0.36	0.46	0.65	0.93	1.38	2.02	2.76
	µg/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	µg/m ³	Urban	15,984	99%	0.86 ± 0.01	0.25	0.30	0.43	0.66	1.05	1.64	2.21
	µg/m ³	Rural	2,494	95%	0.43 ± 0.02	0.04	0.13	0.21	0.33	0.52	0.78	1.01
	µg/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-	µg/m ³	Urban	15,388	81%	0.092 ± 0.002	ND	ND	0.025	0.058	0.114	0.215	0.302
	µg/m ³	Rural	2,185	29%	0.012 ± 0.001	ND	ND	ND	ND	0.017	0.046	0.059
	µg/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	µg/m ³	Urban	14,713	99%	0.569 ± 0.003	0.361	0.433	0.496	0.562	0.651	0.737	0.798
	µg/m ³	Rural	2,189	92%	0.534 ± 0.016	ND	0.180	0.402	0.537	0.633	0.727	0.798
	µg/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	µg/m ³	Urban	16,068	87%	0.265 ± 0.022	ND	ND	0.093	0.132	0.217	0.420	0.668
	µg/m ³	Rural	3,802	43%	0.052 ± 0.003	ND	ND	ND	ND	0.095	0.144	0.230
	µg/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	µg/m ³	Urban	16,118	100%	3.11 ± 0.04	0.66	0.99	1.60	2.47	3.84	5.63	7.25
	µg/m ³	Rural	5,002	100%	2.22 ± 0.05	0.53	0.68	1.06	1.69	2.74	4.19	5.45
	µg/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	µg/m ³	Urban	15,612	86%	0.25 ± 0.01	ND	ND	0.06	0.13	0.25	0.48	0.74
	µg/m ³	Rural	2,272	36%	0.09 ± 0.04	ND	ND	ND	ND	0.04	0.08	0.16
	µg/m ³	All Sites	17,884	79%	0.23 ± 0.01	ND	ND	0.04	0.11	0.22	0.44	0.70
Trichloroethylene	µg/m ³	Urban	15,843	41%	0.040 ± 0.002	ND	ND	ND	ND	0.051	0.107	0.164
	µg/m ³	Rural	3,388	13%	0.021 ± 0.003	ND	ND	ND	ND	ND	0.017	0.250
	µg/m ³	All Sites	19,231	36%	0.037 ± 0.002	ND	ND	ND	ND	0.041	0.105	0.167
Vinyl Chloride	µg/m ³	Urban	14,778	19%	0.0044 ± 0.0003	ND	ND	ND	ND	ND	0.0137	0.0257
	µg/m ³	Rural	2,444	8%	0.0040 ± 0.0009	ND	ND	ND	ND	ND	ND	0.0156
	µg/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 Chesterfield, SC

Analyte	Units	# Data Records	% Detection	Arithmetic Mean ^a	Percentile Value ^b						
					5th	10th	25th	50th	75th	90th	95th
Acetaldehyde	µg/m ³	866	99%	2.02 ± 0.17	0.41	0.66	0.96	1.33	2.04	4.14	5.60
Arsenic (PM ₁₀)	ng/m ³	886	92%	0.61 ± 0.09	ND	0.07	0.26	0.43	0.67	0.96	1.23
Benzene	µg/m ³	861	74%	0.35 ± 0.03	ND	ND	ND	0.23	0.43	0.78	1.30
Benzo(a)pyrene	ng/m ³	602	12%	0.008 ± 0.003	ND	ND	ND	ND	ND	0.03	0.05
Beryllium (PM ₁₀)	ng/m ³	886	36%	0.0074 ± 0.0023	ND	ND	ND	ND	0.003	0.023	0.031
Butadiene, 1,3-	µg/m ³	857	8%	0.013 ± 0.004	ND	ND	ND	ND	ND	ND	0.109
Cadmium (PM ₁₀)	ng/m ³	886	86%	0.13 ± 0.01	ND	ND	0.06	0.11	0.16	0.23	0.31
Carbon Tetrachloride	µg/m ³	861	63%	0.51 ± 0.05	ND	ND	ND	0.39	0.52	1.22	2.45
Chloroform	µg/m ³	861	15%	0.019 ± 0.004	ND	ND	ND	ND	ND	0.096	0.106
Chromium VI	ng/m ³	490	32%	0.006 ± 0.001	ND	ND	ND	ND	0.008	0.019	0.025
Formaldehyde	µg/m ³	866	100%	4.19 ± 0.20	1.22	1.52	2.19	3.30	5.09	8.50	11.42
Lead (PM ₁₀)	ng/m ³	886	96%	2.48 ± 0.79	0.29	0.58	0.99	1.58	2.42	3.67	4.48
Manganese (PM ₁₀)	ng/m ³	886	99%	4.61 ± 0.43	0.68	0.93	1.61	2.69	4.84	10.15	14.98
Naphthalene	ng/m ³	602	99%	13.87 ± 1.39	3.53	4.31	6.27	10.18	16.10	25.84	35.04
Nickel (PM ₁₀)	ng/m ³	886	69%	1.64 ± 0.43	ND	ND	ND	0.54	1.36	3.33	5.30
Tetrachloroethylene	µg/m ³	861	10%	0.121 ± 0.043	ND	ND	ND	ND	ND	ND	0.139
Trichloroethylene	µg/m ³	861	1%	0.009 ± 0.009	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	µg/m ³	861	1%	0.0014 ± 0.0019	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	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
VOCs	--	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC
Carbonyls	--	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC
PM ₁₀ Metals	--	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC	SCDHEC
Chromium VI	--	--	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	ERG	--	--	--	--	--
PAHs	--	--	--	--	--	ERG	ERG	ERG	ERG	ERG	ERG	ERG	SCDHEC	SCDHEC	SCDHEC	SCDHEC

--: Not Applicable

SCDHEC: South Carolina Department of Health and Environmental Control

ERG: Eastern Research Group, Inc.

Figure 3. Chesterfield, SC Annual Average Concentrations

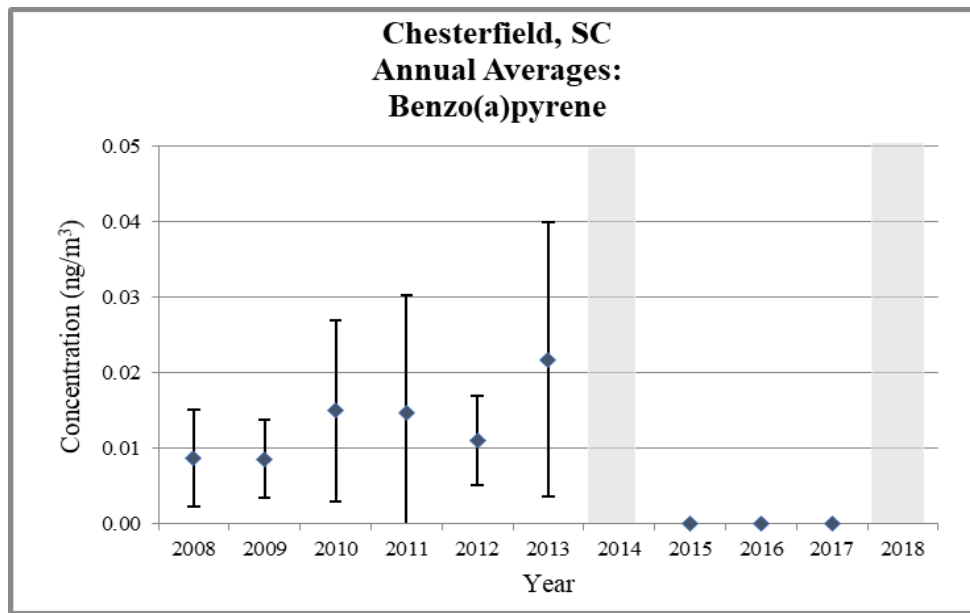
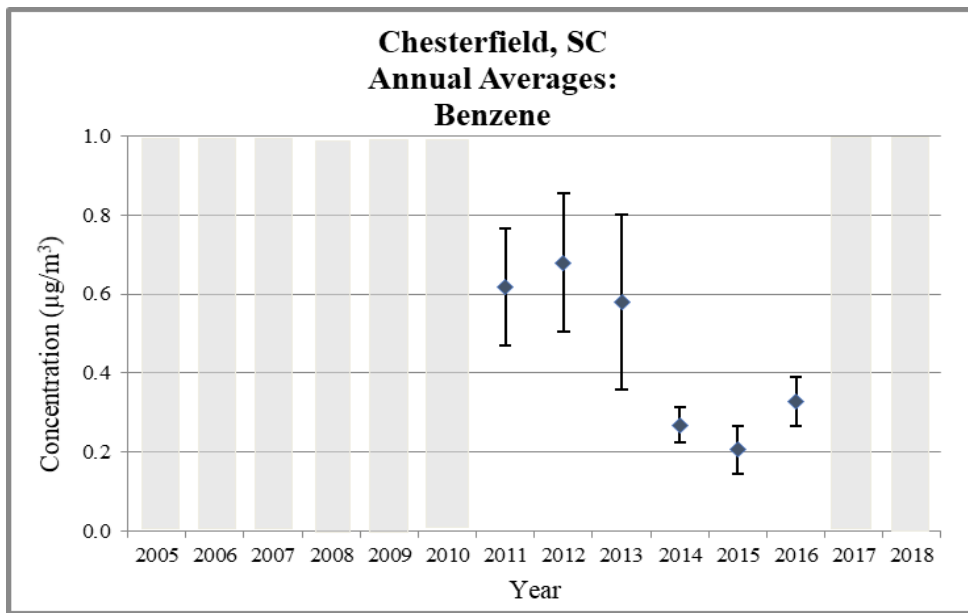
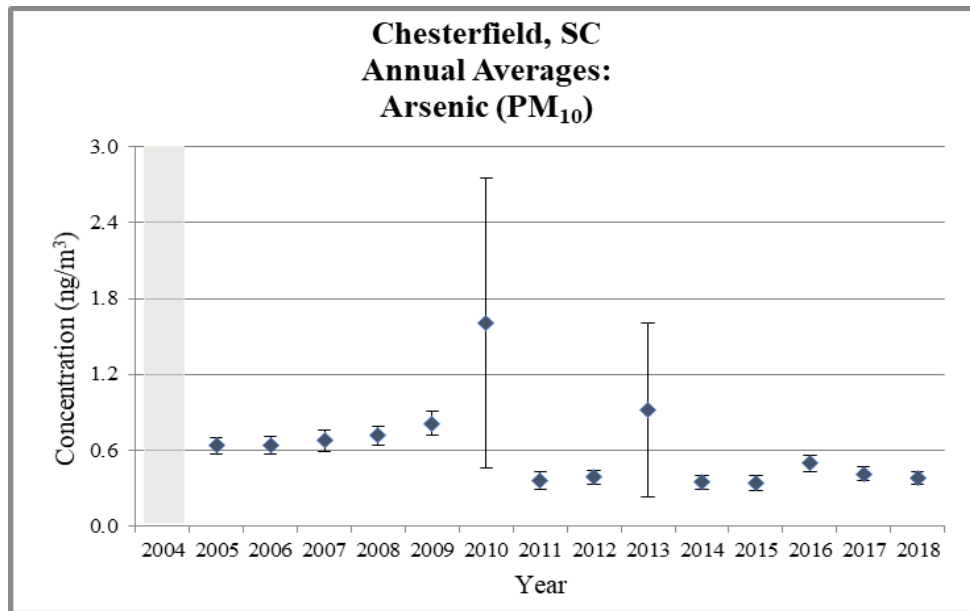
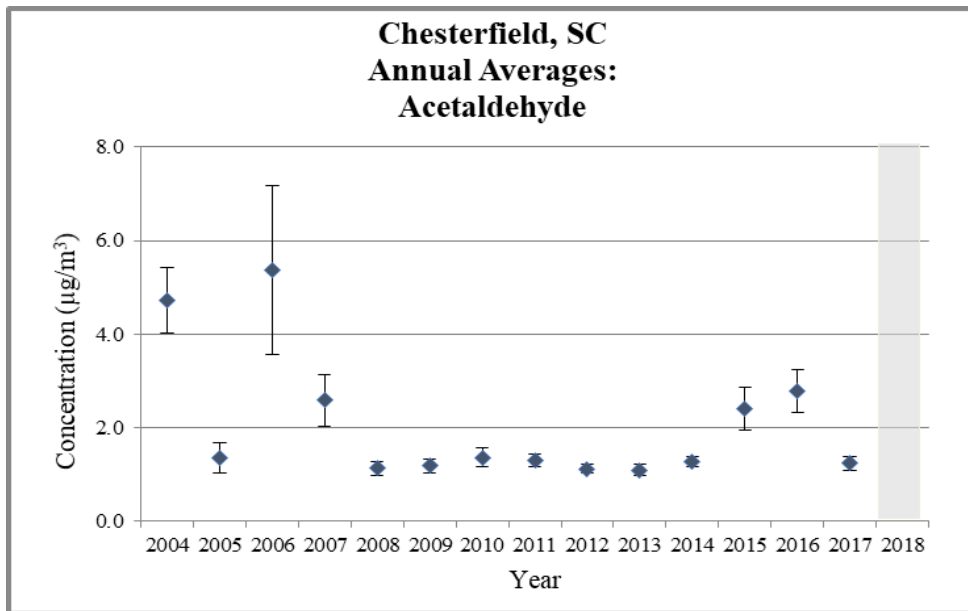


Figure 3. Chesterfield, SC Annual Average Concentrations

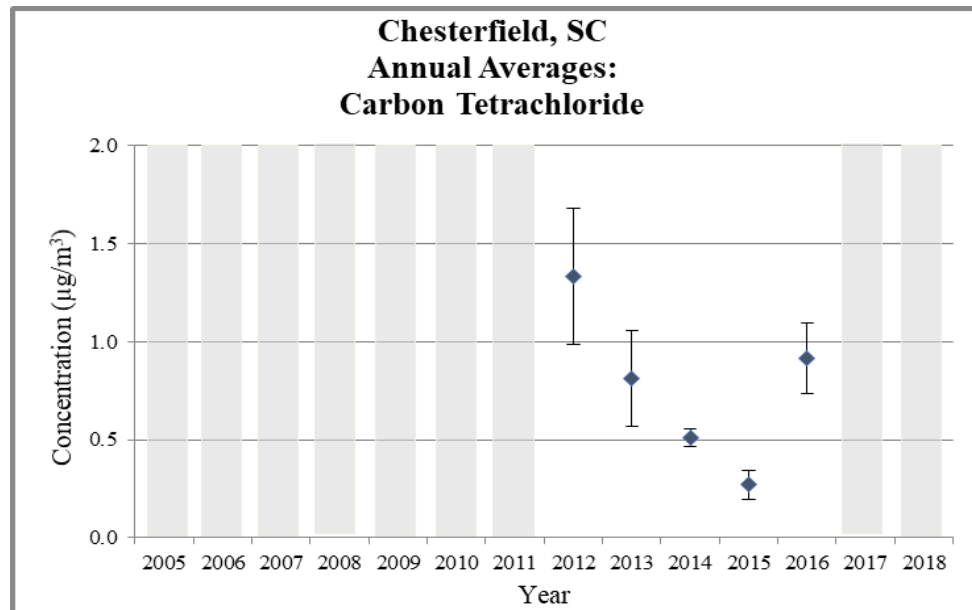
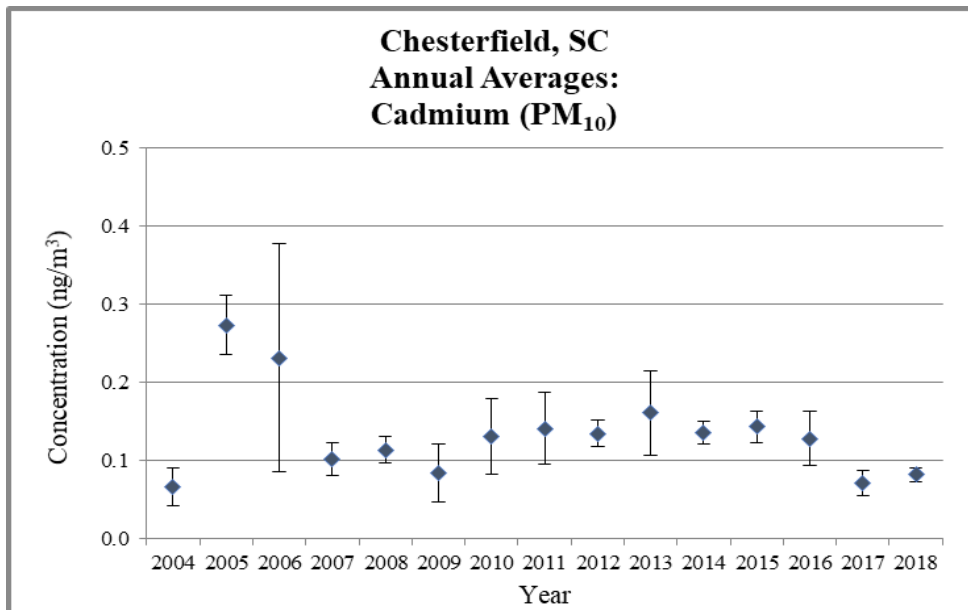
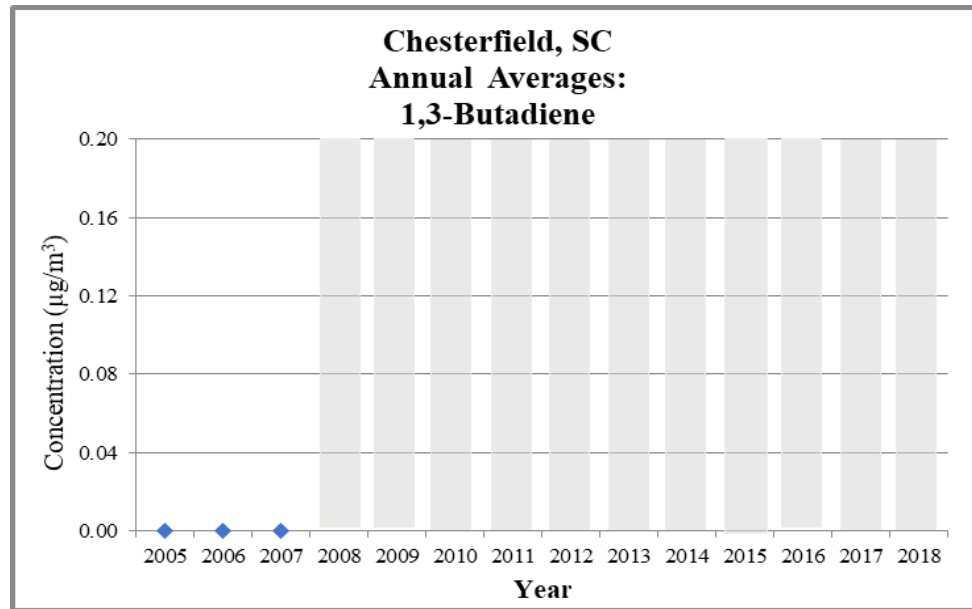
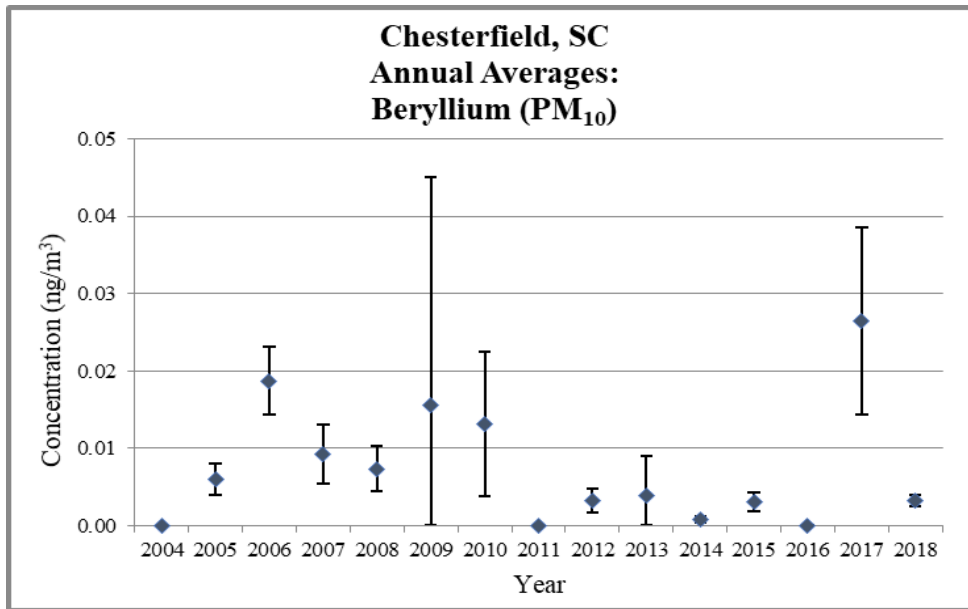


Figure 3. Chesterfield, SC Annual Average Concentrations

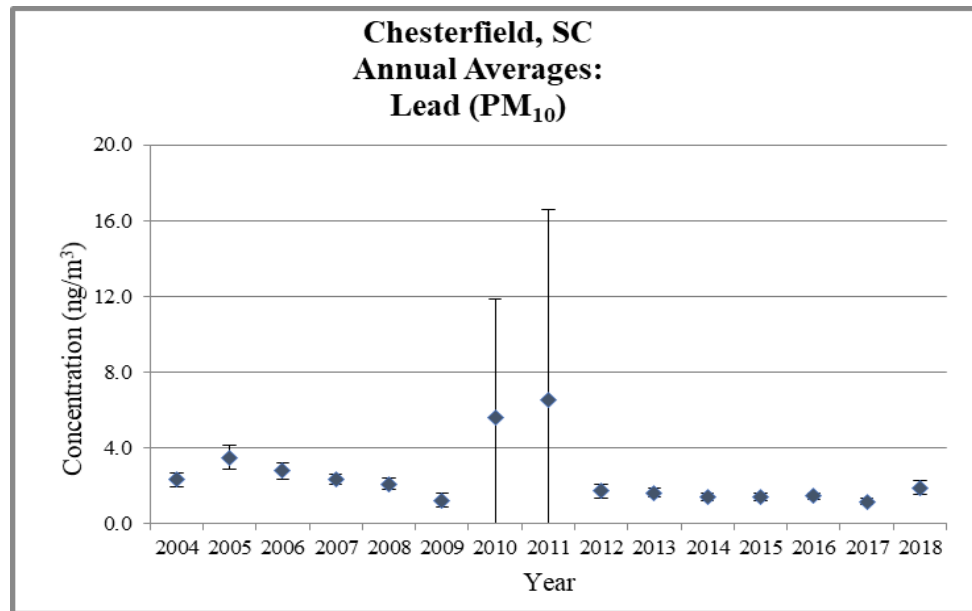
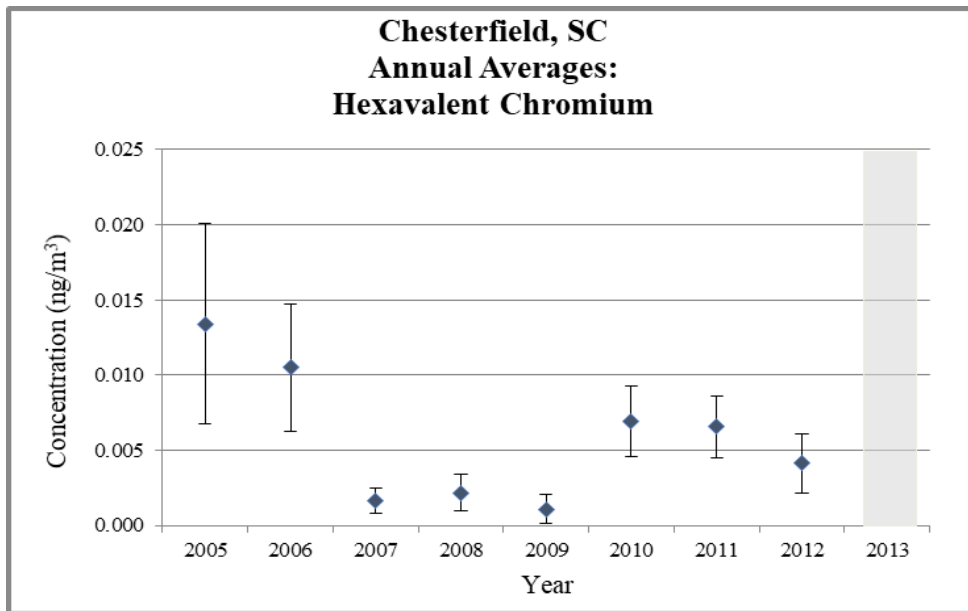
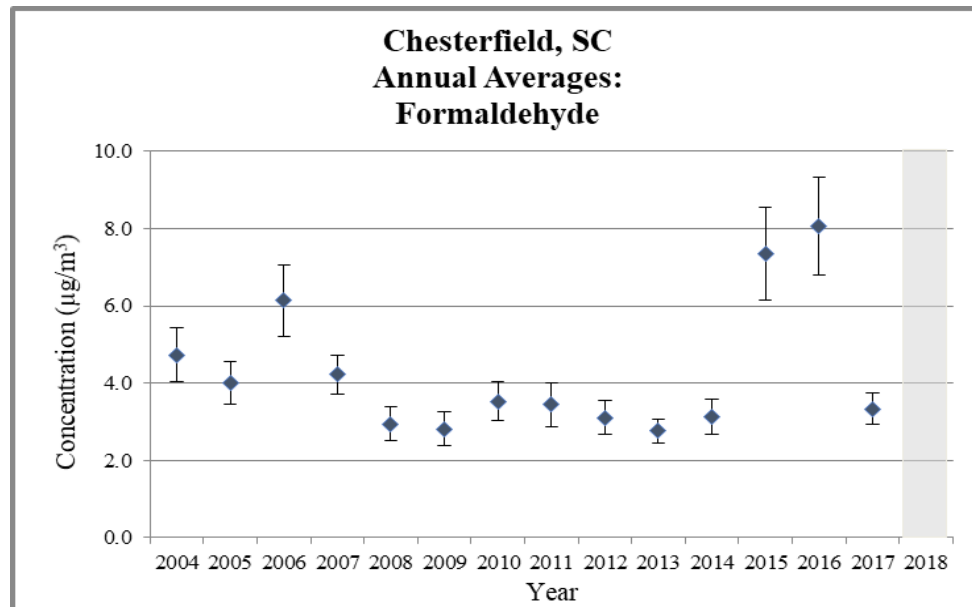
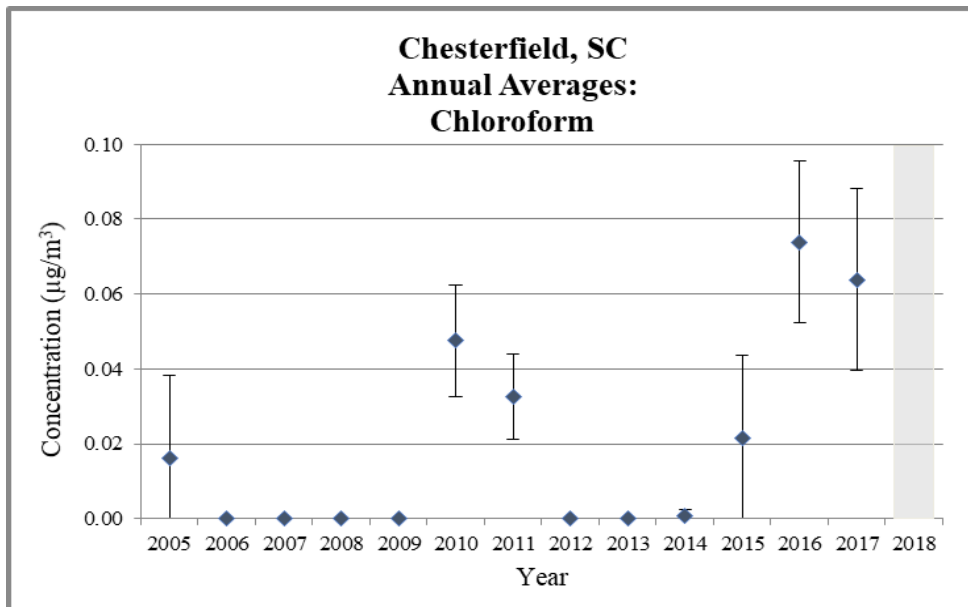


Figure 3. Chesterfield, SC Annual Average Concentrations

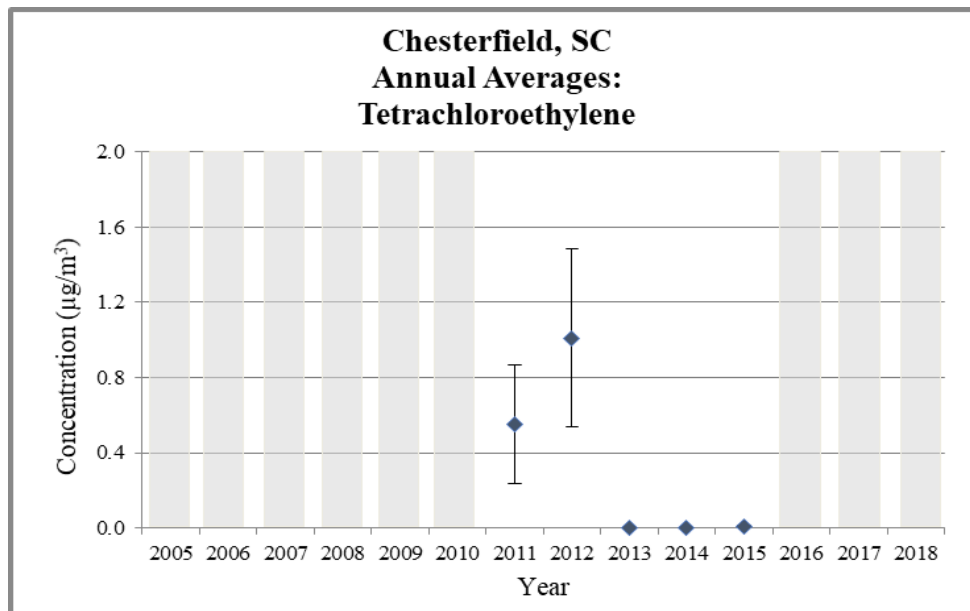
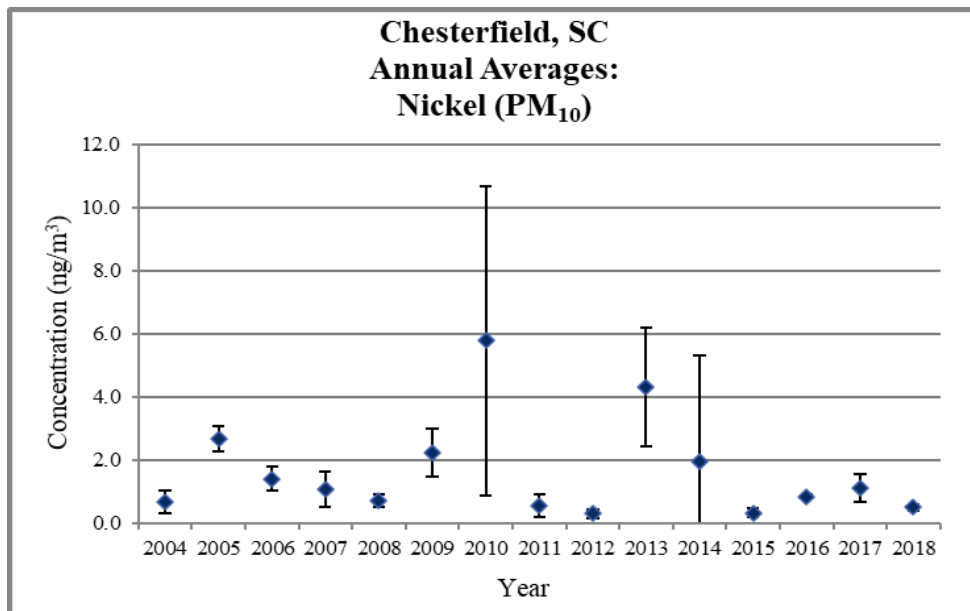
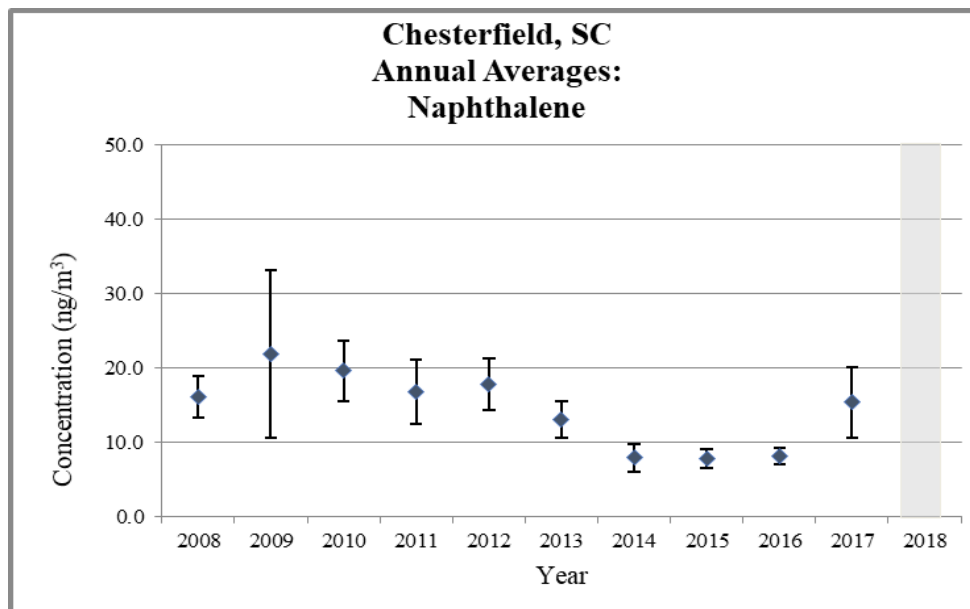
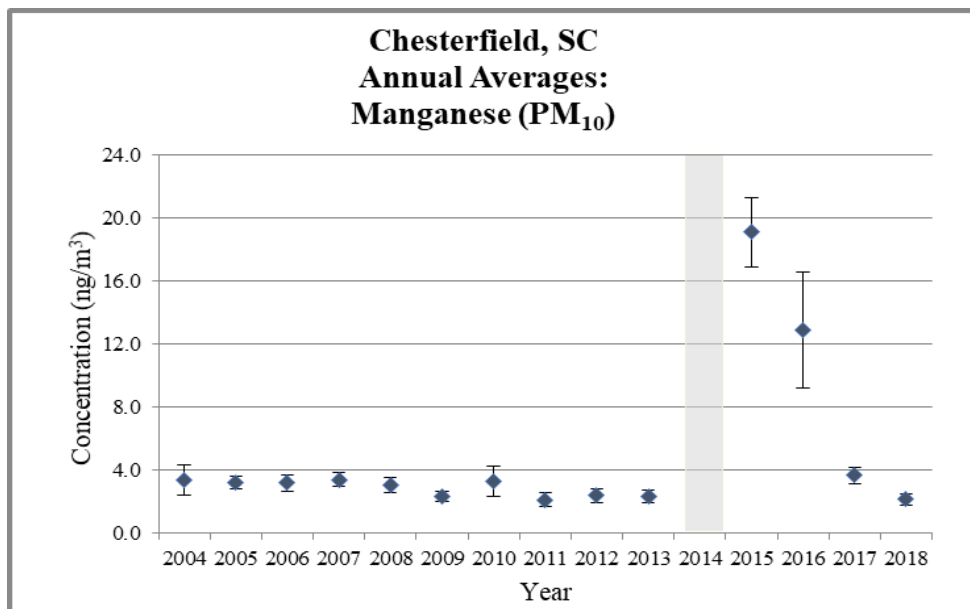
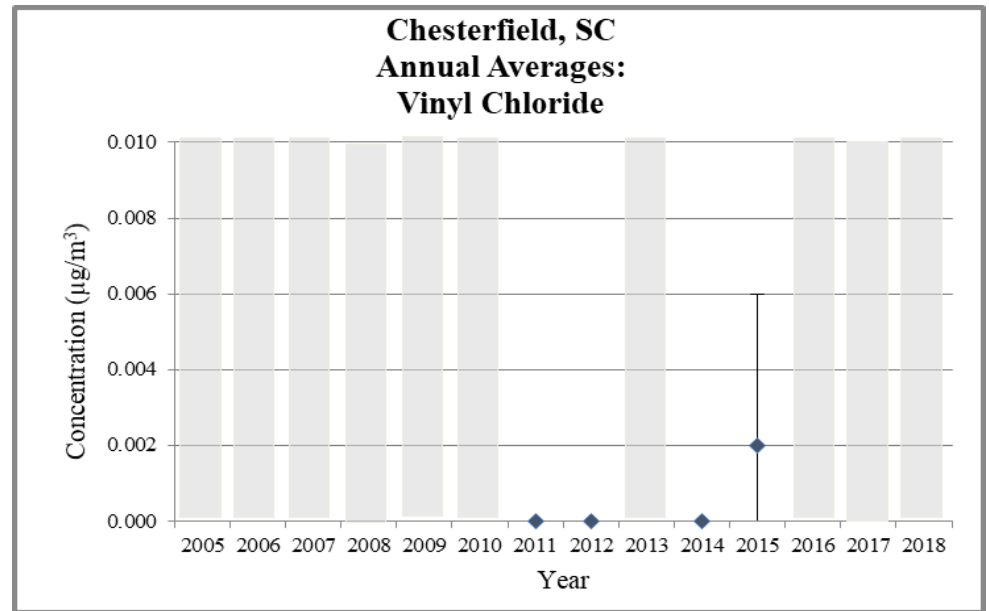
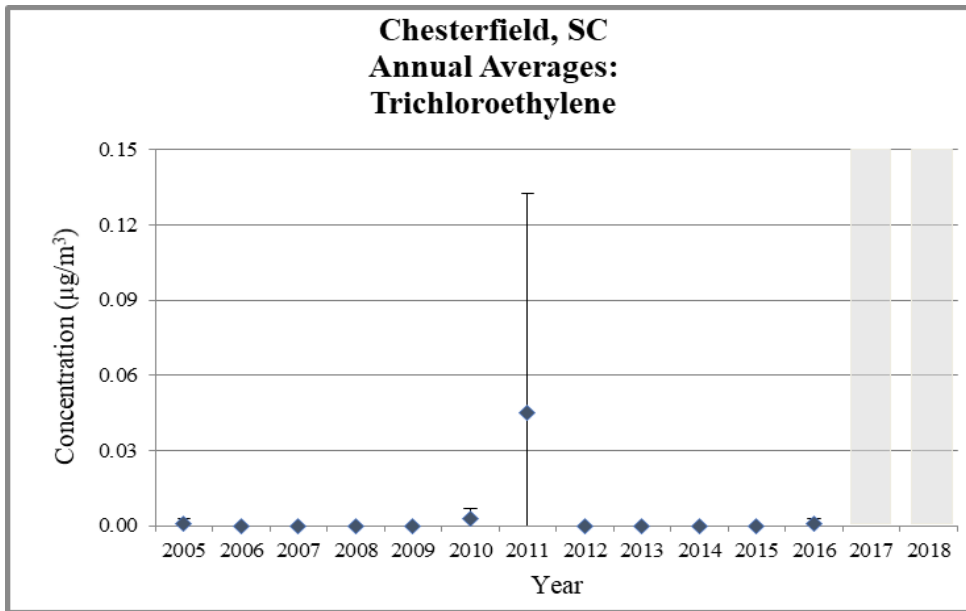


Figure 3. Chesterfield, SC Annual Average Concentrations



 Does not meet MQO

Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

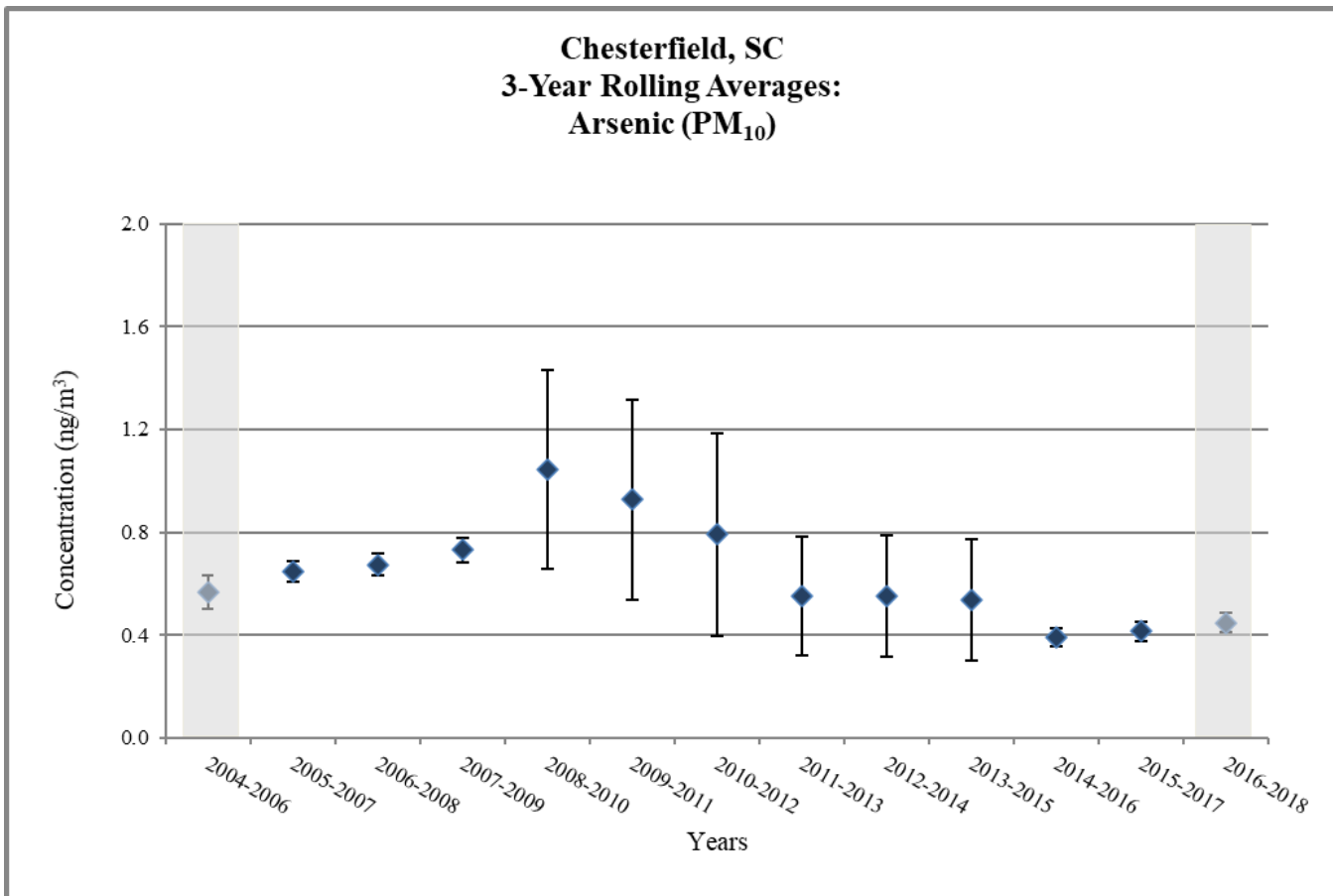
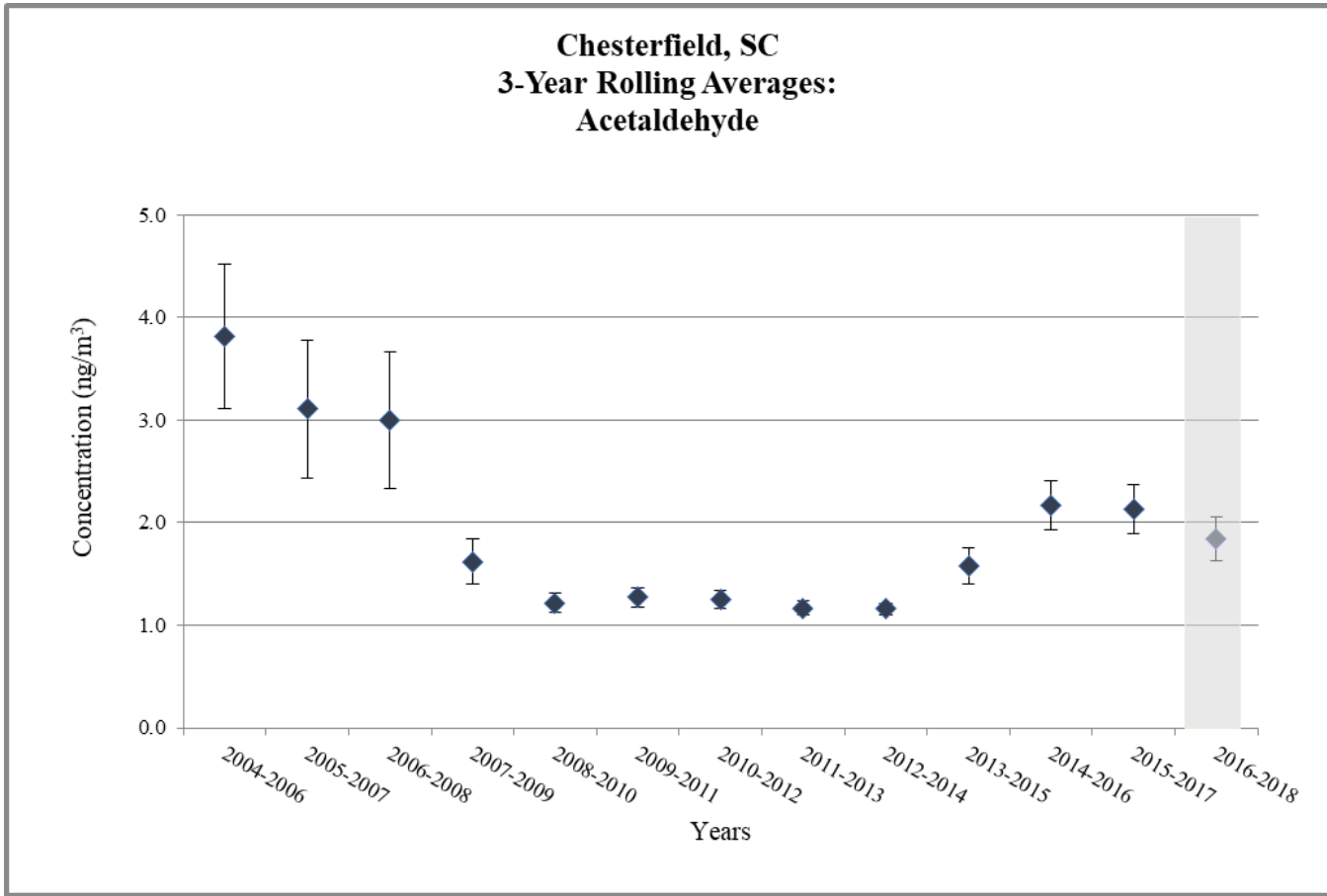


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

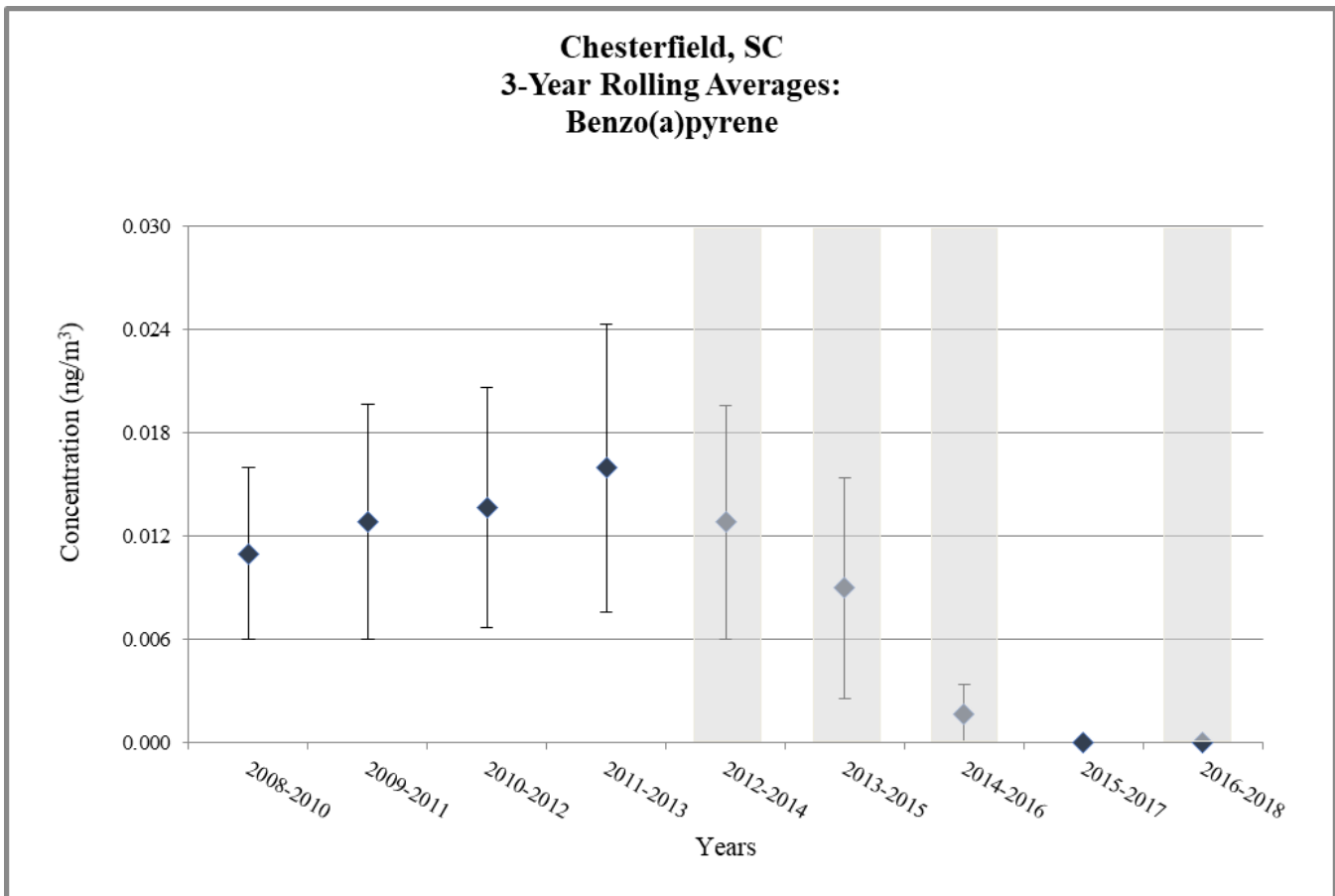
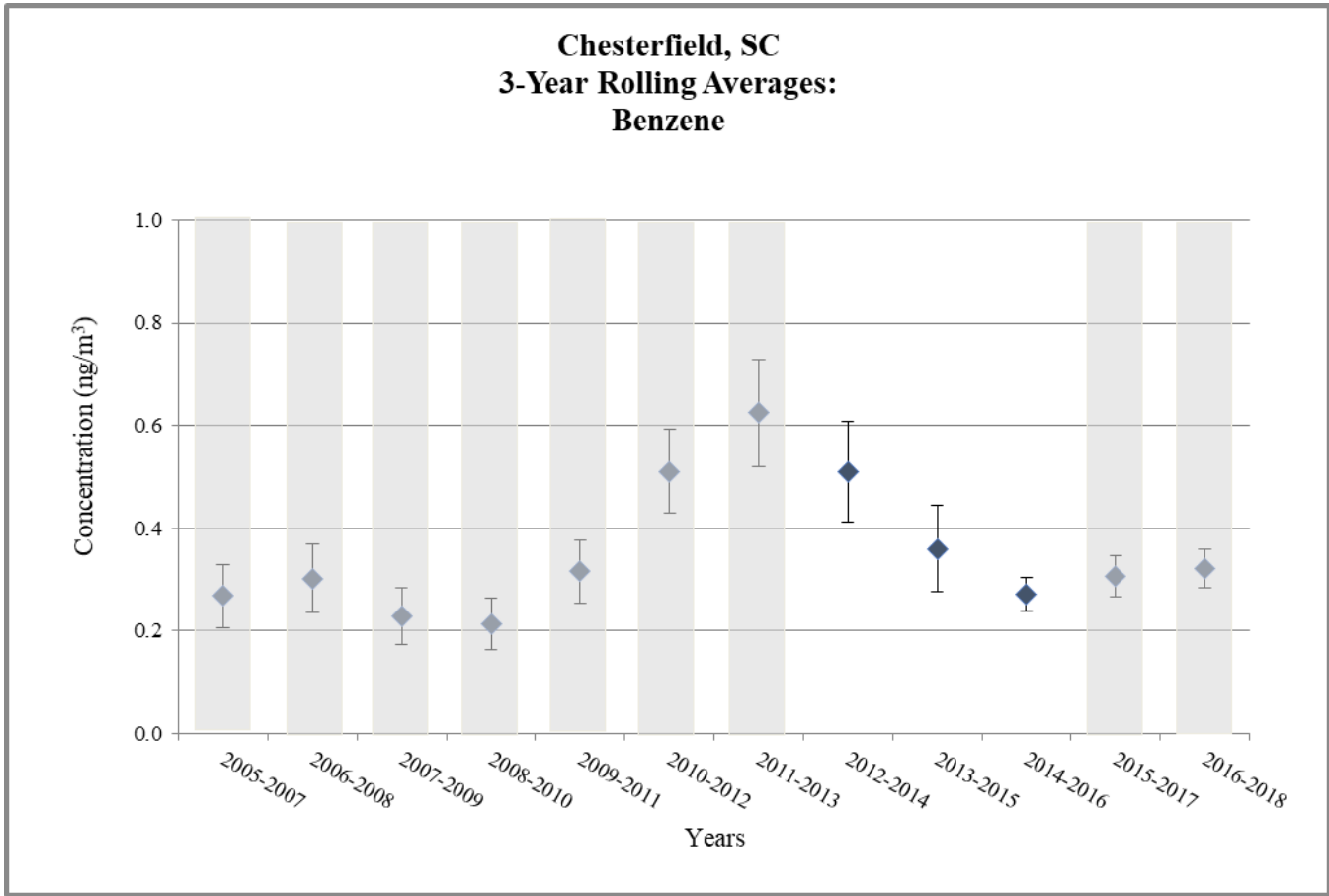


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

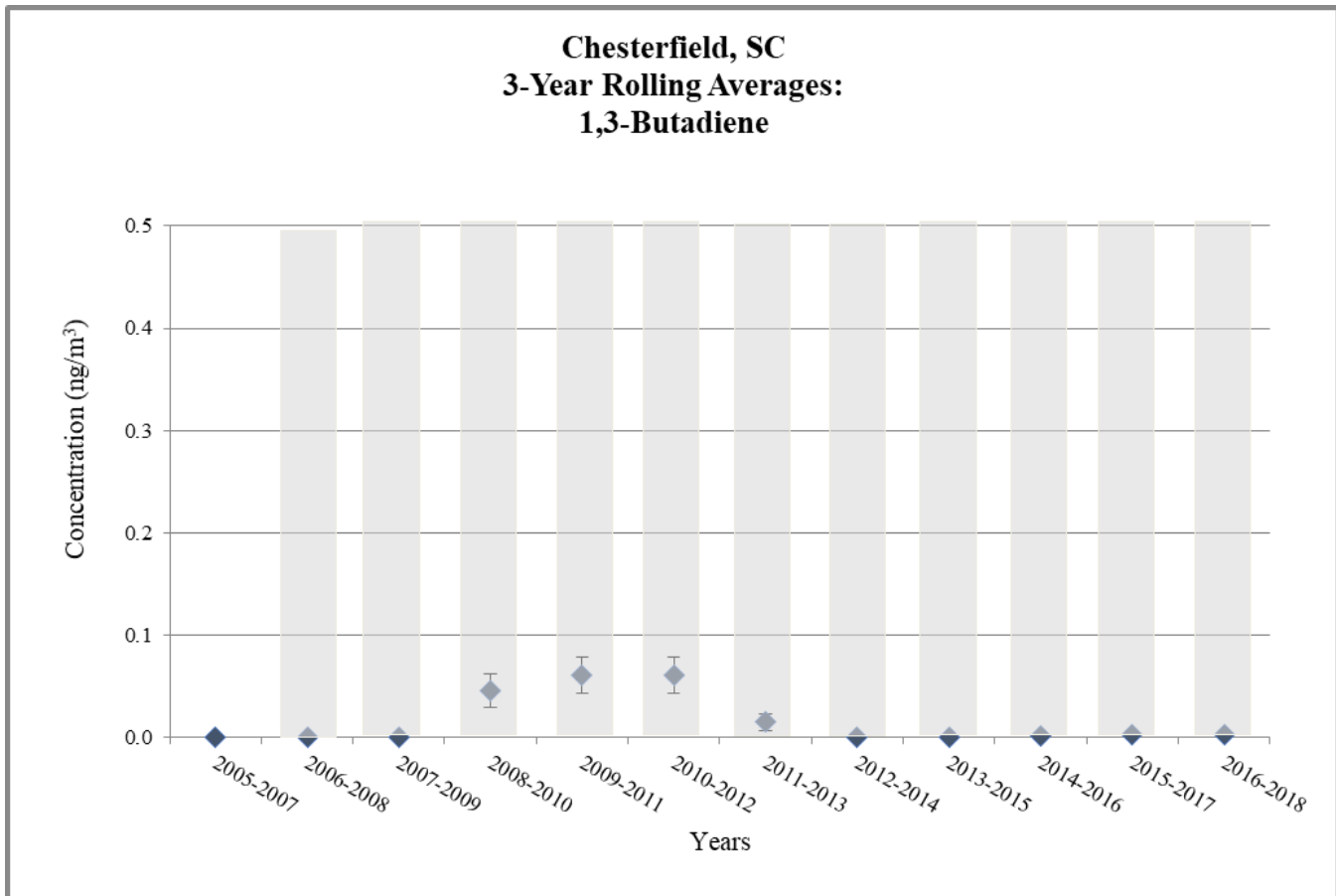
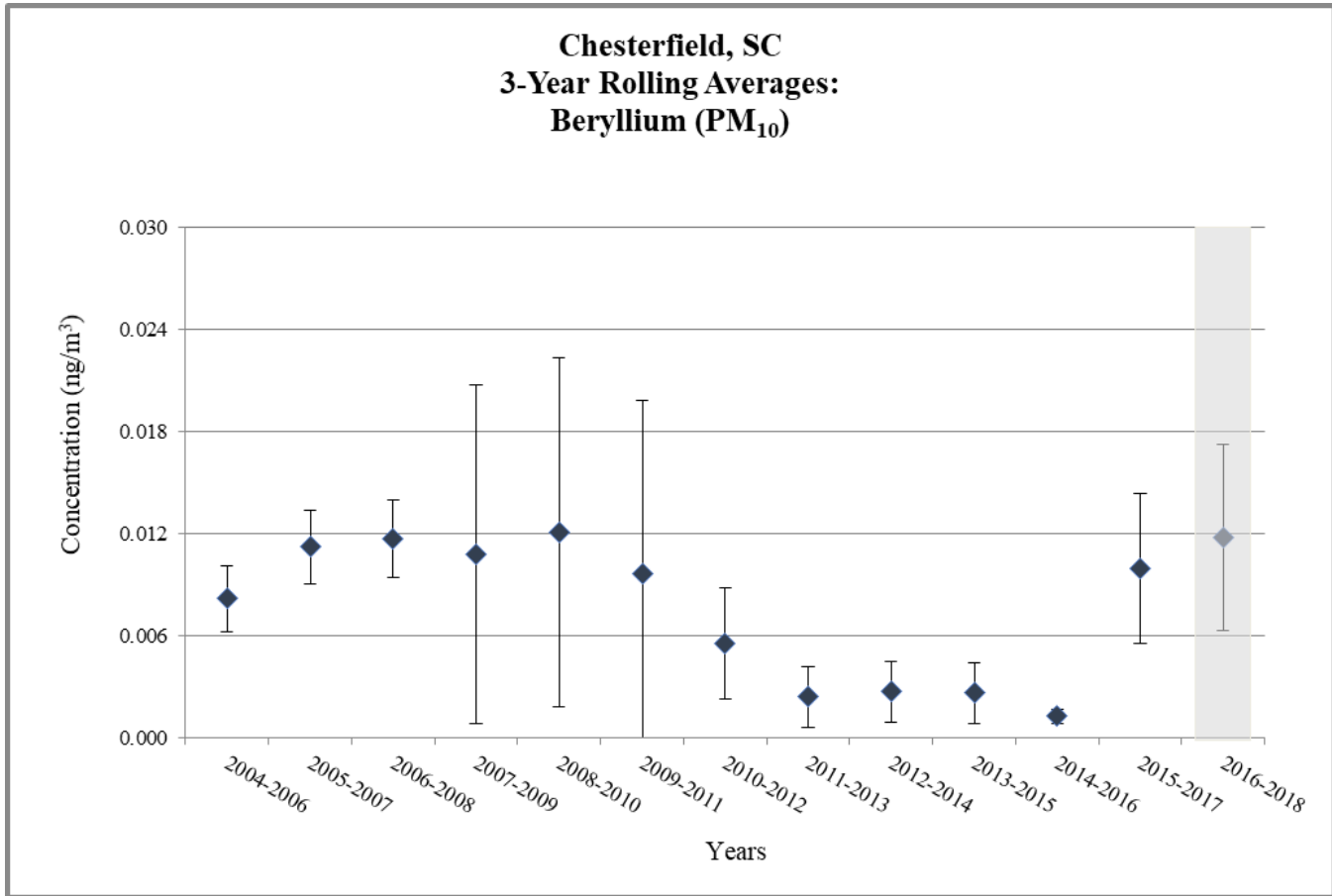


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

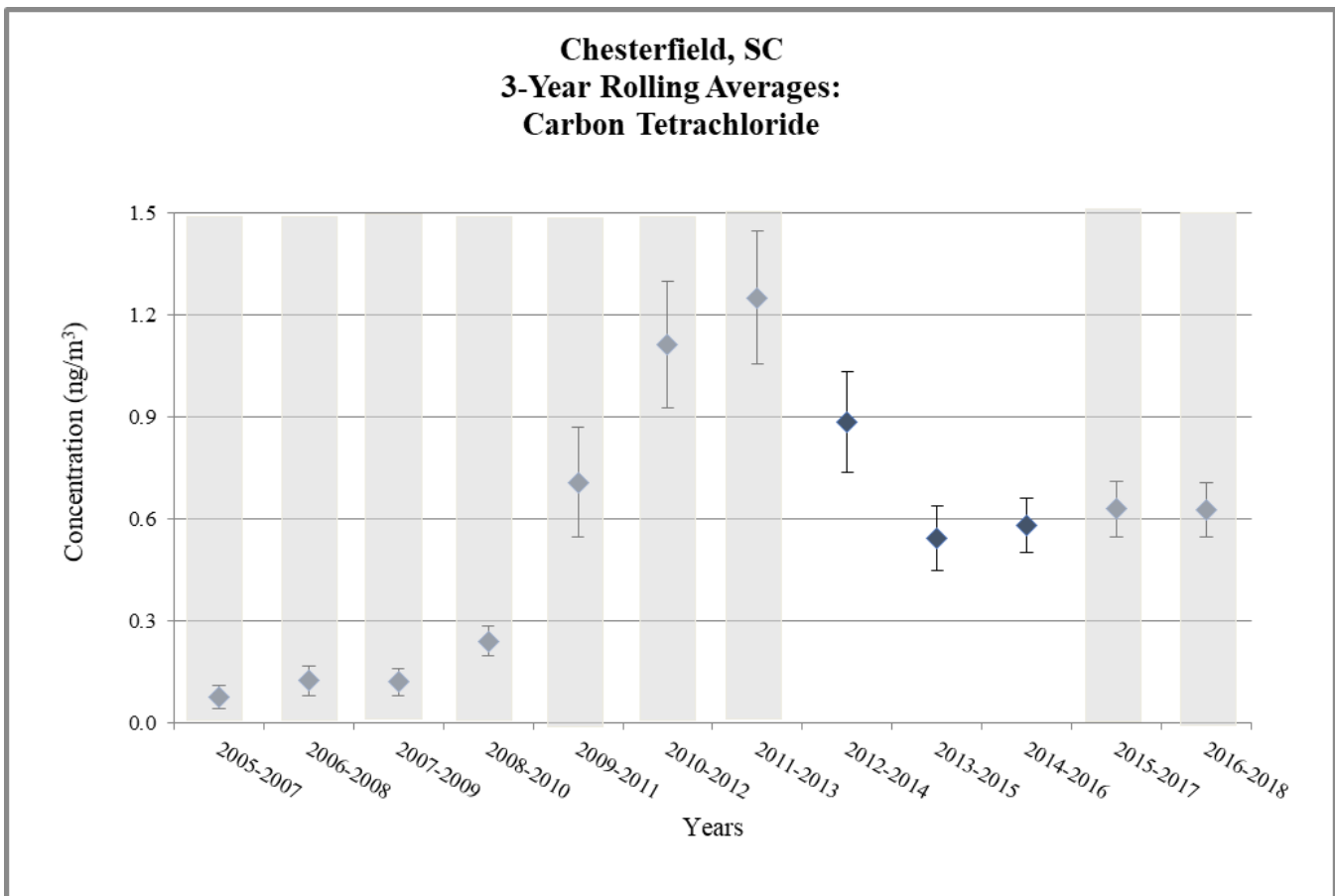
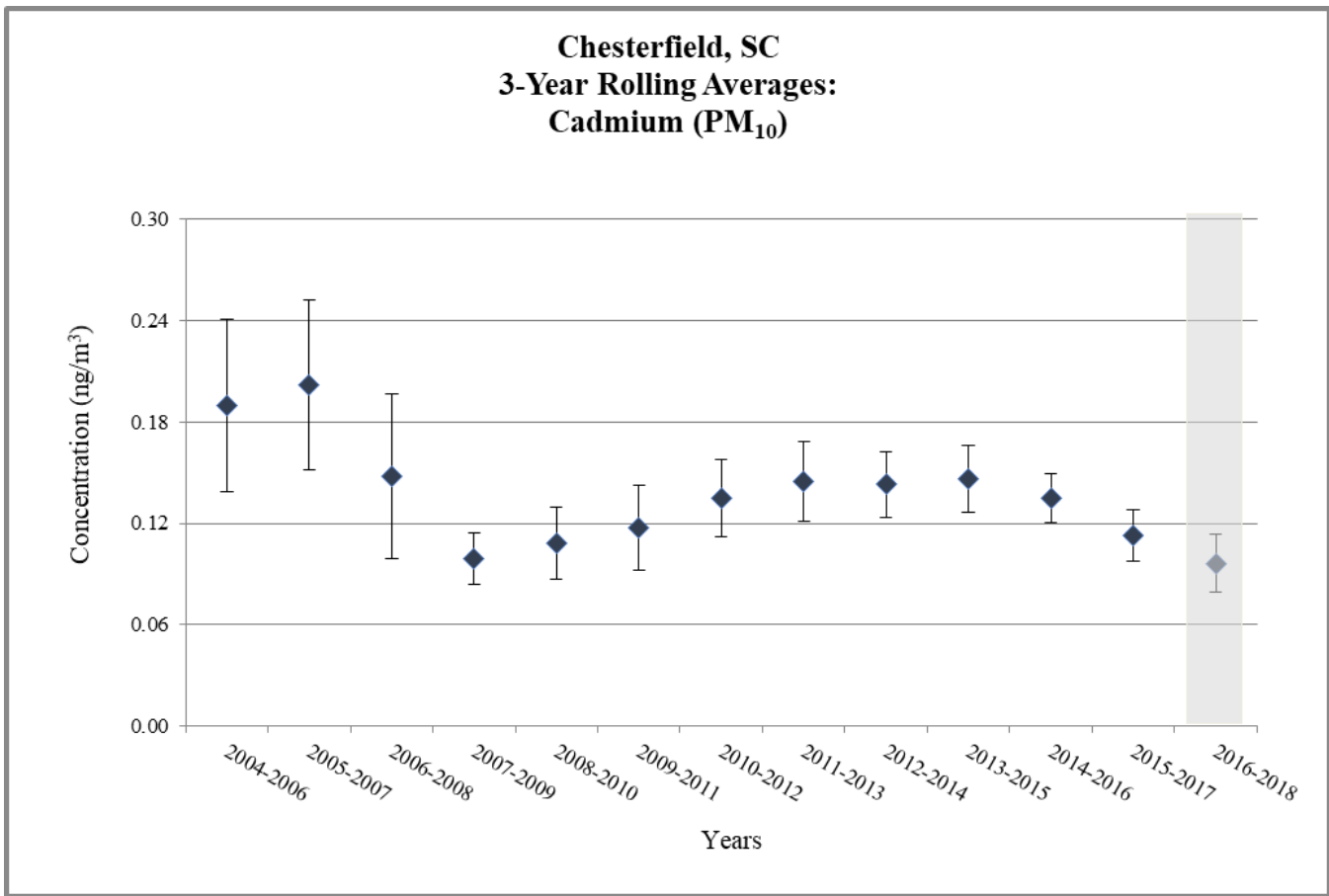


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

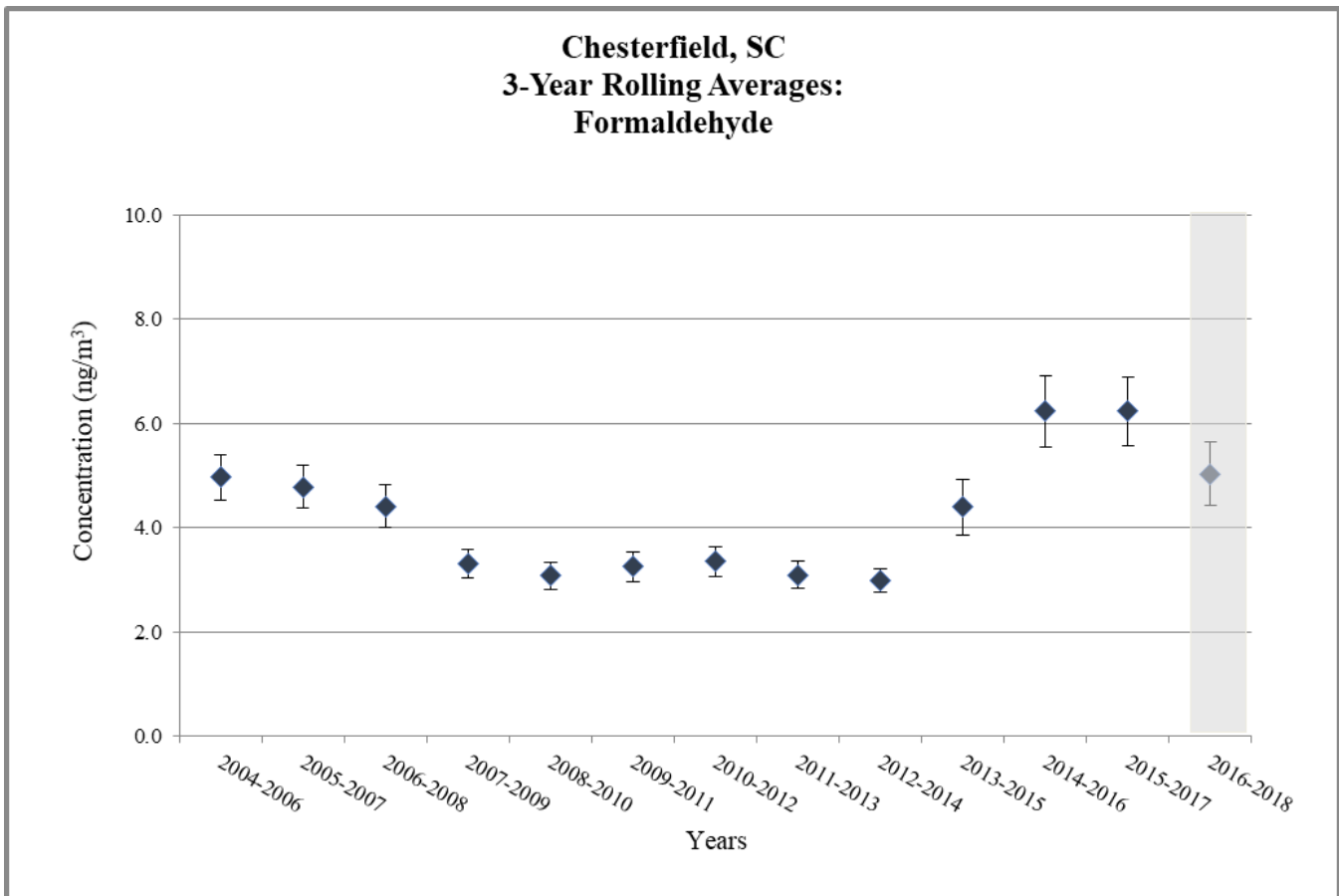
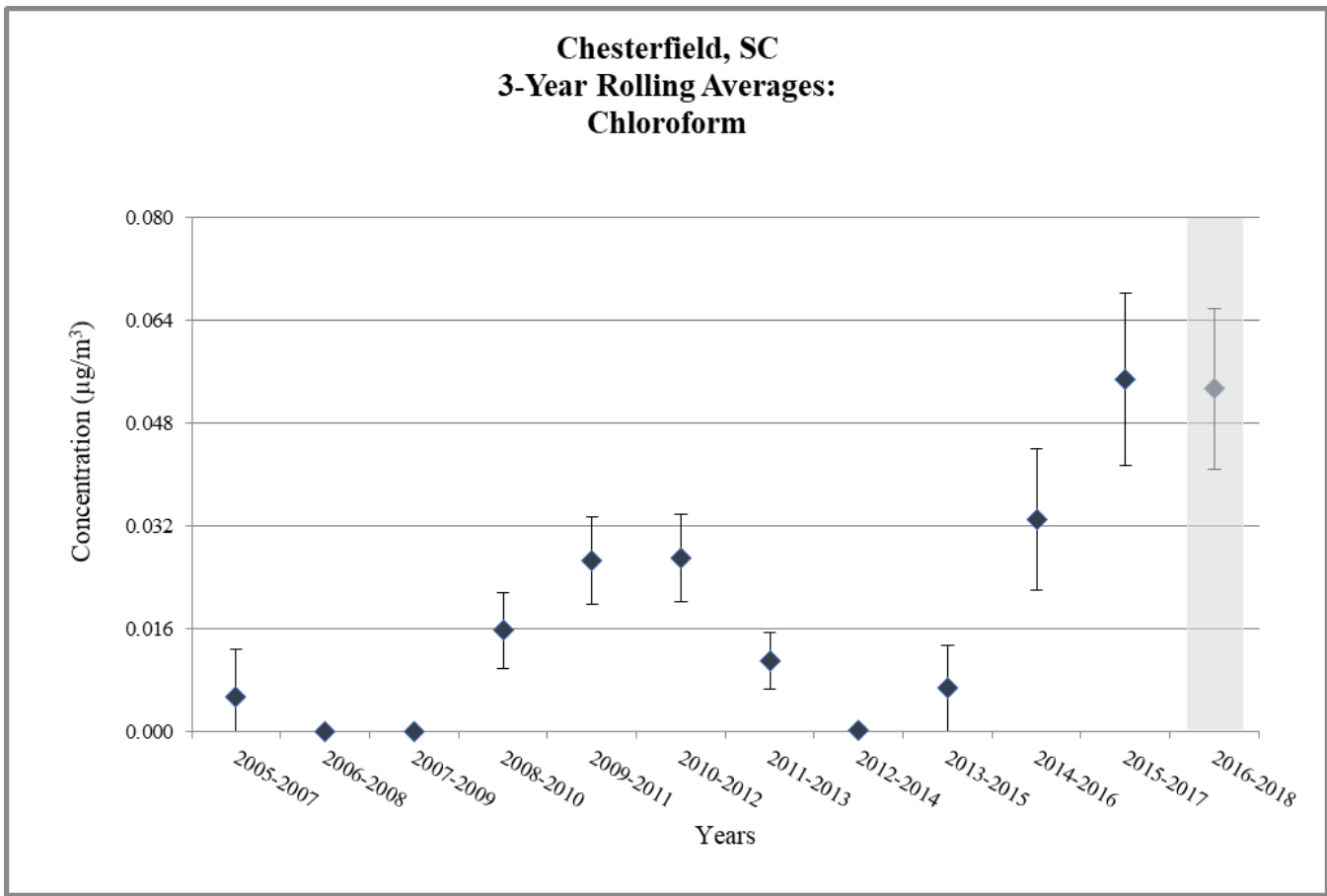


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

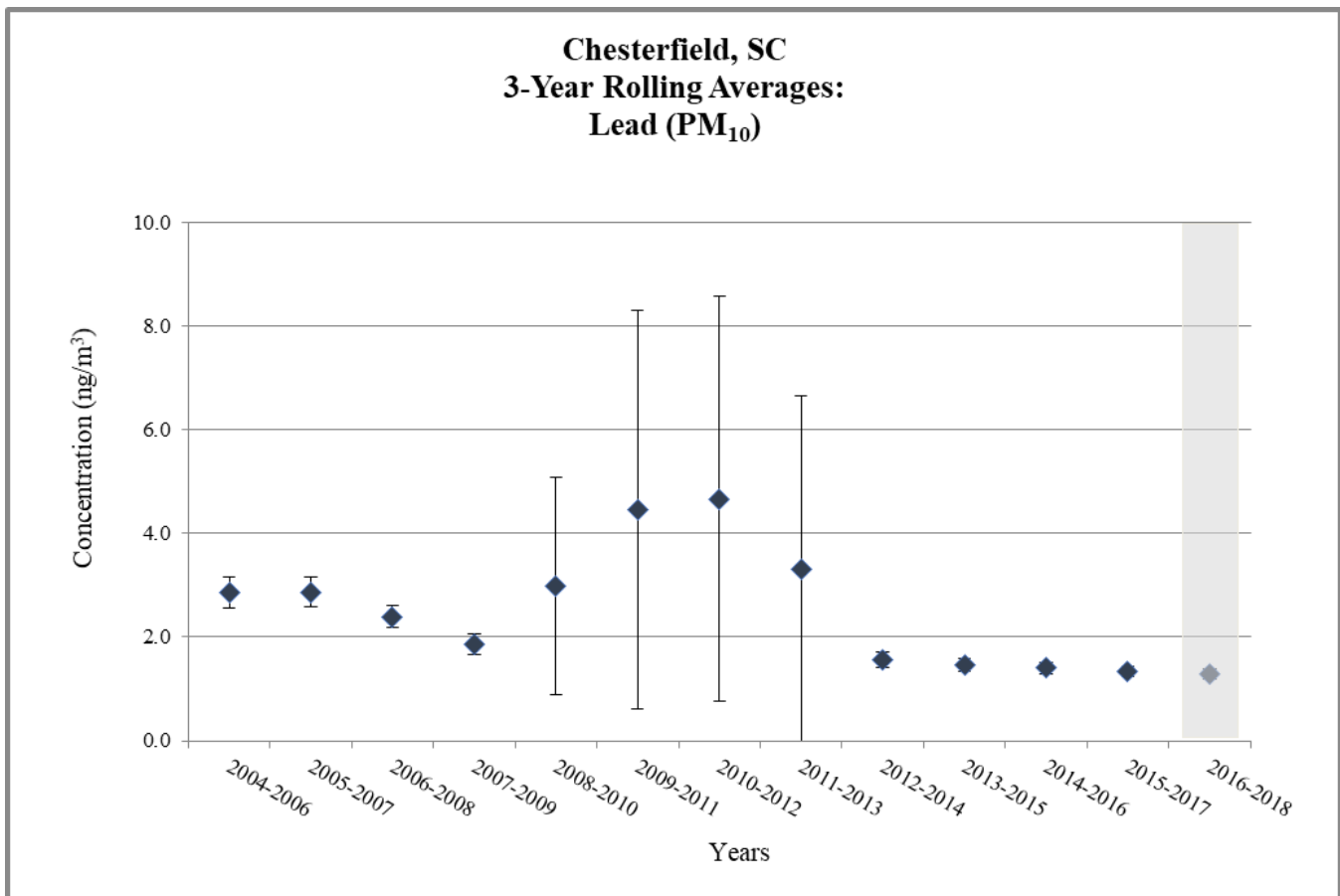
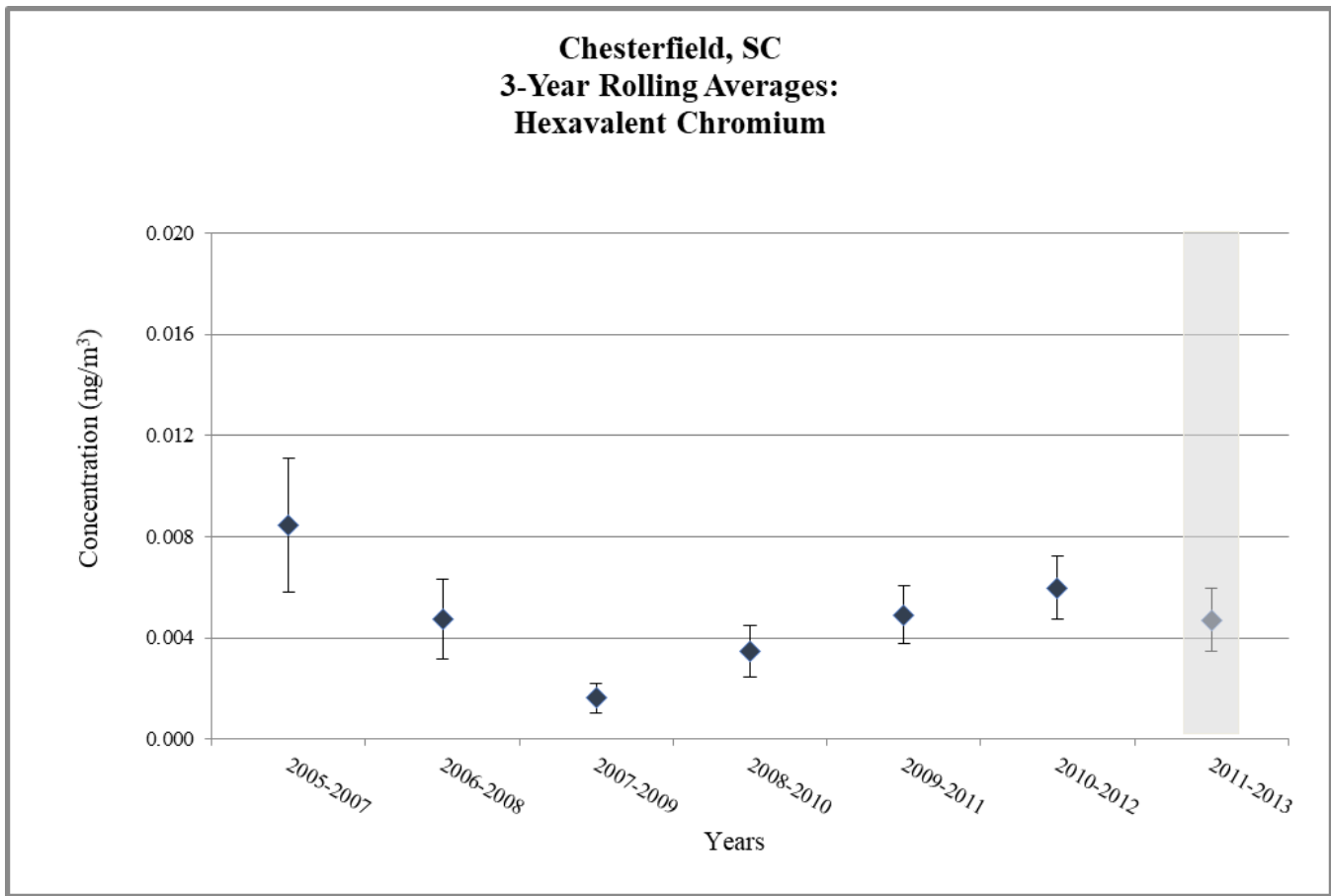


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

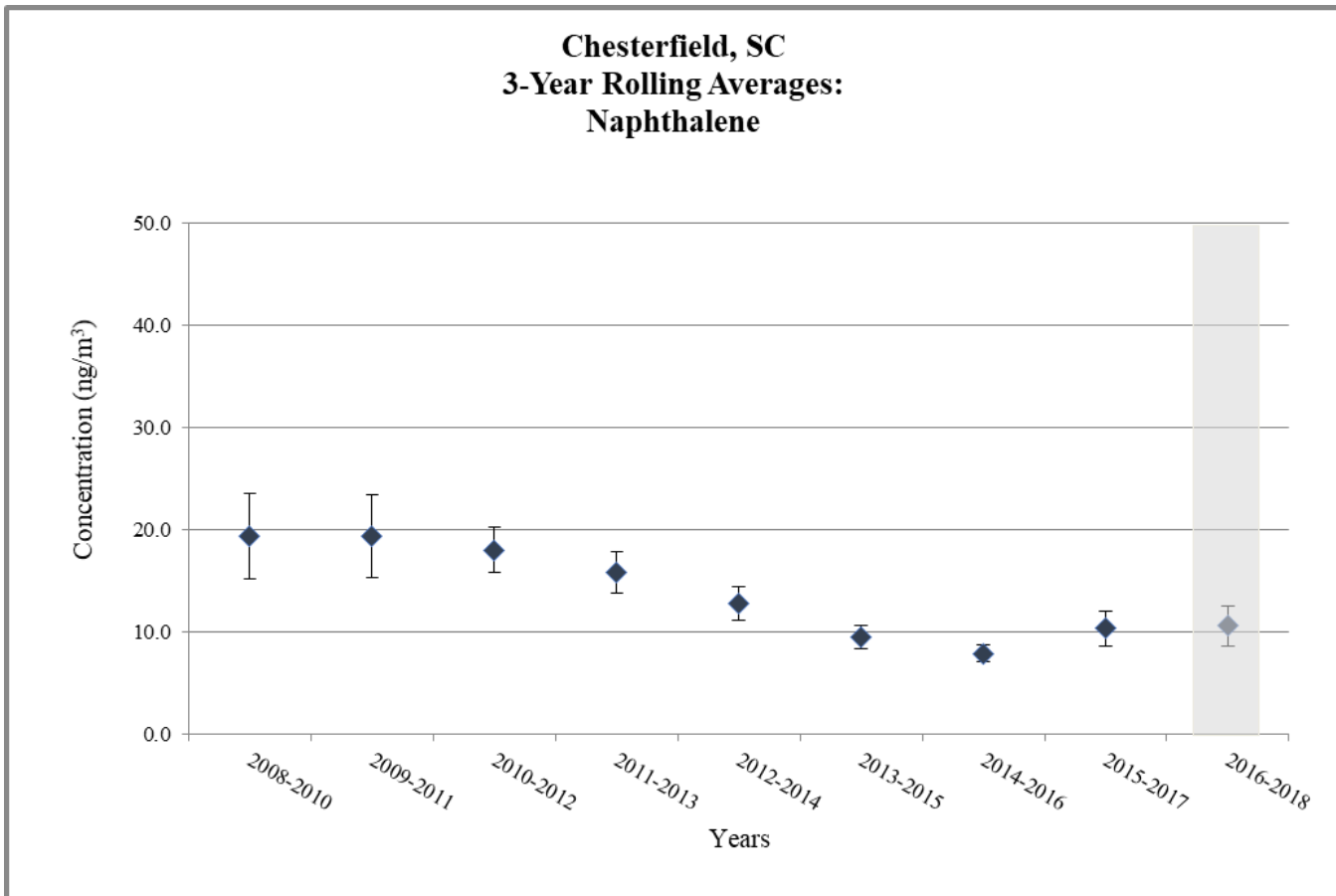
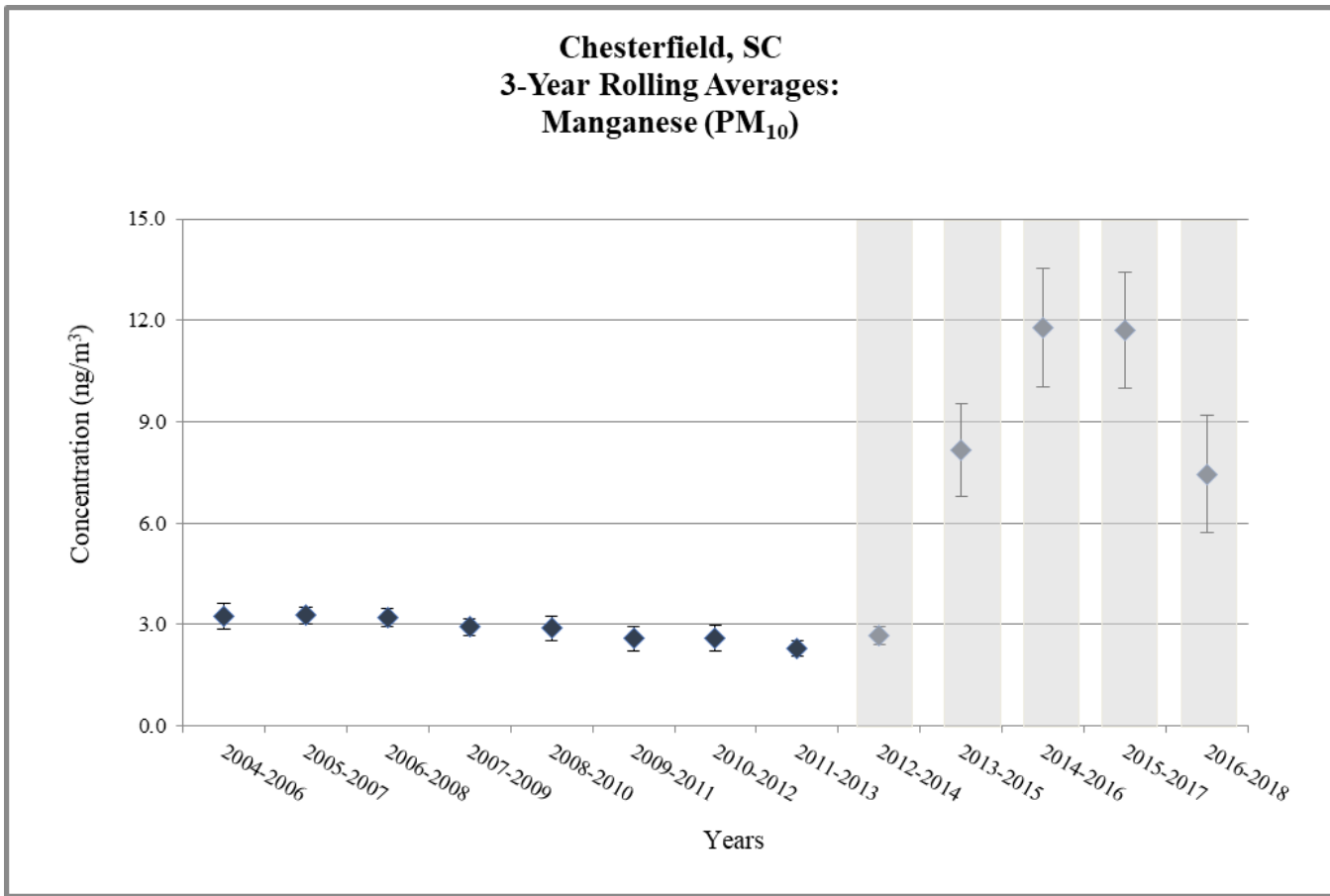


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations

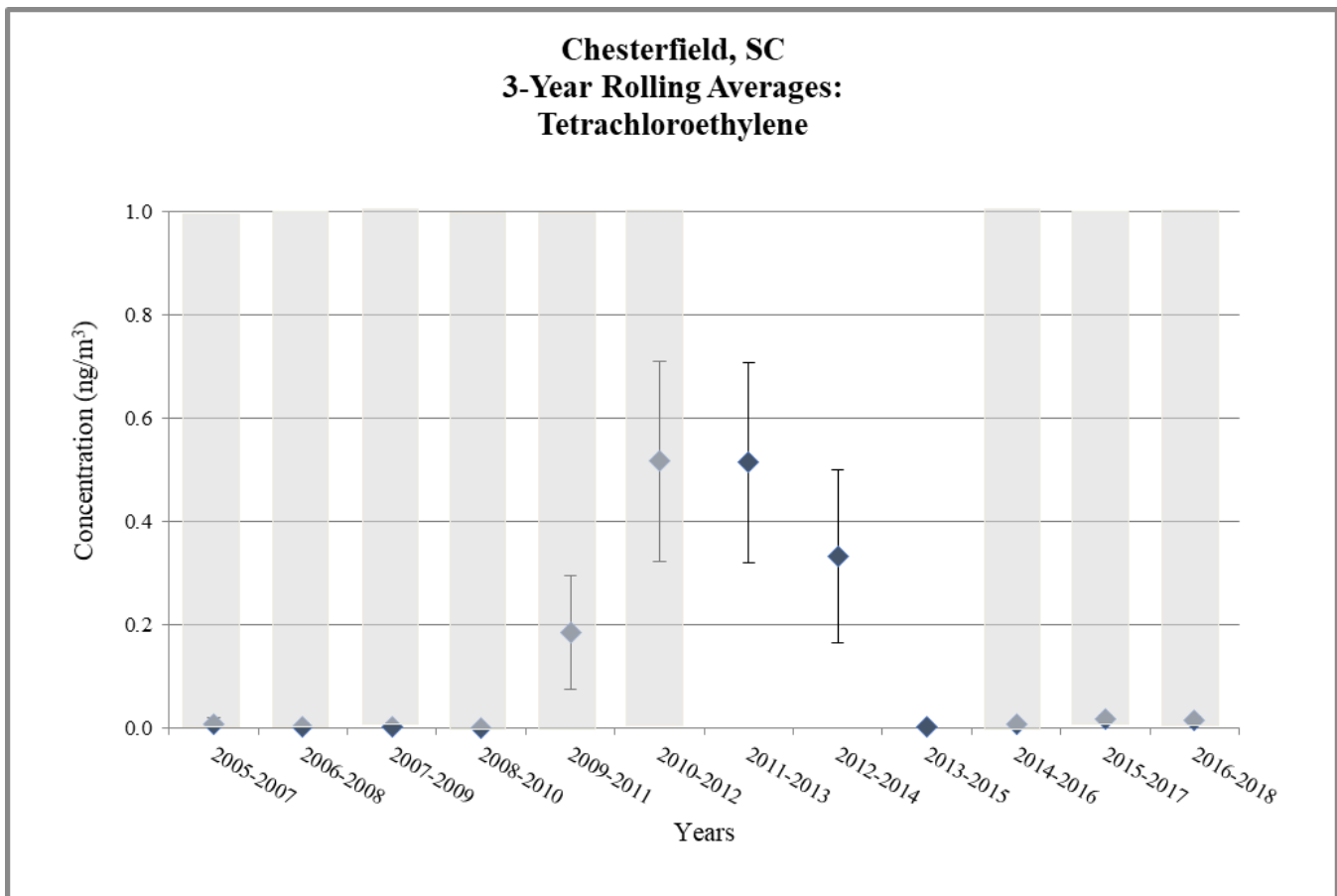
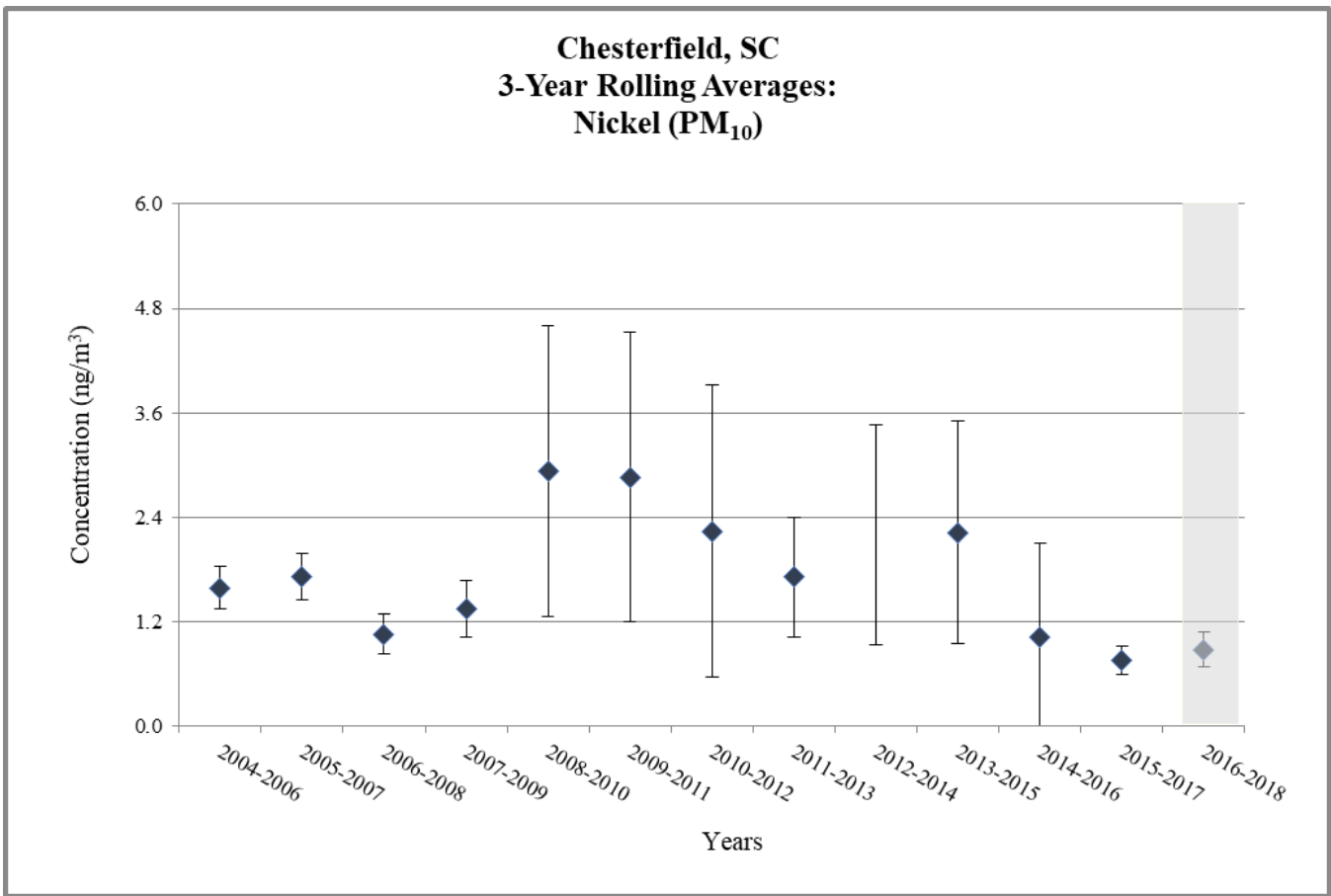
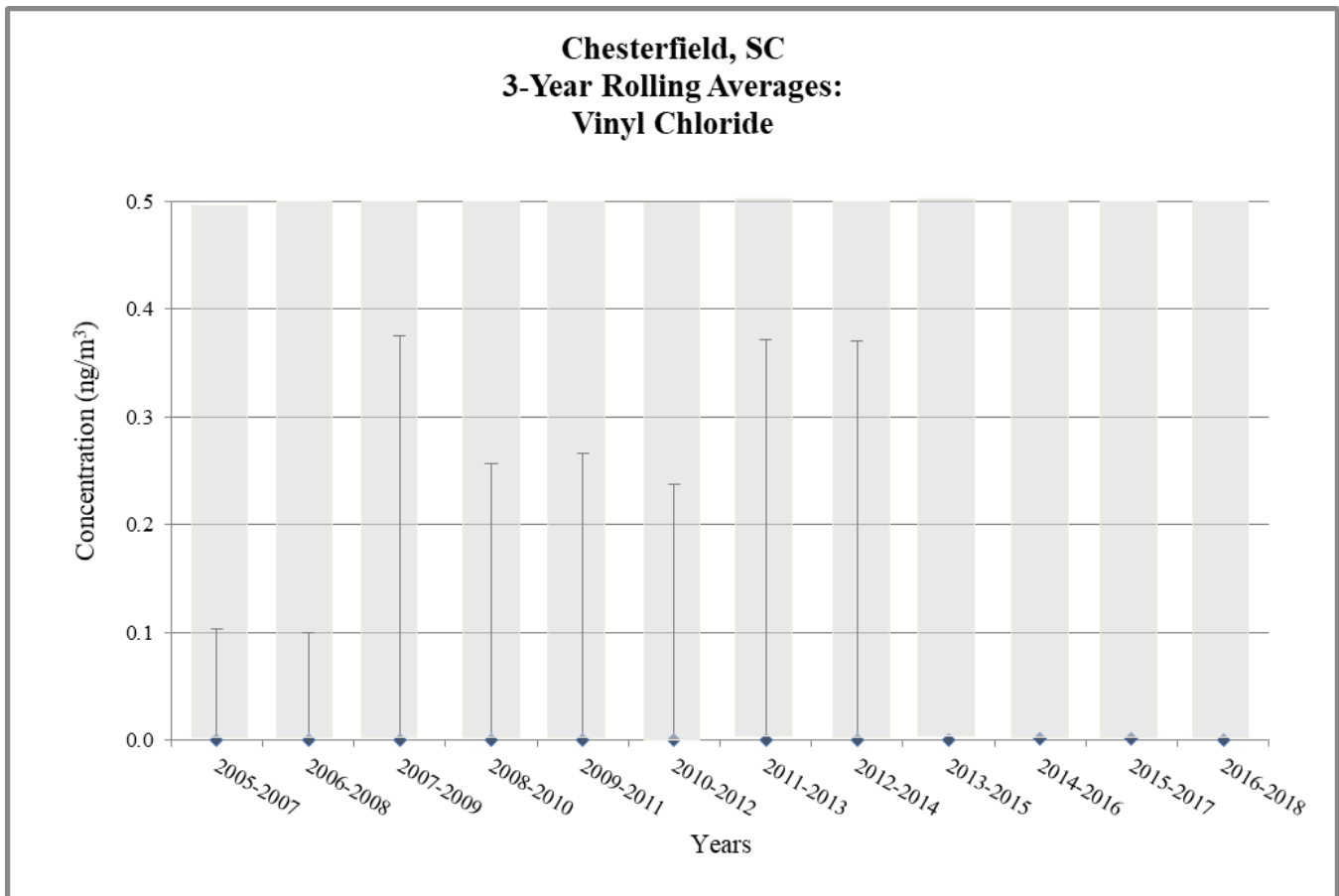
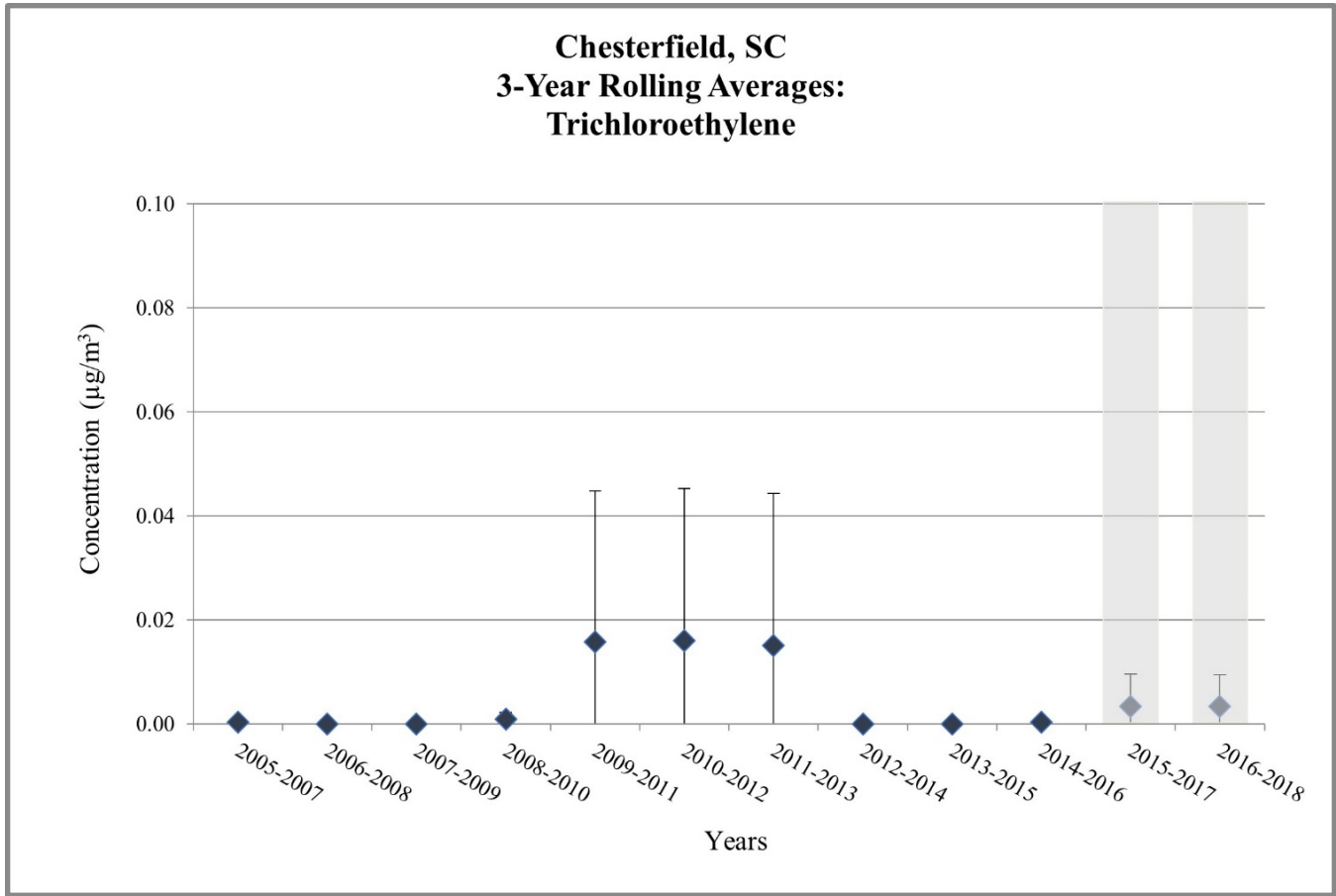


Figure 4. Chesterfield, SC - 3-Year Rolling Average Concentrations



Does not meet MQO



Concentrations not included in Analysis

Table 6. NATTS Network Assessment: MQO#1 - Completeness Percentage at Chesterfield, SC

Pollutant Group	Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyl	Acetaldehyde	92	95	97	100	100	100	95	95	95	98	92	95	98	98	72
Carbonyl	Formaldehyde	92	95	97	100	100	100	95	95	95	98	92	95	98	98	72
Chromium VI	Chromium VI	--	90	97	97	100	95	102	98	82	--	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	100	90	95	98	87	95	92	98	100	97	59
PAH	Naphthalene	--	--	--	--	100	90	95	98	87	95	92	98	100	97	59
PM ₁₀ Metals	Arsenic (PM ₁₀)	97	98	95	98	97	100	100	98	95	97	92	93	98	98	34
PM ₁₀ Metals	Beryllium (PM ₁₀)	97	98	95	98	97	100	100	98	95	97	92	93	98	98	34
PM ₁₀ Metals	Cadmium (PM ₁₀)	97	98	95	98	97	100	100	98	95	97	92	93	100	98	34
PM ₁₀ Metals	Lead (PM ₁₀)	97	98	95	98	97	100	100	98	95	97	92	93	98	98	34
PM ₁₀ Metals	Manganese (PM ₁₀)	97	98	95	98	97	100	100	98	95	97	92	93	98	98	34
PM ₁₀ Metals	Nickel (PM ₁₀)	97	98	95	98	97	100	100	98	95	97	92	93	98	98	34
VOC	Benzene	--	100	98	100	100	100	100	100	97	100	97	87	100	100	87
VOC	Butadiene, 1,3-	--	100	98	100	100	100	93	100	97	100	97	87	100	100	87
VOC	Carbon tetrachloride	--	100	98	100	100	100	100	100	97	100	97	87	100	100	87
VOC	Chloroform	--	100	98	100	100	100	100	100	97	100	97	87	100	100	87
VOC	Tetrachloroethylene	--	100	98	100	100	100	100	100	97	100	97	87	100	100	87
VOC	Trichloroethylene	--	100	98	100	100	100	100	100	97	100	97	87	100	100	87
VOC	Vinyl chloride	--	100	98	100	100	100	100	100	97	100	97	87	100	100	87

A-rated: ≥85%

B-rated: Between 75% to 85%

Does not meet: ≤75%

-- No data available

^a: Pollutant was expected, but not sampled at this site for this year.

Table 7. NATTS Network Assessment: MQO#2 - Reported Method Detection Limits (MDLs) at Chesterfield, SC

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 ³	0.36	0.38	0.38	0.40	0.38	0.44	0.44	0.50	0.50	0.44	0.22	0.18	0.38	0.39	0.06
Carbonyl	Formaldehyde	0.98/0.08 ^a	µg/m ³	0.16	0.17	0.17	0.20	0.23	0.25	0.25	0.26	0.24	1.88	0.86	0.86	1.70	1.71	0.20
Chromium VI	Chromium VI	0.08	ng/m ³	--	0.22	0.14	0.09	0.08	0.05	0.01	0.05	0.04	0.05	--	--	--	--	--
PAH	Benzo(a)pyrene	0.91	ng/m ³	--	--	--	--	0.08	0.07	0.04	0.05	0.06	0.06	0.0003	0.03	0.07	0.00	0.07
PAH	Naphthalene	29.00	ng/m ³	--	--	--	--	0.016	0.009	0.012	0.004	0.005	0.007	0.00001	0.00003	0.003	0.000	0.003
PM ₁₀ Metals	Arsenic (PM ₁₀)	0.23	ng/m ³	6.09	0.13	0.13	0.13	0.13	0.13	0.01	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.09
PM ₁₀ Metals	Beryllium (PM ₁₀)	0.42	ng/m ³	0.67	0.004	0.004	0.002	0.002	0.002	0.008	0.003	0.003	0.003	0.003	0.003	0.003	0.017	0.010
PM ₁₀ Metals	Cadmium (PM ₁₀)	0.56	ng/m ³	0.03	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.020
PM ₁₀ Metals	Lead (PM ₁₀)	15.0	ng/m ³	0.004	0.0002	0.0002	0.0002	0.0002	0.0002	0.000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.075
PM ₁₀ Metals	Manganese (PM ₁₀)	5.0	ng/m ³	0.011	0.0005	0.0005	0.0004	0.0004	0.0004	0.001	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0035	0.05
PM ₁₀ Metals	Nickel (PM ₁₀)	2.1	ng/m ³	0.67	0.001	0.001	0.001	0.001	0.001	0.013	0.001	0.001	0.001	0.001	0.001	0.001	0.02	0.49
VOC	Benzene	0.13	µg/m ³	2.31	2.31	2.31	2.68	3.68	4.43	3.05	0.34	0.88	0.88	0.88	0.88	0.88	5.78	5.78
VOC	Butadiene, 1,3-	0.10	µg/m ³	2.00	2.00	2.00	1.91	4.11	5.32	3.67	1.68	2.21	2.21	2.21	2.21	2.21	3.85	3.85
VOC	Carbon tetrachloride	0.17	µg/m ³	3.53	3.53	3.53	5.55	7.59	6.31	6.96	1.15	1.33	1.33	1.33	1.33	1.33	8.51	8.51
VOC	Chloroform	0.50	µg/m ³	1.00	1.00	1.00	1.33	1.81	0.88	1.39	0.22	0.41	0.41	0.41	0.41	0.41	1.02	1.02
VOC	Tetrachloroethylene	0.17	µg/m ³	4.12	4.12	4.12	7.44	9.69	6.79	7.06	0.84	1.08	1.08	1.08	1.08	1.08	7.18	7.18
VOC	Trichloroethylene	0.5/0.2 ^a	µg/m ³	1.00	1.00	1.00	1.93	1.92	1.94	1.98	0.28	0.39	0.97	0.97	0.97	0.97	5.35	5.35
VOC	Vinyl chloride	0.11	µg/m ³	2.73	2.73	2.73	2.68	3.81	3.73	3.81	0.81	1.32	1.32	1.32	1.32	1.32	2.05	2.05

	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 Chesterfield, SC

Pollutant Group	Pollutant Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Carbonyls	Acetaldehyde	7.0	11.9	-4.4	-5.8	6.3	-7.9	a	-1.0	b	9.2	9.4	b	-2.1	0.9	-5.0
Carbonyls	Formaldehyde	3.5	8.5	-13.9	-10.2	19.2	1.6	a	6.6	b	16.6	8.4	b	1.6	7.1	13.1
Chromium VI	Chromium VI	--	b	b	b	b	-5.6 ^c	10.5 ^c	b	19.5	-6.5	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	b	-1.7	-2.3	-2.1	25.2	-5.7	-42.9	0.4	-33.3	-27.1	-28.1
PAH	Naphthalene	--	--	--	--	b	-7.7	-17.1	-13.9	21.4	25.5	-33.0	-68.9	-14.2	-22.4	-22.6
PM ₁₀ Metals	Arsenic (PM ₁₀)	-15.4	d	-5.6	11.2	6.1	4.0	-32.6	-15.1	-11.7	-11.4	-14.4	b	6.0	23.6	-11.8
PM ₁₀ Metals	Beryllium (PM ₁₀)	-11.4	d	-2.2	12.4	-5.5	9.7	-19.2	-14.8	-4.5	-1.9	e	b	4.6	17.8	-7.5
PM ₁₀ Metals	Cadmium (PM ₁₀)	-0.5	d	-16.3	-6.7	-4.6	-0.5	-24.9	-8.0	3.9	-1.0	e	b	27.5	15.2	-11.9
PM ₁₀ Metals	Lead (PM ₁₀)	6.5	d	19.2	2.1	8.8	-5.1	-28.4	13.7	21.8	18.3	3.3	b	0.6	10.7	-14.7
PM ₁₀ Metals	Manganese (PM ₁₀)	11.1	d	-1.2	-1.1	-16.0	0.8	-6.1	12.4	15.9	0.7	155.3	b	86.6	66.3	-7.7
PM ₁₀ Metals	Nickel (PM ₁₀)	3.6	d	-5.4	-3.5	4.2	-9.3	-5.2	3.0	-5.0	7.4	f	b	52.5	46.0	8.9
VOC	Benzene	-24.0	7.5	7.4	-0.1	-7.7	-24.3	-18.7	-41.9	b	-22.7	-39.2	-20.6	-36.0	13.8	-16.5
VOC	Butadiene, 1,3-	703.7	14.9	8.0	-17.1	-14.3	19.7	9.8	-42.1	b	83.8	-19.7	-7.2	-30.2	10.1	-28.3
VOC	Carbon tetrachloride	0.0	-6.6	17.8	11.7	-13.2	-34.5	-24.5	-38.6	b	-25.0	-25.8	26.9	-12.8	23.8	-43.9
VOC	Chloroform	-14.4	-12.9	1.2	-3.7	-11.6	-27.9	-24.7	-45.8	b	-20.1	-10.3	-16.0	-35.4	0.4	-42.2
VOC	Tetrachloroethylene	-23.1	2.1	-3.6	0.7	-16.7	-6.0	-16.1	-32.8	b	-27.6	-20.0	5.9	38.6	2.0	-24.3
VOC	Trichloroethylene	d	2.7	16.5	-7.6	-16.8	-8.6	-22.9	-38.7	b	-18.9	-10.6	26.1	-28.0	-7.6	-24.1
VOC	Vinyl chloride	102.9	-18.0	-8.4	4.5	-31.0	-20.7	-23.5	-37.7	b	93.7	-6.5	34.6	-38.3	-7.9	-57.3

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

^a: Although this pollutant was sampled for at this site and year, the laboratory equipment was not operating at the time the Proficiency Test sample was sent.

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

^c: 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.

^d: Pollutant was sampled at this site and year, but no bias data were reported.

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

^f: 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 Chesterfield, SC

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	57.2	29.2	26.8	18.7	13.0	10.9	19.2	14.7	9.3	8.8	8.2	25.8	63.0	17.9	10.0
Carbonyls	Formaldehyde	57.2	12.4	21.0	17.6	12.5	10.4	14.0	14.6	6.7	11.2	12.0	35.4	64.0	17.5	15.0
Chromium VI	Chromium VI	--	49.8	a	a	13.0	26.5	33.8	8.9	9.7	a	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	--	--	--	--	--	--	a	a	a	a	a
PAH	Naphthalene	--	--	--	--	--	--	--	--	--	--	37.5	22.9	21.0	29.4	24.0
PM ₁₀ Metals	Arsenic (PM ₁₀)	4.4	15.0	20.0	19.0	11.6	25.8	24.8	35.3	19.4	31.7	40.4	18.1	22.4	19.9	10.9
PM ₁₀ Metals	Beryllium (PM ₁₀)	a	20.1	12.8	10.8	5.2	a	90.1	a	53.8	36.1	51.3	13.6	141.4	56.6	15.1
PM ₁₀ Metals	Cadmium (PM ₁₀)	36.5	32.3	29.4	40.1	22.3	45.7	62.9	37.9	31.4	37.5	41.4	47.8	60.8	43.3	41.0
PM ₁₀ Metals	Lead (PM ₁₀)	27.4	16.1	33.8	27.3	15.3	39.1	69.2	37.5	34.0	27.3	35.6	30.6	29.3	21.2	14.4
PM ₁₀ Metals	Manganese (PM ₁₀)	41.6	8.8	20.8	27.4	15.6	14.4	44.4	32.7	34.8	28.4	25.5	29.3	22.3	10.7	9.4
PM ₁₀ Metals	Nickel (PM ₁₀)	81.0	31.8	52.1	72.2	63.8	66.6	74.4	57.7	65.6	94.1	89.6	28.9	24.2	35.3	a
VOC	Benzene	23.0	20.9	22.8	8.8	32.3	a	6.2	8.5	7.6	13.6	15.5	10.4	15.4	3.9	32.9
VOC	Butadiene, 1,3-	a	a	a	a	a	a	3.1	a	a	a	a	a	a	a	a
VOC	Carbon tetrachloride	a	7.4	15.7	a	6.4	a	a	3.5	5.4	11.1	8.9	15.1	11.4	a	a
VOC	Chloroform	a	a	a	a	a	a	a	a	a	a	a	61.7	12.9	a	a
VOC	Tetrachloroethylene	a	10.1	a	a	a	a	a	14.7	1.0	a	a	a	a	a	a
VOC	Trichloroethylene	a	a	a	a	a	a	a	0	a	a	a	a	a	a	a
VOC	Vinyl chloride	a	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

^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 Chesterfield, SC

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	--	--	--	--	--	--	--	--	a	a	a	a	a	b	0.7
Carbonyls	Formaldehyde	--	--	--	--	--	--	--	--	a	a	a	a	a	b	0.7
Chromium VI	Chromium VI	--	--	4.0	13.2	10.2	15.5	10.9	6.7	4.1	a	--	--	--	--	--
PAH	Benzo(a)pyrene	--	--	--	--	--	--	--	--	a	a	a	a	a	a	b
PAH	Naphthalene	--	--	--	--	--	--	--	--	2.5	1.1	1.9	a	a	a	1.3
PM ₁₀ Metals	Arsenic (PM ₁₀)	--	--	--	--	--	--	--	--	a	a	a	a	b	b	b
PM ₁₀ Metals	Beryllium (PM ₁₀)	--	--	--	--	--	--	--	--	a	a	a	a	b	b	b
PM ₁₀ Metals	Cadmium (PM ₁₀)	--	--	--	--	--	--	--	--	a	a	a	a	b	b	b
PM ₁₀ Metals	Lead (PM ₁₀)	--	--	--	--	--	--	--	--	a	a	a	a	0.7	2.3	b
PM ₁₀ Metals	Manganese (PM ₁₀)	--	--	--	--	--	--	--	--	a	a	a	a	6.7	9.0	b
PM ₁₀ Metals	Nickel (PM ₁₀)	--	--	--	--	--	--	--	--	a	a	a	a	34.8	b	b
VOC	Benzene	--	--	--	--	--	--	--	--	a	a	a	a	14.5	2.0	b
VOC	Butadiene, 1,3-	--	--	--	--	--	--	--	--	a	a	a	a	a	b	a
VOC	Carbon tetrachloride	--	--	--	--	--	--	--	--	a	a	a	a	5.9	b	b
VOC	Chloroform	--	--	--	--	--	--	--	--	a	a	a	a	12.9	b	b
VOC	Tetrachloroethylene	--	--	--	--	--	--	--	--	a	a	a	a	b	b	a
VOC	Trichloroethylene	--	--	--	--	--	--	--	--	a	a	a	a	b	b	a
VOC	Vinyl chloride	--	--	--	--	--	--	--	--	a	a	a	a	b	b	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

^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.

Appendix A: Equipment Inventory

Pollutant Type	Year(s)	Manufacturer/Model, Extraction Type, and Year
<i>Sampling Equipment</i>		
Carbonyls	2004	ATEC model 100 (Year Deployed: 2001)
	2005-2017	ATEC model 2200 (2 units) (Year Deployed: 2005)
	2018	ATEC 2200 (Year Deployed: 2018)
Chromium VI	2005-2007	ERG Chromium VI sampler (Year Deployed: 2005)
	2008-2013	ERG Chromium VI sampler (Year Deployed: 2008)
PAHs	2008-2010	Andersen GPS-1 PUF Sampler (Year Deployed: 1990)
	2011-2011	Thermo Andersen GPS-1 PUF Sampler (Year Deployed: 2000)
	2012-2018	General Metal Works Model No. PS-1 (2 Units) (Year Deployed: 2001)
PM ₁₀ Metals	2004-2011	Andersen Hi-Volume PM10 Sampler (Year Deployed: 1989)
	2012-2018	General Metal Works Hi-Vol Model UV15H (2 units) (Year Deployed: 1989)
VOCs	2004-2018	Thermo-Anderson AVOCs (Year Deployed: 2001)
<i>Analytical Equipment</i>		
Carbonyls	2004-2018	Hitachi LaChrome Elite (Year Deployed: 2003)
Chromium VI	2005-2013	Dionex 300 ion chromatography system (Year Deployed: 2001)
PAHs	2008-2014	HP/Agilent 5890/5971 GC/MS (Year Deployed: 2008)
	2015-2018	Agilent 6890/5973N GC/MS (Year Deployed: 2000)
PM ₁₀ Metals	2004-2013	PE Optima 2000 ICP-OES (Year Deployed: 2001)
	2014-2018	PE ELAN 9000 ICP-MS (Year Deployed: 2015)
VOCs	2004-2015	HP/Agilent 6890/5973 GC/MS (Year Deployed: 2001)
	2016-2018	HP/Agilent 7890/5977 GC/MS (Year Deployed: 2016)
<i>Preconcentrator Equipment</i>		
VOCs	2004-2014	Entech 7100A (Year Deployed: 2004)
	2015-2018	Entech 7200 (Year Deployed: 2015)
<i>Standards Preparation Equipment</i>		
VOCs	2004-2007	Ashcroft pressure gauge (Pressure Dilution) (Year Deployed: 1994)
	2008-2013	Entech 4600A (Dynamic Dilution) (Year Deployed: 2007)
	2014-2018	Entech 4700 (Static Dilution) (Year Deployed: 2014)
<i>Canister Cleaning Equipment</i>		
VOCs	2004-2004	SIS Canister Cleaning System (Cold) (Year Deployed: unknown)
	2005-2017	Entech 3100A (Hot) (Year Deployed: 2004)
	2018	Entech 3100 (Hot) (Year Deployed: 2018)
<i>PM₁₀ Extraction Equipment</i>		
PM ₁₀ Metals	2004-2006	CAE Ultrasonics Model HT-1212-H (Year Deployed: 2006)
	2007-2011	CAE Ultrasonics Model HT-1212-H (Year Deployed: 2000)
	2012-2013	CAE Ultrasonics Model HT-1212-H (Year Deployed: 2004)
	2014-2018	CAE Ultrasonics Model HT-1212-H (Year Deployed: 2011)
<i>Chromium VI Extraction Equipment</i>		
Chromium VI	2005-2010	Branson 8510 (Sonicator) (Year Deployed: 2001)
	2011-2011	Branson 8510 Sonicator/ Branson Shaker (Year Deployed: 2001/2011)
	2012-2013	Branson Shaker (Year Deployed: 2011)
<i>PAHs Extraction Equipment</i>		
PAHs	2008-2014	Dionex -300 (ASE) (Year Deployed: 2004)
	2015-2018	Unknown (Soxhlet) (Year Deployed: 2015)