**Seattle, WA NATTS Network Assessment Review**

- Established 2003: Carbonyls, $PM_{10}$ Metals, and VOCs
  - Added Chromium VI in 2005, completed in 2013
  - Added PAHs in 2008
  - Added Ethylene Oxide in 2020
- For the NATTS Network Assessment (2003-2022):
  - 6 of 17 Method Quality Objective (MQO) Core HAPs were included in the national trends
    - Due to Covid pandemic restrictions, sampling in 2020 was limited.
  - 288 of 319 pollutant datasets were suitable for trends analysis
  - Annual Average and 3-Year Rolling Average Concentrations were decreasing for arsenic ($PM_{10}$), benzene, 1,3-butadiene, lead ($PM_{10}$), manganese ($PM_{10}$), naphthalene, nickel ($PM_{10}$), and tetrachloroethylene.
  - 100% Reporting of Datasets
- Method Quality Objectives (MQO): 2003-2022
  - Completeness: Met 85% completeness in 296 of 330 pollutant datasets
  - Method Detection Limits: Met MDL Target Ratio of 1.00 in 309 of 330 pollutant datasets
  - Bias: Met ±25% for 256 of 279 pollutant datasets
  - Overall Method Precision: Met ≤15% CV for 120 of 132 pollutant datasets
  - Analytical Method Precision: Met ≤15% CV for 205 of 212 pollutant datasets
- Analytical Laboratories for 2022

| VOC | Carbonyl | $PM_{10}$ Metals | PAHs |
|---|---|---|---|
| ERG | ERG | ERG | ERG |

- Equipment Year Deployed

| Equipment Type | VOC | Carbonyl | $PM_{10}$ Metals | PAHs |
|---|---|---|---|---|
| Sampler | 2016 | 2021 | 2022 | 2005 |
| Analytical | 2019 | 2018 | 2017 | 2021 |
| Preconcentrator | 2019 | NA | NA | NA |
| Standards Preparation | 1985 | NA | NA | NA |
| Canister Cleaning | 2010 | NA | NA | NA |
| Extraction | NA | NA | 2014 | 2019 |

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

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

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

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

**Figure 1. NATTS Site and Year Established**

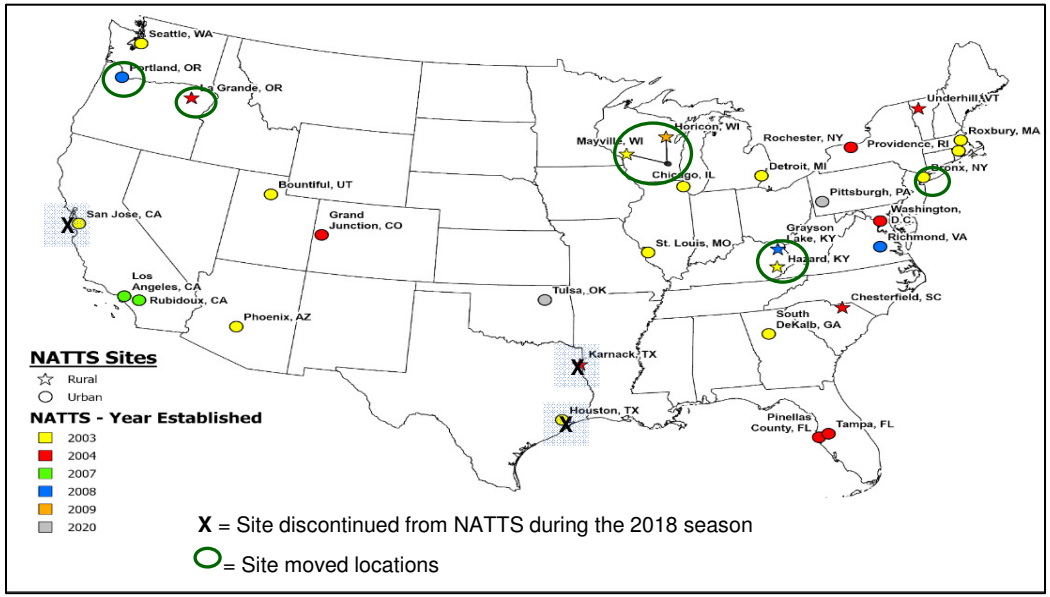



**Table 1. NATTS Network Assessment: Count and Percentage of Suitable Datasets by Pollutant Group**

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

**Table 2. Three-Year Block Averages for National Trends**

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

[a] Acrolein and ethylene oxide were not assessed due to sampling and analytical issues

[b] Hexavalent chromium (not assessed) was discontinued in 2013

**Site Information**

| | |
|---|---|
| Region | 10 |
| NATTS Site Type | Urban |
| County | King |
| AQS Site Code | 53-033-0080 |
| NATTS Operating Agency | WA Department of Ecology |
| Latitude | 47.568333 |
| Longitude | -122.308056 |
| AQS Land Use | Industrial |
| AQS Location Setting | Suburban |
| County Population (2023) | 2,271,380 |

**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 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetaldehyde | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Arsenic ($PM_{10}$) | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) |
| Benzene | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Benzo(a)pyrene | -- | -- | -- | -- | -- | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Beryllium ($PM_{10}$) | N(a) | N(b) | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) |
| Butadiene, 1,3- | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Cadmium ($PM_{10}$) | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) |
| Carbon tetrachloride | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Chloroform | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Formaldehyde | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Lead ($PM_{10}$) | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) |
| Manganese ($PM_{10}$) | N(a) | Y | Y | N(b) | Y | Y | 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 | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Nickel ($PM_{10}$) | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) | Y(T) |
| Tetrachloroethylene | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Trichloroethylene | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |
| Vinyl chloride | N(a) | Y | Y | N(b) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | (c) | Y | Y |

[a]: No MDL reported to EPA.

[b]: Completeness was less than 75% based on 1-in-6 day sampling.

[c]: Due to Covid pandemic restrictions, sampling activities were limited; thus, the agency was not able to have the opportunity to collect enough samples.

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

| Analyte | Units | Site Type | # Data Records | % Detections | Arithmetic Mean[b] | Percentile Value[c] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 5th | 10th | 25th | 50th | 75th | 90th | 95th |
| Acetaldehyde | µg/m$^3$ | Urban | 22,000 | 100% | 1.73 ± 0.02 | 0.50 | 0.65 | 0.95 | 1.42 | 2.15 | 3.19 | 3.96 |
| | µg/m$^3$ | Rural | 6,392 | 100% | 1.17 ± 0.03 | 0.36 | 0.45 | 0.65 | 0.92 | 1.35 | 1.98 | 2.67 |
| | µg/m$^3$ | All Sites | 28,392 | 100% | 1.61 ± 0.02 | 0.45 | 0.58 | 0.85 | 1.29 | 1.97 | 2.99 | 3.79 |
| Arsenic ($PM_{10}$) | ng/m$^3$ | Urban | 21,944 | 95% | 0.87 ± 0.03 | 0.03 | 0.16 | 0.32 | 0.56 | 0.96 | 1.65 | 2.37 |
| | ng/m$^3$ | Rural | 6,385 | 96% | 0.49 ± 0.02 | 0.03 | 0.08 | 0.16 | 0.35 | 0.58 | 0.93 | 1.30 |
| | ng/m$^3$ | All Sites | 28,329 | 96% | 0.78 ± 0.02 | 0.03 | 0.13 | 0.27 | 0.51 | 0.87 | 1.51 | 2.16 |
| Benzene | µg/m$^3$ | Urban | 22,246 | 99% | 0.85 ± 0.01 | 0.23 | 0.29 | 0.42 | 0.64 | 1.02 | 1.62 | 2.20 |
| | µg/m$^3$ | Rural | 5,932 | 90% | 0.52 ± 0.01 | ND | 0.06 | 0.20 | 0.38 | 0.67 | 1.08 | 1.51 |
| | µg/m$^3$ | All Sites | 28,178 | 97% | 0.78 ± 0.01 | 0.16 | 0.23 | 0.36 | 0.58 | 0.95 | 1.52 | 2.07 |
| Benzo(a)pyrene | ng/m$^3$ | Urban | 17,810 | 73% | 0.10 ± 0.01 | ND | ND | ND | 0.04 | 0.10 | 0.23 | 0.35 |
| | ng/m$^3$ | Rural | 4,735 | 37% | 0.07 ± 0.01 | ND | ND | ND | ND | 0.02 | 0.19 | 0.38 |
| | ng/m$^3$ | All Sites | 22,545 | 65% | 0.09 ± 0.01 | ND | ND | ND | 0.03 | 0.09 | 0.22 | 0.35 |
| Beryllium ($PM_{10}$) | ng/m$^3$ | Urban | 21,786 | 77% | 0.042 ± 0.004 | ND | ND | 0.0005 | 0.005 | 0.015 | 0.043 | 0.098 |
| | ng/m$^3$ | Rural | 6,062 | 49% | 0.018 ± 0.002 | ND | ND | ND | ND | 0.004 | 0.012 | 0.041 |
| | ng/m$^3$ | All Sites | 27,848 | 71% | 0.037 ± 0.003 | ND | ND | ND | 0.003 | 0.011 | 0.038 | 0.083 |
| Butadiene, 1,3- | µg/m$^3$ | Urban | 22,220 | 78% | 0.092 ± 0.002 | ND | ND | 0.018 | 0.051 | 0.110 | 0.215 | 0.317 |
| | µg/m$^3$ | Rural | 5,940 | 29% | 0.017 ± 0.001 | ND | ND | ND | ND | 0.011 | 0.054 | 0.104 |
| | µg/m$^3$ | All Sites | 28,160 | 68% | 0.076 ± 0.002 | ND | ND | ND | 0.039 | 0.092 | 0.190 | 0.283 |
| Cadmium ($PM_{10}$) | ng/m$^3$ | Urban | 21,954 | 93% | 0.184 ± 0.014 | ND | 0.019 | 0.043 | 0.081 | 0.160 | 0.354 | 0.572 |
| | ng/m$^3$ | Rural | 6,067 | 89% | 0.092 ± 0.005 | ND | ND | 0.026 | 0.055 | 0.099 | 0.179 | 0.270 |
| | ng/m$^3$ | All Sites | 28,021 | 92% | 0.164 ± 0.011 | ND | 0.012 | 0.039 | 0.075 | 0.143 | 0.300 | 0.518 |
| Carbon Tetrachloride | µg/m$^3$ | Urban | 22,202 | 98% | 0.556 ± 0.002 | 0.336 | 0.423 | 0.486 | 0.550 | 0.638 | 0.725 | 0.784 |
| | µg/m$^3$ | Rural | 5,909 | 84% | 0.494 ± 0.010 | ND | ND | 0.342 | 0.533 | 0.629 | 0.728 | 0.807 |
| | µg/m$^3$ | All Sites | 28,111 | 95% | 0.543 ± 0.003 | ND | 0.363 | 0.475 | 0.547 | 0.636 | 0.726 | 0.788 |
| Chloroform | µg/m$^3$ | Urban | 22,218 | 88% | 0.243 ± 0.016 | ND | ND | 0.094 | 0.129 | 0.205 | 0.398 | 0.630 |
| | µg/m$^3$ | Rural | 5,942 | 56% | 0.062 ± 0.002 | ND | ND | ND | 0.049 | 0.098 | 0.134 | 0.228 |
| | µg/m$^3$ | All Sites | 28,160 | 82% | 0.205 ± 0.013 | ND | ND | 0.076 | 0.110 | 0.187 | 0.342 | 0.543 |
| Formaldehyde | µg/m$^3$ | Urban | 22,024 | 100% | 3.03 ± 0.04 | 0.69 | 1.00 | 1.57 | 2.42 | 3.72 | 5.47 | 6.95 |
| | µg/m$^3$ | Rural | 6,432 | 100% | 2.16 ± 0.04 | 0.49 | 0.64 | 1.03 | 1.67 | 2.69 | 4.12 | 5.34 |
| | µg/m$^3$ | All Sites | 28,456 | 100% | 2.83 ± 0.03 | 0.61 | 0.86 | 1.42 | 2.25 | 3.50 | 5.22 | 6.65 |

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

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

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

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

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

**Table 4. Summary Statistics for Seattle, WA**

| Analyte | Units | # Data Records | % Detection | Arithmetic Mean[a] | Percentile Value[b] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 5th | 10th | 25th | 50th | 75th | 90th | 95th |
| Acetaldehyde | µg/m$^3$ | 1,141 | 100% | 1.00 ± 0.04 | 0.31 | 0.39 | 0.53 | 0.81 | 1.29 | 1.81 | 2.21 |
| Arsenic ($PM_{10}$) | ng/m$^3$ | 1,200 | 100% | 0.72 ± 0.03 | 0.17 | 0.23 | 0.34 | 0.54 | 0.90 | 1.47 | 1.92 |
| Benzene | µg/m$^3$ | 1,137 | 100% | 0.72 ± 0.03 | 0.22 | 0.27 | 0.38 | 0.57 | 0.85 | 1.36 | 1.75 |
| Benzo(a)pyrene | ng/m$^3$ | 849 | 66% | 0.05 ± 0.01 | ND | ND | ND | 0.01 | 0.04 | 0.12 | 0.22 |
| Beryllium ($PM_{10}$) | ng/m$^3$ | 1,175 | 73% | 0.002 ± 0.0003 | ND | ND | ND | 0.001 | 0.003 | 0.005 | 0.008 |
| Butadiene, 1,3- | µg/m$^3$ | 1,137 | 93% | 0.076 ± 0.004 | ND | 0.02 | 0.04 | 0.05 | 0.09 | 0.15 | 0.22 |
| Cadmium ($PM_{10}$) | ng/m$^3$ | 1,200 | 100% | 0.26 ± 0.23 | 0.02 | 0.02 | 0.04 | 0.07 | 0.12 | 0.20 | 0.29 |
| Carbon Tetrachloride | µg/m$^3$ | 1,137 | 100% | 0.69 ± 0.01 | 0.51 | 0.55 | 0.61 | 0.67 | 0.74 | 0.83 | 0.94 |
| Chloroform | µg/m$^3$ | 1,137 | 99% | 0.15 ± 0.01 | 0.08 | 0.09 | 0.11 | 0.12 | 0.15 | 0.21 | 0.35 |
| Formaldehyde | µg/m$^3$ | 1,141 | 100% | 1.07 ± 0.10 | 0.23 | 0.31 | 0.47 | 0.75 | 1.19 | 1.81 | 2.23 |
| Lead ($PM_{10}$) | ng/m$^3$ | 1,200 | 100% | 3.11 ± 0.16 | 0.73 | 0.95 | 1.48 | 2.40 | 3.69 | 6.01 | 7.86 |
| Manganese ($PM_{10}$) | ng/m$^3$ | 1,200 | 100% | 7.34 ± 0.49 | 0.99 | 1.38 | 2.40 | 4.56 | 8.56 | 16.63 | 23.50 |
| Naphthalene | ng/m$^3$ | 849 | 100% | 53.30 ± 2.75 | 13.21 | 17.44 | 26.39 | 41.64 | 67.58 | 101.00 | 134.85 |
| Nickel ($PM_{10}$) | ng/m$^3$ | 1,200 | 100% | 1.72 ± 0.11 | 0.29 | 0.40 | 0.58 | 1.04 | 1.97 | 3.98 | 5.48 |
| Tetrachloroethylene | µg/m$^3$ | 1,136 | 89% | 0.11 ± 0.01 | ND | ND | 0.06 | 0.09 | 0.14 | 0.24 | 0.33 |
| Trichloroethylene | µg/m$^3$ | 1,137 | 37% | 0.032 ± 0.004 | ND | ND | ND | ND | 0.04 | 0.11 | 0.16 |
| Vinyl Chloride | µg/m$^3$ | 1,078 | 4% | 0.0004 ± 0.0002 | 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 | WSU | WSU | WSU | RJ Lee | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG |
| Carbonyls | WSU | WSU | WSU | RJ Lee | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG |
| $PM_{10}$ Metals | WSU | WSU | WSU | RJ Lee | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG |
| PAHs | -- | -- | -- | -- | -- | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG | ERG |

| Pollutant Group | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| VOCs | ERG | ERG | ERG | ERG |
| Carbonyls | ERG | ERG | ERG | ERG |
| $PM_{10}$ Metals | ERG | ERG | ERG | ERG |
| PAHs | ERG | ERG | ERG | ERG |

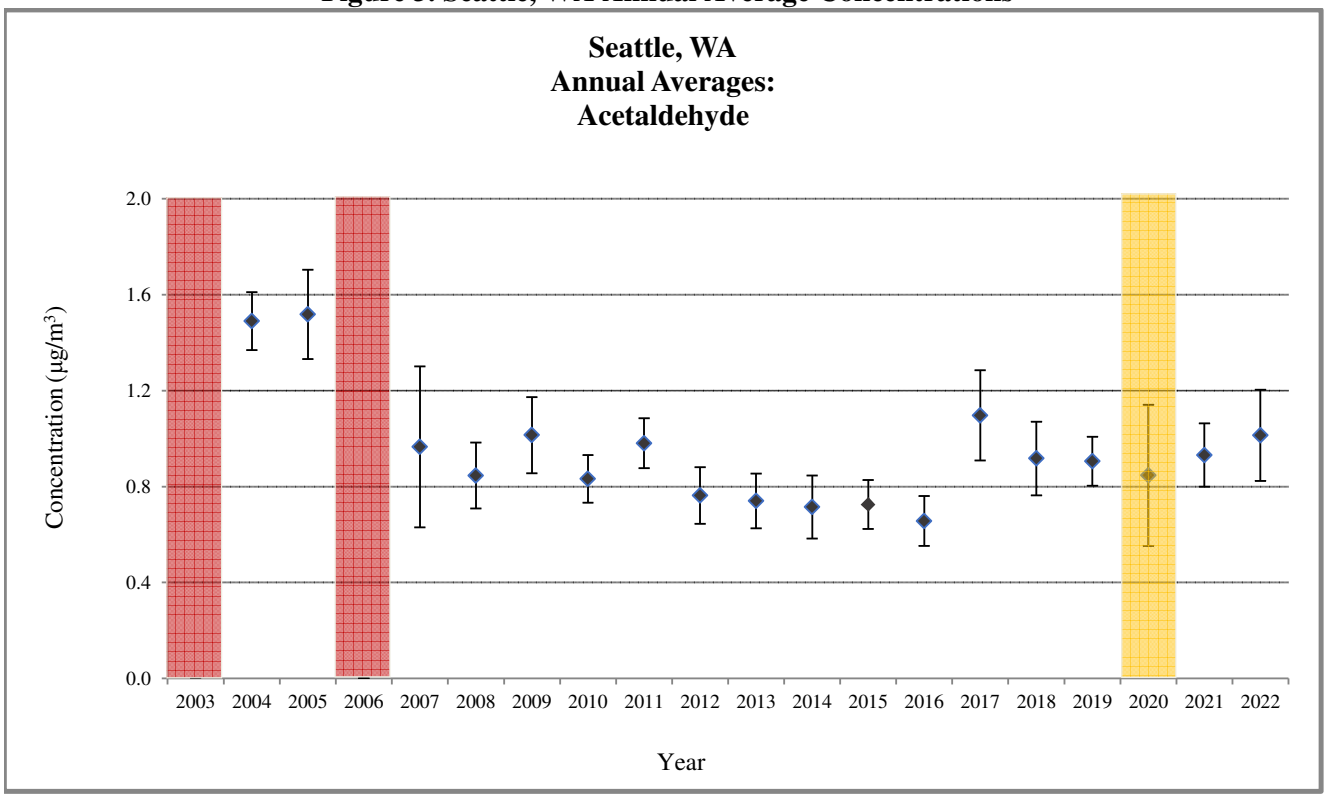
--: Not Applicable

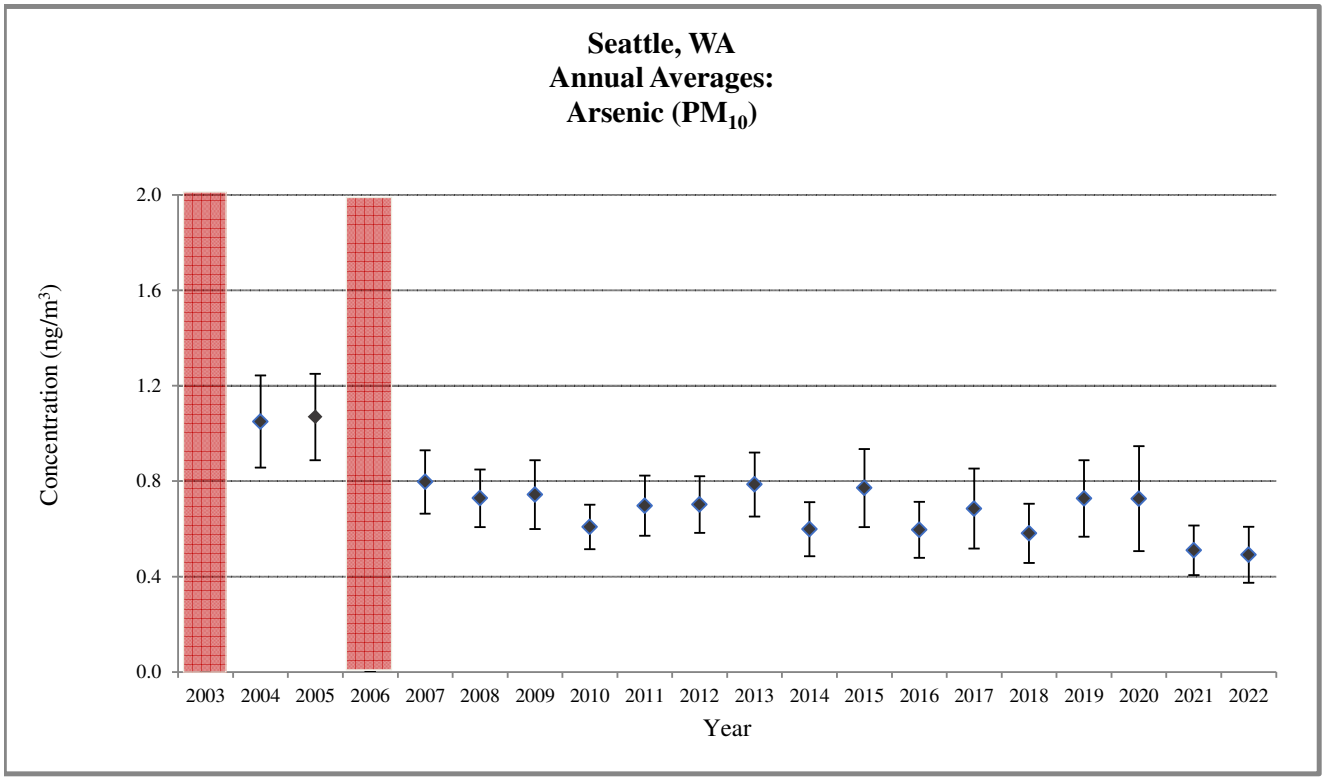
ERG: Eastern Research Group, Inc.

RJ Lee: RJ Lee Group Center for Laboratory Sciences

WSU: Washington State University

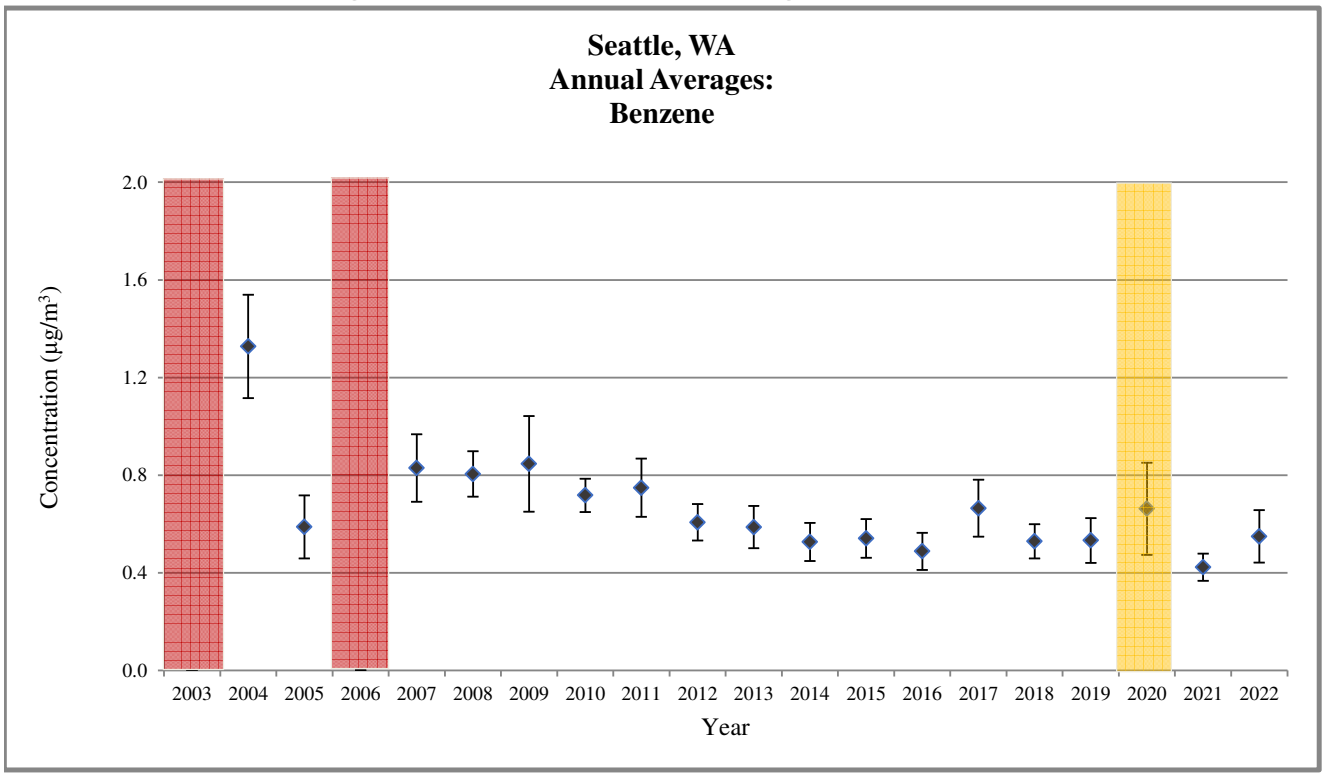
**Figure 3. Seattle, WA Annual Average Concentrations**

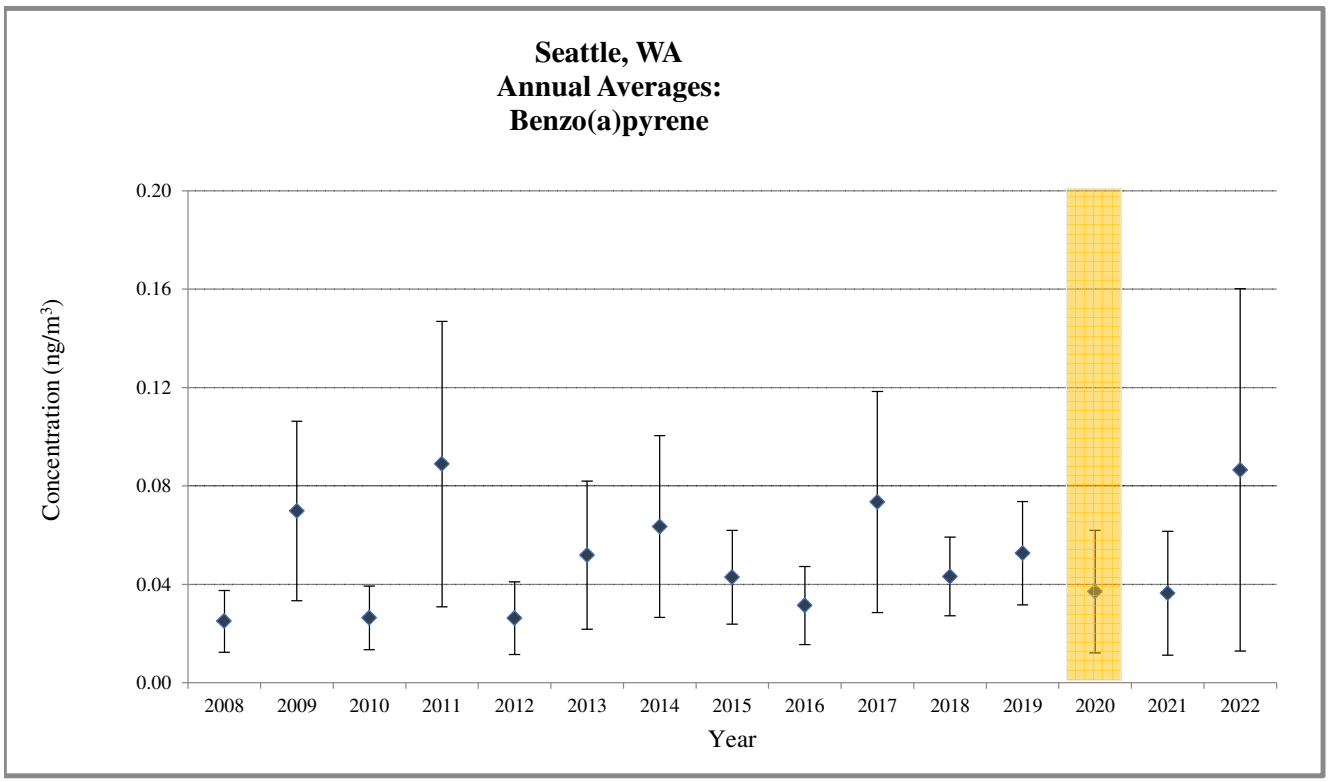



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

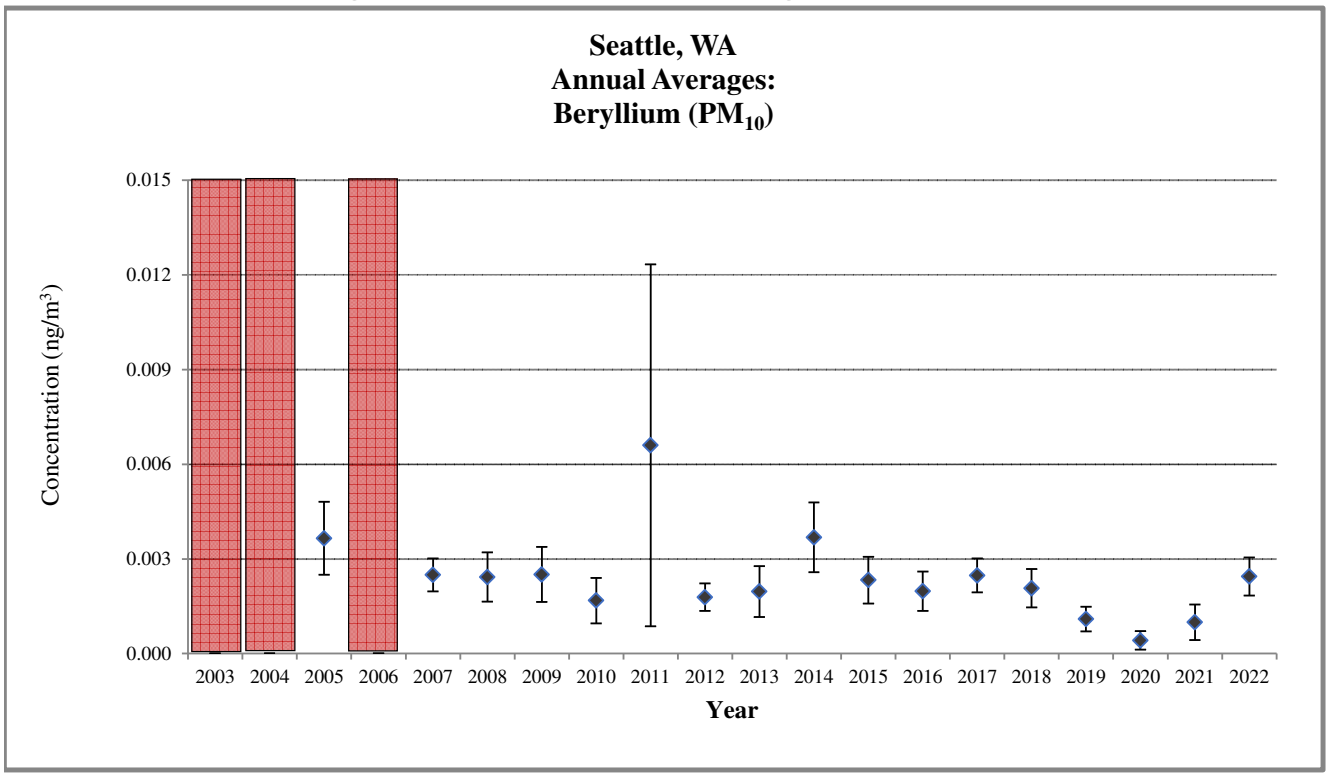
**Figure 3. Seattle, WA Annual Average Concentrations**

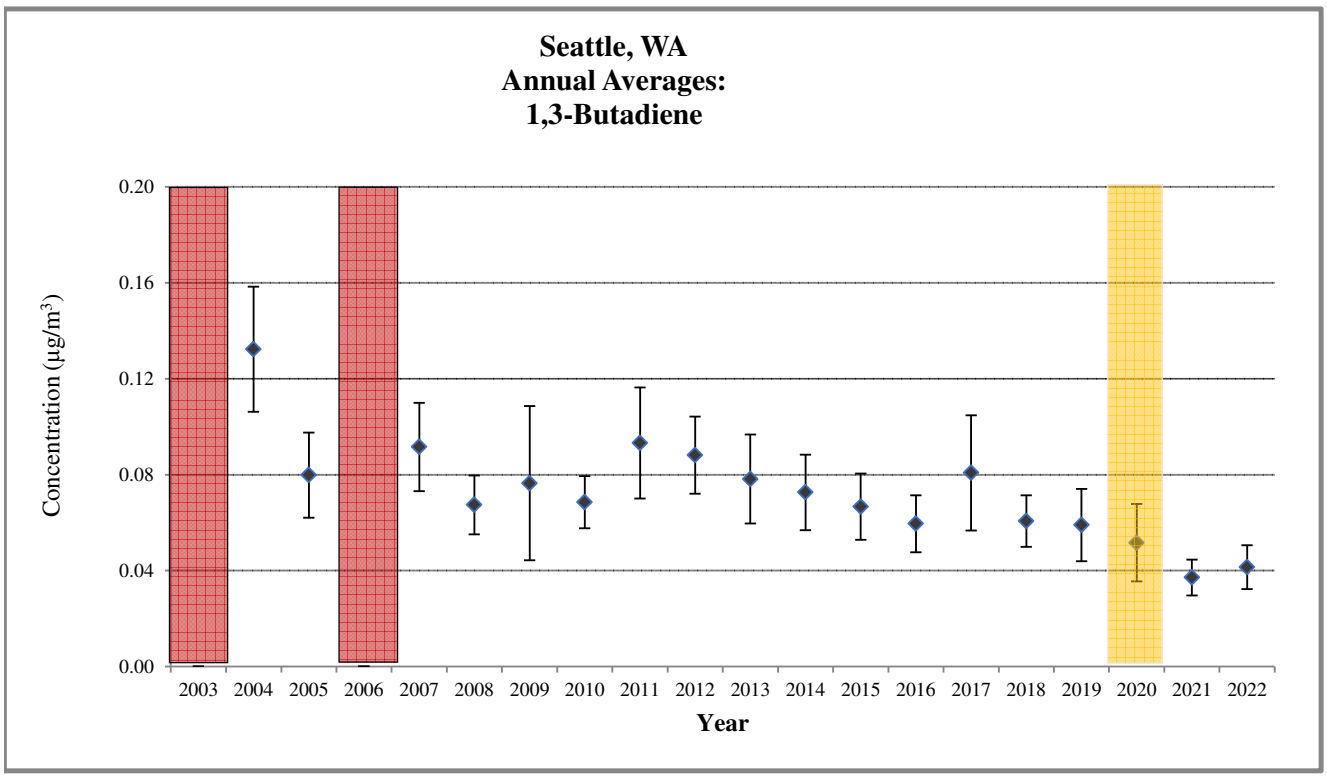



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

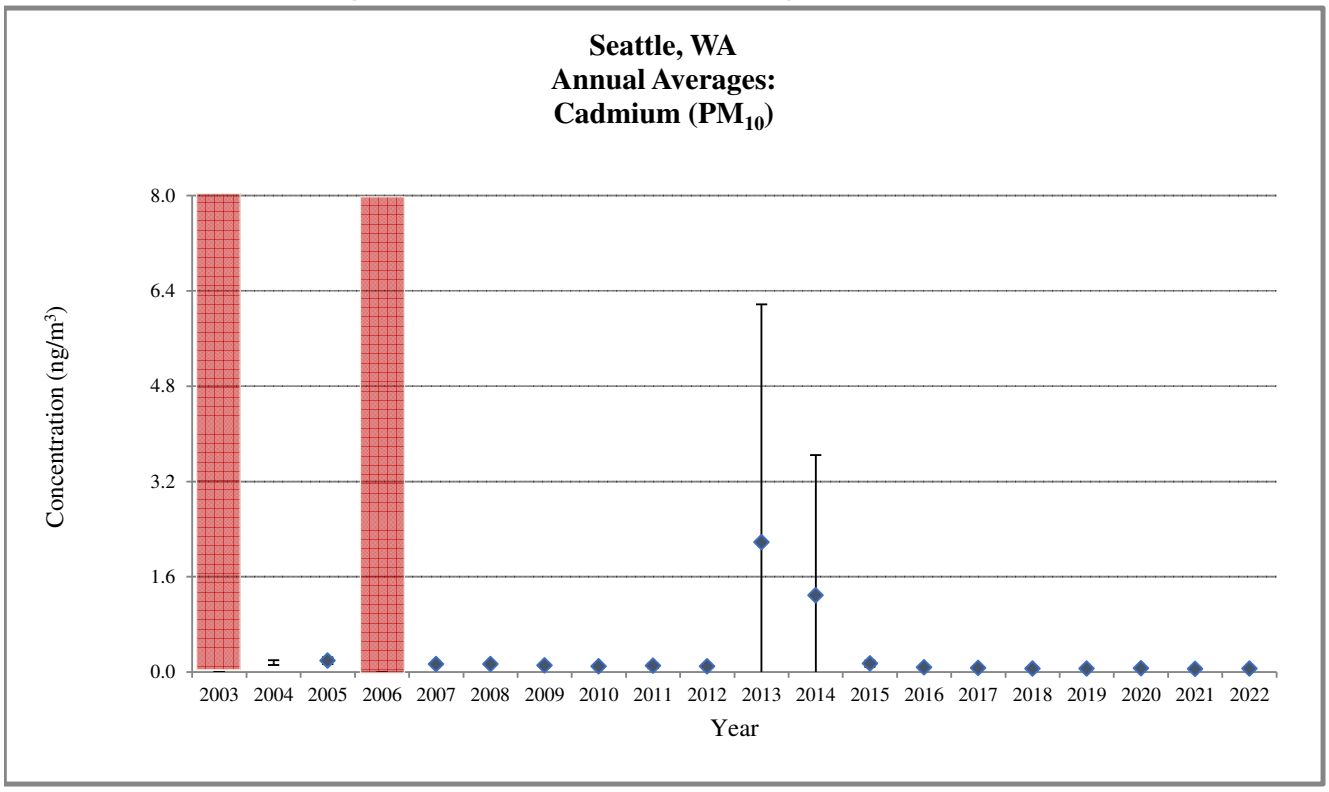
**Figure 3. Seattle, WA Annual Average Concentrations**

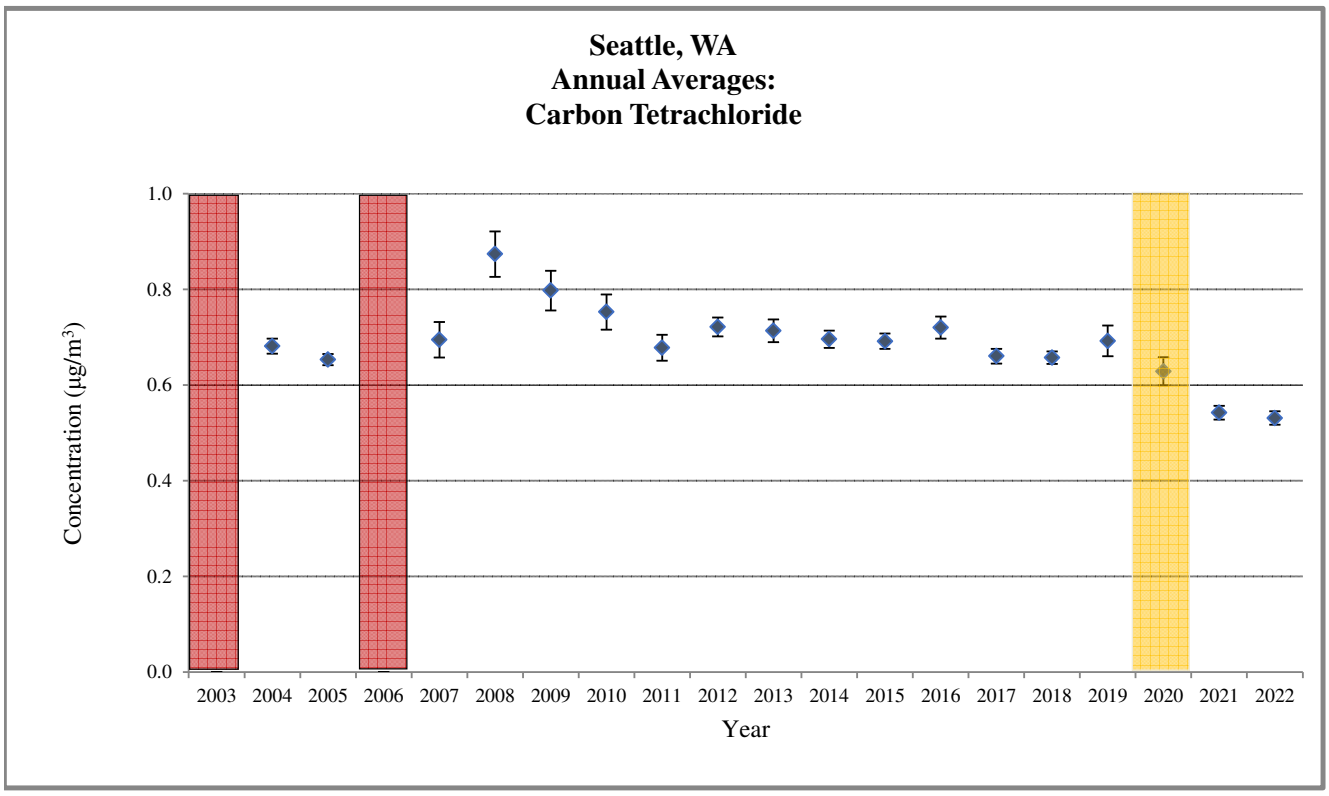



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

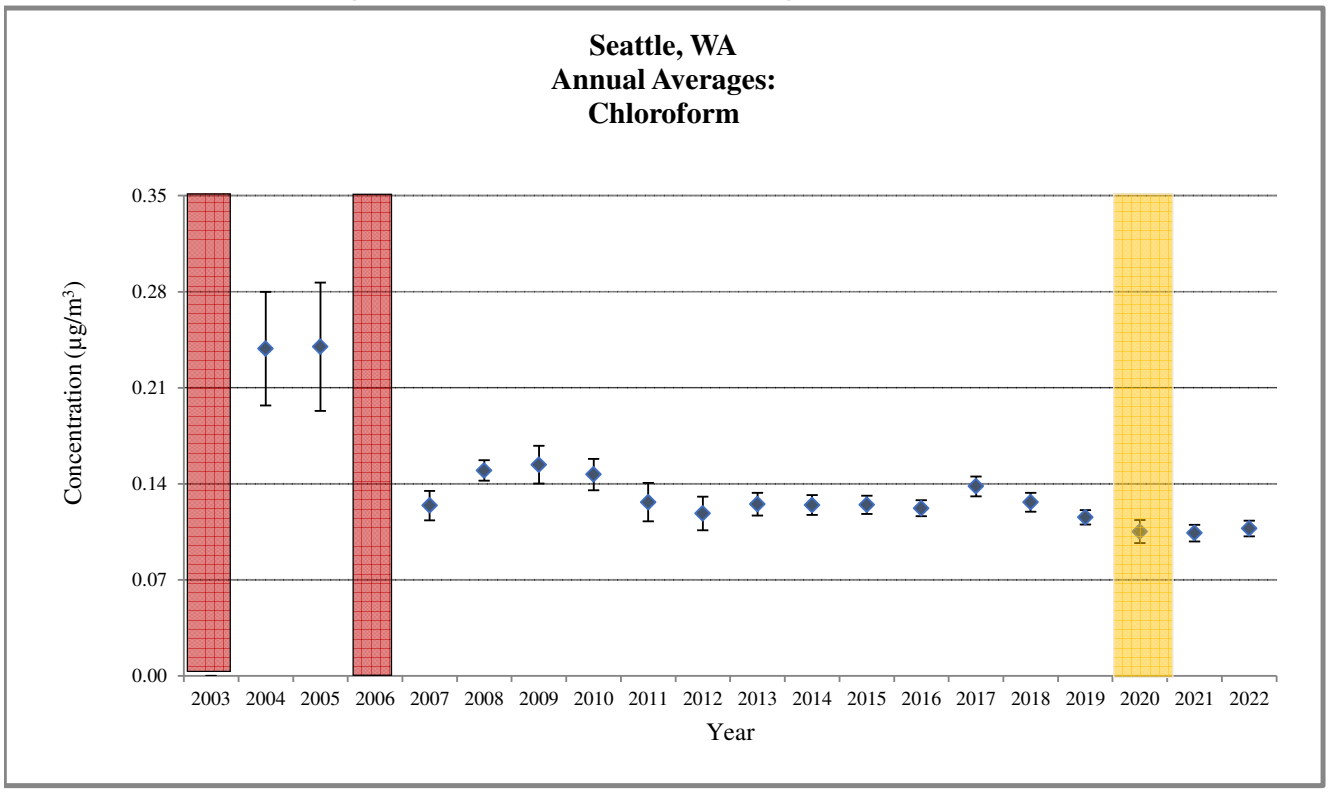
**Figure 3. Seattle, WA Annual Average Concentrations**

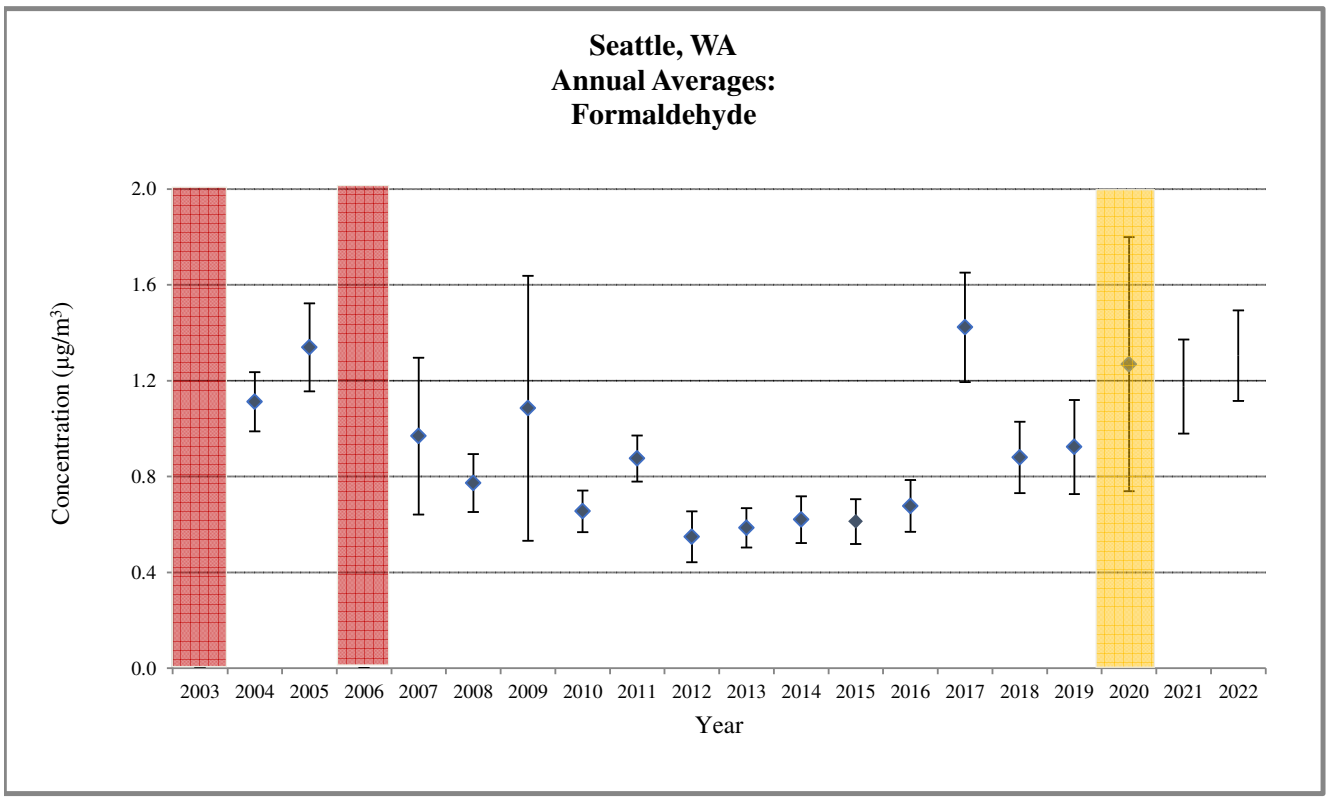



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

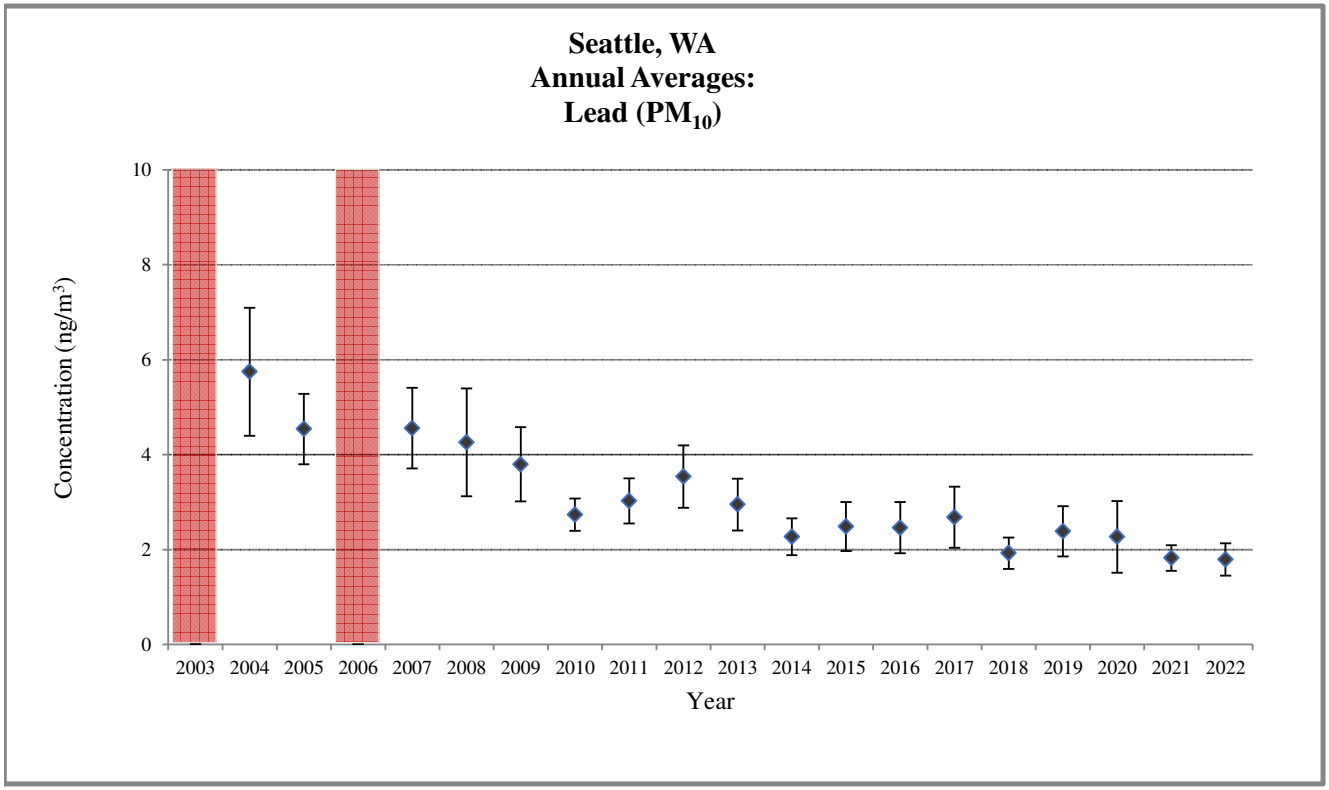
**Figure 3. Seattle, WA Annual Average Concentrations**

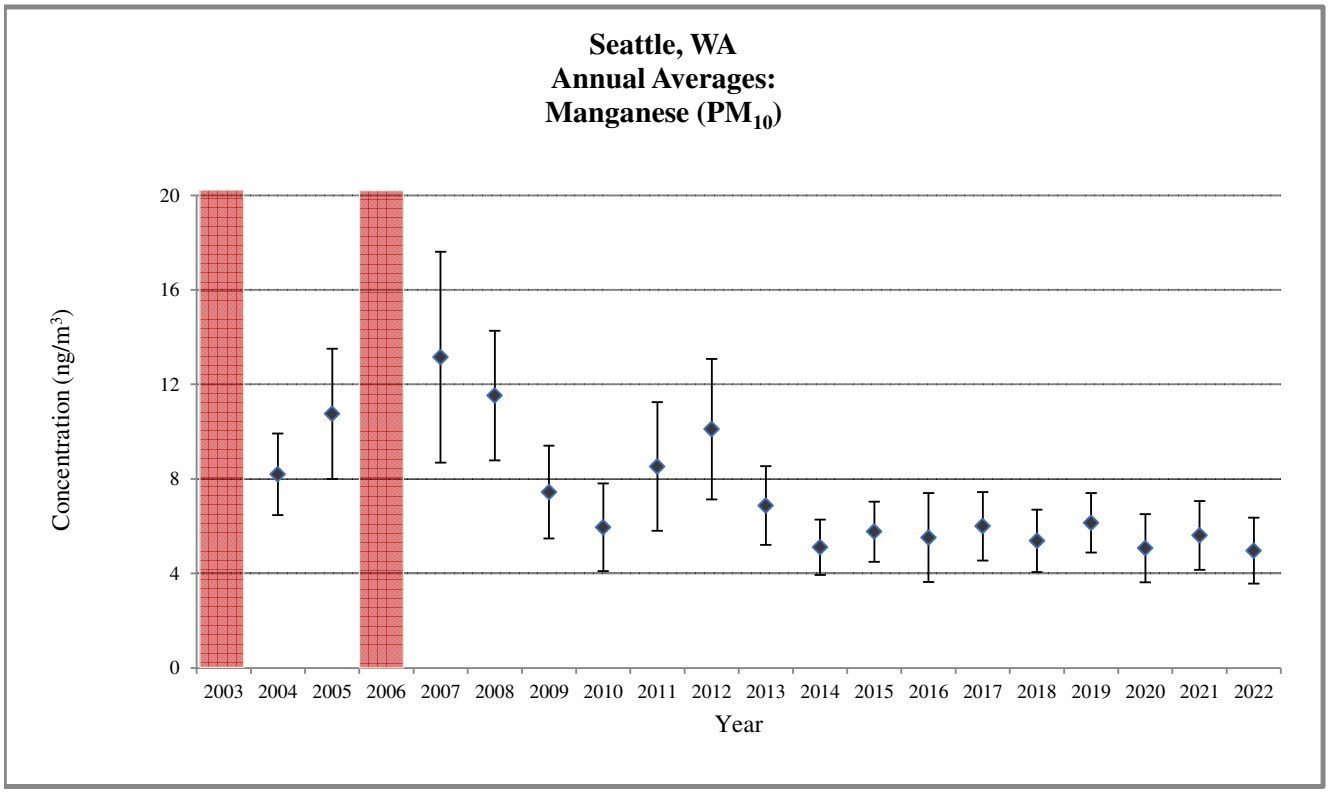



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

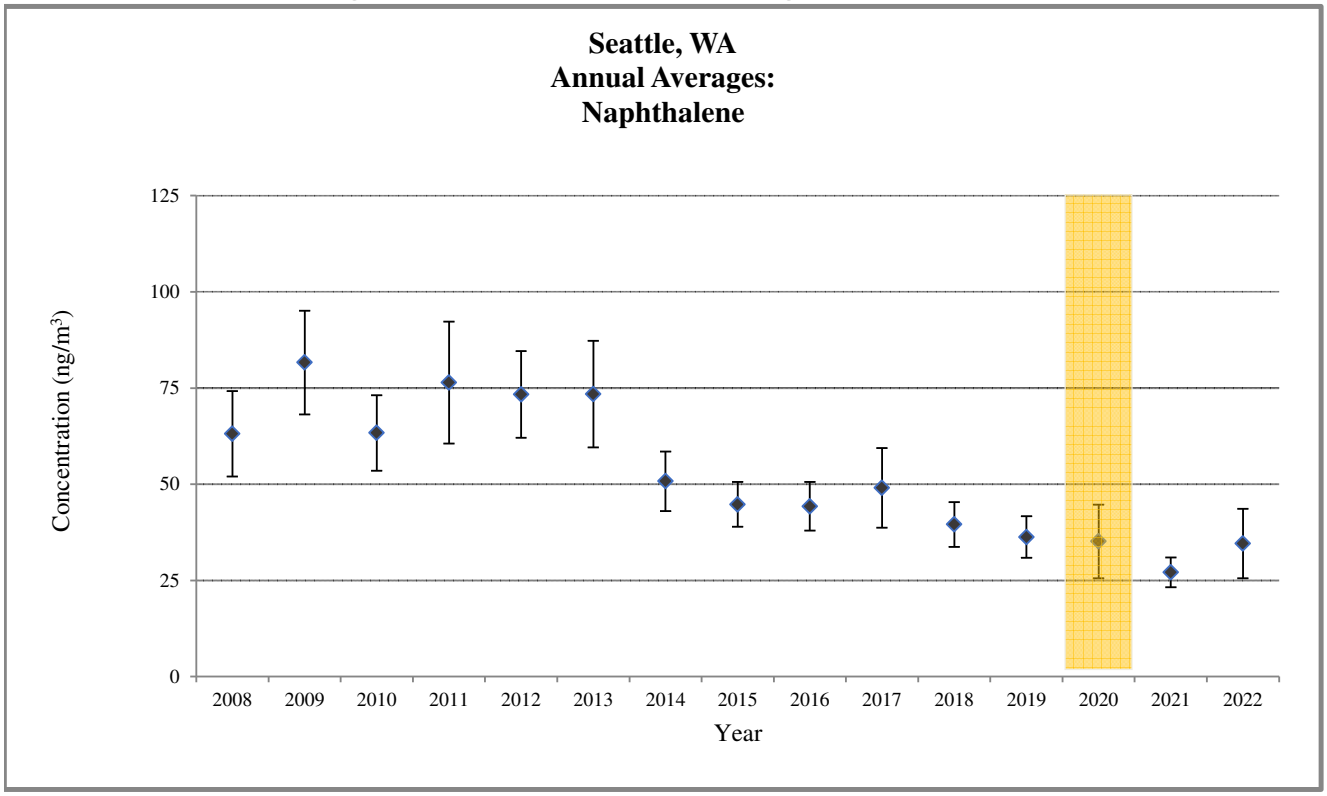
**Figure 3. Seattle, WA Annual Average Concentrations**

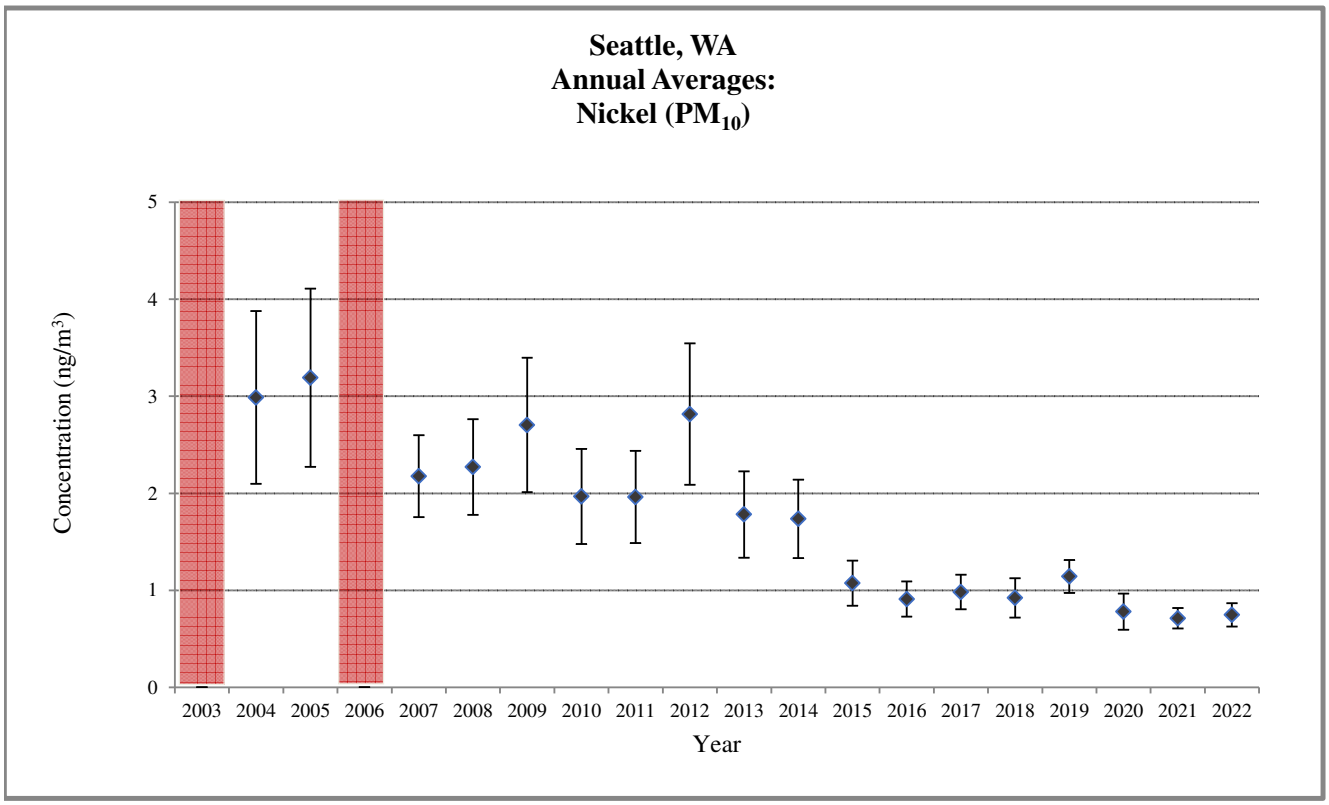



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

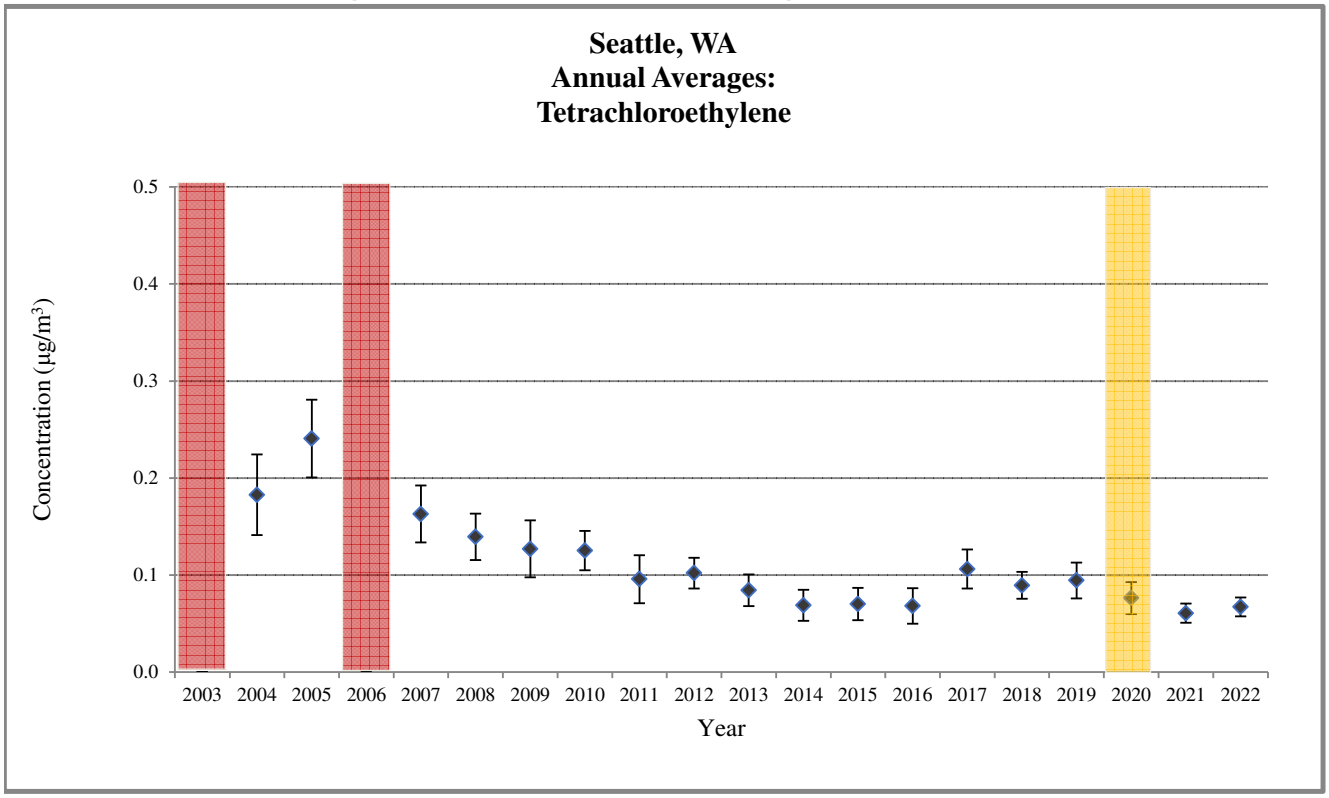
**Figure 3. Seattle, WA Annual Average Concentrations**

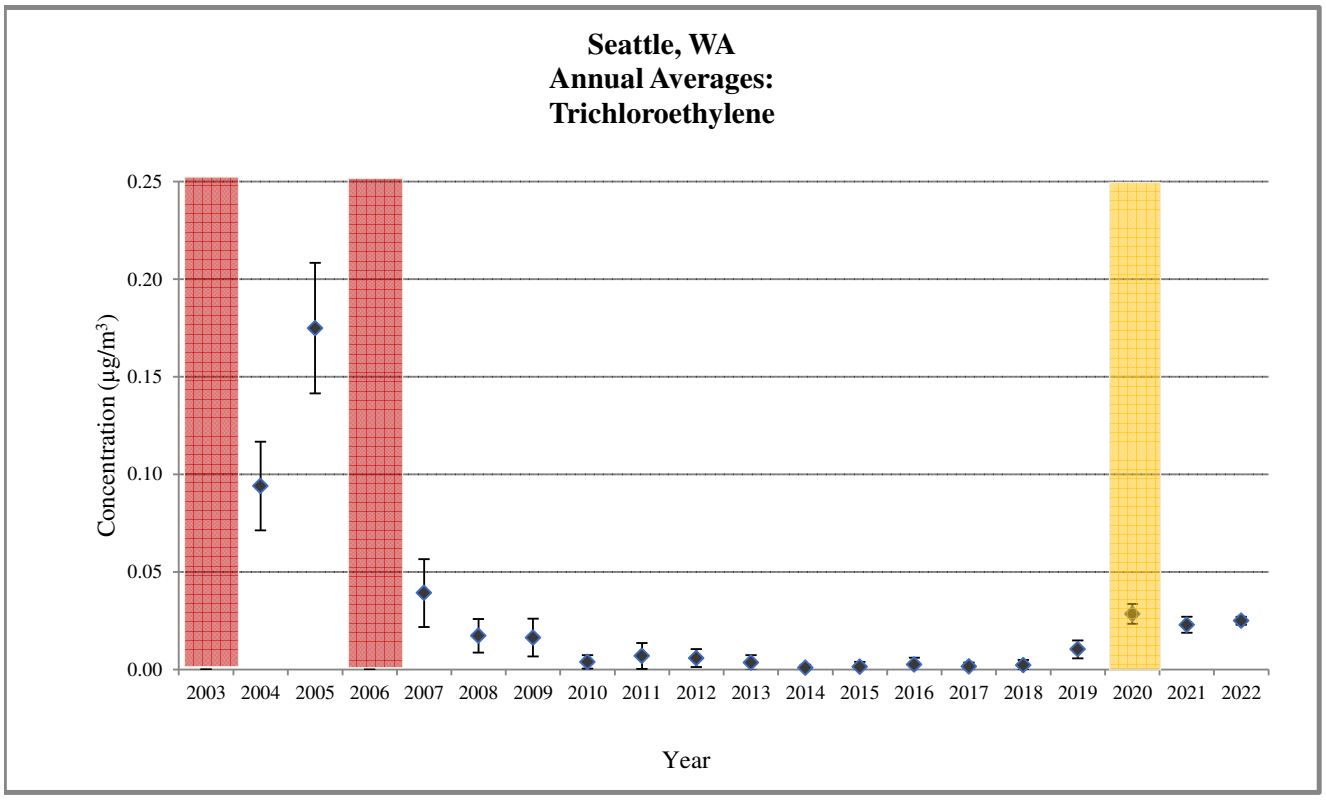



Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

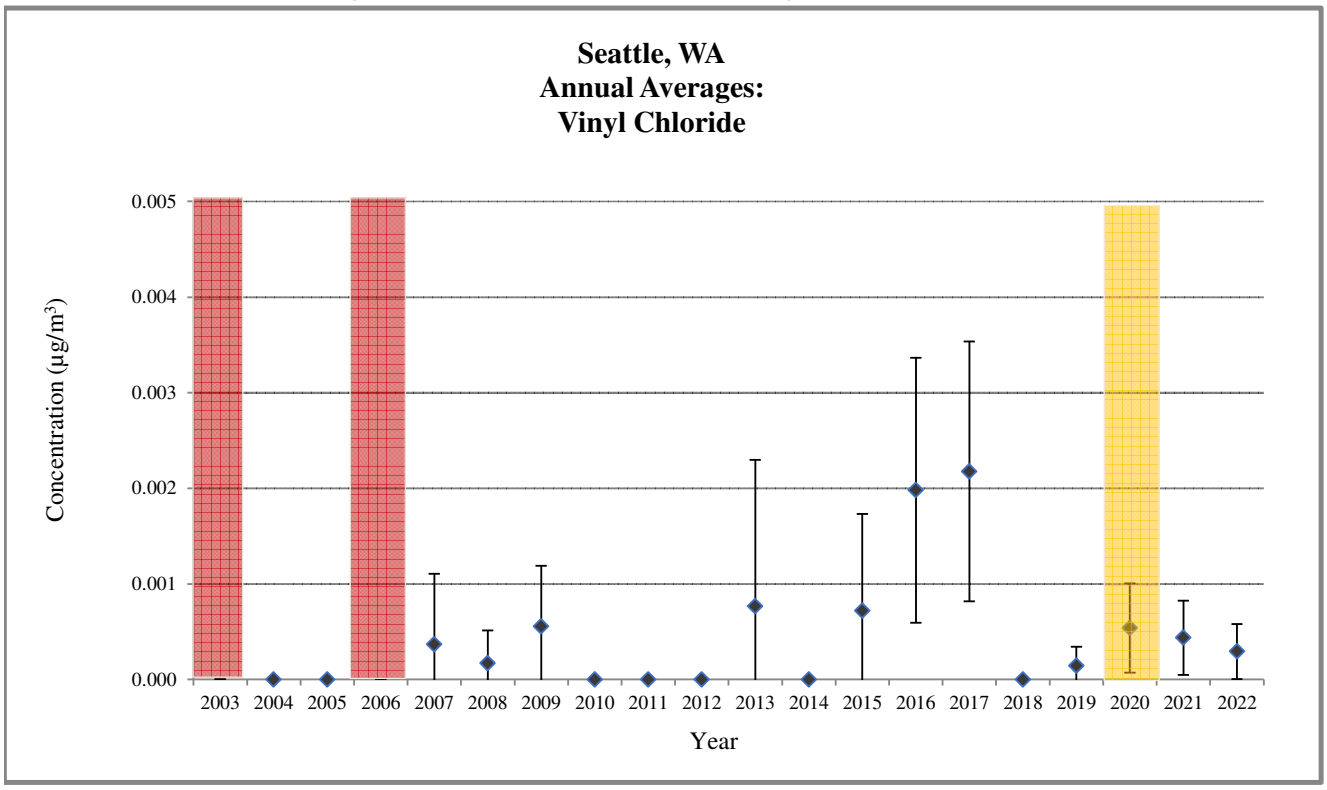
**Figure 3. Seattle, WA Annual Average Concentrations**



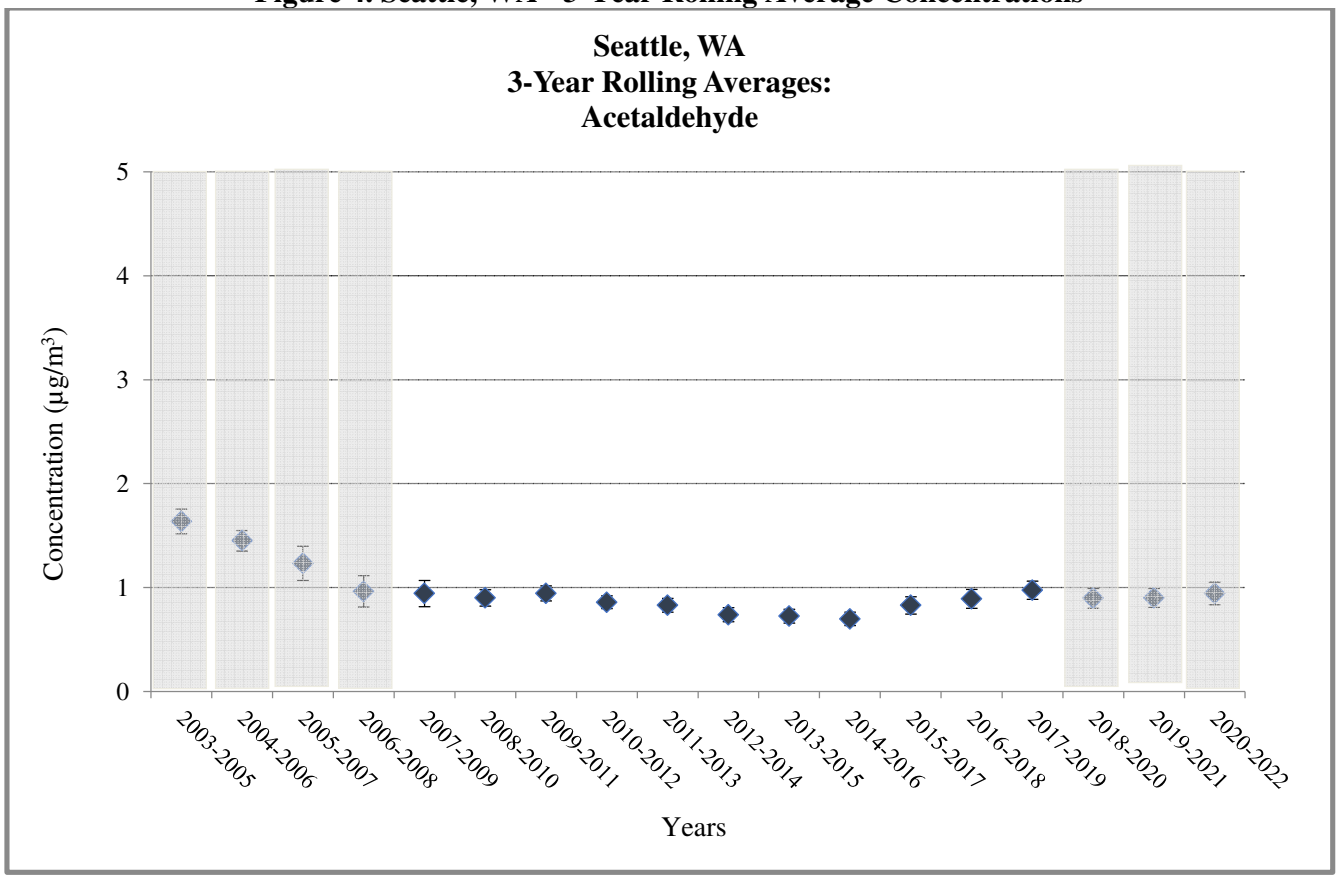

Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

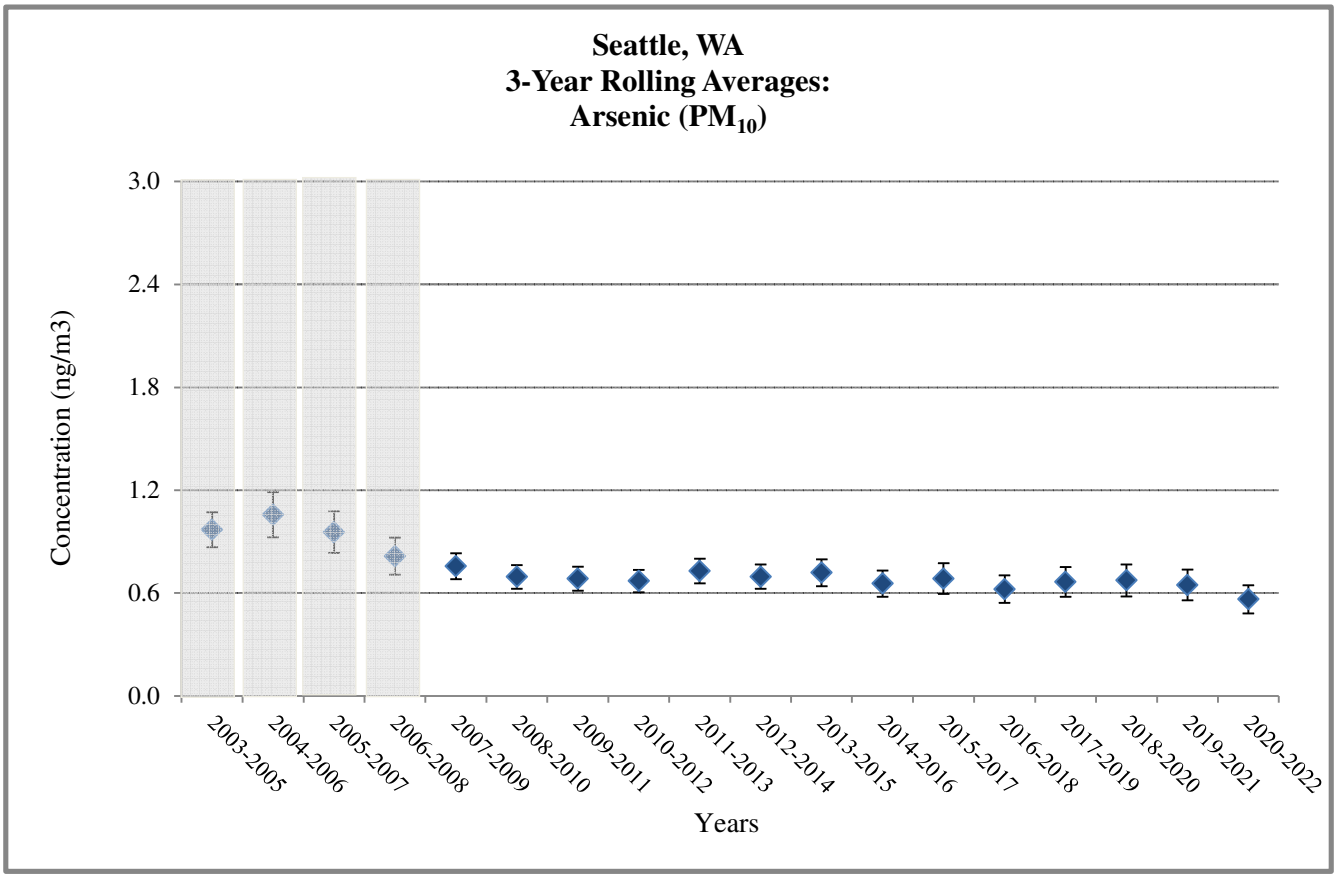
**Figure 3. Seattle, WA Annual Average Concentrations**




Does not meet MQO
Sampling began midway through the year.
Not enough observations due to Covid-19 restrictions

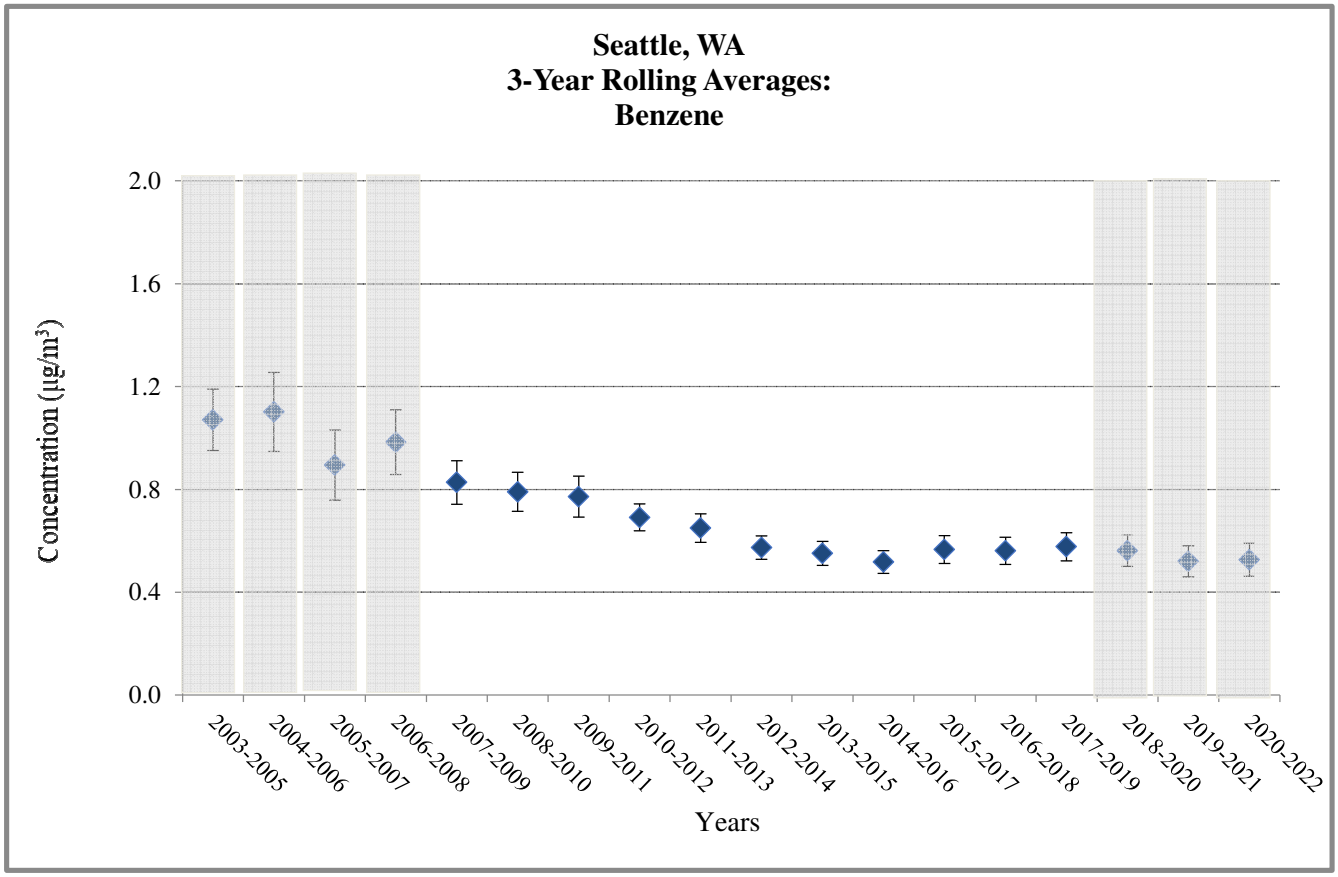
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

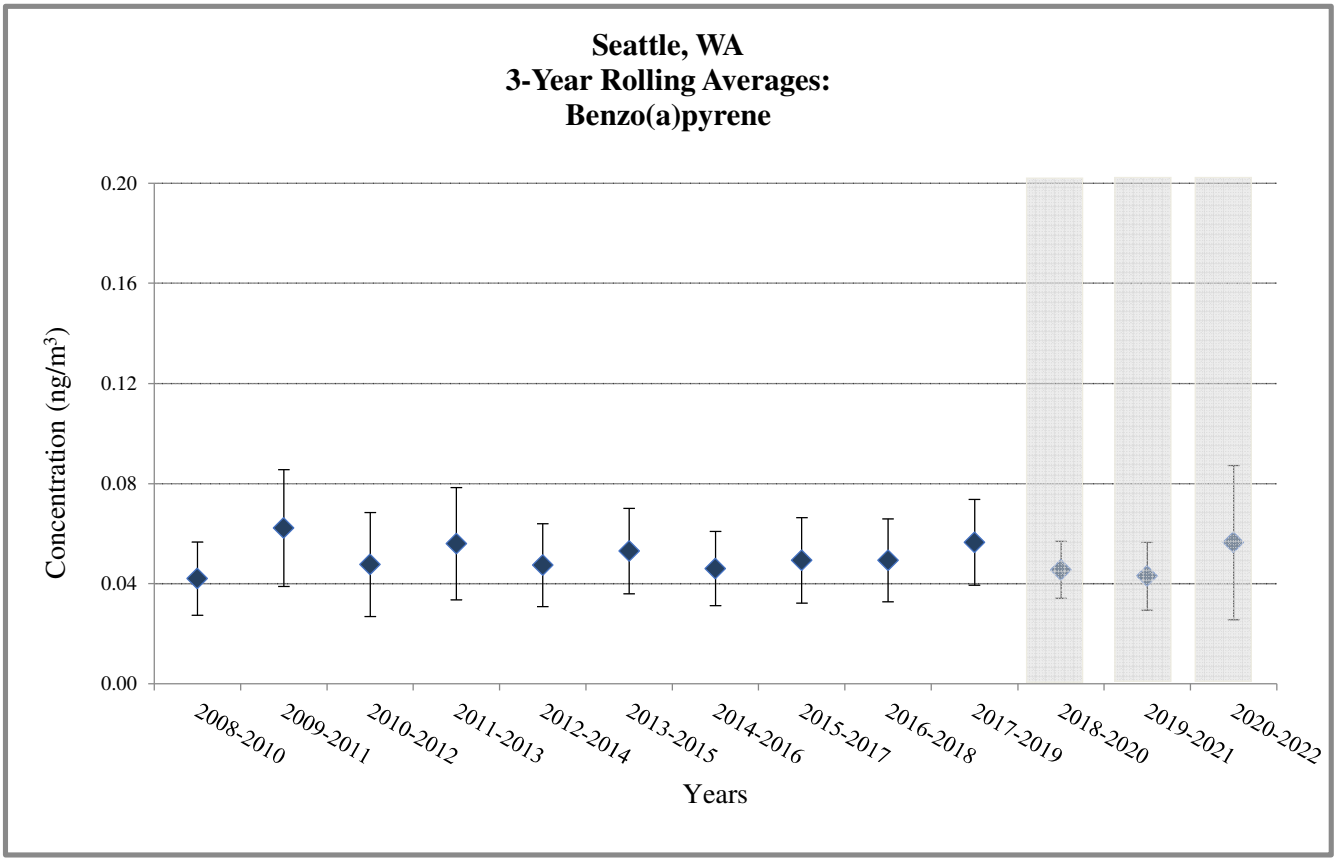



Does not meet MQO or wasn't able to collect enough samples

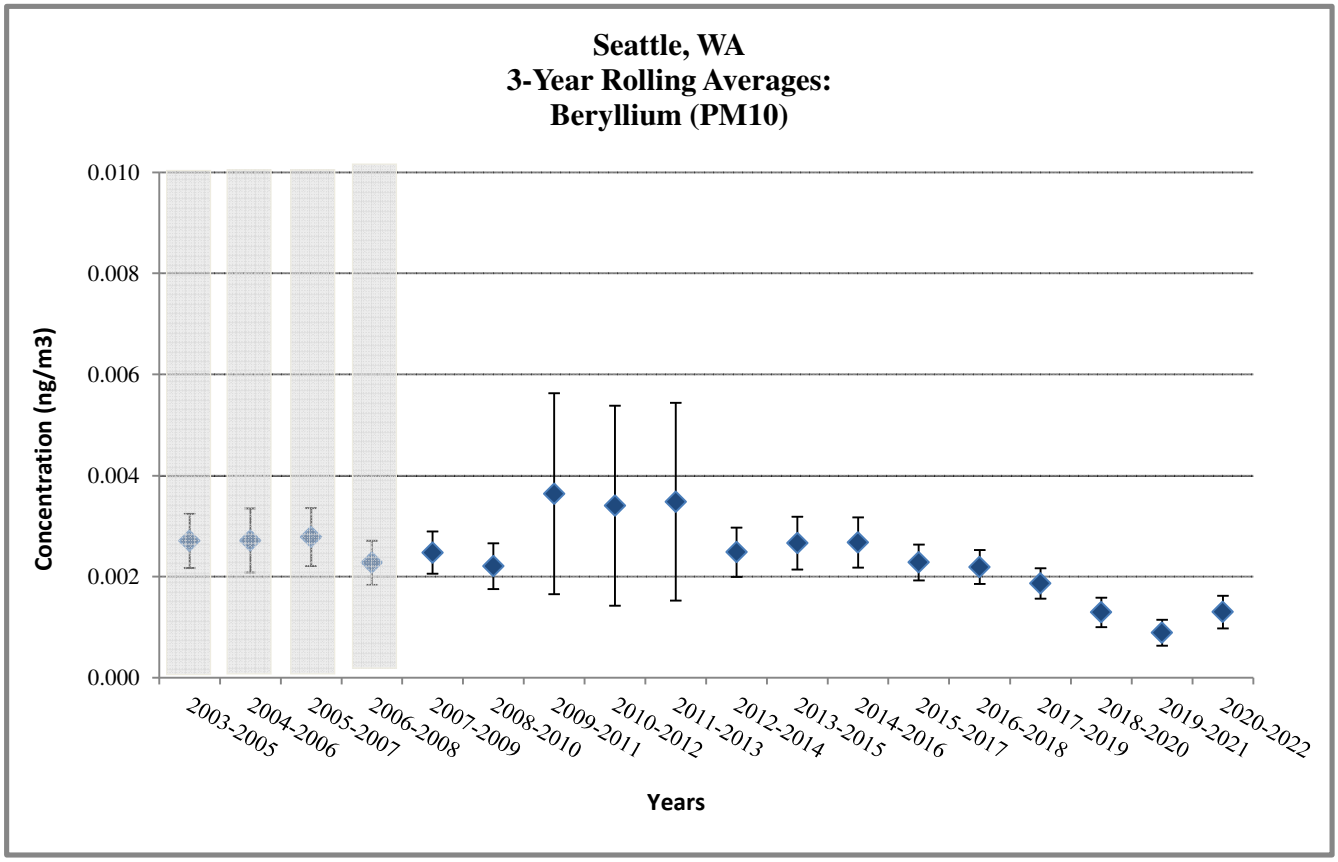
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

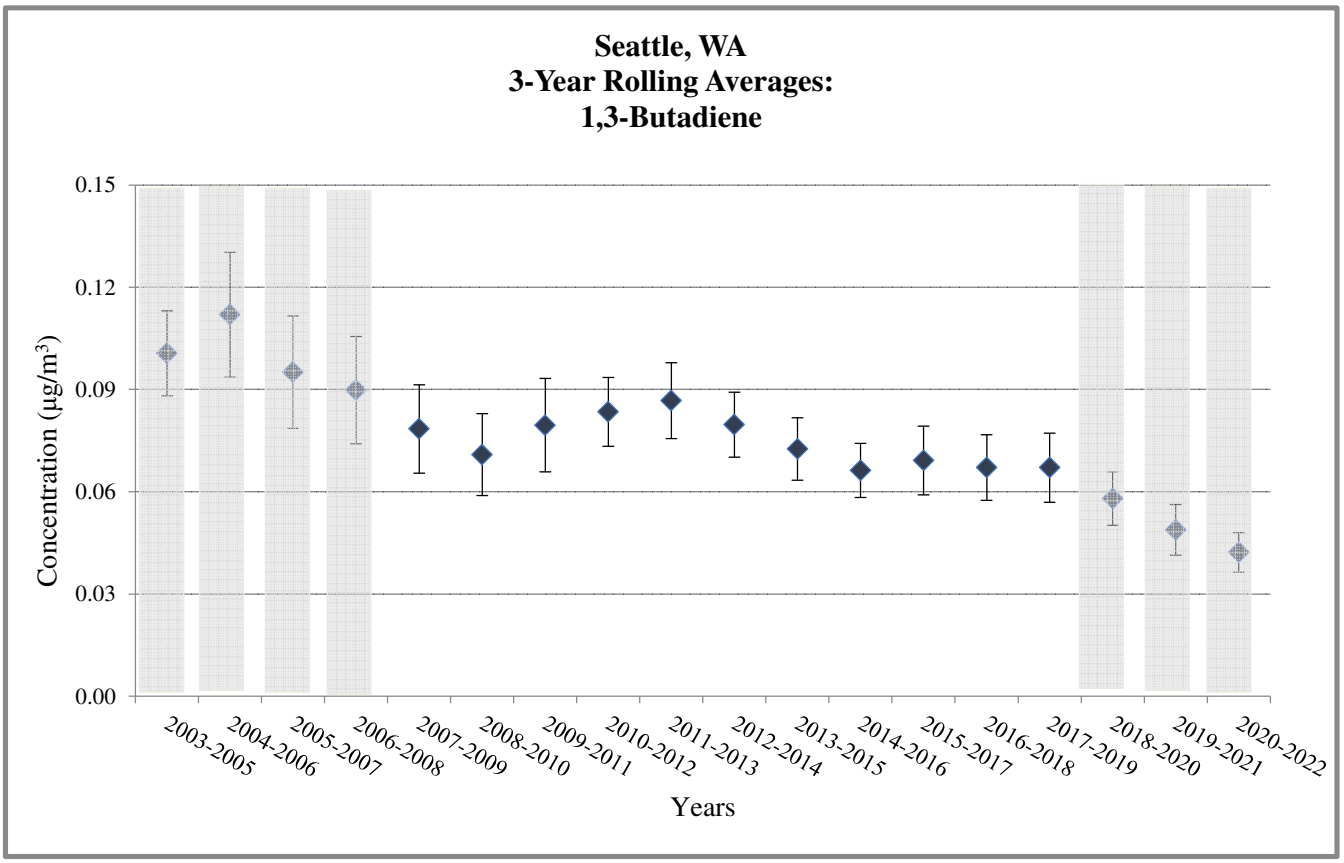



Does not meet MQO or wasn't able to collect enough samples

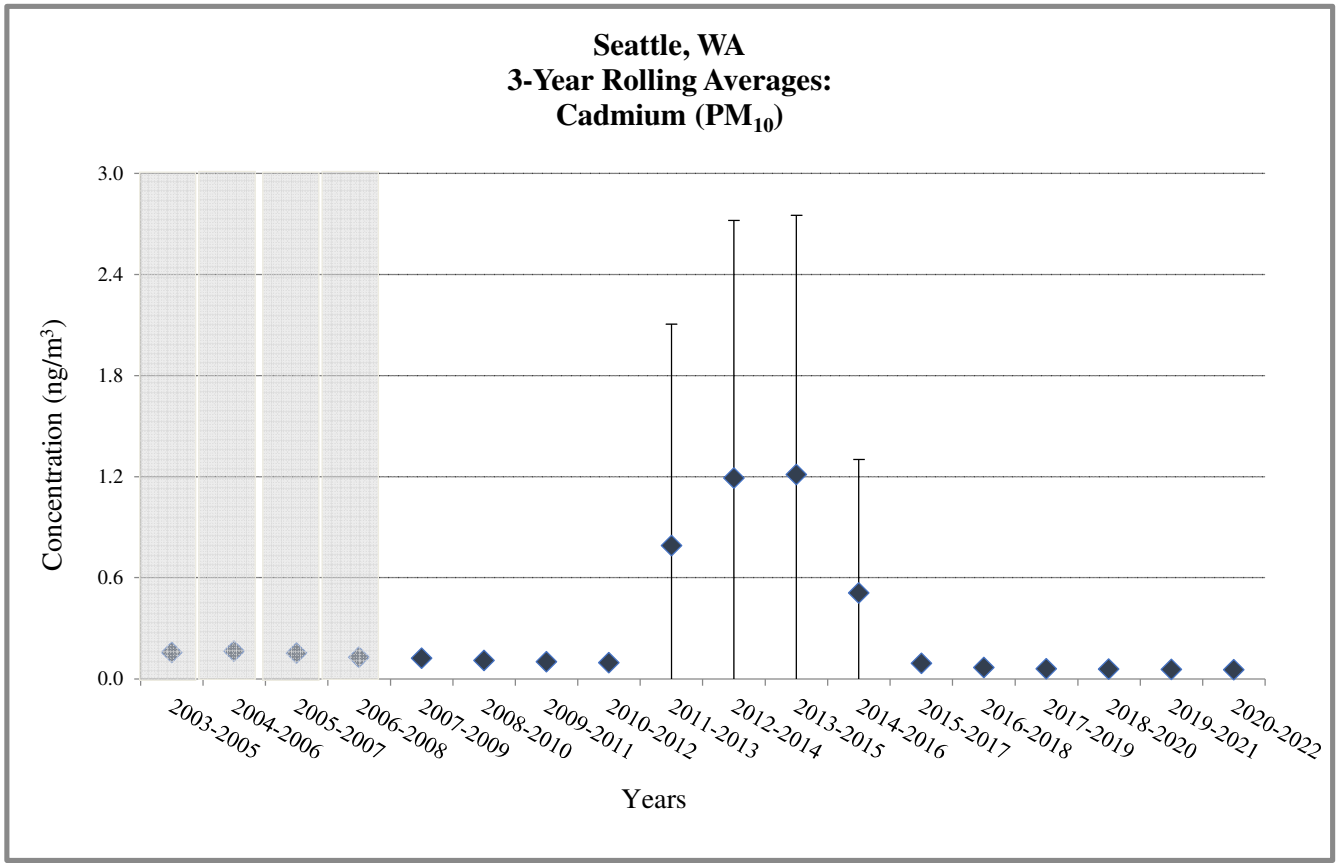
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

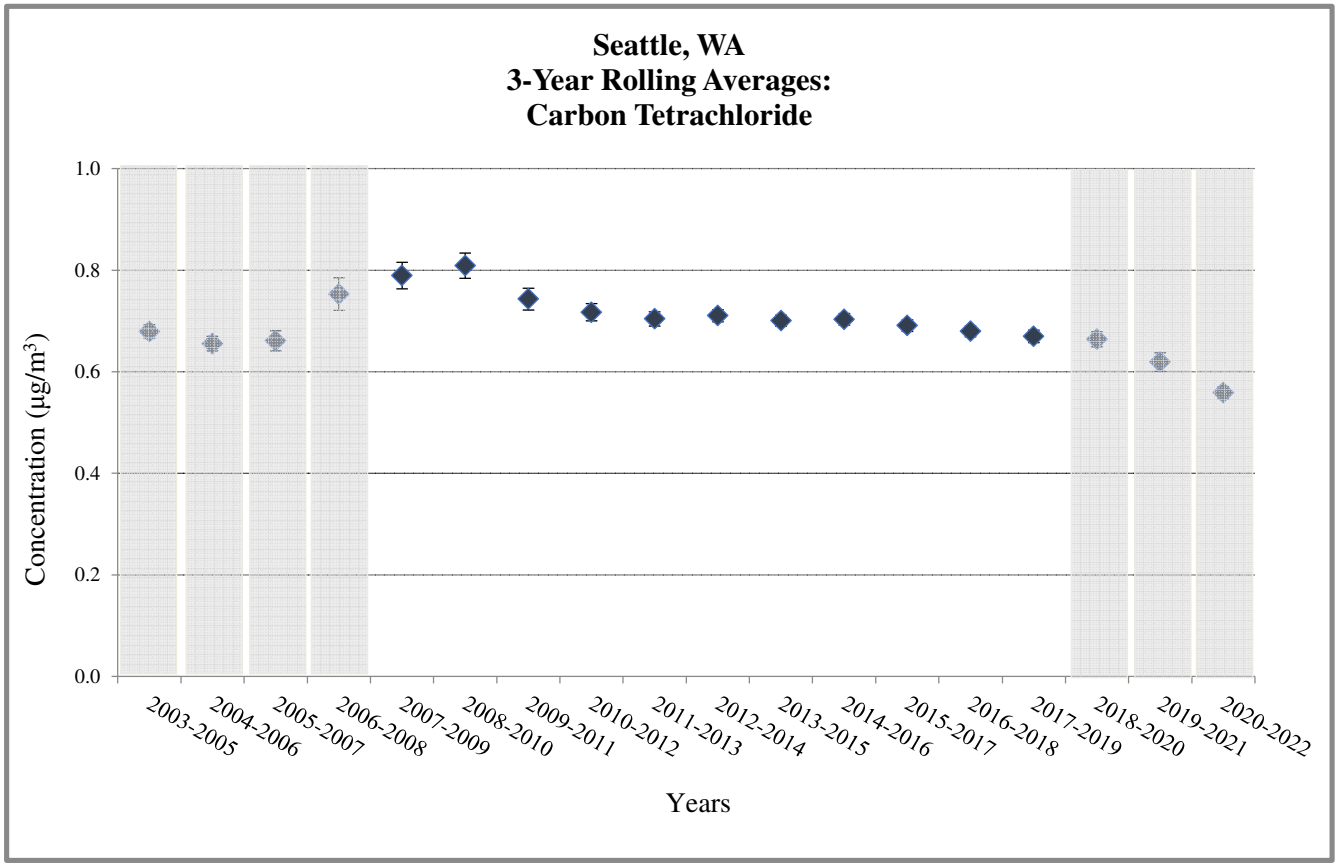



Does not meet MQO or wasn't able to collect enough samples

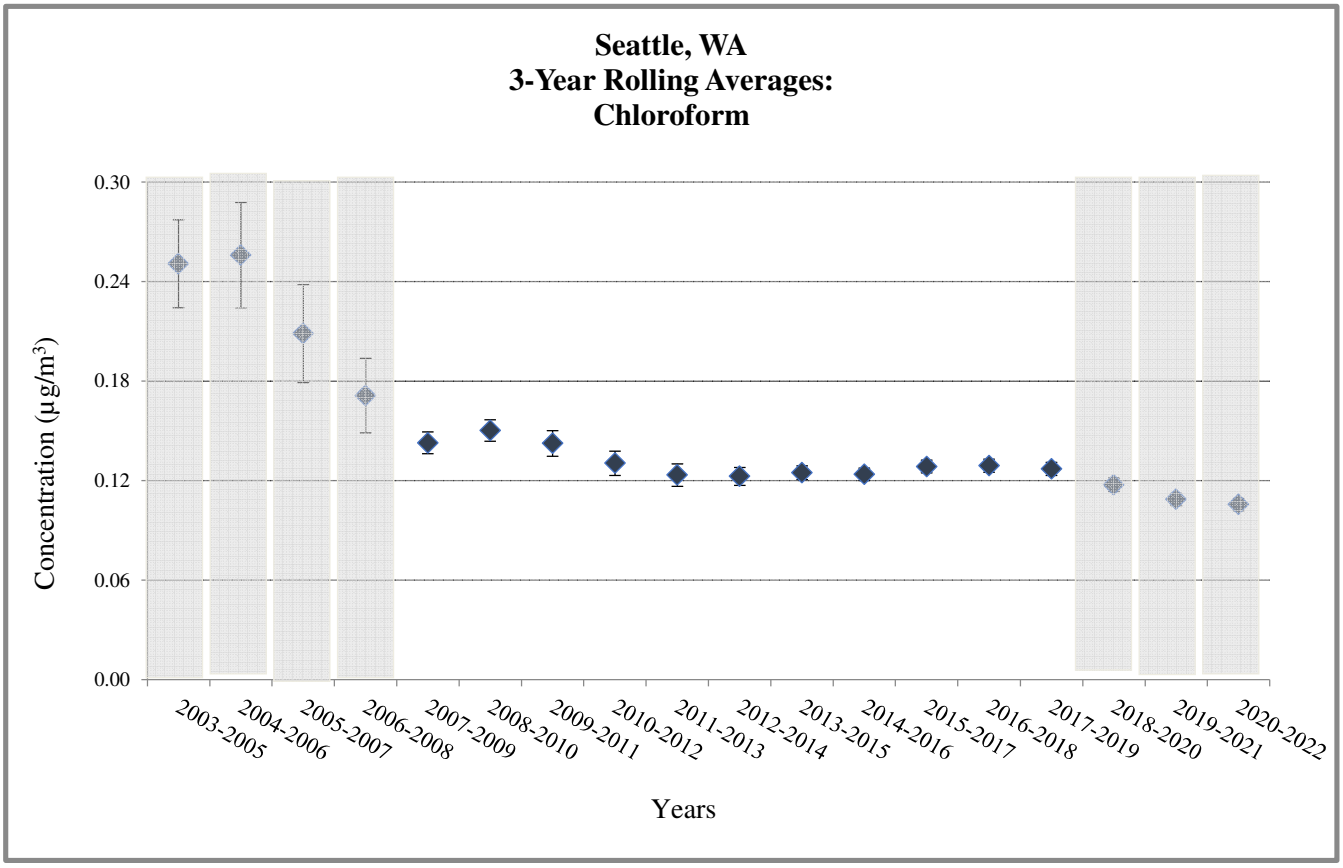
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

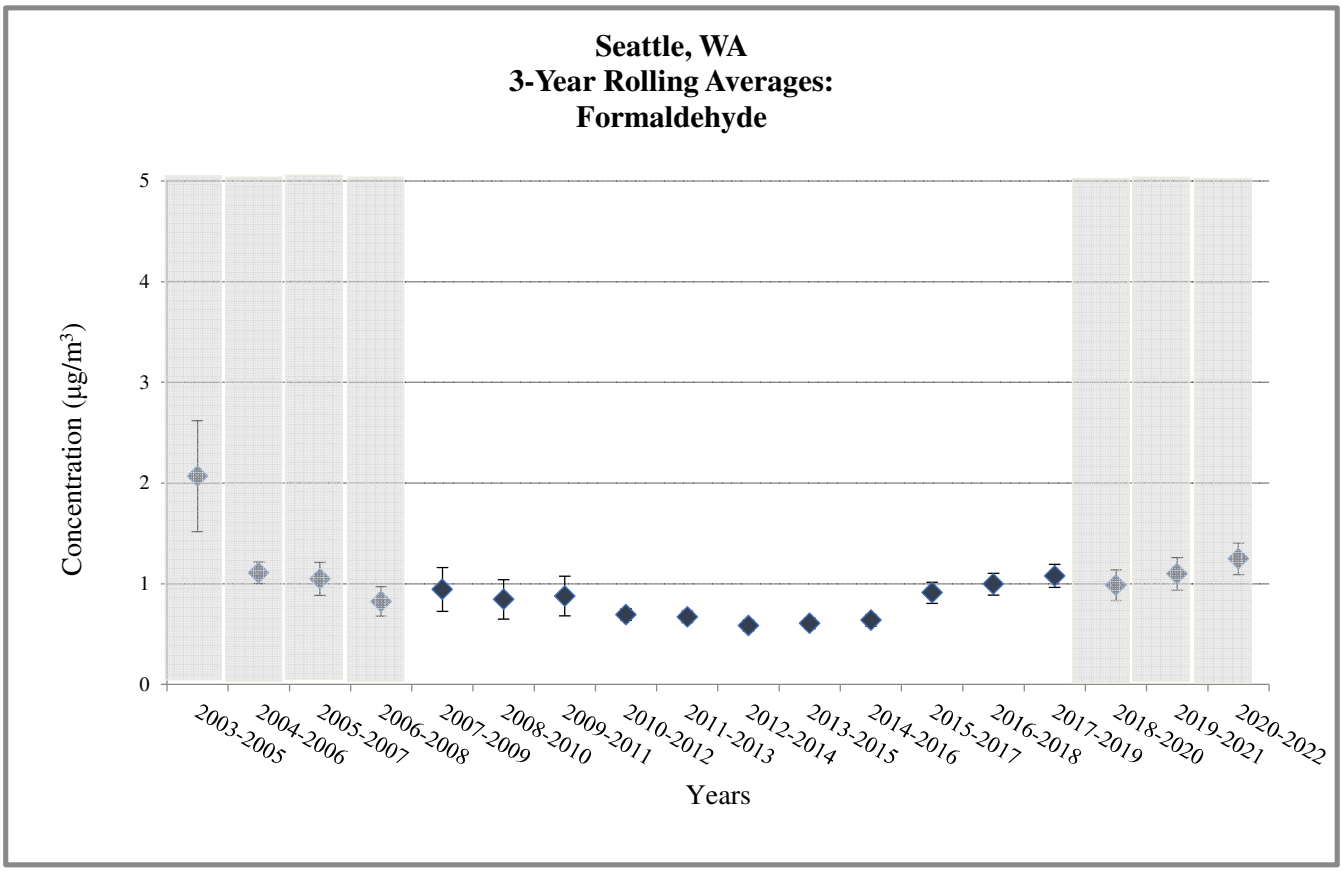



Does not meet MQO or wasn't able to collect enough samples

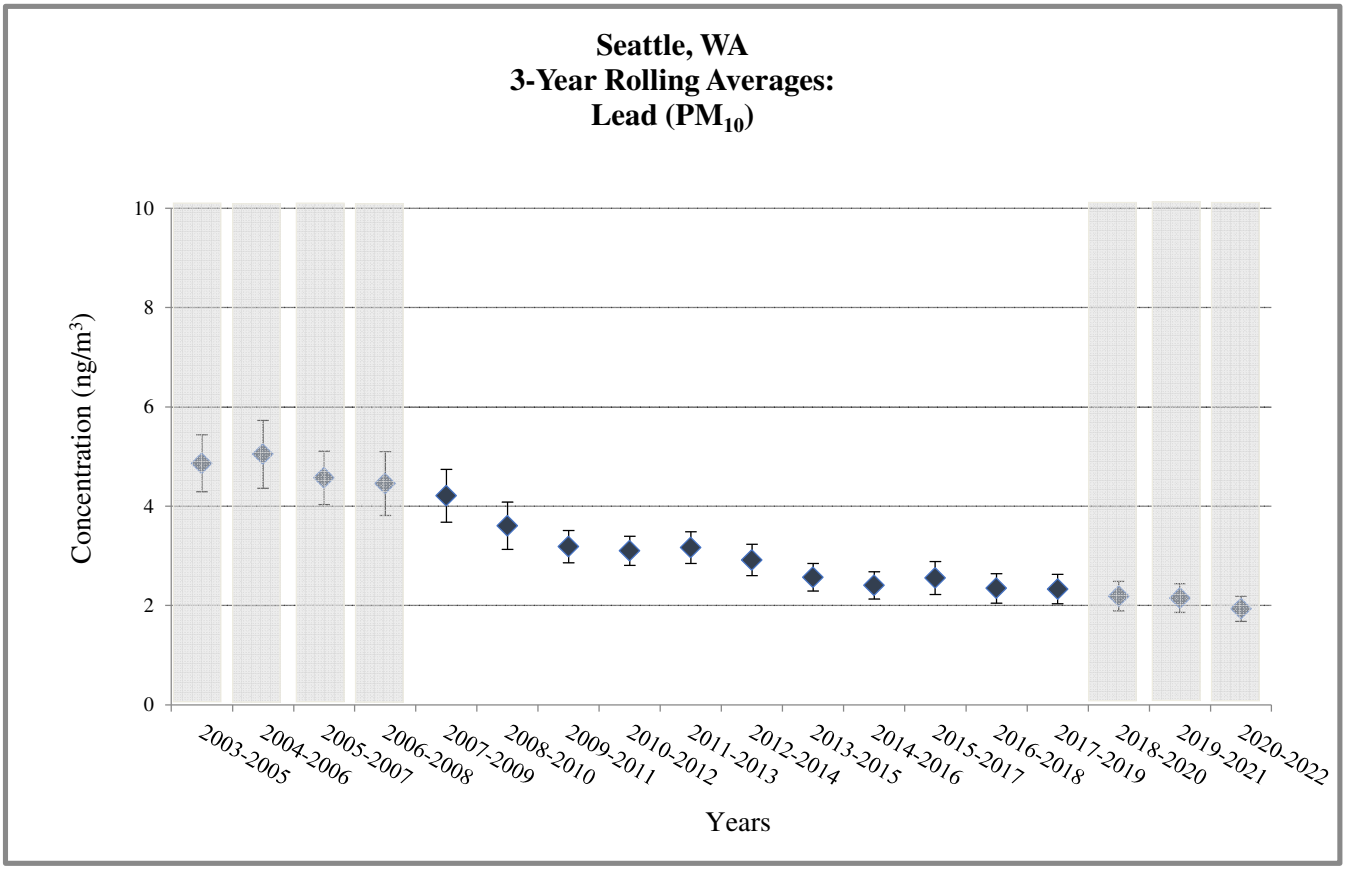
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

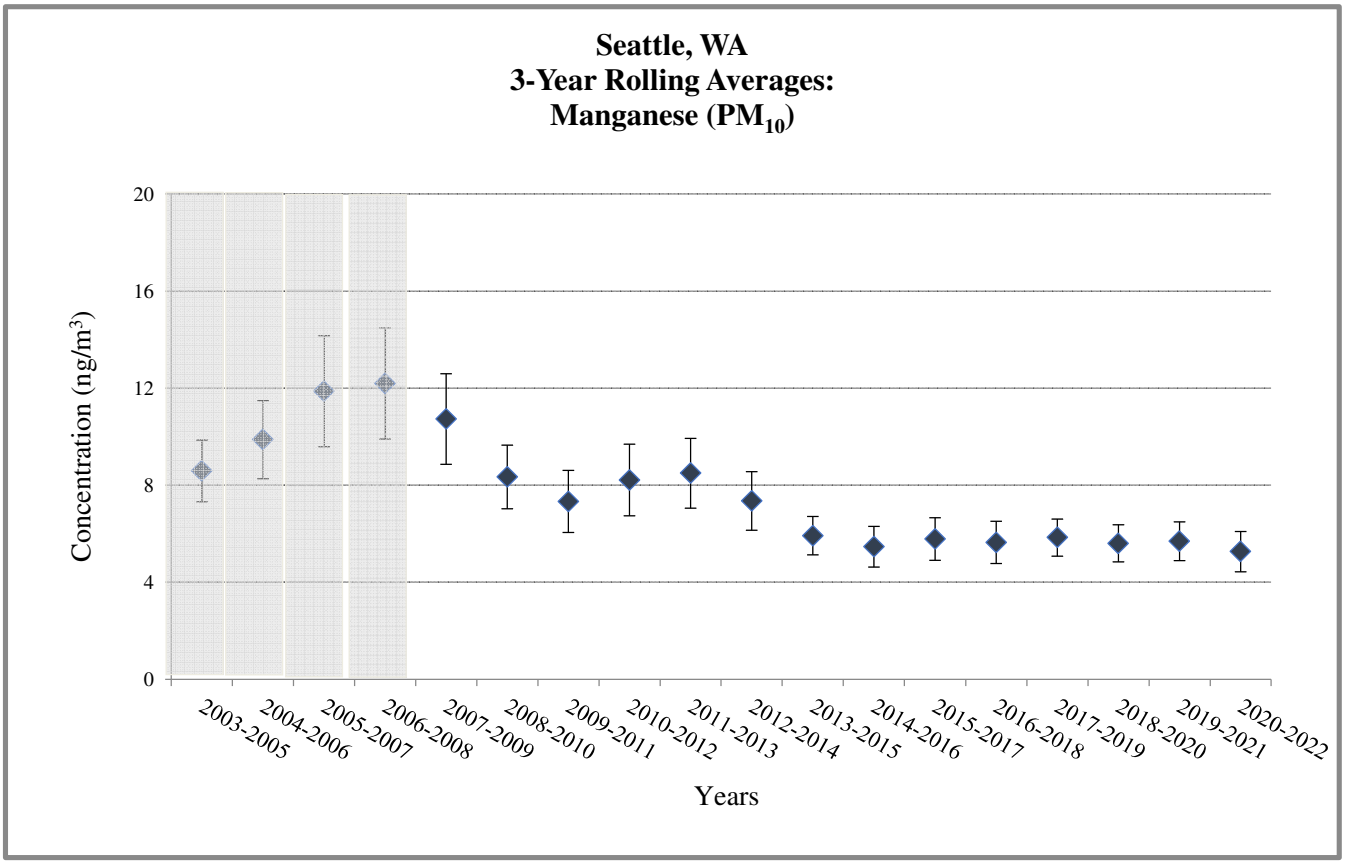



Does not meet MQO or wasn't able to collect enough samples

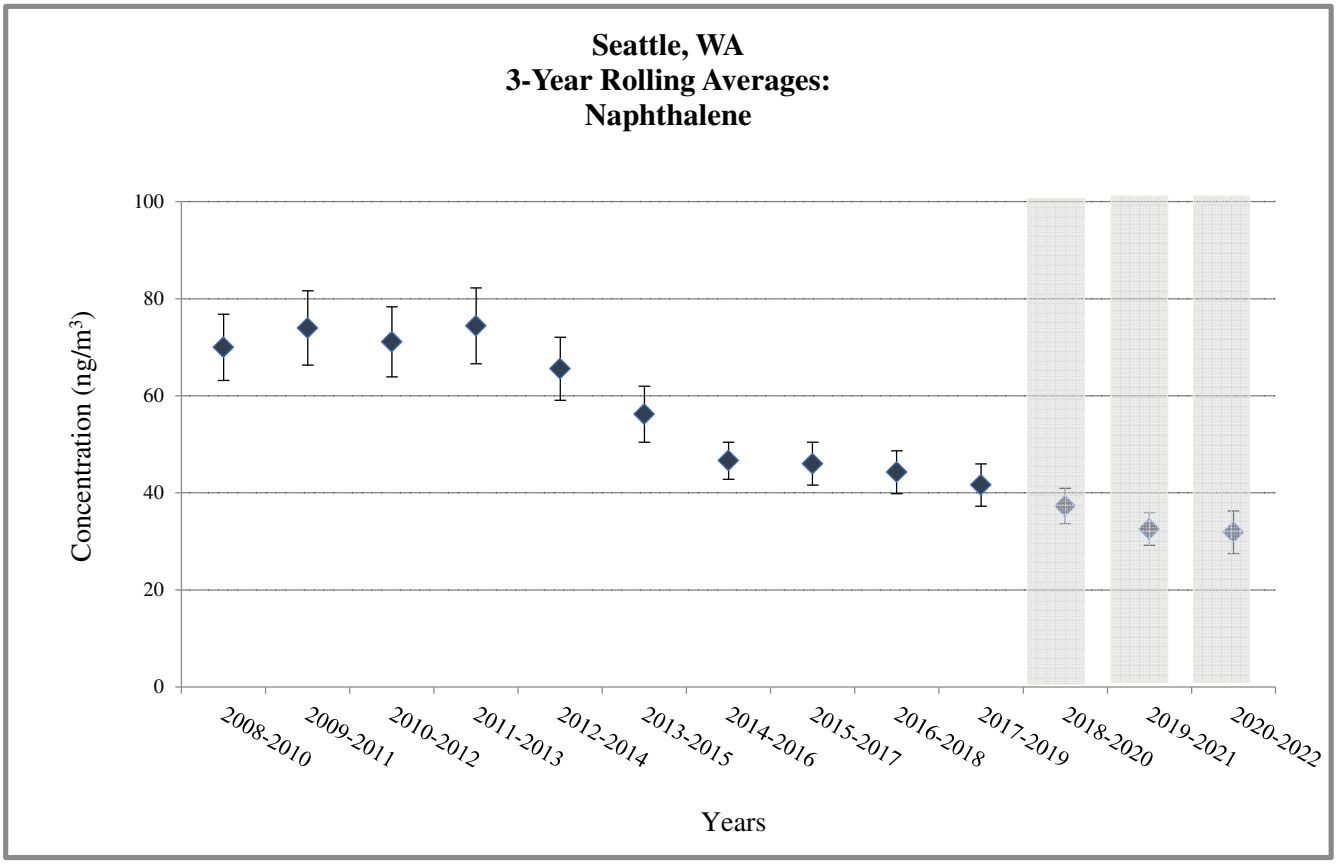
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

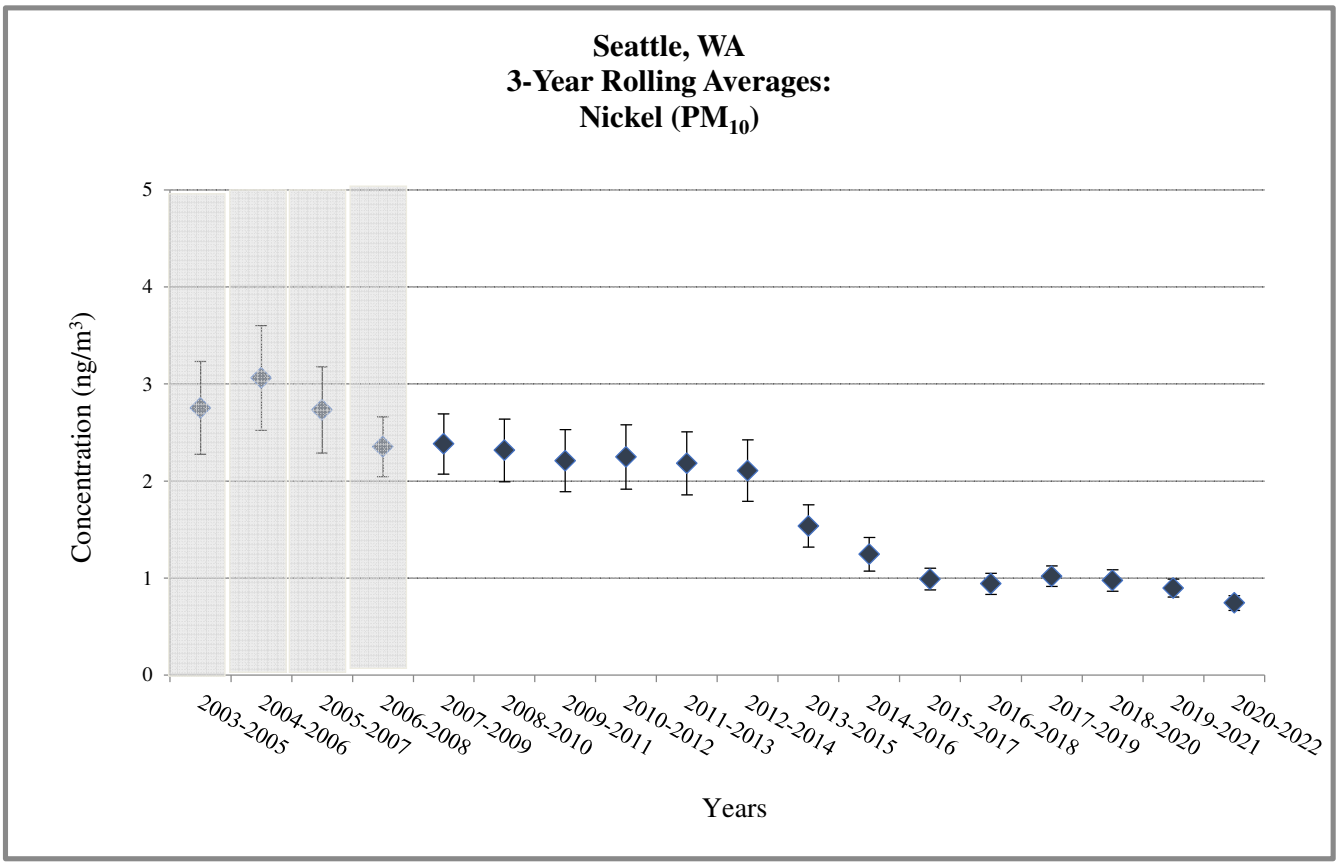



Does not meet MQO or wasn't able to collect enough samples

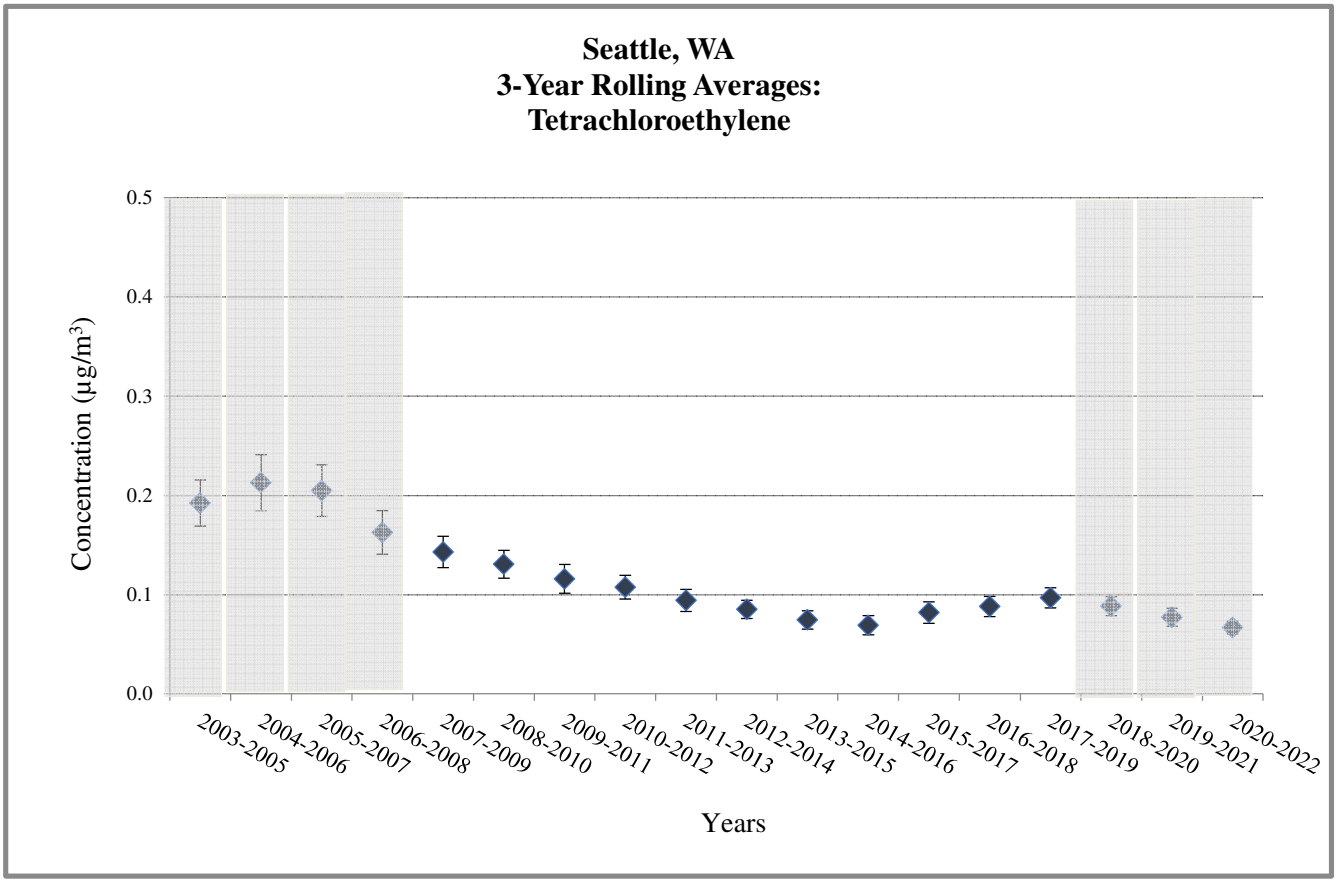
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**

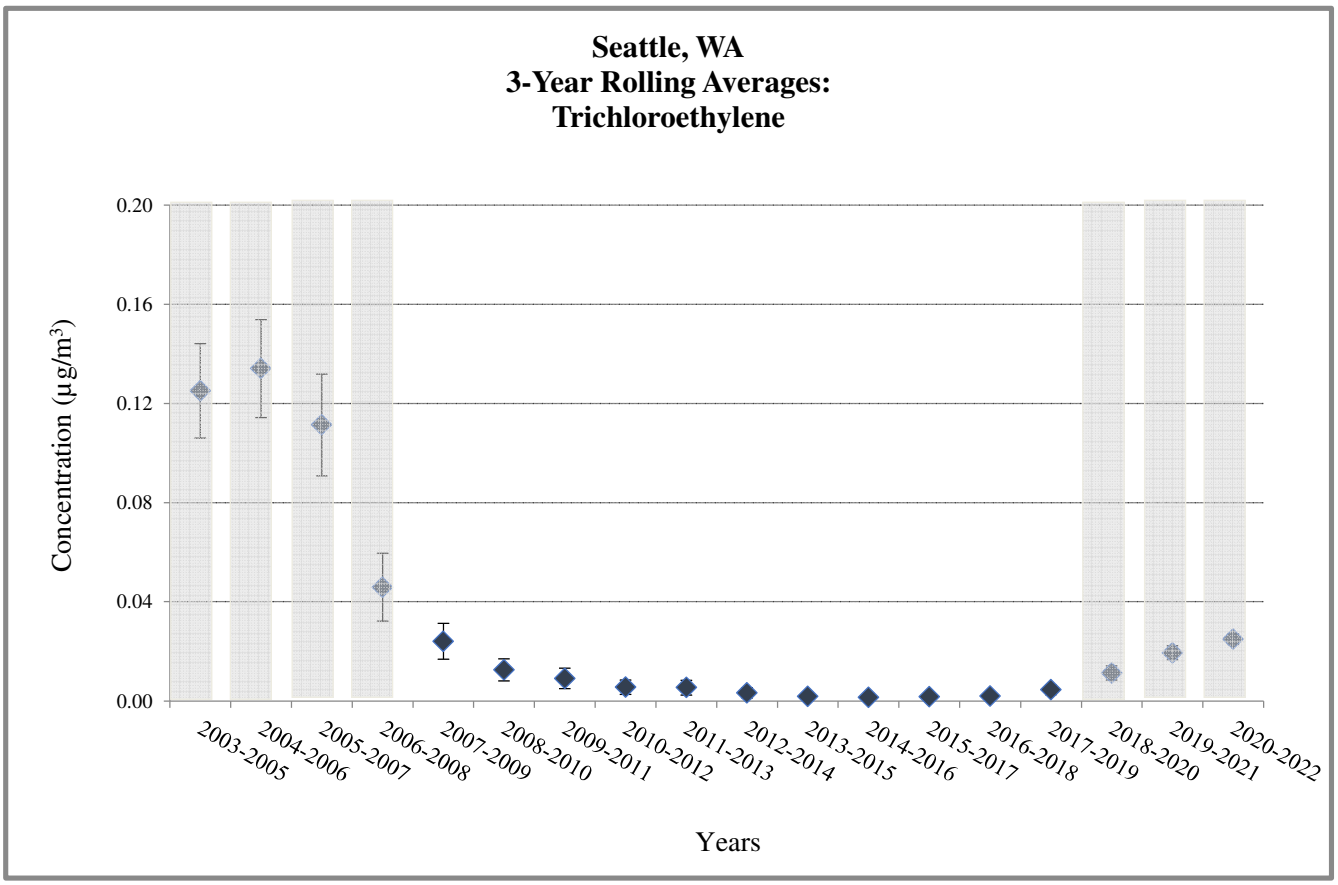



Does not meet MQO or wasn't able to collect enough samples

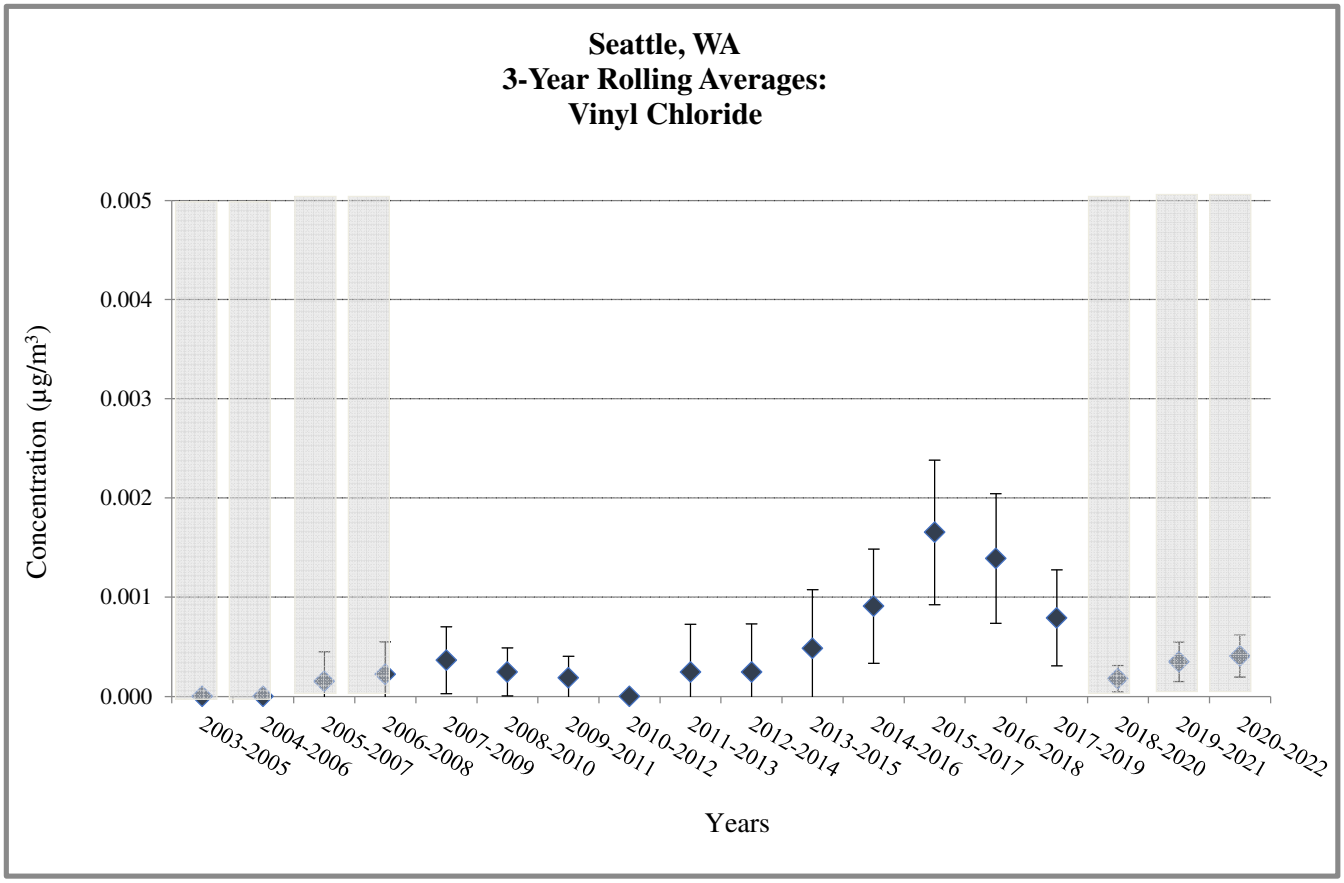
**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**




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

**Figure 4. Seattle, WA - 3-Year Rolling Average Concentrations**




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

**Table 6. NATTS Network Assessment: MQO#1 - Completeness Percentage at Seattle, WA**

| Year | Benzene | Butadiene, 1,3- | Carbon tetrachloride | Chloroform | Tetrachloroethylene | Trichloroethylene | Vinyl chloride | Acetaldehyde | Formaldehyde | Arsenic (PM10) | Beryllium (PM10) | Cadmium (PM10) | Lead (PM10) | Manganese (PM10) | Nickel (PM10) | Benzo(a)pyrene | Naphthalene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOCs | | | | | | | Carbonyls | | PM10 Metals | | | | | | PAHs | |
| *Seattle, WA (AQS Site Code: 53-033-0080)* | | | | | | | | | | | | | | | | | |
| 2003 | 100 | 100 | 100 | 100 | 100 | 100 | --a | 100 | 100 | 96 | 96 | 96 | 96 | 96 | 96 | -- | -- |
| 2004 | 98 | 98 | 98 | 98 | 98 | 98 | 100 | 97 | 97 | 97 | 72 | 97 | 97 | 97 | 97 | -- | -- |
| 2005 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 92 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | -- | -- |
| 2006 | 41 | 41 | 41 | 41 | 41 | 41 | 43 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | -- | -- |
| 2007 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 98 | 100 | 100 | 100 | 100 | 100 | 100 | -- | -- |
| 2008 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 102 | 102 | 98 | 98 | 98 | 98 | 98 | 98 | 96 | 96 |
| 2009 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 105 | 105 | 97 | 97 | 97 | 97 | 97 | 97 | 100 | 100 |
| 2010 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| 2011 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 98 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 98 |
| 2012 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 |
| 2013 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 98 | 98 | 98 | 98 | 98 | 98 | 93 | 93 |
| 2014 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 100 | 100 | 98 | 98 | 98 | 98 | 98 | 98 | 100 | 100 |
| 2015 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 98 | 98 | 97 | 97 | 97 | 97 | 97 | 97 | 95 | 95 |
| 2016 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 95 | 95 | 95 | 95 | 95 | 95 | 100 | 100 |
| 2017 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 123 | 123 | 123 | 123 | 123 | 123 | 98 | 98 |
| 2018 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 125 | 125 | 125 | 125 | 125 | 125 | 98 | 98 |
| 2019 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 98 | 98 | 131 | 131 | 131 | 131 | 131 | 131 | 97 | 97 |
| 2020 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 82 | 82 | 82 | 82 | 82 | 82 | 56 | 56 |
| 2021 | 98 | 98 | 98 | 98 | 97 | 98 | 98 | 93 | 93 | 125 | 108 | 125 | 125 | 125 | 125 | 92 | 92 |
| 2022 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 98 | 98 | 92 | 92 | 92 | 92 | 92 | 92 | 97 | 97 |

A-rated: ≥85%

B-rated: Between 75% to 85%

Does not meet: ≤75%

Not enough observations due to Covid-19 restrictions

-- No data available

[a]: Vinyl chloride was not reported at the Seattle, WA site, although the other VOCs were reported for the year.

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

| Year | Benzene | Butadiene, 1,3- | Carbon tetrachlorid | Chloroform | Tetrachloroethylene | Trichloroethylene | Vinyl chloride | Acetaldehyde | Formaldehyde | Arsenic (PM10) | Beryllium (PM10) | Cadmium (PM10) | Lead (PM10) | Manganese (PM10) | Nickel (PM10) | Benzo(a)pyrene | Naphthalene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOCs | | | | | | | Carbonyls | | PM10 Metals | | | | | | PAHs | |
| *Seattle, WA (AQS Site Code: 53-033-0080* | | | | | | | | | | | | | | | | | |
| 2003 | --a | --a | --a | --a | --a | --a | --a | --a | --a | --a | --a | --a | --a | --a | --a | -- | -- |
| 2004 | 0.23 | 0.40 | 0.35 | 0.20 | 0.41 | 0.10 | 1.18 | 0.04 | 0.02 | 0.03 | 0.01 | 0.00 | 0.00 | 0.02 | 0.04 | -- | -- |
| 2005 | 0.23 | 0.40 | 0.35 | 0.20 | 0.41 | 0.10 | 1.18 | 0.04 | 0.02 | 0.03 | 0.01 | 0.00 | 0.00 | 0.02 | 0.04 | -- | -- |
| 2006 | 0.58 | 0.44 | 0.25 | 0.08 | 0.49 | 0.11 | --b | 0.02 | 0.01 | 0.03 | 0.01 | 0.01 | 0.003 | 0.01 | 0.03 | -- | -- |
| 2007 | 0.59 | 0.40 | 0.56 | 0.17 | 0.44 | 0.19 | 0.56 | 0.02 | 0.01 | 0.04 | 0.05 | 0.01 | 0.001 | 0.00 | 0.04 | -- | -- |
| 2008 | 0.25 | 0.11 | 0.15 | 0.07 | 0.24 | 0.04 | 0.12 | 0.02 | 0.02 | 0.04 | 0.03 | 0.01 | 0.001 | 0.00 | 0.04 | 0.07 | 0.02 |
| 2009 | 0.15 | 0.07 | 0.07 | 0.02 | 0.12 | 0.02 | 0.05 | 0.03 | 0.01 | 0.04 | 0.005 | 0.01 | 0.004 | 0.00 | 0.05 | 0.06 | 0.01 |
| 2010 | 0.47 | 0.22 | 0.89 | 0.17 | 0.44 | 0.18 | 0.30 | 0.01 | 0.004 | 0.05 | 0.002 | 0.14 | 0.054 | 0.07 | 0.80 | 0.04 | 0.01 |
| 2011 | 0.71 | 0.15 | 0.89 | 0.09 | 0.72 | 0.27 | 0.19 | 0.03 | 0.02 | 0.23 | 0.00 | 0.01 | 0.006 | 0.02 | 0.17 | 0.04 | 0.003 |
| 2012 | 1.50 | 0.24 | 0.89 | 0.14 | 0.80 | 0.24 | 0.26 | 0.02 | 0.01 | 0.28 | 0.01 | 0.01 | 0.009 | 0.07 | 0.22 | 0.05 | 0.004 |
| 2013 | 0.47 | 0.24 | 0.59 | 0.15 | 0.56 | 0.43 | 0.26 | 0.04 | 0.26 | 0.79 | 0.04 | 0.02 | 0.006 | 0.03 | 0.11 | 0.05 | 0.01 |
| 2014 | 0.37 | 0.29 | 0.63 | 0.14 | 0.52 | 0.46 | 0.28 | 0.03 | 0.21 | 0.88 | 0.04 | 0.02 | 0.002 | 0.03 | 0.08 | 0.02 | 0.01 |
| 2015 | 0.96 | 0.31 | 0.37 | 0.16 | 0.56 | 0.46 | 0.19 | 0.03 | 0.26 | 0.06 | 0.002 | 0.013 | 0.002 | 0.02 | 0.11 | 0.10 | 0.00 |
| 2016 | 0.52 | 0.58 | 0.59 | 0.12 | 0.64 | 0.43 | 0.74 | 0.03 | 0.21 | 0.16 | 0.002 | 0.003 | 0.002 | 0.02 | 0.09 | 0.05 | 0.02 |
| 2017 | 0.64 | 0.44 | 0.85 | 0.19 | 1.24 | 0.94 | 0.40 | 0.13 | 1.07 | 0.14 | 0.002 | 0.003 | 0.002 | 0.02 | 0.10 | 0.02 | 0.05 |
| 2018 | 0.36 | 0.43 | 0.49 | 0.13 | 0.58 | 0.40 | 0.30 | 0.08 | 0.72 | 0.14 | 0.003 | 0.008 | 0.004 | 0.04 | 0.51 | 0.01 | 0.04 |
| 2019 | 0.24 | 0.24 | 0.40 | 0.08 | 0.35 | 0.33 | 0.24 | 0.07 | 0.66 | 0.14 | 0.006 | 0.024 | 0.004 | 0.06 | 0.30 | 0.01 | 0.03 |
| 2020 | 0.24 | 0.24 | 0.40 | 0.08 | 0.49 | 0.24 | 0.24 | 0.08 | 0.60 | 0.13 | 0.01 | 0.008 | 0.004 | 0.06 | 0.29 | 0.01 | 0.02 |
| 2021 | 0.25 | 0.26 | 0.41 | 0.07 | 0.49 | 0.24 | 0.20 | 0.05 | 0.59 | 0.13 | 0.01 | 0.008 | 0.004 | 0.06 | 0.28 | 0.01 | 0.02 |
| 2022 | 0.25 | 0.37 | 0.41 | 0.07 | 0.73 | 0.33 | 0.18 | 0.06 | 0.44 | 0.10 | 0.01 | 0.013 | 0.004 | 0.07 | 0.13 | 0.01 | 0.02 |

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]: Pollutant was sampled, but no MDL data were reported to AQS.

**Table 8. NATTS Network Assessment: MQO#3 - Bias Percent Difference at Seattle, WA**

| Year | Benzene | Butadiene, 1,3- | Carbon tetrachlorid | Chloroform | Tetrachloroethylene | Trichloroethylene | Vinyl chloride | Acetaldehyde | Formaldehyde | Arsenic (PM10) | Beryllium (PM10) | Cadmium (PM10) | Lead (PM10) | Manganese (PM10) | Nickel (PM10) | Benzo(a)pyrene | Naphthalene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOCs | | | | | | | Carbonyls | | PM10 Metals | | | | | | PAHs | |
| *Seattle, WA (AQS Site Code: 53-033-0080)* | | | | | | | | | | | | | | | | | |
| 2004 | -13.5 | -40.1 | 15.5 | -15.1 | -6.6 | -11.3 | -20.6 | 13.7 | 3.2 | --a | --a | --a | --a | --a | --a | -- | -- |
| 2005 | 1.5 | 14.5 | 21.9 | 12.5 | -4.4 | 4.9 | -7.3 | 5.5 | 12.5 | -27.8 | -16.5 | -30.6 | -26.7 | -28.8 | -25.9 | -- | -- |
| 2006 | -28.3 | 35.1 | -1.8 | 5.5 | -12.1 | 0.7 | 36.6 | 32.6 | 22.9 | 1.5 | 18.9 | -3.2 | -0.4 | 0.8 | -0.2 | -- | -- |
| 2007 | -5.8 | 2.5 | 10.4 | 9.1 | -3.7 | 5.5 | 1.1 | -1.9 | -3.2 | 11.5 | 18.9 | 5.3 | -1.5 | -13.8 | -8.5 | -- | -- |
| 2008 | -1.5 | 7.8 | 16.5 | 4.3 | 0.0 | 5.3 | -14.1 | 24.6 | 14.4 | 8.4 | 4.8 | 5.1 | 4.7 | -25.3 | 8.6 | --b | --b |
| 2009 | 6.2 | -0.5 | 1.9 | 5.4 | 1.1 | 2.7 | -0.1 | -10.1 | -7.8 | -14.8 | -5.5 | -16.2 | -30.6 | -37.7 | -28.9 | -1.7 | -7.7 |
| 2010 | -13.2 | -3.7 | 31.6 | 1.0 | -16.1 | -6.4 | -14.1 | 0.7 | -2.8 | 7.3 | 11.2 | 4.9 | -3.5 | 0.6 | 4.7 | -2.3 | -17.1 |
| 2011 | 10.2 | 10.9 | 25.4 | -9.7 | 0.8 | -8.3 | 0.3 | 3.0 | -3.4 | 1.4 | -8.2 | -5.7 | -6.3 | -3.8 | -6.8 | -2.1 | -13.9 |
| 2012 | --b | --b | --b | --b | --b | --b | --b | --b | --b | 15.7 | 17.5 | 16.6 | 19.9 | 21.5 | 11.4 | 25.2 | 21.4 |
| 2013 | -3.3 | 0.6 | 13.3 | -2.4 | -9.5 | 3.0 | -8.1 | 0.1 | -0.5 | -3.0 | -2.0 | 1.4 | 0.1 | -6.2 | -1.2 | -5.7 | 25.5 |
| 2014 | 18.1 | -8.1 | 24.2 | 8.5 | -1.8 | -0.3 | 10.0 | -4.3 | -2.2 | 1.9 | --c | --c | 2.2 | 13.2 | --d | -16.3 | 0.7 |
| 2015 | -5.3 | -22.0 | 40.2 | 10.3 | -14.6 | -10.0 | -7.1 | --b | --b | --b | --b | --b | --b | --b | --b | -14.2 | -11.4 |
| 2016 | 5.2 | -10.1 | 53.5 | 8.1 | -5.5 | -9.5 | 1.5 | -5.4 | -19.1 | -2.3 | -0.4 | 3.9 | -1.6 | 3.9 | 26.5 | -10.5 | -9.5 |
| 2017 | 14.6 | 3.9 | 26.5 | 9.2 | 13.0 | 9.6 | -3.3 | 3.6 | -5.3 | -1.4 | 3.7 | 2.8 | -0.4 | 1.3 | 21.2 | -22.4 | -11.6 |
| 2018 | -11.8 | -6.6 | 0.0 | -7.5 | -3.8 | -14.6 | -2.7 | -8.7 | -3.7 | -3.4 | 0.5 | 3.0 | -1.9 | 2.6 | 10.6 | -14.8 | -20.7 |
| 2019 | 18.5 | 2.2 | 23.8 | 11.2 | 13.5 | 8.4 | 3.5 | -3.1 | -5.8 | 3.4 | 6.9 | 4.6 | 3.2 | 6.5 | 1.6 | 29.3 | 18.5 |
| 2020 | -1.6 | -11.6 | 16.4 | 4.9 | 6.8 | -4.9 | -3.7 | 1.6 | -1.9 | 4.4 | -0.2 | 4.6 | -3.5 | 2.2 | 5.1 | 13.1 | 15.8 |
| 2021 | 1.5 | 1.2 | 12.1 | 9.0 | 10.3 | 5.9 | 6.7 | -9.5 | -11.2 | 6.8 | 2.7 | 7.7 | 0.0 | 5.8 | 3.1 | 0.1 | -2.0 |
| 2022 | 9.7 | -19.3 | 6.9 | 2.0 | 5.6 | -1.0 | -8.6 | -1.5 | -1.0 | --b | --b | --b | --b | --b | --b | --b | --b |

A-rated:±25%

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

Does not meet:>35% or <35%

-- No data available

[a]: Pollutant not included in the PT sample sent to the lab supporting this site.

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

[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 Seattle, WA**

| Year | Benzene | Butadiene, 1,3- | Carbon tetrachlorid | Chloroform | Tetrachloroethylene | Trichloroethylene | Vinyl chloride | Acetaldehyde | Formaldehyde | Arsenic (PM10) | Beryllium (PM10) | Cadmium (PM10) | Lead (PM10) | Manganese (PM10) | Nickel (PM10) | Benzo(a)pyrene | Naphthalene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOCs | | | | | | | Carbonyls | | PM10 Metals | | | | | | PAHs | |
| *Seattle, WA (AQS Site Code: 53-033-0080)* | | | | | | | | | | | | | | | | | |
| 2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2007 | 9.7 | 10.4 | 7.6 | 27.4 | 3.6 | 21.8 | --a | 3.1 | 8.0 | 2.4 | --a | 6.3 | 0.6 | 0.8 | 7.0 | -- | -- |
| 2008 | 6.5 | 6.5 | 2.4 | 9.9 | 11.0 | 31.2 | --a | 23.9 | 13.3 | -- | -- | -- | -- | -- | -- | --a | 10.6 |
| 2009 | 9.8 | 4.5 | 5.3 | 32.6 | 5.2 | 9.4 | --a | 2.7 | 5.7 | -- | -- | -- | -- | -- | -- | 5.9 | 13.2 |
| 2010 | 5.3 | 10.0 | 6.9 | 17.7 | 5.9 | --a | --a | 2.4 | 5.2 | -- | -- | -- | -- | -- | -- | 1.7 | 30.9 |
| 2011 | 4.6 | 5.0 | 13.1 | 16.6 | 0.9 | 5.4 | --a | 1.8 | 4.0 | -- | -- | -- | -- | -- | -- | 12.7 | 6.0 |
| 2012 | 6.3 | 3.5 | 8.3 | 14.1 | 2.3 | -- | -- | 1.7 | 3.1 | -- | -- | -- | -- | -- | -- | 12.6 | 4.6 |
| 2013 | 3.8 | 5.6 | 4.9 | 9.6 | 6.4 | --a | -- | 1.9 | 5.7 | -- | -- | -- | -- | -- | -- | 4.9 | 4.5 |
| 2014 | 4.7 | 6.8 | 2.7 | 22.5 | 3.2 | --a | --a | 5.2 | 3.7 | -- | -- | -- | -- | -- | -- | 46.5 | 8.4 |
| 2015 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.6 | 5.0 |
| 2016 | -- | -- | -- | -- | -- | -- | --a | -- | -- | -- | -- | -- | -- | -- | -- | --a | 5.4 |
| 2017 | 8.1 | 12.4 | 8.1 | 7.7 | --a | --a | --a | 1.9 | 2.2 | -- | -- | -- | -- | -- | -- | 4.0 | 6.2 |
| 2018 | 5.0 | 6.7 | 3.3 | 2.9 | 15.5 | --a | --a | 2.1 | 4.3 | -- | -- | -- | -- | -- | -- | 6.0 | 2.5 |
| 2019 | 8.7 | 10.6 | 6.2 | 7.3 | 7.2 | --a | --a | 4.3 | 3.3 | -- | -- | -- | -- | -- | -- | 10.5 | 5.4 |
| 2020 | 8.6 | 15.0 | 4.1 | 2.8 | 4.6 | --a | --a | 5.9 | 6.7 | -- | -- | -- | -- | -- | -- | 4.6 | 7.0 |
| 2021 | 3.3 | 55.1 | 3.1 | 3.4 | 2.0 | --a | --a | 1.2 | 1.2 | -- | -- | -- | -- | -- | -- | 4.0 | 7.6 |
| 2022 | 2.2 | --a | 4.0 | 1.0 | --a | --a | --a | 1.2 | 1.9 | -- | -- | -- | -- | -- | -- | 6.5 | 4.2 |

Green = precision ≤ 15%

Yellow = precision > 15% to ≤ 25%

Red = precision > 25%

-- Gray = dataset was not rated

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

**Table 10. NATTS Network Assessment: MQO#4 - Analytical Method Precision %CV at Seattle, WA**

| Year | Benzene | Butadiene, 1,3- | Carbon tetrachlorid | Chloroform | Tetrachloroethylene | Trichloroethylene | Vinyl chloride | Acetaldehyde | Formaldehyde | Arsenic (PM10) | Beryllium (PM10) | Cadmium (PM10) | Lead (PM10) | Manganese (PM10) | Nickel (PM10) | Benzo(a)pyrene | Naphthalene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOCs | | | | | | | Carbonyls | | PM10 Metals | | | | | | PAHs | |
| *Seattle, WA (AQS Site Code: 53-033-0080)* | | | | | | | | | | | | | | | | | |
| 2003 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2004 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2005 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2006 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2007 | 6.7 | 7.8 | 3.8 | 7.1 | 7.3 | 3.6 | -- | 1.3 | 1.9 | 0.5 | --a | 2.7 | 0.2 | 2.0 | 0.2 | -- | -- |
| 2008 | 6.2 | 6.2 | 5.7 | 9.5 | 3.5 | 6.6 | -- | 0.6 | 1.3 | -- | -- | -- | -- | -- | -- | 0.0 | 1.6 |
| 2009 | 3.7 | 9.0 | 5.9 | 11.8 | 5.6 | 0.0 | -- | 0.9 | 0.6 | -- | -- | -- | -- | -- | -- | 1.7 | 2.1 |
| 2010 | 2.8 | 2.2 | 3.1 | 3.6 | 1.5 | -- | -- | 0.4 | 0.4 | -- | -- | -- | -- | -- | -- | 2.4 | 2.6 |
| 2011 | 2.3 | 6.0 | 2.7 | 7.4 | 10.0 | 5.4 | -- | 1.3 | 0.7 | -- | -- | -- | -- | -- | -- | 8.1 | 1.7 |
| 2012 | 8.2 | 6.6 | 9.2 | 3.8 | 2.3 | --a | --a | 1.8 | 0.6 | 1.2 | --a | 3.3 | 1.7 | 1.8 | 1.2 | 4.3 | 2.8 |
| 2013 | 3.1 | 6.4 | 3.7 | 5.1 | 3.3 | --a | --a | 1.2 | 2.2 | 22.1 | --a | 7.6 | 1.7 | 1.2 | 2.7 | 1.1 | 3.6 |
| 2014 | 5.0 | 6.3 | 4.5 | 3.7 | 6.3 | --a | --a | 1.9 | 1.4 | 12.5 | --a | 9.0 | 1.0 | 0.8 | 1.5 | 2.4 | 2.6 |
| 2015 | 3.6 | 11.9 | 4.8 | 7.7 | 4.3 | --a | --a | 9.5 | 5.4 | 15.3 | 0.0 | 4.0 | 0.7 | 1.0 | 2.4 | 1.9 | 4.1 |
| 2016 | 7.9 | 4.8 | 6.5 | 8.5 | 7.4 | --a | --a | 5.5 | 4.9 | 4.7 | 3.3 | 3.0 | 0.5 | 0.4 | 1.0 | --a | 4.6 |
| 2017 | 3.0 | 7.0 | 4.4 | 6.9 | --a | --a | --a | 0.8 | 0.9 | 2.2 | 20.0 | 1.2 | 1.4 | 0.6 | 2.4 | 2.2 | 1.7 |
| 2018 | 3.5 | 4.0 | 2.9 | 3.0 | 3.2 | --a | --a | 0.6 | 1.3 | 1.5 | 5.5 | 5.6 | 0.6 | 1.3 | 1.3 | 1.3 | 2.9 |
| 2019 | 4.4 | 6.2 | 4.4 | 6.0 | 7.7 | --a | --a | 0.5 | 0.6 | 1.7 | --a | 1.9 | 0.7 | 0.8 | 0.8 | 1.4 | 1.9 |
| 2020 | 8.4 | 3.4 | 11.4 | 6.8 | 1.7 | --a | --a | 0.9 | 0.6 | 2.2 | --a | 1.8 | 0.6 | 0.9 | 0.3 | 1.1 | 0.7 |
| 2021 | 3.0 | 4.0 | 3.2 | 3.2 | 1.7 | --a | --a | 3.3 | 0.5 | 1.8 | 0.3 | 1.8 | 0.5 | 0.6 | 0.8 | 5.2 | 0.2 |
| 2022 | 0.8 | 5.1 | 1.1 | 1.1 | --a | --a | --a | 1.0 | 0.5 | 1.5 | --a | 4.8 | 0.4 | 0.5 | 0.9 | 3.2 | 0.3 |

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

**Appendix A. Equipment Inventory**

| Method | Year(s) | Manufacturer/Model, Extraction Type, and Year |
|---|---|---|
| ***Sampling Equipment*** | | |
| Carbonyls | 2003-2020 | Xontech Canister Sampler (Year Deployed: 1998) |
| | 2021 | Xontech Canister Sampler (Year Deployed: 1998); ATEC 8000 Cartridge Sampler (Year Deployed: 2021) |
| | 2022 | ATEC 8000 Cartridge Sampler (Year Deployed: 2021) |
| PAHs | 2007-2022 | Tisch Hi-Vol Sampler (Year Deployed: 2005) |
| $PM_{10}$ Metals | 2003-2013 | Anderson GMW (Year Deployed: 2002) |
| | 2014 | Anderson GMW (Year Deployed: 2002); Thermo 2025 (Year Deployed: 2014) |
| | 2015-2021 | Thermo 2025 (Year Deployed: 2014) |
| | 2022 | Thermo 2025 (Year Deployed: 2014); Thermo 2025i (Year Deployed: 2022) |
| VOCs | 2003-2004 | Tisch Environmental TE-323 Sampler (Year Deployed: 1998) |
| | 2005 | Tisch Environmental TE-323 Sampler (Year Deployed: 1998); Xontech 910PC (Year Deployed: 2005) |
| | 2006-2015 | Xontech 910PC (Year Deployed: 2005) |
| | 2016 | Xontech 910PC (Year Deployed: 2005); Xontech 901 (Year Deployed: 2016) |
| | 2017-2022 | Xontech 901 (Year Deployed: 2016) |
| ***Analytical Equipment*** | | |
| Carbonyls | 2003-2007 | UNKNOWN (Year Deployed: UNKNOWN) |
| | 2007-2017 | Waters Alliance 2695 HPLC /model 2487 Dual Absorbance (Year Deployed: 2003) |
| | 2018-2022 | Waters Alliance 2695 HPLC /model 2489 Dual Absorbance (Year Deployed: 2018) |
| PAHs | 2007-2014 | HP/Agilent 5890/5971 GC/MS (Year Deployed: 2008) |
| | 2015-2020 | HP/Agilent 7890B/5975C GC/MS (Year Deployed: 2015) |
| | 2021-2022 | HP/Agilent 7890B/5975C GC/MS (Year Deployed: 2015); HP/Agilent 6890/5973 GC/MS (Year Deployed: 2021) |
| $PM_{10}$ Metals | 2006-2014 | PE ELAN 9000 ICP-MS (Year Deployed: 2003) |
| | 2015-2018 | Thermo iCAP Q ICP-MS (Year Deployed: 2015) |
| | 2019-2022 | Thermo iCAP Q ICP-MS (Year Deployed: 2015); Thermo iCAP rQ ICP-MS (Year Deployed: 2017) |
| VOCs | 2003 | HP/Agilent 5890/5971 GC/MS, HP/Agilent model 6890/5973 GC/MS (Year Deployed: 1990) |
| | 2004 | HP/Agilent 6890/5973 GC/MS (Year Deployed: 1990); HP/Agilent 6890/5973 GC/MS (Year Deployed: 1993) |
| | 2005-2006 | HP/Agilent 6890/5973 GC/MS (Year Deployed: 1993) |
| | 2007 | HP/Agilent 6890/5973 GC/MS (Year Deployed: 1993); HP/Agilent 6890/5973 GC/MS (Year Deployed: 2006) |
| | 2008-2009 | HP/Agilent 6890/5973 GC/MS (Year Deployed: 2005) |
| | 2010 | HP/Agilent 5890/5971 GC/MS (Year Deployed: 2008) |
| | 2011-2018 | HP/Agilent 6890/5975 GC/MS (Year Deployed: 2010) |
| | 2019 | HP/Agilent 6890/5975 GC/MS (Year Deployed: 2010); HP/Agilent 8890/5977B GC/MS (Year Deployed: 2019) |
| | 2020-2022 | HP/Agilent 8890/5977B GC/MS (Year Deployed: 2019) |
| ***Preconcentrator Equipment*** | | |
| VOCs | 2003 | Entech 7000 (Year Deployed: 2003) |
| | 2004 | Entech 7100 (Dynamic Dilution) (Year Deployed: 2003); UNKNOWN (Year Deployed: UNKNOWN) |
| | 2005-2006 | UNKNOWN (Year Deployed: UNKNOWN) |
| | 2007 | UNKNOWN (Year Deployed: UNKNOWN); Entech 7100A (Year Deployed: 2007) |
| | 2008-2018 | Entech 7100A (Year Deployed: 2007) |
| | 2019 | Entech 7100A (Year Deployed: 2009); Entech 7200A (Year Deployed: 2019) |
| | 2020-2022 | Entech 7200A (Year Deployed: 2019) |

**Appendix A. Equipment Inventory**

| Method | Year(s) | Manufacturer/Model, Extraction Type, and Year |
|---|---|---|
| ***Standards Preparation Equipment*** | | |
| VOCs | 2003 | Custom-built (dynamic dilution) (Year Deployed: 1985) |
| | 2004 | Custom-built (dynamic dilution) (Year Deployed: 1985); UNKNOWN (Year Deployed: UNKNOWN |
| | 2005-2006 | UNKNOWN (Year Deployed: UNKNOWN) |
| | 2007 | UNKNOWN (Year Deployed: UNKNOWN); Custom-built (dynamic dilution) (Year Deployed: 1985) |
| | 2008-2022 | Custom-built (dynamic dilution) (Year Deployed: 1985) |
| ***Canister Cleaning Equipment*** | | |
| VOCs | 2003 | Custom-built (Cold) (Year Deployed: 2003) |
| | 2004 | Custom-built (Cold) (Year Deployed: 2003); UNKNOWN (Year Deployed: UNKNOWN |
| | 2005-2006 | UNKNOWN (Year Deployed: UNKNOWN) |
| | 2007 | UNKNOWN (Year Deployed: UNKNOWN); Custom-built (Cold) (Year Deployed: 2003) |
| | 2018-2022 | Wasson-ECE TO Clean (Hot) (Year Deployed: 2010) |
| ***$PM_{10}$ Extraction Equipment*** | | |
| $PM_{10}$ Metals | 2006-2013 | Branson 8510 (Sonicator) (Year Deployed: 2004) |
| | 2014-2022 | Environmental Express (Hotblock) (Year Deployed: 2014) |
| ***PAHs Extraction Equipment*** | | |
| PAHs | 2007-2018 | Dionex -300 (ASE) (Year Deployed: 2004) |
| | 2019-2022 | Dionex -350 (ASE) (Year Deployed: 2019) |