ANALYSIS, DEVELOPMENT, AND UPDATE OF THE NATIONAL AIR TOXICS TRENDS STATIONS (NATTS) NETWORK PROGRAM-LEVEL DATA QUALITY OBJECTIVE (DQO) AND ASSOCIATED METHOD QUALITY OBJECTIVES (MQOS)

Final Report

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Table of Contents

List of Tables

List of Figures

Abstract

This report presents results of U.S. EPA's assessment of the Data Quality Objective (DQO) for the National Air Toxics Trends System (NATTS) Network. EPA followed the seven step DQO process described in EPA's Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4. This allowed EPA to validate the current Program-Level DQO and four associated method quality objectives (completeness, sensitivity, bias, and precision) or to make adjustments. To assess the completeness and precision MQOs, EPA developed a Monte Carlo simulation model. The report presents the inputs and results of the Monte Carlo simulations. To assess the bias and sensitivity MQOs, EPA examined NATTS Network data. The report presents the data EPA used to examine sensitivity and bias. Finally, the report presents EPA's recommended changes to the NATTS DQO.

Acknowledgements

This report is the result of concerted efforts of EPA staff, state and local agencies, data users, decision makers, and laboratory professionals. EPA would like to thank especially members of the NATTS Network DQO Revision Workgroup. The workgroup formed in October 2012 and met frequently over a 3-month period to discuss and refine the content of the report. The following are the workgroup participants:

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EXECUTIVE SUMMARY

In 2012/2013, EPA analyzed and updated the program-level data quality objective (DQO) and the corresponding method quality objectives (MQOs) of the National Air Toxics Trends Stations (NATTS) Network. The goal of the analysis was to determine whether the original NATTS DQO, which was developed in 2002, is still appropriate now that multiple years of data have been collected.

BACKGROUND

The NATTS Network collects ambient air monitoring data on air toxics as part of the Urban Air Toxic Strategy, which addresses air toxics in urban areas.[1] The NATTS Network was created to generate long-term ambient air toxics concentration data to identify trends in air toxic concentrations and evaluate the effectiveness of efforts to reduce air toxics across the nation.

The analysis and update of the NATTS DQO and MQOs follows a draft assessment of the NATTS Network itself. In September 2012, EPA completed a draft assessment that focused on multiple aspects of the program, both quantitatively and qualitatively.[2] The quantitative portion of the assessment examined whether data collected under the program were complete enough and were of adequate quality to meet the program-level DQO and corresponding MQOs:

DQO: 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.

MQOs: 85 percent completeness on a quarterly basis with 1-in-6 day sampling; and Coefficient of variation (CV) of no more than 15 percent.

Decision error refers to the level of confidence in detecting a trend. Prior to the initiation of the NATTS Network, a 10% level of confidence was modeled and deemed acceptable for the framework of the NATTS DQO. The 2012 Network Assessment found that 83 percent of the data collected for the years 2003 through 2010 were of adequate quality for assessing trends.

APPROACH

To begin the 2012/2013 analysis of the DQO and MQOs, EPA/OAQPS organized a DQO Workgroup, which included representatives of EPA regional offices, data users, decision makers, state and local agencies, and monitoring and laboratory personnel. The DQO Workgroup met regularly from October 2012 through January 2013 to discuss and direct the DQO process.

To re-examine the DQO in 2012, EPA built onto the DQO process that was used to develop the original DQO in 2002.

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[1] U.S. EPA, 1999. National Air Toxics Program: The Integrated Urban Strategy; Federal Register Notice, 64 FR 38706, July 19, 1999.

[2] U.S. EPA, 2012. National Air Toxics Trends Stations (NATTS) Network Assessment. Revised Draft, September 2012. Research Triangle Park, NC.

- EPA followed the seven step DQO process described in EPA's Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4 document (EPA QA/G-4).
- To assess the *completeness* and *precision* MQOs, EPA developed a Monte Carlo simulation model that characterizes the ability to identify trends in ambient pollutant concentrations between two 3-year periods.
- To assess the *bias* and *sensitivity* MQOs, EPA examined NATTS Network data.
- For all aspects of the DQO analysis, EPA used pollutant concentration data from the NATTS Network from 2008-2010, compared to the original DQO analysis, which used data from a 1-year, 10-city pilot study.

The Monte Carlo simulation model is similar to the one EPA used to develop the original DQO in 2002. The Monte Carlo simulation model characterizes the ability to identify trends in ambient pollutant concentrations between two 3-year periods. The statistical model allowed EPA to do the following:

- Generate a pollutant concentration for each day of the year for a site, based on actual NATTS concentration data for 18 pollutants for the years 2008-2010.
- Generate power curves for various iterations of the input parameters.
- Determine the level of confidence for observing either a zero or 30 percent change in back-to-back 3-year average concentrations for a given pollutant.

The DQO Workgroup developed a list of iterations to run, changing one variable at a time to determine how each variable affected the probability of observing the action limit (i.e., "What if?" scenarios). Specifically, Monte Carlo simulations were used to evaluate varying program action levels, levels of confidence, completeness, and precision requirements. The modeling runs were segregated between the A-rated and B-rated datasets.[3] Table ES-1 lists the iterations that were run for each pollutant (highlighted). There were 18 iterations per pollutant.

Modeling Observations

EPA conducted Monte Carlo simulations for 15 of the 19 MQO Core HAPs (including the four Core HAPs), which is more than twice the number of pollutants evaluated for the 2002 DQO process.

- Monte Carlo simulations were generated for 15 pollutants: arsenic (PM_{10}), acetaldehyde, benzene, 1,3-butadiene, cadmium (PM_{10}), carbon tetrachloride, chloroform, formaldehyde, hexavalent chromium, lead (PM_{10}), manganese (PM_{10}), naphthalene, nickel (PM_{10}), tetrachloroethylene, and trichloroethylene.

- Acrolein was not evaluated in the Monte Carlo simulations due to the continued uncertainty of the measurements.

[3] Section 1.2 of the report further defines A-rated and B-rated datasets. NATTS data which met all four MQOs were considered "A-rated." Data that were that were just outside the MQOs were considered "B-rated."

ES-1. NATTS MQO Iterations Per MQO Core HAP

Iteration Step	Dataset	Action Limit	Completeness	Sampling Frequency	Precision – Overall Method
1 (Baseline)	A-Rated	15%	85%	1-in-6 days	15%
2	A-Rated	5%	85%	1-in-6 days	15%
3	A-Rated	20%	85%	1-in-6 days	15%
4	A-Rated	25%	85%	1-in-6 days	15%
5	A-Rated	15%	75%	1-in-6 days	15%
6	A-Rated	15%	95%	1-in-6 days	15%
7	A-Rated	15%	85%	1-in-12 days	15%
8	A-Rated	15%	85%	1-in-6 days	5%
9	A-Rated	15%	85%	1-in-6 days	25%
10	B-Rated	15%	85%	1-in-6 days	15%
11	B-Rated	5%	85%	1-in-6 days	15%
12	B-Rated	20%	85%	1-in-6 days	15%
13	B-Rated	25%	85%	1-in-6 days	15%
14	B-Rated	15%	75%	1-in-6 days	15%
15	B-Rated	15%	95%	1-in-6 days	15%
16	B-Rated	15%	85%	1-in-12 days	15%
17	B-Rated	15%	85%	1-in-6 days	5%
18	B-Rated	15%	85%	1-in-6 days	25%

- Due to the large number of non-detects across all the NATTS monitoring sites, and the large variations in the statistical inputs, Monte Carlo simulations were not performed for benzo(a)pyrene, vinyl chloride, and beryllium (PM_{10}).
  - Most MQO Core HAPs support the 10% confidence levels for no change or significant change at the 15% action level. However, some pollutants are not supported at the 10% confidence levels. Thus, even variability in A-rated data sets does not always meet the DQO.
  - Monte Carlo simulation results using input data from the 2008-2010 NATTS dataset validated the original 15% action limit DQO at the 10% confidence level for the following 10 MQO Core HAPs:
    - Acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, chloroform, formaldehyde, manganese (PM_{10}), nickel (PM_{10}), tetrachloroethylene, and trichloroethylene.
  - Monte Carlo simulation results using input data from the 2008-2010 NATTS dataset that were just outside the upper bound of the 10% confidence level were seen for the following three MQO Core HAPs:
    - Arsenic (PM_{10}), naphthalene, and lead (PM_{10})

- Monte Carlo simulation results using input data from the 2008-2010 NATTS dataset that were just outside the lower and upper bounds of the 10% confidence level were seen for the following two MQO Core HAPs:
    - Hexavalent chromium and cadmium (PM_{10})

Sensitivity MQO

The Sensitivity MQO examines whether the experimentally-derived MDL was at or below the NATTS target method detection limit (MDL), as presented in the NATTS Work Plan template. In the NATTS Network Assessment, EPA compared the MDLs reported by NATTS sites and laboratories to the target MDLs. EPA also compared the MDLs to the 5th and 95th percentile observed concentrations of the pollutant for the year 2010. EPA created graphs to show the MDLs reported by NATTS sites versus the target MDL level. These graphs also include the 5th and 95th percentile observed concentrations of the pollutant for the year 2010 for direct comparison to the MDLs. These figures appear in Appendix D of this DQO report. Note that in 2010, there were 27 sites operating, representing 22 operating agencies.

The DQO Workgroup examined these graphs, and recommended changes to the MDLs for two pollutants: 1,3-butadiene (from $\leq 0.10\ \mu g/m^3$ to $\leq 0.033\ \mu g/m^3$) and benzo(a)pyrene (from $\leq 0.91\ ng/m^3$ to $\leq 0.57\ ng/m^3$). These results are shown in Table ES-2.

Bias MQO

The Bias MQO is measured by conducting performance evaluations based on proficiency testing standards. In the NATTS Network Assessment (U.S. EPA, 2012a), EPA evaluated the proficiency test (PT) results reported by NATTS sites and laboratories. The DQO Workgroup examined the bias results, presented in Appendix E of this DQO report and the current Bias MQO of ±25% for each pollutant.

The DQO Workgroup recommended changes to the bias requirement for three pollutants: acetaldehyde (from ±25% to ±20%), formaldehyde (from ±25% to ±20%) and nickel (from ±25% to ±20%). These results are shown in Table ES-2.

RECOMMENDATION

Based on the Monte Carlo simulation results of the 2008-2010 NATTS A-rated dataset and analysis of the Sensitivity and Bias MQO datasets for 2010, the revised Program-Level DQO is that if the NATTS Network:

Measures concentrations of specified pollutants a minimum of once in every six days;
Contains observations that are at least 85 percent complete on a quarterly basis; and
Controls measurement error with a coefficient of variation (CV) of no more than 15 percent,

then a 15 percent reduction in pollutant concentrations will be statistically significant based on a significance levels of 10 to 15 percent for all MQO Core HAPs. Additionally, when evaluating confidence in the data measures, both Sensitivity and Bias results need to be included. Thus, the Program-Level DQO of the NATTS Network is recommended to change from:

> *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.*

to:

> *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, while demonstrating the confidence in the sampling measurements.*

Confidence in the sampling measurements is associated with the Sensitivity and Bias MQOs, which were not originally considered in the original DQO assessment. Table 6-1 presents the recommended MQOs for the NATTS Program-Level DQO based on the results of the Monte Carlo simulations, and examination of the Sensitivity and Bias MQO data. While the original MQOs are not recommended for change, there were a few recommended updates to the NATTS Workplan Template. These are denoted in Table ES-2 in ***bold italics*** typeface.

Table ES-2. Summary of Recommended MQOs for each MQO Core HAP

Pollutant	Completeness MQO (%)	Sensitivity MQO	Bias MQO (% Difference)	Precision[1] (%CV)
Acetaldehyde	85% 1-in-6 day sampling Each Quarter	≤ 0.45 μg/m^3	***±20%***	≤ 15%
Acrolein		≤ 0.09 μg/m^3	±25%	
Arsenic (PM_{10})		≤ 0.23 ng/m^3	±25%	
Benzene		≤ 0.13 μg/m^3	±25%	
Benzo(a)pyrene[2]		***≤ 0.57 ng/m^3***	±25%	
Beryllium (PM_{10})[2]		≤ 0.42 ng/m^3	±25%	
1,3-Butadiene		***≤ 0.033 μg/m^3***	±25%	
Cadmium (PM_{10})		≤ 0.56 ng/m^3	±25%	
Carbon Tetrachloride		≤ 0.17 μg/m^3	±25%	
Chloroform		≤ 0.50 μg/m^3	±25%	
Formaldehyde		≤ 0.08 μg/m^3	***±20%***	
Hexavalent Chromium		≤ 0.08 ng/m^3	±25%	
Lead (PM_{10})		≤ 15.0 ng/m^3	±25%	
Manganese (PM_{10})		≤ 5.0 ng/m^3	±25%	
Naphthalene		≤ 29.0 ng/m^3	±25%	
Nickel (PM_{10})		≤ 2.1 ng/m^3	***±20%***	
Tetrachloroethylene		≤ 0.17 μg/m^3	±25%	
Trichloroethylene		≤ 0.21 μg/m^3	±25%	
Vinyl Chloride[2]		≤ 0.11 μg/m^3	±25%	

***Bold italics*:** change from 2012 NATTS Workplan Template.

[1] Precision refers to both Overall Method and Analytical.

[2] Monte Carlo simulations were not run for these pollutants due to the large variability in the statistical inputs. However, the other pollutant results were used as surrogates.

1.0 INTRODUCTION

This section describes the purpose of the NATTS Network, the origin of the data quality objective, the 2012 assessment of the Network, and the current analysis of the DQO.

The National Air Toxics Trends Station (NATTS) Network is a component of EPA's National Ambient Air Monitoring Strategy. In 2004, EPA published the final draft of the National Monitoring Strategy, Air Toxics Component,[4] which requires that the NATTS Network be evaluated, and modified as needed, every 6 years:

> *Although the longevity of trends sites typically extends over a decade or more, the NATTS must be evaluated, and modified as needed, on 6-year intervals to assure continued relevancy, consistent with the procedures established under the National Strategy.*

In September 2012, EPA completed a revised draft NATTS Network Assessment[2] focusing on multiple aspects of the program, both quantitatively and qualitatively. The quantitative portion of the assessment examined whether data collected under the program were complete enough and were of adequate quality to meet the program-level data quality objective (DQO). The Program-Level DQO[5] of the NATTS Network is the following:

> *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.*

1.1 Development of the Initial Program-Level DQO and Associated Method Quality Objectives (MQOs)

In 2002, prior to the initiation of NATTS sampling, EPA followed the seven step DQO process described in EPA's *Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4* document[6] to develop the DQO for the NATTS Network. The DQO process described in EPA's QA/G-4 document provides a general framework for ensuring that the data collected by EPA meets the needs of the intended decision makers and data users. The process establishes the link between the specific end use(s) of the data with the data collection process and the data quality (and quantity) needed to meet a program's goals. This process was applied to one of the primary goals of the NATTS Network: to identify trends in ambient concentrations of air toxic pollutants in the United States.

EPA developed the initial NATTS Program-Level DQO and associated measurement quality objectives (MQOs) through use of Monte Carlo model simulations. Monte Carlo

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[4] U.S. EPA, 2004. National Monitoring Strategy—Air Toxics Component, Final Strategy, July 2004. (http://www.epa.gov/ttn/amtic/files/ambient/monitorstrat/atstrat804.pdf).

[5] U.S. EPA, 2002. Draft Report on Development of Data Quality Objectives (DQOs) for the National Ambient Air Toxics Trends Monitoring Network, Contract No. 68-D-98-030, Work Assignment 5-12. Prepared by Battelle, Columbus, OH, for U.S. EPA, Office of Air Quality Planning and Standards; Emissions, Monitoring, and Analysis Division. September 27, 2002.

[6] U.S. EPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4. EPA/240/B-06/001. Washington, DC. (http://www.epa.gov/quality/qs-docs/g4-final.pdf).

simulations are used for a wide variety of applications, including for sensitivity analysis to answer "What if?" questions in program designs. This approach was taken because: 1) at the time of the analysis, EPA had little data on the true distribution of concentrations; and 2) using a Monte Carlo model simulation allowed EPA to generate a large number of observations. The ambient concentration data that served as the inputs to the Monte Carlo model simulations were from the 10-City Pilot Study sponsored by EPA, which took place in 2000-2001.[7]

In 2002, EPA demonstrated through Monte Carlo model simulations that if the NATTS Network:

- Measures concentrations of specified pollutants a minimum of once in every six days;
- Contains observations that are at least 85 percent complete on a quarterly basis; and
- Controls measurement error with a coefficient of variation (CV) of no more than 15 percent,

then a 15 percent change (increase or decrease) in pollutant concentrations will be statistically significant at a significance level of 10 percent. Thus, for decreases:

- If the true decrease in concentration is 30 percent, an estimated reduction in the concentration ratio of 15 percent or less from sampling will be found less than 10 percent of the time; and
- If the true decrease in concentration is 0 percent, an estimated reduction in the concentration ratio greater than 15 percent will be found less than 10 percent of the time.

In other words, if sampling showed a 15 percent reduction in concentrations, then EPA is 90 percent confident that the reduction is not zero, but some statistically significant reduction did occur. Note that the Sensitivity and Bias MQOs were not evaluated via Monte Carlo simulation, but were later added to the NATTS Program.

For the 2002 DQO process, EPA developed the initial Program-Level DQO based on the model simulations of the six priority HAPs identified in the Pilot Study data: benzene, 1,3-butadiene, arsenic, formaldehyde, total chromium, and acrolein. It was later determined that the chromium and acrolein simulation results were not applicable as inputs for the DQO because: 1) hexavalent chromium, a toxic form of chromium, was determined to be more representative of risk than total chromium; and 2) acrolein concentration results were determined to be unreliable because of difficulty in quantifying acrolein through the cartridge-based sampling systems used at the time. Thus, the focus of the initial Program-Level DQO was limited to four HAPs (benzene, 1,3-butadiene, arsenic, and formaldehyde), which were then used as surrogates for the other HAPs in their associated method pollutant groups (i.e., benzene and 1,3-butadiene simulation results were used as surrogates for other VOC HAPs; arsenic simulation results were

[7] LADCO, 2003. Phase II Air Toxics Monitoring Data: Analyses and Network Design Recommendations. Prepared by Battelle Memorial Institute; Sonoma Technology, Inc.; Final technical report prepared for Lake Michigan Air Directors Consortium (LADCO), Des Plaines, IL, by Battelle Memorial Institute, Columbus, OH, and Sonoma Technology, Inc., Petaluma, CA. (http://www.ladco.org/reports/toxics/battelle_2/)

used as surrogates for other PM_{10} HAPs; and formaldehyde simulation results were used as surrogates for other carbonyl HAPs).

1.2 NATTS Network Assessment to Evaluate the Program-Level DQO

Six years of data were needed to meet the NATTS Program-Level DQO of identifying pollutant-specific trends in average concentrations over two successive 3-year periods. Although the program itself was older than 6 years at the time of the assessment, many of the original sites did not begin to fully sample for the initial 16 core HAPs (i.e., seven volatile organic compounds (VOCs), two carbonyls, and seven speciated PM_{10} metals) consistently until the start of the 2005 sampling year. Thus, the assessment was conducted after the 2010 sampling year to ensure a full 6 years of VOC, carbonyl, and PM_{10} metals data at all of the original NATTS sites. By 2010, 27 NATTS sites were operating (Figure 1-1).

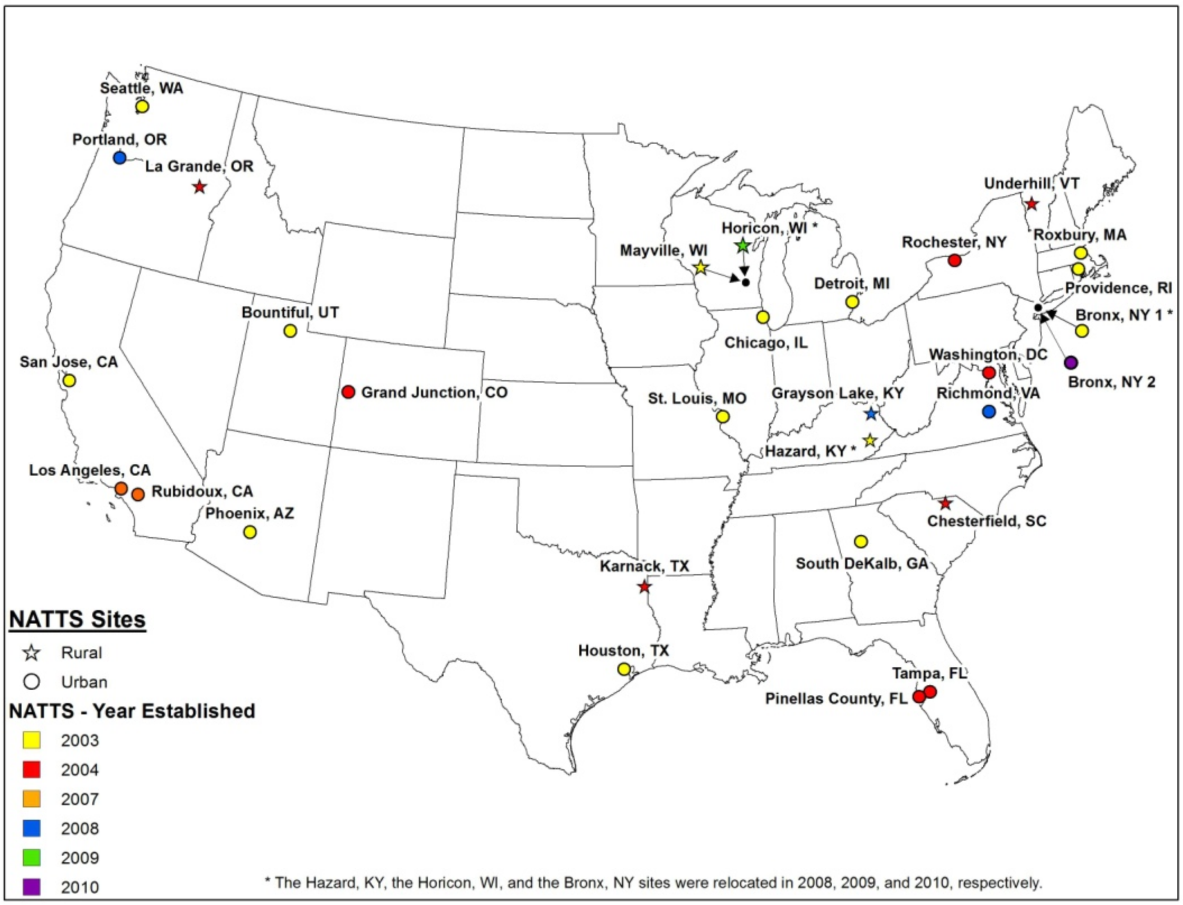

Figure 1-1. NATTS Network

To assess the Program-Level DQO, EPA calculated 3-year block averages (2005-2007 and 2008-2010) using only NATTS data that met the established MQOs, which are:

- **Completeness**: ≥ 85 percent, measured as the percent of samples actually collected versus samples scheduled to be collected, based on a 1-in-6 day sampling schedule.
- **Sensitivity**: Quantification at the target method detection limits (MDLs), as demonstrated by experimentally-determined MDL on an annual basis.
- **Bias**: Percent difference of ±25 percent, as demonstrated through periodic proficiency tests.
- **Precision**: Coefficient of variation (CV) of ≤ 15 percent, as demonstrated through duplicate or collocated sampling.

Initial examination of the datasets showed two important factors when comparing the pollutant datasets to the MQOs: 1) Some pollutant datasets were *just outside* of the MQO; and 2) not all pollutant datasets could be evaluated versus each MQO because the MQOs did not apply consistently for the period of the assessment. For example, a dataset may have completeness of 80 percent or have bias of 28 percent—values just outside of the MQO. Also, precision measurements were not required for the assessment period and there was variability in the frequency of proficiency testing for measuring bias. Thus, EPA developed scoring criteria to account for these two factors.

The scoring criteria weights the MQOs as follows: completeness (40 percent), sensitivity (30 percent), bias (20 percent), and precision (10 percent). In addition, if a pollutant dataset could not be scored for an MQO because the data were not required (precision measurements) or because the data were not available (proficiency test for measuring bias was not requested by EPA), then the dataset was not scored for that MQO. This means a pollutant dataset was not "penalized" for not having data to compare to the precision or bias MQO. The benefits of the scoring criteria are that the evaluation of pollutant datasets reflects how the respective MQOs were applied during the period of the assessment, which results in more datasets being included in assessing trends. If the NATTS data met all four MQOs, then the data were considered "A-rated." Data that were that were just outside the MQOs by a certain percentage were considered "B-rated." Data that were further outside the MQOs than the "B-rated" percentages were identified as "Does Not Meet". The NATTS Network trends (3-year block, 3-year rolling, and annual averages) analysis were limited to A- and B-rated data.

1.3 Evaluating/Re-evaluating Program-Level DQO and Associated MQOs

At the conclusion of the NATTS Network Assessment, EPA undertook a re-evaluation of the NATTS Program-Level DQO and associated MQOs to determine their continued relevance and applicability for future years. EPA followed the same seven step DQO process described in EPA's QA/G-4 document.[4] Additionally, EPA re-created the same modeling assumptions and equations used in the initial development of the DQO to either validate the current Program-Level DQO and associated MQOs, or adjust certain elements that satisfy the decision makers. Similar to the 2002 effort, the Monte Carlo simulations were used to assess the Completeness and Precision MQOs in evaluating the NATTS Program-Level DQO.

The technical approach for this DQO assessment followed the Monte Carlo simulation model that was developed for the initial NATTS DQO process, which was based on the conceptual model used to develop the DQOs for $PM_{2.5}$.[8] The conceptual model was followed mainly due to its success in use with $PM_{2.5}$ and its flexibility. It is a general model for simulating the characterization of ambient concentrations in terms of annual or multi-year averages from 1 in n day sampling. The model incorporates several sources of variability: seasonal variability, natural day-to-day variability, sampling completeness, and measurement error. The measurement error was restricted to a precision component without a bias component because the final mathematical form of the assessment of trends is robust to multiplicative bias. Pollutant specific parameters were used in the modeling. The parameters describing the natural variation of the pollutants are based on data collected by the NATTS Network during the years 2008-2010. The model and the input parameters are further described in Appendix A.

1.4 Scope of the Re-Evaluation

A DQO committee organized by EPA/OAQPS provided representatives of EPA regional offices, data users, decision makers, monitoring agencies, and laboratory personnel. The DQO committee met regularly via teleconference from October 2012 through December 2012 to discuss and direct the DQO process. This report documents the decisions and results of the DQO process.

A key decision early on was to attempt to develop Monte Carlo simulations for all 18 MQO Core HAPs, which are presented below:

- Acetaldehyde
- Arsenic (PM_{10})
- Benzene
- Benzo(a)pyrene
- Beryllium (PM_{10})
- 1,3-Butadiene
- Cadmium (PM_{10})
- Carbon tetrachloride
- Chloroform
- Formaldehyde
- Hexavalent chromium
- Lead (PM_{10})
- Manganese (PM_{10})
- Naphthalene
- Nickel (PM_{10})
- Tetrachloroethylene
- Trichloroethylene
- Vinyl chloride

While acrolein is also identified as an MQO Core HAP (not listed above), the concentration data were not analyzed for the NATTS Network Assessment. EPA made this determination after results of a short-term laboratory study raised questions about the consistency and reliability of monitoring results of acrolein. More information is available at http://www.epa.gov/schoolair/acrolein.html.

[8] U.S. EPA, 2001. Draft Technical Report, Data Quality Objectives (DQOs) for $PM_{2.5}$. Prepared by Battelle, Columbus, OH, for U.S. EPA, Office of Air Quality Planning and Standards July 25, 2001, Research Triangle Park, NC. (http://www.epa.gov/ttnamti1/files/ambient/pm25/qa/2001Dqo.pdf).

It is also important to note that the majority of the above MQO Core HAPs were identified by EPA's most recent National-scale Air Toxics Assessment (NATA) as National or Regional Cancer and/or Noncancer Drivers and Contributors (www.epa.gov/nata). Specifically:

- National Cancer Risk Driver: formaldehyde
- Regional Cancer Risk Driver: benzene, benzo(a)pyrene (as a Polycyclic Aromatic Hydrocarbon), and naphthalene
- National Cancer Risk Contributor: acetaldehyde, arsenic, 1,3-butadiene, carbon tetrachloride, hexavalent chromium, and tetrachloroethylene
- National Noncancer Hazard Driver: acrolein
- Regional Noncancer Hazard Driver: manganese

The Monte Carlo simulation results for the above MQO Core HAPs are presented in Section 3. Another key decision made by the DQO Workgroup was to examine the Sensitivity and Bias MQOs using actual data based on the most recent year of the NATTS Network Assessment. Previously, the Sensitivity and Bias MQOs were not established through Monte Carlo simulations, but were added afterwards. Discussion of the Sensitivity and Bias MQOs are presented in Sections 4 and 5.

2.0 THE GENERAL DQO PROCESS

This section presents the seven steps in EPA's DQO guidance process as applied to the primary goal of the NATTS Network: to identify trends in ambient concentrations of air toxic pollutants in the United States. This section identifies the seven decision-making steps and documents the specific issues and decisions that were made to revise the DQO and method quality objectives (MQOs) for the NATTS Network.

The seven step DQO process is based on the scientific method to ensure that the data collected by EPA meet the needs of its data users and decision makers in terms of the information to be collected, in particular the desired quality and quantity of data. It also provides a framework for checking and evaluating the program goals to make sure they are feasible and that the data are collected efficiently. The seven steps are usually labeled as:

1) State the Problem

2) Identify the Goals of the Study

3) Identify the Inputs to the Decision

4) Define the Study Boundaries

5) Develop a Decision Rule [QA/G-4: Develop the Analytic Approach]

6) Specify Tolerable Limits on the Decision Errors [QA/G-4: Specify Performance or Acceptance Criteria]

7) Optimize the Design [QA/G-4: Develop the Plan for Obtaining Data]

This section has general discussion for each of these items. The pollutant specific outcomes of the DQO process are contained in Section 3.

2.1 State of Problem

Characterize the ambient concentrations in the region represented by the monitor to establish any significant downward trend (measured by a percent change between successive 3-year means of the concentrations).

The analysis of the trends at the site level is based on a percent difference between the mean of the first three annual concentrations and the mean of the last three annual concentrations. Hence for each year the annual average concentration, X_i, needs to be found, i = 1, 2, … 6. Next find the mean, X, for the first 3 years and the mean, Y, for years 4 through 6 as follows:

$$X = \frac{X_1 + X_2 + X_3}{3} \text{ and } Y = \frac{X_4 + X_5 + X_6}{3}.$$

Then the downward trend, T, is the percent decrease from the first 3-year period to the second 3-year period. Namely,

$$T = \frac{X - Y}{X} \cdot 100 .$$

The trend, T, and associated measurement of uncertainty corresponds with the Action Level. Based on an action level of 15 percent, as presented in Section 2.2, at least a 15 percent decrease[9] between the two distinct 3-year mean concentrations would need to be observed in order to be considered a significant decrease. In the NATTS Network Assessment, EPA used only concentration datasets at the NATTS sites if all 6 years of interest (2005-2010) were either A-rated or B-rated. Datasets that were not A-rated or B-rated for the 6 years of interest were not considered for trends. The approach was deemed a reasonable interpretation for calculating trends, which provided weight to other method quality parameters that may be overlooked when calculating trends (i.e., sensitivity, bias, and precision).

EPA developed a statistical model, similar to the model used in 2002, to characterize the ability to identify trends in ambient pollutant concentrations between two 3-year periods. The model derives baseline input parameters from ambient air measurements, such as average concentration, coefficient of variation, and seasonality. Using these parameters along with randomly-generated values from the statistical model, simulation results are generated for thousands of model runs. This is particularly beneficial, because typical NATTS sampling takes place once every six days, whereas the model runs represent every day sampling. For this evaluation, EPA used ambient air concentration data from the NATTS Network for 18 NATTS core HAPs for the years 2008-2010[10] to develop the baseline model parameters. See Appendix A for a description of the model and Appendix B for the input variables derived from the NATTS 2008-2010 dataset. Results for individual pollutants are in Section 3.

Additionally, EPA evaluated the Sensitivity and Bias MQOs using site-specific results from the 2010 sampling year, which is the most recent year from the Assessment. These results and the recommended target values are presented in Sections 4 and 5.

2.2 Identify the Decision

The decision statement provides a link between the principal study question and possible actions. The action level is the cutoff point that separates different decision alternatives. In 2002, an action level of 15 percent was chosen based on the assumed budgetary constraint of 1-in-6 day sampling and the natural variation exhibited by the six compounds considered.

For this re-assessment, EPA modeled alternative action levels of 5, 20, and 25 percent. Initial modeling runs showed that action levels less than 15 percent would require either a higher sampling frequency and/or a lower level of confidence. Action levels higher than 15 percent showed no significant difference in the level of confidence and would require a larger percentage

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[9] The document uses the term "decrease" but the statistic deployed include being able to see an increase or decrease. EPA's goal is to reduce pollution so the term "decrease" is used for convenience.

[10] NATTS data quality has steadily improved over the years so 2008-2010 was used in this assessment.

change that may not be realistic given reductions that have already taken place. For example, according to the NATTS Network Assessment, 10 of the 16 MQO core HAPs have realized a reduction of greater than 15 percent from 2005-2007 to 2008-2010. The DQO Workgroup concluded that 15 percent was still appropriate, because the Monte Carlo simulations generally supported this action level.

Thus, at least a 15 percent decrease between the two distinct 3-year mean concentrations will need to be observed in order to be considered a significant decrease:

> *Significant decreases (15 percent or more) between successive 3-year mean concentration levels will result in [a potential action]. Insignificant decreases, (increases, or decreases of less than 15 percent) will trigger alternate actions of [an alternative potential action].*

The potential actions associated with achieving or failing to achieve a particular percent decrease in the observed 3-year mean concentration were not defined by the DQO Workgroup. However, it was decided that any decision would be based on whether or not a 15 percent decrease was observed.

The 15 percent reduction assumes that the mean concentrations are above the health standards, and hence it makes sense to consider trends.

2.3 Identify the Inputs to the Decision

EPA used the model described in Appendix A to examine the Program-Level DQO. Using the model required decisions regarding model inputs. Thus, the DQO Workgroup identified the baseline model parameters and determined which model parameters would be varied to determine how such variation of individual model parameters would affect the probability of observing the action limit.

Baseline model parameters:

The DQO Workgroup decided to use data from 2008-2010, which is the second 3-year block in the NATTS Network Assessment. Using these latter years from the NATTS Network offered several advantages, including: 1) improved capability of sampling and analysis over time; 2) inclusion of four sites that joined the NATTS Network (Los Angeles, CA and Rubidoux, CA in 2007; Portland, OR and Richmond, VA in 2008); 3) inclusion of benzo(a)pyrene and naphthalene, which began full-scale sampling in 2008; and 4) representation of the second 3-year averaging block from the NATTS Network Assessment.

The model parameters include the following:

- Eighteen NATTS MQO Core HAPs: benzene, 1,3-butadiene, carbon tetrachloride, chloroform, tetrachloroethylene, trichloroethylene, vinyl chloride, acetaldehyde, formaldehyde, arsenic, beryllium, cadmium, lead, manganese, nickel, hexavalent chromium, benzo(a)pyrene, and naphthalene.

  - Because of the large number of non-detects and the high variability in input statistics, power curves could not be generated for vinyl chloride, beryllium, and benzo(a)pyrene. (See further discussion in Section 2.7.)
  - Due to questions on the reliability of the acrolein measurements, the data were not evaluated. (See explanation in Section 1.4.)
- No distinction between urban and rural sites. In 2010, there were 21 urban sites and six rural sites operating in the NATTS Network. Initial Monte Carlo simulation results were generated to confirm there was no statistical difference by keeping the data segregated by urban and rural types. Thus, it was decided that running Monte Carlo simulations based on segregating the data would not provided optimal results for nationwide trends analysis.
- Initial concentration, population CV, and seasonality: Used the 75th percentile of the NATTS concentration data for years 2008-2010 because it represented a conservative value without using the extreme value.
- Initial Model MQOs:
  - 85 percent completeness at 1-in-6 days sampling
  - Method Detection Limits (MDLs) – not included via Monte Carlo simulations
  - Bias – not included via Monte Carlo simulations
  - Precision – 15 percent coefficient of variation (CV)

Modeling Runs:

The DQO Workgroup developed a list of iterations to run, changing one variable at a time to determine how each variable affected the probability of observing the action limit (i.e., "What if?" scenarios). The modeling runs were segregated between the A-rated and B-rated datasets. Table 2-1 lists the iterations that were run for each pollutant. The model results showing all iterations for each pollutant are presented in Appendix C. Section 2.7 presents decisions that resulted from running the various iterations of the model listed in Table 2-1.

2.4 Define the Study Boundaries

Similar to the 2002 initiation of the NATTS Network, it is desired that the specific location of the monitors be constrained so that they represent neighborhood scale assessment for each of the two 3-year periods under consideration, and that the monitoring sites be placed in stable locations for long-term monitoring. NATTS sites were initially situated at $PM_{2.5}$ monitoring sites to satisfy these logistical reasons (e.g., reliable power supply, neighborhood-scale, little or no obstructions, coordination of staff). In general, the NATTS sites have achieved this, with a few exceptions:

- In 2008, the Hazard, KY site relocated 67 miles north to Grayson Lake, KY because the site operator retired and there were no state employees available in the Hazard, KY area who could manage the NATTS site. The site moved to the Grayson Lake, KY monitoring site, which was already a rural (background) monitoring site for $PM_{2.5}$ and had experienced site operators available.
- In 2009, the Mayville, WI site relocated 5 miles southwest to Horicon, WI because the Mayville site was located on private property that was potentially for sale. Wisconsin Department of Natural Resources (DNR) relocated the site to land owned by Wisconsin DNR.

Table 2-1. NATTS MQO Iterations Per MQO Core HAP

Iteration Step	Dataset	Action Limit	Completeness	Sampling Frequency	Precision – Overall Method
1 (Baseline)	A-Rated	15%	85%	1-in-6 days	15%
2	A-Rated	5%	85%	1-in-6 days	15%
3	A-Rated	20%	85%	1-in-6 days	15%
4	A-Rated	25%	85%	1-in-6 days	15%
5	A-Rated	15%	75%	1-in-6 days	15%
6	A-Rated	15%	95%	1-in-6 days	15%
7	A-Rated	15%	85%	1-in-12 days	15%
8	A-Rated	15%	85%	1-in-6 days	5%
9	A-Rated	15%	85%	1-in-6 days	25%
10 (baseline)	B-Rated	15%	85%	1-in-6 days	15%
11	B-Rated	5%	85%	1-in-6 days	15%
12	B-Rated	20%	85%	1-in-6 days	15%
13	B-Rated	25%	85%	1-in-6 days	15%
14	B-Rated	15%	75%	1-in-6 days	15%
15	B-Rated	15%	95%	1-in-6 days	15%
16	B-Rated	15%	85%	1-in-12 days	15%
17	B-Rated	15%	85%	1-in-6 days	5%
18	B-Rated	15%	85%	1-in-6 days	25%

Shaded areas indicate the variable that changes from the baseline.

2.5 Define the Study Boundaries

Similar to the 2002 initiation of the NATTS Network, it is desired that the specific location of the monitors be constrained so that they represent neighborhood scale assessment for each of the two 3-year periods under consideration, and that the monitoring sites be placed in stable locations for long-term monitoring. NATTS sites were initially situated at $PM_{2.5}$ monitoring sites to satisfy these logistical reasons (e.g., reliable power supply, neighborhood-scale, little or no obstructions, coordination of staff). In general, the NATTS sites have achieved this, with a few exceptions:

- In 2008, the Hazard, KY site relocated 67 miles north to Grayson Lake, KY because the site operator retired and there were no state employees available in the Hazard, KY area who could manage the NATTS site. The site moved to the Grayson Lake, KY monitoring site, which was already a rural (background) monitoring site for $PM_{2.5}$ and had experienced site operators available.
- In 2009, the Mayville, WI site relocated 5 miles southwest to Horicon, WI because the Mayville site was located on private property that was potentially for sale. Wisconsin Department of Natural Resources (DNR) relocated the site to land owned by Wisconsin DNR.

- In 2010, the Bronx, NY site relocated 5 miles southwest to another location in Bronx, NY because the rooftop on which the monitor was located was being replaced and other building repairs were made such that a new site was needed. It is anticipated that the NATTS monitoring site will return to the original Bronx, NY location in 2013.

None of the above six sites were included in the calculation of the 6-year trends in the NATTS Network Assessment or in the dataset used for the revisited Monte Carlo simulations.

2.6 Develop a Decision Rule

The decision rule is an "if... then…" statement for how the various alternatives will be chosen. As noted in Section 2.2, the specific alternative actions have not been determined, just the form of the decision rule.

If the percent change between successive 3-year average concentration levels is greater than or equal to 15 percent, then [a potential action]… Otherwise…[a potential alternative action].

2.7 Specify Tolerable Limits on the Decision Errors

Because the NATTS Network does not generate complete, error-free data, there is some probability of making a decision error. The main goal of the DQO process is to find a workable balance between how complete and error-free the data are with acceptable levels of decision errors. To find the balance, the possible errors need to be carefully defined. This usually needs to be done with the recognition that there will be a range, often called the gray zone, where it is impractical to control decision errors.

The QA/G-4 guidance recommends using 0.01 as the starting point for setting decision error rates. However, such a limit would generally require a sampling rate that is not feasible. The 2002 Workgroup decided on the following limits:

If there is no true decrease in the 3-year average concentrations, then the probability of observing a mean concentration for years four through six that is at least 15 percent below the observed mean concentration from years one through three should be no more than 10 percent.

If there is a true decrease in the 3-year average concentrations of at least 30 percent, then the probability of observing a mean concentration for years four through six that is less than 15 percent below the observed mean concentration from years one through three should be no more than 10 percent.

Equivalently, the second statement could read that:

If there is a true decrease in the 3-year average concentrations of at least 30 percent, then the probability of observing a mean concentration for years four through six that is at least 15 percent below the observed mean concentration from years one through three should be at least 90 percent.

For this reassessment, the 2012 DQO Workgroup considered different levels of decision errors other than 10 percent (variables T1 and T2 in Section 3). These levels included 5 percent, 15 percent, and 20 percent. After reviewing the simulation results, the DQO Workgroup concluded that a 10 percent level of decision error continues to be appropriate for most pollutants. However, for other pollutants, a decision error greater than 10 percent may be acceptable. Figure 2-1 presents an example of a power graph used to visually display the error rates as a function of probability.

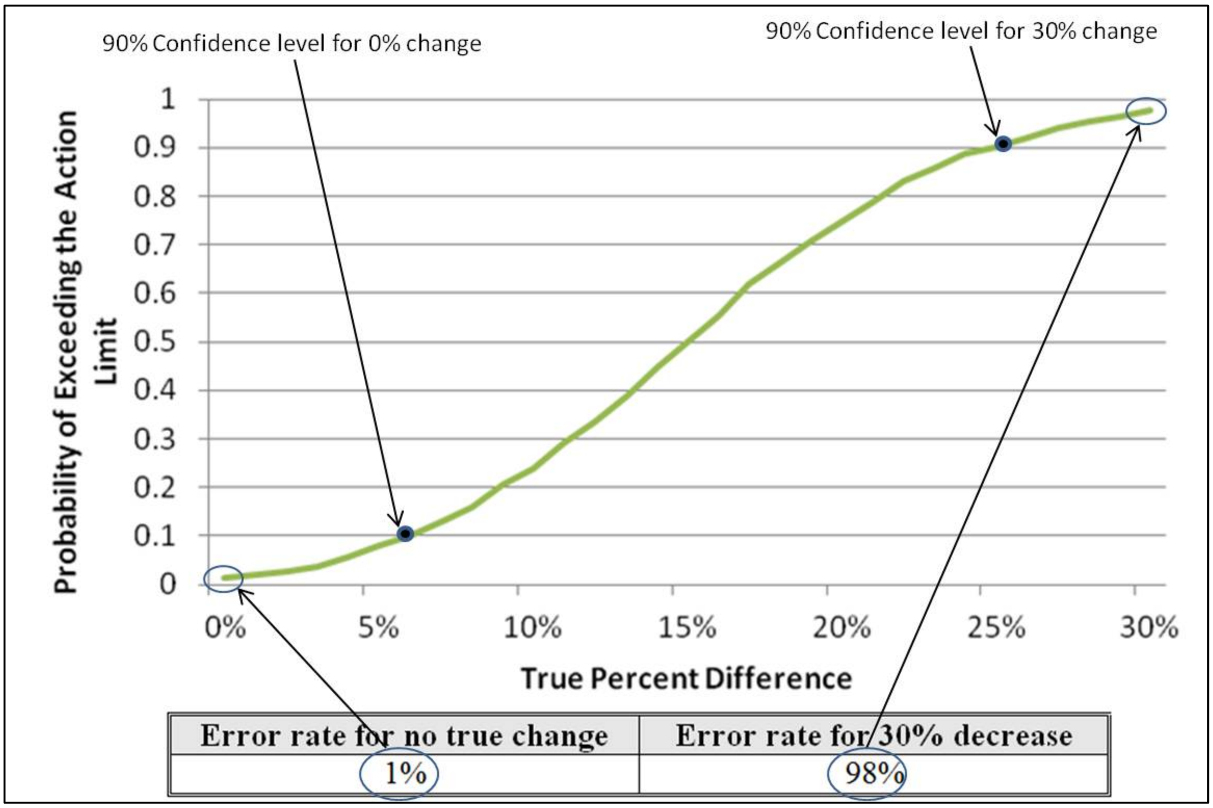


Figure 2-1. Power Curve Example

In the above graphic, because both the "Error rate for no true change" is below the level at 0.1 probability and the "Error rate for 30% decrease" is above the level at 0.9 probability, the 15% action limit is met. The power curves shown in Appendix D visually present the probability of observing at least a 15 percent decrease as a function of the true decrease. In terms of the above goals, this means that the power curve graphs should start below 10 percent for a true percent change of 0 and end above 90 percent for a true percent change of 30 percent. Because there is a particular interest in the error rates for no true change and for a true change of a 30 percent decrease, this associated x-axis (horizontal axis) range is shown for each curve. Also, it is sometimes useful to know when the two target error rates are achieved. The range of "truth" between these values cannot be reliably detected by the sampling scheme.

2.8 Optimize the Design

The parameters describing the natural state of the ambient conditions used to construct the results in Section 3 are pollutant-specific, based on NATTS concentration data. In each case, the NATTS concentration data yielded a range of estimates. The specific values used were chosen at the 75th percentile, which reflects the higher ranges without considering the extreme values such that detecting a downward trend would be more difficult. Actual performance in almost all cases should be better than that indicated by the power curves, because specific sites would not be characterized by these extremes in each of these parameters. However, because the sensitivity to the different parameters is not the same, the DQOs need to protect against a combined set of extremes. Hence, the use of the 75th percentile values of Initial Concentration, Seasonality, and Population CV for network design purposes is conservative.

3.0 EVALUATION FOR FIFTEEN STUDY POLLUTANTS

This section presents the expected maximum error rates and power curves for the NATTS MQO core pollutants.

The DQO Workgroup evaluated the modeling runs from both the A-rated and B-rated datasets.

There are 10 input parameters shown in each section. They are:

1. T1. This is the target error rate for when there is no change. Determinations were made at different decision levels: 5, 10, 15, and 20 percent. The decision level chosen was 10 percent for most pollutants, but 15 percent was chosen for select pollutants.

2. T2. This is the target error rate for when there is a 30 percent decrease. Determinations were made at different decision levels: 5, 10, 15, and 20 percent. The decision level chosen was 10 percent for most pollutants, but 15 percent was chosen for select pollutants.

3. The action limit. This is the minimum observed percent change from the mean concentration of the first 3 years to the mean concentration from the last 3 years that would be used to indicate that the concentrations have decreased. Decreases less than this amount would not be considered significant decreases in the mean concentration. This was tested at four action limits: 5, 15, 20, and 25 percent. The action limit chosen for all pollutants was 15 percent.

4. The sampling rate. Sampling rates of 1-in-6 days and 1-in-12 days were tested. The sampling rate of 1-in-6 days was chosen.

5. The annual completeness criterion. This was tested at three levels: 75, 85, and 95 percent. The annual completeness of 85 percent was chosen.

6. Measurement error Coefficient of Variation (CV). This was tested at three levels: 5, 15, and 25 percent for each compound. The Measurement error CV of ≤15 percent was chosen.

7. Seasonality ratio. This is a measure of the degree of seasonality. Specifically, it is the ratio of the highest point on the seasonal curve to the lowest point. A value of 1 indicates no seasonality. Larger values make it more difficult to estimate an annual or 3-year mean concentration, and hence larger values make it more difficult to measure the percent change. Seasonality ratios were not calculated for vinyl chloride, benzo(a)pyrene, and beryllium (PM_{10}) because of the larger seasonality ratios were influenced by the high number of non-detects. Appendix B presents the calculated seasonality ratios by site and pollutant.

8. Autocorrelation. This is a measurement of how quickly day-to-day deviation from the seasonal curve can occur. A value of 0 indicates that changes occur quickly enough

that each day is independent of the preceding day. Values greater than 0 indicate that the changes are generally slower, so that days with concentrations above the seasonal curve are more likely to be followed by another day above the seasonal curve. Values greater than 0 increase the precision of the 3-year means and the percent change between the 3-year means. Hence, a value of 0 is the most conservative choice for the DQOs. Zero was used in all cases, because many daily measurements are required to obtain a reliable estimate of this parameter, and the previous sampling measurement typically has no bearing on the next sampling measurement.

9. Population CV. This is a measurement of the natural variation about the seasonal curve. Larger values decrease the precision of the 3-year mean concentration estimates and the percent change between them. The power curves are strongly dependent on this parameter, but the estimates can be strongly influenced by a few outlier values. For this study, the 75th percentile of the estimates from the 2008-2010 dataset was used as a balance between these competing forces. No adjustments were made between urban and rural sites. Appendix B presents the calculated population CVs by site and pollutant.

10. Initial mean concentration. This is the mean concentration of the first 3 years in the simulations. Values closer to the MDL decrease the precision of the percent change estimate. The value chosen was approximately equal to the 75th percentile of the site-compound means from the 2008-2010 dataset. As per the NATTS Network Assessment, concentrations that were non-detect were assigned a zero value and included in the mean. Appendix B presents the calculated annual mean concentrations by site and pollutant.

In addition to the power curves, there are two sets of output values.

1. Error rate for no true change is the percent of the simulations with no change in the true 3-year means that in fact generated at least a 15 percent decrease in the observed 3-year means. The goal of meeting the DQO is for the probability to be ≤ 0.1.

2. Error rate for 30 percent decrease is the percent of the simulations with a 30 percent decrease in the true 3-year means that generated less than a 15 percent decrease in the observed 3-year means. The goal of meeting the DQO is for the probability to be ≥ 0.9

In summary, based on variability and uncertainty estimates from the NATTS concentration data, Table 3-1 suggests that most of the specified program-level DQO will likely be met for monitoring sites that satisfy the goals of 1-in-6 day sampling, 85 percent quarterly completeness, and 15 percent measurement CV. All results presented below are from the A-rated datasets.

Table 3-1. Evaluation Input Parameters for all Locations Using A-rated Data

MQO Core HAP[a]	T1[b]	T2[b]	Action Limit	Sampling Rate	Seasonality[c]	Population CV[c,d]	Initial Concentration[c] (µg/m^3)	Measurement CV[d]	Completeness	Autocorrelation
Benzene	10%	10%	15%	1 in 6 day	3.61	50%	0.98	15%	85%	0
1,3-Butadiene	10%	10%	15%	1 in 6 day	7.22	67%	0.11	15%	85%	0
Carbon Tetrachloride	10%	10%	15%	1 in 6 day	1.56	18%	0.68	15%	85%	0
Chloroform	10%	10%	15%	1 in 6 day	4.48	49%	0.24	15%	85%	0
Tetrachloroethylene	10%	10%	15%	1 in 6 day	5.87	74%	0.26	15%	85%	0
Trichloroethylene	10%	10%	15%	1 in 6 day	5.75	75%	0.06	15%	85%	0
Acetaldehyde	10%	10%	15%	1 in 6 day	3.06	52%	1.85	15%	85%	0
Formaldehyde	10%	10%	15%	1 in 6 day	4.09	47%	2.81	15%	85%	0
Arsenic (PM_{10})[e]	10%	15%	15%	1 in 6 day	4.69	85%	0.00089	15%	85%	0
Cadmium (PM_{10})[e,f]	15%	15%	15%	1 in 6 day	6.74	87%	0.00019	15%	85%	0
Lead (PM_{10})[e]	10%	15%	15%	1 in 6 day	4.09	80%	0.00414	15%	85%	0
Manganese (PM_{10})	10%	10%	15%	1 in 6 day	5.55	75%	0.00728	15%	85%	0
Nickel (PM_{10})	10%	10%	15%	1 in 6 day	3.76	69%	0.00204	15%	85%	0
Hexavalent Chromium[f,g]	15%	20%	15%	1 in 6 day	9.42	95%	0.00003	15%	85%	0
Naphthalene[d]	10%	15%	15%	1 in 6 day	4.33	83%	0.09344	15%	85%	0

[a] Benzo(a)pyrene, beryllium (PM_{10}), and vinyl chloride could not be evaluated via Monte Carlo simulations due to the large number of non-detects, thereby skewing statistical input parameters.

[b] T1 is the target error rate for when there is no change and T2 is the target error for when there is a 30% change. Our goal is to try to achieve target error rates of 10%, respectively.

[c] The 75th percentile of the applicable site-pollutant-years was used for the Monte Carlo simulations and is presented here.

[d] CV = coefficient of variation.

[e] A 15% Action Limit is achieved if the confidence level of the target error rate (T1) for when there is no change is increased from 10% to 15%.

[f] A 15% Action Limit is achieved if the confidence level of the target error rate (T2) for when there is a 30 percent change is increased from 10% to 15%.

[g] A 15% Action Limit is achieved if the confidence level of the target error rate (T2) for when there is a 30 percent change is increased from 10% to 20%.

4.0 SENSITIVITY MQO

This section describes how EPA addressed the Sensitivity MQO in examining the NATTS DQO. The Sensitivity MQO, indicated by the method detection limit (MDL), is based on what was reported by sites, and was not modeled. Therefore, EPA examined the Sensitivity MQO based on the site-specific MDLs reported by the site and/or supporting laboratories.

The Sensitivity MQO examines whether the experimentally-derived MDL was at or below the NATTS target MDL, as presented in the NATTS Work Plan template. To accomplish the consistency needed to meet the MQOs for the NATTS core HAPs, EPA prescribes pollutant-specific sample collection and analysis methods. The following methods are prescribed for the NATTS Network:

- Method TO-15 for sampling and analysis of VOCs
- Method TO-11A for sampling and analysis of carbonyl compounds
- Method IO-3.5 for sampling and analysis of metals (PM_{10})
- EPA approved method for sampling and analysis of hexavalent chromium
- Method TO-13A for sampling and analysis of PAHs.

To further ensure consistency across the NATTS Network, laboratories contracted by NATTS must experimentally determine and report MDLs in accordance with 40 CFR Part 136, Appendix B. The EPA defines MDL in 40 CFR Part 136, Appendix B as “the minimum concentration of a substance that can be reported with 99 percent confidence that the analyte concentration is greater than zero.” This statistical assessment can be used to compare laboratory performance using the same or different method. MDLs can be operator, method, laboratory, and matrix-specific.

Although the analytical techniques that have been used throughout the NATTS Network have not changed, some of the MDLs have been refined since sampling began. Table 4-1 lists the MDLs as of April 11, 2012 NATTS Workplan Template.[11] Typically, the target MDLs are reflective of the lowest risk level for either a 1-in-a-million cancer risk or noncancer hazard quotient/10. However, some pollutants were not risk-based, but were instead based on what was achievable by most sites. MQO Core HAPs in which the target MDL does not match their health benchmark concentration level include: acrolein; 1,3-butadiene; nickel (PM_{10}); and benzo(a)pyrene.

[11] U.S. EPA, 2012. National Air Toxics Trends Station Work Plan Template. http://www.epa.gov/ttnamti1/files/ambient/airtox/nattsworkplantemplate.pdf. Last accessed 4/17/12.

Table 4-1. Current NATTS Target Method Detection Limits for the MQO Core HAPs

Pollutant Group	Pollutant	Units	NATTS Target MDL[a]	Reported MDL Range	# Sites > Target MDL	# Labs > Target MDL
VOC	Acrolein[b]	µg/m³	≤ 0.09	NA		
	Benzene	µg/m³	≤ 0.13	0.013-0.864	4	3
	1,3-Butadiene	µg/m³	≤ 0.10	0.013-0.599	8	6
	Carbon Tetrachloride	µg/m³	≤ 0.17	0.031-1.702	9	6
	Chloroform	µg/m³	≤ 0.50	0.029-1.028	3	2
	Tetrachloroethylene	µg/m³	≤ 0.17	0.034-1.631	7	5
	Trichloroethylene[c]	µg/m³	≤ 0.21	0.038-1.562	7	4
	Vinyl Chloride	µg/m³	≤ 0.11	0.015-0.435	10	7
Carbonyl	Acetaldehyde	µg/m³	≤ 0.45	0.004-1.176	1	1
	Formaldehyde[d]	µg/m³	≤ 0.08	0.002-1.176	5	4
PM_{10} Metal	Arsenic (PM_{10})	ng/m³	≤ 0.23	0.001-0.540	9	5
	Beryllium (PM_{10})	ng/m³	≤ 0.42	0.001-1.110	7	4
	Cadmium (PM_{10})	ng/m³	≤ 0.56	0.001-0.690	1	1
	Lead (PM_{10})	ng/m³	≤ 15.0	0.001-1.325	0	0
	Manganese (PM_{10})	ng/m³	≤ 5.0	0.003-1.425	0	0
	Nickel (PM_{10})	ng/m³	≤ 2.1	0.004-1.797	0	0
	Hexavalent Chromium	ng/m³	≤ 0.08	0.001-0.035	0	0
Polycyclic aromatic hydrocarbon (PAH)	Benzo(a)pyrene	ng/m³	≤ 0.91	0.020-0.550	0	0
	Naphthalene	ng/m³	≤ 29.0	0.120-1.800	0	0

[a] Target MDLs were published in the April 11, 2012 NATTS Workplan Template at: http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf (U.S. EPA, 2012b).
[b] Acrolein sensitivity was not analyzed in the NATTS Network Assessment due to questions about the reliability of the sampling and analytical methods. However, the target MDL listed in the NATTS Network Assessment was revised from 0.10 µg/m³ to 0.09 µg/m³ in the 2012 NATTS Workplan Template.
[c] The target MDL from the NATTS Network Assessment was revised from 0.50 µg/m³ to 0.21 µg/m³ in the 2012 NATTS Workplan Template.
[d] The target MDL from the NATTS Network Assessment was revised from 0.98 µg/m³ to 0.08 µg/m³ in the 2012 NATTS Workplan Template.

In the NATTS Network Assessment, EPA compared the MDLs reported by NATTS sites and laboratories versus the target MDLs. EPA also compared the MDLs to the 5th and 95th percentile observed concentrations of the pollutant for the year 2010. These figures are presented in Appendix D. In 2010, there were 27 sites operating (the Bronx, NY site relocated within the same city and is listed twice) representing 22 operating agencies. The DQO Workgroup examined these graphs, and recommended the following target MDLs for each pollutant:

- ***Acetaldehyde***: The current target MDL is 0.45 µg/m³, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but one site/lab achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.45 µg/m³.

- ***Acrolein***: The current target MDL is 0.09 µg/m^3, which is higher than the lowest risk value based on the hazard quotient/10. However, as there are still issues concerning the reliability of acrolein results, there is no basis to change the current target MDL of 0.09 µg/m^3.
- ***Arsenic (PM_{10})***: The current target MDL is 0.23 ng/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but nine sites/five labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.23 ng/m^3.
- ***Benzene***: The current target MDL is 0.13 µg/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but four sites/three labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.13 µg/m^3.
- ***Benzo(a)pyrene***: The current target MDL is 0.91 ng/m^3, which is higher than the lowest risk value based on 1-in-a-million cancer risk. By 2010, all sites/labs achieved the target MDL. However, if the target MDL is reduced to the 1-in-a-million cancer risk value of 0.57 ng/m^3, then all but one site/lab could achieve this new target. Thus, it is recommended that the target MDL value be revised to 0.57 ng/m^3.
- ***Beryllium (PM_{10})***: The current target MDL is 0.42 ng/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but seven sites/four labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.42 ng/m^3.
- ***1,3-Butadiene***: The current target MDL is 0.10 µg/m^3, which is higher than the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but eight sites/six labs achieved the target MDL. However, if the target MDL is reduced to the 1-in-a-million cancer risk value of 0.033 µg/m^3, then all but ten sites/eight labs could achieve this new target. Thus, it is recommended that the target MDL value be revised to 0.033 µg/m^3.
- ***Cadmium (PM_{10})***: The current target MDL is 0.56 ng/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but one site/lab achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.56 ng/m^3.
- ***Carbon tetrachloride***: The current target MDL is 0.17 µg/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but nine sites/six labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.17 µg/m^3.
- ***Chloroform***: The current target MDL is 0.50 µg/m^3, which is the lowest risk value based on the hazard quotient/10. By 2010, all but three sites/two labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.50 µg/m^3.
- ***Formaldehyde***: The current target MDL is 0.08 µg/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but five sites/four labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.08 µg/m^3.
- ***Hexavalent Chromium***: The current target MDL is 0.08 ng/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all sites/labs achieved the

target MDL. Thus, there is no recommended change in the target MDL value of 0.08 ng/m^3.

- ***Lead (PM_{10})***: The current target MDL is 15 ng/m^3, which is the lowest risk value based on the hazard quotient/10. By 2010, all sites/labs achieved the target MDL. Thus, there is no recommended change in the target MDL value of 15 ng/m^3.
- ***Manganese (PM_{10})***: The current target MDL is 5 ng/m^3, which is the lowest risk value based on the hazard quotient/10. By 2010, all sites/labs achieved the target MDL. Thus, there is no recommended change in the target MDL value of 5 ng/m^3.
- ***Naphthalene***: The current target MDL is 29 ng/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all sites/labs achieved the target MDL. Thus, there is no recommended change in the target MDL value of 29 ng/m^3.
- ***Nickel (PM_{10})***: The current target MDL is 2.1 ng/m^3, which is the lower than the lowest risk value based on 1-in-a-million cancer risk. By 2010, all sites/labs achieved the target MDL. Thus, there is no recommended change in the target MDL value of 2.1 ng/m^3.
- ***Tetrachloroethylene***: The current target MDL is 0.17 µg/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but seven sites/five labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.17 µg/m^3.
- ***Trichloroethylene***: The current target MDL is 0.21 µg/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but seven sites/four labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change of 0.21 µg/m^3.
- ***Vinyl chloride***: The current target MDL is 0.11 µg/m^3, which is the lowest risk value based on 1-in-a-million cancer risk. By 2010, all but ten sites/seven labs achieved the target MDL. Because the majority of sites/labs achieved the target MDL, there is no recommended change in the target MDL value of 0.11 µg/m^3.

Table 4-2 presents the recommended target MDLs for each of the NATTS MQO Core HAPs.

Table 4-2. Recommended NATTS Target Method Detection Limits for the MQO Core HAPs

Pollutant Group	Pollutant	Recommended NATTS Target MDL
VOC	Acrolein	≤ 0.09 μg/m^3
	Benzene	≤ 0.13 μg/m^3
	1,3-Butadiene	≤ 0.033 μg/m^3
	Carbon Tetrachloride	≤ 0.17 μg/m^3
	Chloroform	≤ 0.50 μg/m^3
	Tetrachloroethylene	≤ 0.17 μg/m^3
	Trichloroethylene	≤ 0.21 μg/m^3
	Vinyl Chloride	≤ 0.11 μg/m^3
Carbonyl	Acetaldehyde	≤ 0.45 μg/m^3
	Formaldehyde	≤ 0.08 μg/m^3
PM_{10} Metal	Arsenic (PM_{10})	≤ 0.23 ng/m^3
	Beryllium (PM_{10})	≤ 0.42 ng/m^3
	Cadmium (PM_{10})	≤ 0.56 ng/m^3
	Lead (PM_{10})	≤ 15.0 ng/m^3
	Manganese (PM_{10})	≤ 5.0 ng/m^3
	Nickel (PM_{10})	≤ 2.1 ng/m^3
	Hexavalent Chromium	≤ 0.08 ng/m^3
Polycyclic aromatic hydrocarbon (PAH)	Benzo(a)pyrene	≤ 0.57 ng/m^3
	Naphthalene	≤ 29.0 ng/m^3

Shaded area represents a change in the MQO for this HAP.

5.0 BIAS MQO DISCUSSION

This section describes how EPA addressed the Bias MQO in examining the NATTS DQO. The Bias MQO, indicated by Proficiency Test (PT) results, is based on what was reported by sites, and was not modeled. Therefore, EPA examined the Bias MQO based on the site-specific PT results reported by the site and/or supporting laboratories.

Bias assesses whether there is a systematic deviation from the true concentration being reported. Bias is measured by conducting performance evaluations based on proficiency testing standards. The NATTS criteria sets the bias acceptance criteria to a percent difference of ±25 percent.

In the NATTS Network Assessment (U.S. EPA, 2012a), EPA evaluated the proficiency test (PT) results reported by NATTS sites and laboratories. In 2010, there were 27 sites operating (the Bronx, NY site relocated within the same city and is listed twice) representing 22 operating agencies. The DQO Workgroup examined the bias results, presented in Appendix E and the current Bias MQO of ±25% for each pollutant. Table 5-1 summarizes the ranges and data distributions of the 2010 PT results for each pollutant.

Table 5-1. Summary of the 2010 PT Results for Each MQO Core HAP

Pollutant	#Sites With Results	PT Result Range	5th Percentile PT Result	50th Percentile PT Result	95th Percentile PT Result	# Sites Outside ±25%	# Labs Outside ±25%
Acetaldehyde	26	-9.0 to 4.0	-3.9	0.7	3.6	0	0
Arsenic (PM_{10})	27	-32.6 to 56.1	-14.3	7.3	23.1	2	2
Benzene	25	-18.7 to 18.7	-13.2	-12.1	-0.2	0	0
Benzo(a)pyrene	27	-41.3 to -1.3	-41.2	-2.3	-2.3	4	2
Beryllium (PM_{10})	27	-19.2 to 41.4	-18.0	11.2	19.6	1	1
1,3-Butadiene	25	-11.0 to 50.0	-10.5	3.7	34.1	6	4
Cadmium (PM_{10})	27	-24.9 to 12.8	-16.4	4.9	10.0	0	0
Carbon Tetrachloride	25	-30.6 to 36.7	-29.4	9.2	31.6	11	3
Chloroform	25	-41.2 to 8.2	-37.9	-7.2	1.3	2	1
Formaldehyde	26	-8.2 to 8.2	-4.1	-2.8	2.5	0	0
Hexavalent Chromium	22	10.5 to 10.5	10.5	10.5	10.5	0	0
Lead (PM_{10})	27	-28.4 to 47.4	-20.8	-3.5	4.0	2	2
Manganese (PM_{10})	27	-17.8 to 98.0	-16.2	0.6	10.4	1	1
Naphthalene	27	-49.6 to -17.1	-47.4	-17.1	-17.1	4	2
Nickel (PM_{10})	27	-13.7 to 10.4	-11.2	4.7	10.0	0	0
Tetrachloroethylene	25	-39.8 to 8.6	-36.5	-16.1	8.4	2	1
Trichloroethylene	25	-23.9 to 29.4	-23.7	-6.4	5.1	1	1
Vinyl Chloride	25	-23.5 to 31.8	-23.5	-12.9	16.2	1	1

Based on the above results, the DQO Workgroup recommended the following Bias MQOs for each pollutant:

- ***Acetaldehyde***: By 2010, all NATTS Operating Agency sites/laboratories were meeting the Bias MQO of ±25% difference for acetaldehyde. The actual range of results was from -9.0% to +4.0% at 26 sites. Because these ranges are much lower than ±25%, it is recommended that the Bias MQO for acetaldehyde be incrementally reduced to ±20%.
- ***Acrolein***: Due to the reliability issues of the acrolein measurements, there were no PT data to gauge how well the sites performed. Thus, it is recommended that the Bias MQO for acrolein remain at ±25%.
- ***Arsenic (PM_{10})***: By 2010, all but two NATTS Operating Agency sites/laboratories were meeting the Bias MQO of ±25% difference for arsenic (PM_{10}). The actual range of the results was from -32.6% to +56.1% at 27 sites. Because these ranges are close to or outside the ±25%, it is recommended that the Bias MQO for arsenic (PM_{10}) remain at ±25%.
- ***Benzene***: By 2010, all NATTS Operating Agency sites/laboratories were meeting the Bias MQO of ±25% difference for benzene. The actual range of results was from -18.7% to +18.7% at 25 sites. Because these ranges are only somewhat lower than ±25%, it is recommended that the Bias MQO for benzene remain at ±25%.
- ***Benzo(a)pyrene***: By 2010, all but four NATTS Operating Agency sites/two laboratories were meeting the Bias MQO of ±25% difference for benzo(a)pyrene. The actual range of results was from -41.3% to -1.3% at 27 sites. Because some sites were close to or outside the ±25%, it is recommended that the Bias MQO for benzo(a)pyrene remain at ±25%.
- ***Beryllium (PM_{10})***: By 2010, all but one NATTS Operating Agency site/laboratory were meeting the Bias MQO of ±25% difference for beryllium (PM_{10}). The actual range of the results was from -19.2% to +41.4% at 27 sites. Because some sites were close to or outside the ±25%, it is recommended that the Bias MQO for beryllium (PM_{10}) remain at ±25%.
- ***1,3-Butadiene***: By 2010, all but six NATTS Operating Agency sites/four laboratories were meeting the Bias MQO of ±25% difference for 1,3-butadiene. The actual range of results was from -11.0% to +50.0% at 25 sites. Because these ranges were close to or outside the ±25%, it is recommended that the Bias MQO for 1,3-butadiene remain at ±25%.
- ***Cadmium (PM_{10})***: By 2010, all NATTS Operating Agency sites/laboratories were meeting the Bias MQO of ±25% difference for cadmium (PM_{10}). The actual range of the results was from -24.9% to +12.8% at 27 sites. Because these ranges are close to the ±25%, it is recommended that the Bias MQO for cadmium (PM_{10}) remain at ±25%.
- ***Carbon Tetrachloride***: By 2010, all but 11 NATTS Operating Agency sites/three laboratories were meeting the Bias MQO of ±25% difference for carbon tetrachloride. The actual range of results was from -30.6% to +36.7% at 25 sites. Because these ranges were close to or just outside the ±25%, it is recommended that the Bias MQO for carbon tetrachloride remain at ±25%.

- ***Chloroform***: By 2010, all but two NATTS Operating Agency sites/one laboratory were meeting the Bias MQO of ±25% difference for chloroform. The actual range of results was from -41.2% to +8.2% at 25 sites. Because these ranges were close to or outside the ±25%, it is recommended that the Bias MQO for chloroform remain at ±25%.
- ***Formaldehyde***: By 2010, all NATTS Operating Agency sites/laboratories were meeting the Bias MQO of ±25% difference for acetaldehyde. The actual range of results was from -8.2% to +8.2% at 26 sites. Because these ranges are much lower than ±25%, it is recommended that the Bias MQO for formaldehyde be incrementally reduced to ±20%.
- ***Hexavalent Chromium***: By 2010, all 22 NATTS Operating Agencies that were supported by the National Contract laboratory were meeting the Bias MQO of ±25% difference for hexavalent chromium. PT results for hexavalent chromium were not available for any other NATTS Operating Agency laboratories. The PT result for the National Contract laboratory was 10.5% difference. Because only one laboratory had participated in the 2010 PT, it is recommended that the Bias MQO for hexavalent chromium remain at ±25%.
- ***Lead (PM_{10})***: By 2010, all but two NATTS Operating Agency site/two laboratories were meeting the Bias MQO of ±25% difference for lead (PM_{10}). The actual range of the results was from -28.4% to +47.4% at 27 sites. Because some sites were close to or outside the ±25%, it is recommended that the Bias MQO for lead (PM_{10}) remain at ±25%.
- ***Manganese (PM_{10})***: By 2010, all but one NATTS Operating Agency site/laboratory were meeting the Bias MQO of ±25% difference for manganese (PM_{10}). The actual range of the results was from -17.8% to +98.0% at 27 sites. Because some sites were close to or outside the ±25%, it is recommended that the Bias MQO for manganese (PM_{10}) remain at ±25%.
- ***Naphthalene***: By 2010, all but four NATTS Operating Agency sites/two laboratories were meeting the Bias MQO of ±25% difference for naphthalene. The actual range of results was from -49.6% to -17.1% at 27 sites. Because some sites were close to or outside the ±25%, it is recommended that the Bias MQO for naphthalene remain at ±25%.
- ***Nickel (PM_{10})***: By 2010, all NATTS Operating Agency sites/laboratories were meeting the Bias MQO of ±25% difference for nickel (PM_{10}). The actual range of the results was from -13.7% to +10.4% at 27 sites. Because these ranges are lower than the ±25%, it is recommended that the Bias MQO for nickel (PM_{10}) be incrementally reduced to ±20%.
- ***Tetrachloroethylene***: By 2010, all but two NATTS Operating Agency site/one laboratory were meeting the Bias MQO of ±25% difference for tetrachloroethylene. The actual range of results was from -39.8% to +8.6% at 25 sites. Because these ranges were close to or outside the ±25%, it is recommended that the Bias MQO for tetrachloroethylene remain at ±25%.
- ***Trichloroethylene***: By 2010, all but one NATTS Operating Agency site/laboratory were meeting the Bias MQO of ±25% difference for tetrachloroethylene. The actual range of results was from -23.9% to +29.4% at 25 sites. Because these ranges were

close to or outside the ±25%, it is recommended that the Bias MQO for trichloroethylene remain at ±25%.

- ***Vinyl Chloride***: By 2010, all but one NATTS Operating Agency site/laboratory were meeting the Bias MQO of ±25% difference for vinyl chloride. The actual range of results was from -23.5% to +31.8% at 25 sites. Because these ranges were close to or outside the ±25%, it is recommended that the Bias MQO for vinyl chloride remain at ±25%.

Table 5-2 presents the recommended Bias percent differences for each of the NATTS MQO Core HAPs.

Table 5-2. Recommended Bias Percent Difference for the MQO Core HAPs

Pollutant Group	Pollutant	Recommended Bias Percent Difference
VOC	Acrolein	±25%
	Benzene	±25%
	1,3-Butadiene	±25%
	Carbon Tetrachloride	±25%
	Chloroform	±25%
	Tetrachloroethylene	±25%
	Trichloroethylene	±25%
	Vinyl Chloride	±25%
Carbonyl	Acetaldehyde	±20%
	Formaldehyde	±20%
PM_{10} Metal	Arsenic (PM_{10})	±25%
	Beryllium (PM_{10})	±25%
	Cadmium (PM_{10})	±25%
	Lead (PM_{10})	±25%
	Manganese (PM_{10})	±25%
	Nickel (PM_{10})	±20%
	Hexavalent Chromium	±25%
Polycyclic aromatic hydrocarbon (PAH)	Benzo(a)pyrene	±25%
	Naphthalene	±25%

Shaded area represents a change in the MQO for this HAP.

6.0 SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS

This section presents the revised Program-Level DQO and associated MQOs.

In 2002, EPA demonstrated through Monte Carlo model simulations that if the NATTS Network:

- Measured concentrations of specified pollutants a minimum of once in every six days;
- Contains observations that are at least 85 percent complete on a quarterly basis; and
- Controls measurement error with a coefficient of variation (CV) of no more than 15 percent,

then a 15 percent reduction in pollutant concentrations will be statistically significant based on a significance level of 10 percent. This led to the current program-level Data Quality Objective (DQO) of the NATTS Network to the following (U.S. EPA, 2002):

> *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.*

In 2012, EPA conducted a NATTS Network Assessment to determine whether or not data generated under the NATTS Network could meet the above Program-Level DQO. Additionally, the NATTS Network Assessment allowed EPA to determine whether EPA and the participating sites were meeting the network objectives, and what can be done to improve the network, as a whole, and on a site-by-site basis.

After the NATTS Assessment, EPA revisited the Program-Level DQO and associated MQOs to determine its continued relevance and applicability.

6.1 Observations

EPA used a similar approach to evaluating the Program-Level DQO and associated MQOs. Monte Carlo simulations were used to evaluate varying program action levels, levels of confidence, completeness, and precision requirements. To evaluate the Sensitivity and Bias MQOs, EPA evaluated results from the NATTS Network Analysis for the 2010 year, which was the latest year of data in the assessment. The following observations were made:

- The original DQO process developed Monte Carlo simulations for six priority HAPs: benzene, 1,3-butadiene, formaldehyde, arsenic, chromium, and acrolein. Chromium and acrolein were later dropped from the NATTS Core HAP list due to sampling and analytical issues. For this DQO revision, EPA conducted Monte Carlo simulations for 15 of the 19 MQO Core HAPs (including the four Core HAPs), which is more than twice the number of pollutants done for the 2002 DQO process.

    - Monte Carlo simulations were generated for 15 pollutants: arsenic (PM_{10}), acetaldehyde, benzene, 1,3-butadiene, cadmium (PM_{10}), carbon tetrachloride, chloroform, formaldehyde, hexavalent chromium, lead (PM_{10}), manganese (PM_{10}), naphthalene, nickel (PM_{10}), tetrachloroethylene, and trichloroethylene.

- Acrolein was not evaluated in the Monte Carlo simulations due to the reliability of the measurements.
- Due to the large number of non-detects across all the NATTS monitoring sites, and the large variations in the statistical inputs, Monte Carlo simulations were not performed for benzo(a)pyrene, vinyl chloride, and beryllium (PM_{10}).

- Most MQO Core HAPs support the 10% confidence levels for no change or significant change at the 15% action level. However, some pollutants are not supported at the 10% confidence levels. Thus, even variability in A-rated data sets does not always meet the DQO.
- Monte Carlo simulation results using input data from the 2008-2010 NATTS dataset validated the original 15% action limit DQO at the 10% confidence level for the following 10 MQO Core HAPs:
  - Acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, chloroform, formaldehyde, manganese (PM_{10}), nickel (PM_{10}), tetrachloroethylene, and trichloroethylene.
- Monte Carlo simulation results using input data from the 2008-2010 NATTS dataset that were just outside the upper bound of the 10% confidence level were seen for the following three MQO Core HAPs:
  - Arsenic (PM_{10}), naphthalene, and lead (PM_{10})
- Monte Carlo simulation results using input data from the 2008-2010 NATTS dataset that were just outside the lower and upper bounds of the 10% confidence level were seen for the following two MQO Core HAPs:
  - Hexavalent chromium and cadmium (PM_{10})

6.2 Recommendations

Based on the Monte Carlo simulation results of the 2008-2010 NATTS A-rated dataset and analysis of the Sensitivity and Bias MQO datasets for 2010, the revised Program-Level DQO is that if the NATTS Network:

- Measures concentrations of specified pollutants a minimum of once in every six days;
- Contains observations that are at least 85 percent complete on a quarterly basis; and
- Controls measurement error with a coefficient of variation (CV) of no more than 15 percent,

then a 15 percent reduction in pollutant concentrations will be statistically significant based on a significance levels of 10 to 15 percent for all MQO Core HAPs. Additionally, when evaluating confidence in the data measures, both Sensitivity and Bias results need to be included. Thus, the Program-Level DQO of the NATTS Network is recommended to change from:

> *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.*

to:

> *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, while demonstrating the confidence in the sampling measurements.*

Confidence in the sampling measurements is associated with the Sensitivity and Bias MQOs, which were not originally considered in the original DQO assessment. Table 6-1 presents the recommended MQOs for the NATTS Program-Level DQO based on the results of the Monte Carlo simulations, and examination of the Sensitivity and Bias MQO data. While the original MQOs are not recommended for change, there were a few recommended updates to the NATTS Workplan Template. These are denoted in Table 6-1 in ***bold italics*** typeface.

An additional observation regarding the precision calculation is that the NATTS Network Assessment only considered data pairs if both concentrations were greater than the respective MDL. Concentrations reported below the MDL typically distort the precision calculation, given the uncertainty in data reported below the MDL. It is recommended that the precision calculation continues with this same approach.

Table 6-1. Summary of Recommended MQOs for Each MQO Core HAP

Pollutant	Completeness MQO (%)	Sensitivity MQO	Bias MQO (% Difference)	Precision[1] (%CV)
Acetaldehyde		≤ 0.45 µg/m^3	***±20%***	
Acrolein		≤ 0.09 µg/m^3	±25%	
Arsenic (PM$_{10}$)		≤ 0.23 ng/m^3	±25%	
Benzene		≤ 0.13 µg/m^3	±25%	
Benzo(a)pyrene[2]		***≤ 0.57 ng/m^3***	±25%	
Beryllium (PM$_{10}$)[2]		≤ 0.42 ng/m^3	±25%	
1,3-Butadiene		***≤ 0.033 µg/m^3***	±25%	
Cadmium (PM$_{10}$)		≤ 0.56 ng/m^3	±25%	
Carbon Tetrachloride	85%	≤ 0.17 µg/m^3	±25%	
Chloroform	1-in-6 day sampling	≤ 0.50 µg/m^3	±25%	≤ 15%
Formaldehyde	Each Quarter	≤ 0.08 µg/m^3	***±20%***	
Hexavalent Chromium		≤ 0.08 ng/m^3	±25%	
Lead (PM$_{10}$)		≤ 15.0 ng/m^3	±25%	
Manganese (PM$_{10}$)		≤ 5.0 ng/m^3	±25%	
Naphthalene		≤ 29.0 ng/m^3	±25%	
Nickel (PM$_{10}$)		≤ 2.1 ng/m^3	***±20%***	
Tetrachloroethylene		≤ 0.17 µg/m^3	±25%	
Trichloroethylene		≤ 0.21 µg/m^3	±25%	
Vinyl Chloride[2]		≤ 0.11 µg/m^3	±25%	

***Bold italics*:** change from 2012 NATTS Workplan Template.

1 Precision refers to both Overall Method and Analytical.

2 Monte Carlo simulations were not run for these pollutants due to the large variability in the statistical inputs. However, the other pollutant results were used as surrogates.

Appendix A – Description of the Monte Carlo Simulation Model

Appendix A – Description of the Monte Carlo Simulation Model

The model used for this study is based on the model and approach that was taken in the original DQO development for the NATTS Network (U.S. EPA, 2002). The statistical model in the original DQO development was designed by starting with a model similar to the one used for $PM_{2.5}$ FRM data (U.S. EPA, 2001). The ambient concentrations are modeled as deviations from a sine curve, where the amplitude of the sine curve represents *seasonality*. This sine curve represents long-term daily averages of the concentrations that one would observe at a site. The form used is as follows:

$$A\left[1+\left(\frac{r-1}{r+1}\right)\sin\left(\frac{day}{365}2\pi\right)\right]$$

Where:

A = the long-term annual average
r = the ratio of the highest point on the sine curve to the lowest point. (A value of r = 1 indicates no seasonality.)

The natural deviations from the sine curve are assumed to follow a lognormal distribution with a mean that is given by the particular point on the sine curve. For example, the value of the sine curve for Day 100 is the mean for all Day 100s across many years. The coefficient of variation (CV) of the lognormal distribution is assumed to be a constant. The general model considered also allows for the day-to-day deviations from the sine curve to be correlated, but the current DQO is based on an autocorrelation of zero. Finally, the measured values are modeled with a normally distributed random measurement error with a constant coefficient of variation (CV). The specific values for the various parameters are pollutant specific.

An output of the model is a power curve for each pollutant, which graphically presents where the desired Action Limit intersects with various levels of confidence. The power curves and decision errors are established via Monte-Carlo simulation of the model with the particular parameters for various combinations of true and observed percent changes in 3-year mean concentrations. The power curves are plotted as functions of the true percent change in the 3-year annual means for compound specific combinations of the sampling frequency, completeness, and precision.

The model runs were completed based on ambient concentrations from the NATTS Network sites for the years 2008-2010. During this time period, there were 27 NATTS sites, representing large cities, medium cities, and small/rural towns (some sites relocated during this 3-year period). Model runs were completed using the following inputs:

- Dataset. Concentration data are available in the NATTS Network from 2003 through 2010. The DQO Workgroup decided to use data from 2008-2010, which is the second

3-year block in the NATTS Network Assessment. By using concentration data for the years 2008-2010, EPA was able to include data from four sites that began sampling in 2007: Los Angeles, CA; Rubidoux, CA; Portland, OR; and Richmond, VA—all of which started sampling in 2007 or 2008. Additionally, the data quality of the measurements was better in the latter years of the program due to several reasons, including: additional training; sampling and/or analytical equipment upgrades; consistency in methods and expectations outlined in the NATTS Technical Assistance Document (TAD); and additional EPA Program Office and Regional Office oversight regarding the NATTS workplan template.

- Pollutants. Eighteen NATTS Core HAPs [Seven VOCs: benzene, 1,3-butadiene, carbon tetrachloride, chloroform, tetrachloroethylene, trichloroethylene, and vinyl chloride; two carbonyls: acetaldehyde and formaldehyde; six speciated PM_{10} metals: arsenic, beryllium, cadmium, lead, manganese, nickel; and two PAHs: benzo(a)pyrene and naphthalene; and hexavalent chromium]: These pollutants were designated as "Method Quality Objective (MQO) Core HAPs" because of their representativeness, risk, and methods availability. By using concentration data for the years 2008-2010, EPA was able to include the two PAHs (benzo(a)pyrene and naphthalene), for which sampling did not begin until 2007 at selected sites and 2008 across the rest of the NATTS Network.

- Urban/Rural/National. NATTS sites are designated as urban or rural. EPA completed model runs using urban and rural data separately in order to compare modeling results. These results, in terms of Probability of Observing the Action Limits, were similar between the rural data set and the urban data set. Therefore, the urban and rural data were combined as a "national" data set and run in the model.

- A and B Data. A-rated and B-rated data were available for the years 2008-2010. A-rated data are pollutant datasets that met the MQOs, while B-rated data are pollutant datasets that are just outside of the MQO criteria. Both A-rated and B-rated datasets were used for the NATTS Network Assessment. Model runs were completed to compare the results from the A-rated datasets to the B-rated datasets. These results, in terms of Probability of Observing the Action Limits, are presented in Appendix C.

- Bias. The effect of bias is insignificant in the model. If bias is roughly constant between years, then on average, the effect will essentially subtract out of the test statistic. The Bias MQO was evaluated using actual Proficiency Test (PT) data from the 2010 sampling year.

- Derived Statistical Inputs. The initial concentration and population parameters (the degree of seasonality and the CV of the deviations from the sine curve) were calculated from ambient concentrations of eighteen core pollutants from the NATTS Network sites for the years 2008-2010. Appendix B contains these parameters by site, pollutant, and year.
    - Initial concentration. This is simply the mean concentration for the site. It was calculated as a simple mean by site, pollutant, and year based on 2008-2010 NATTS dataset concentration data.

- Population CV. This parameter measures the amount of random, day-to-day variation of the true concentration about the sine curve. This parameter was estimated as follows. Starting with every 6th day measurements, the natural log of each non-zero measurement was found. Next, a new sequence of numbers was created equal to the differences of successive pairs in the sequence of the log-concentrations that were from measurements taken six days apart. Finally, terms were removed from this sequence so that each term in the remaining sequence was based on distinct numbers. Let S be the standard deviation of this set of numbers. The estimate for the Population CV is $\sqrt{\left(\exp\left(S^2/2\right)-1\right)}$. The site estimates are restricted to those with at least 10 terms being used in the estimates.

- Seasonality Ratio. The seasonality ratio parameter is a measure of the degree of variability in the data, or "seasonality," over the course of a year. It is expressed as the ratio of the high point to the low point on the sine curve. A value of 1 indicates no seasonality. The model assumes that the amplitude of the sine curve is proportional to the mean. The seasonality parameter was estimated by finding the annual averages over 2008-2010 and taking the ratio of the highest average to the lowest average. The site estimates are restricted to those sites that had at least three measurements in each of at least 6 months.

- The 75th percentile was chosen as the value that is representative of the above parameters because it represents a conservative value without using the extreme value.

• Autocorrelation. Autocorrelation is a measurement of how quickly day-to-day deviation from the seasonal curve can occur. It is a measurement of the similarity between successive days. The value of the autocorrelation ranges between 0 and 1. A value of 0 indicates that changes occur quickly enough that each day is independent of the preceding day. A value of 1 means that the local concentrations are constant. Values greater than 0 indicate that the changes are generally slower, so that days with concentrations above the seasonal curve are more likely to be followed by another day above the seasonal curve. Values greater than 0 increase the precision of the 3-year means and the percent change between the 3-year means. Hence, a value of 0 is the most conservative choice for the model simulations. Zero was used in all cases, because many daily measurements are required to obtain a reliable estimate of this parameter.

Appendix B – Site and Pollutant-Specific Model Input Parameters

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
Carbonyls - Acetaldehyde							
A	Acetaldehyde	San Jose, CA	06-085-0005	2008	1.8295 µg/m^3	2.177	51.48%
A	Acetaldehyde	San Jose, CA	06-085-0005	2009	1.6859 µg/m^3	2.8561	46.36%
A	Acetaldehyde	San Jose, CA	06-085-0005	2010	1.5281 µg/m^3	2.6625	51.71%
A	Acetaldehyde	Grand Junction, CO	08-077-0018	2008	2.1879 µg/m^3	2.081	31.84%
A	Acetaldehyde	Grand Junction, CO	08-077-0018	2009	2.554 µg/m^3	1.8997	35.00%
A	Acetaldehyde	Grand Junction, CO	08-077-0018	2010	1.7603 µg/m^3	2.2726	33.45%
A	Acetaldehyde	Pinellas County, FL	12-103-0026	2008	2.4603 µg/m^3	1.985	38.24%
A	Acetaldehyde	Pinellas County, FL	12-103-0026	2009	2.9008 µg/m^3	1.8511	37.67%
A	Acetaldehyde	Pinellas County, FL	12-103-0026	2010	3.4294 µg/m^3	3.0238	45.80%
A	Acetaldehyde	Tampa, FL	12-057-3002	2008	1.2074 µg/m^3	3.0522	37.67%
A	Acetaldehyde	Tampa, FL	12-057-3002	2009	1.1645 µg/m^3	1.9358	29.71%
A	Acetaldehyde	Tampa, FL	12-057-3002	2010	1.5197 µg/m^3	2.0985	37.76%
A	Acetaldehyde	Chicago, IL	17-031-4201	2008	0.8874 µg/m^3	4.4262	73.53%
A	Acetaldehyde	Chicago, IL	17-031-4201	2009	0.7151 µg/m^3	2.5693	39.70%
A	Acetaldehyde	Chicago, IL	17-031-4201	2010	1.0448 µg/m^3	3.5959	47.90%
A	Acetaldehyde	Roxbury, MA	25-025-0042	2008	1.522 µg/m^3	2.0554	46.74%
A	Acetaldehyde	Roxbury, MA	25-025-0042	2009	0 µg/m^3	0	0.00%
A	Acetaldehyde	Roxbury, MA	25-025-0042	2010	1.203 µg/m^3	2.1892	56.08%
A	Acetaldehyde	St. Louis, MO	29-510-0085	2008	1.88 µg/m^3	2.8716	46.97%
A	Acetaldehyde	St. Louis, MO	29-510-0085	2009	2.4167 µg/m^3	4.3368	28.64%
A	Acetaldehyde	St. Louis, MO	29-510-0085	2010	4.1879 µg/m^3	2.1834	46.82%
A	Acetaldehyde	La Grande, OR	41-061-0119	2008	0 µg/m^3	0	0.00%
A	Acetaldehyde	La Grande, OR	41-061-0119	2009	1.3405 µg/m^3	2.9523	33.47%
A	Acetaldehyde	La Grande, OR	41-061-0119	2010	0 µg/m^3	0	0.00%
A	Acetaldehyde	Providence, RI	44-007-0022	2008	1.8407 µg/m^3	2.2881	41.51%
A	Acetaldehyde	Providence, RI	44-007-0022	2009	0 µg/m^3	0	0.00%
A	Acetaldehyde	Providence, RI	44-007-0022	2010	1.32 µg/m^3	1.858	53.34%
A	Acetaldehyde	Chesterfield, SC	45-025-0001	2008	1.1251 µg/m^3	3.4388	69.29%
A	Acetaldehyde	Chesterfield, SC	45-025-0001	2009	1.176 µg/m^3	5.3027	43.60%
A	Acetaldehyde	Chesterfield, SC	45-025-0001	2010	0 µg/m^3	0	0.00%
A	Acetaldehyde	Houston, TX	48-201-1039	2008	1.2966 µg/m^3	5.1163	54.39%
A	Acetaldehyde	Houston, TX	48-201-1039	2009	1.417 µg/m^3	2.1833	82.59%
A	Acetaldehyde	Houston, TX	48-201-1039	2010	1.3709 µg/m^3	3.0663	69.53%
A	Acetaldehyde	Karnack, TX	48-203-0002	2008	0.8016 µg/m^3	2.4214	38.13%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Acetaldehyde	Karnack, TX	48-203-0002	2009	0.8062 $\mu g/m^3$	1.5647	34.65%
A	Acetaldehyde	Karnack, TX	48-203-0002	2010	0.9486 $\mu g/m^3$	2.4559	36.51%
A	Acetaldehyde	Bountiful, UT	49-011-0004	2008	1.8532 $\mu g/m^3$	4.7494	66.77%
A	Acetaldehyde	Bountiful, UT	49-011-0004	2009	1.7675 $\mu g/m^3$	2.4858	47.18%
A	Acetaldehyde	Bountiful, UT	49-011-0004	2010	1.9812 $\mu g/m^3$	2.9331	31.83%
A	Acetaldehyde	Underhill, VT	50-007-0007	2008	0.6889 $\mu g/m^3$	2.2783	30.34%
A	Acetaldehyde	Underhill, VT	50-007-0007	2009	0 $\mu g/m^3$	0	0.00%
A	Acetaldehyde	Underhill, VT	50-007-0007	2010	0.6636 $\mu g/m^3$	2.5193	40.45%
A	Acetaldehyde	Seattle, WA	53-033-0080	2008	0.8456 $\mu g/m^3$	3.6671	52.41%
A	Acetaldehyde	Seattle, WA	53-033-0080	2009	1.0153 $\mu g/m^3$	3.4453	74.95%
A	Acetaldehyde	Seattle, WA	53-033-0080	2010	0.8332 $\mu g/m^3$	1.9188	46.76%
			Carbonyls - Formaldehyde				
A	Formaldehyde	San Jose, CA	06-085-0005	2008	0 $\mu g/m^3$	0	0.00%
A	Formaldehyde	San Jose, CA	06-085-0005	2009	2.2203 $\mu g/m^3$	2.5958	52.57%
A	Formaldehyde	San Jose, CA	06-085-0005	2010	2.1319 $\mu g/m^3$	2.1411	46.27%
A	Formaldehyde	Grand Junction, CO	08-077-0018	2008	3.6047 $\mu g/m^3$	2.0121	23.15%
A	Formaldehyde	Grand Junction, CO	08-077-0018	2009	3.5234 $\mu g/m^3$	1.7908	23.47%
A	Formaldehyde	Grand Junction, CO	08-077-0018	2010	2.4376 $\mu g/m^3$	2.0992	23.70%
A	Formaldehyde	Washington, DC	11-001-0043	2008	0 $\mu g/m^3$	0	0.00%
A	Formaldehyde	Washington, DC	11-001-0043	2009	3.0406 $\mu g/m^3$	16.5991	118.60%
A	Formaldehyde	Washington, DC	11-001-0043	2010	6.8593 $\mu g/m^3$	42.6472	159.52%
A	Formaldehyde	Pinellas County, FL	12-103-0026	2008	1.7621 $\mu g/m^3$	3.6009	25.27%
A	Formaldehyde	Pinellas County, FL	12-103-0026	2009	1.2895 $\mu g/m^3$	2.5627	29.49%
A	Formaldehyde	Pinellas County, FL	12-103-0026	2010	1.2327 $\mu g/m^3$	2.4751	29.44%
A	Formaldehyde	Tampa, FL	12-057-3002	2008	2.4198 $\mu g/m^3$	3.7832	40.79%
A	Formaldehyde	Tampa, FL	12-057-3002	2009	2.596 $\mu g/m^3$	1.9709	28.77%
A	Formaldehyde	Tampa, FL	12-057-3002	2010	2.7611 $\mu g/m^3$	4.1089	34.86%
A	Formaldehyde	Chicago, IL	17-031-4201	2008	0.6161 $\mu g/m^3$	3.5806	71.68%
A	Formaldehyde	Chicago, IL	17-031-4201	2009	1.0177 $\mu g/m^3$	2.9362	39.40%
A	Formaldehyde	Chicago, IL	17-031-4201	2010	3.7884 $\mu g/m^3$	38.7631	54.27%
A	Formaldehyde	Roxbury, MA	25-025-0042	2008	2.5496 $\mu g/m^3$	2.0753	32.94%
A	Formaldehyde	Roxbury, MA	25-025-0042	2009	2.5011 $\mu g/m^3$	3.0449	39.16%
A	Formaldehyde	Roxbury, MA	25-025-0042	2010	2.3634 $\mu g/m^3$	2.1651	47.17%
A	Formaldehyde	St. Louis, MO	29-510-0085	2008	2.8756 $\mu g/m^3$	2.6566	41.66%
A	Formaldehyde	St. Louis, MO	29-510-0085	2009	2.4907 $\mu g/m^3$	4.0134	29.35%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Formaldehyde	St. Louis, MO	29-510-0085	2010	2.7805 μg/m^3	2.4409	32.72%
A	Formaldehyde	La Grande, OR	41-061-0119	2008	0 μg/m^3	0	0.00%
A	Formaldehyde	La Grande, OR	41-061-0119	2009	1.8098 μg/m^3	2.7271	30.55%
A	Formaldehyde	La Grande, OR	41-061-0119	2010	0 μg/m^3	0	0.00%
A	Formaldehyde	Portland, OR	41-051-0246	2008	1.9387 μg/m^3	2.4885	49.54%
A	Formaldehyde	Portland, OR	41-051-0246	2009	0 μg/m^3	0	0.00%
A	Formaldehyde	Portland, OR	41-051-0246	2010	1.6554 μg/m^3	3.1577	37.34%
A	Formaldehyde	Providence, RI	44-007-0022	2008	3.2321 μg/m^3	2.238	32.90%
A	Formaldehyde	Providence, RI	44-007-0022	2009	3.0151 μg/m^3	2.0534	37.14%
A	Formaldehyde	Providence, RI	44-007-0022	2010	2.672 μg/m^3	2.3054	52.21%
A	Formaldehyde	Chesterfield, SC	45-025-0001	2008	2.9402 μg/m^3	4.0373	42.33%
A	Formaldehyde	Chesterfield, SC	45-025-0001	2009	2.8126 μg/m^3	4.5166	36.50%
A	Formaldehyde	Chesterfield, SC	45-025-0001	2010	4.3231 μg/m^3	5.2168	42.78%
A	Formaldehyde	Houston, TX	48-201-1039	2008	2.3799 μg/m^3	4.0304	34.97%
A	Formaldehyde	Houston, TX	48-201-1039	2009	2.8098 μg/m^3	2.3218	44.72%
A	Formaldehyde	Houston, TX	48-201-1039	2010	2.7045 μg/m^3	2.0698	47.40%
A	Formaldehyde	Karnack, TX	48-203-0002	2008	1.8383 μg/m^3	6.091	42.83%
A	Formaldehyde	Karnack, TX	48-203-0002	2009	1.8659 μg/m^3	5.5509	38.66%
A	Formaldehyde	Karnack, TX	48-203-0002	2010	2.3345 μg/m^3	6.2918	39.04%
A	Formaldehyde	Bountiful, UT	49-011-0004	2008	2.1665 μg/m^3	4.3811	49.97%
A	Formaldehyde	Bountiful, UT	49-011-0004	2009	2.6218 μg/m^3	2.7617	39.76%
A	Formaldehyde	Bountiful, UT	49-011-0004	2010	3.2074 μg/m^3	4.156	34.47%
A	Formaldehyde	Underhill, VT	50-007-0007	2008	1.3065 μg/m^3	2.553	28.62%
A	Formaldehyde	Underhill, VT	50-007-0007	2009	1.1402 μg/m^3	2.152	38.75%
A	Formaldehyde	Underhill, VT	50-007-0007	2010	1.403 μg/m^3	3.5319	38.64%
A	Formaldehyde	Seattle, WA	53-033-0080	2008	0.7728 μg/m^3	3.3724	52.09%
A	Formaldehyde	Seattle, WA	53-033-0080	2009	1.0858 μg/m^3	11.2844	95.40%
A	Formaldehyde	Seattle, WA	53-033-0080	2010	0.6562 μg/m^3	2.703	48.77%
		Hexavalent Chromium					
A	Hexavalent Chromium	Phoenix, AZ	04-013-9997	2008	0.072 ng/m^3	3.5627	89.98%
A	Hexavalent Chromium	Phoenix, AZ	04-013-9997	2009	0.0903 ng/m^3	4.8095	95.19%
A	Hexavalent Chromium	Phoenix, AZ	04-013-9997	2010	0.1266 ng/m^3	3.9644	103.37%
A	Hexavalent Chromium	Grand Junction, CO	08-077-0017	2008	0.0169 ng/m^3	86.1955	154.49%
A	Hexavalent Chromium	Grand Junction, CO	08-077-0017	2009	0.0063 ng/m^3	0	42.97%
A	Hexavalent Chromium	Grand Junction, CO	08-077-0017	2010	0.0101 ng/m^3	7.4714	34.23%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Hexavalent Chromium	Washington, DC	11-001-0043	2008	0.0075 ng/m^3	0	93.49%
A	Hexavalent Chromium	Washington, DC	11-001-0043	2009	0.007 ng/m^3	0	43.30%
A	Hexavalent Chromium	Washington, DC	11-001-0043	2010	0.0183 ng/m^3	0	54.75%
A	Hexavalent Chromium	Tampa, FL	12-057-3002	2008	0.0057 ng/m^3	0	86.40%
A	Hexavalent Chromium	Tampa, FL	12-057-3002	2009	0.0045 ng/m^3	4.1224	23.93%
A	Hexavalent Chromium	Tampa, FL	12-057-3002	2010	0.0113 ng/m^3	0	53.12%
A	Hexavalent Chromium	Chicago, IL	17-031-4201	2008	0.0142 ng/m^3	7.4169	87.31%
A	Hexavalent Chromium	Chicago, IL	17-031-4201	2009	0.0092 ng/m^3	7.3857	61.22%
A	Hexavalent Chromium	Chicago, IL	17-031-4201	2010	0.0234 ng/m^3	0	48.46%
A	Hexavalent Chromium	Roxbury, MA	25-025-0042	2008	0.0443 ng/m^3	51.2761	183.23%
A	Hexavalent Chromium	Roxbury, MA	25-025-0042	2009	0.0348 ng/m^3	0	151.78%
A	Hexavalent Chromium	Roxbury, MA	25-025-0042	2010	0.0213 ng/m^3	0	66.24%
A	Hexavalent Chromium	Detroit, MI	26-163-0033	2008	0.0454 ng/m^3	10.524	99.14%
A	Hexavalent Chromium	Detroit, MI	26-163-0033	2009	0.037 ng/m^3	5.4211	139.32%
A	Hexavalent Chromium	Detroit, MI	26-163-0033	2010	0.0449 ng/m^3	3.9541	66.44%
A	Hexavalent Chromium	St. Louis, MO	29-510-0085	2008	0.0266 ng/m^3	17.4583	143.11%
A	Hexavalent Chromium	St. Louis, MO	29-510-0085	2009	0.0174 ng/m^3	0	53.04%
A	Hexavalent Chromium	St. Louis, MO	29-510-0085	2010	0.0334 ng/m^3	9.4199	55.70%
A	Hexavalent Chromium	Rochester, NY	36-055-1007	2008	0 ng/m^3	0	0.00%
A	Hexavalent Chromium	Rochester, NY	36-055-1007	2009	0.0047 ng/m^3	0	0.00%
A	Hexavalent Chromium	Rochester, NY	36-055-1007	2010	0.0116 ng/m^3	0	34.75%
A	Hexavalent Chromium	La Grande, OR	41-061-0119	2008	0 ng/m^3	0	0.00%
A	Hexavalent Chromium	La Grande, OR	41-061-0119	2009	0.0072 ng/m^3	0	0.00%
A	Hexavalent Chromium	La Grande, OR	41-061-0119	2010	0.0023 ng/m^3	0	0.00%
A	Hexavalent Chromium	Providence, RI	44-007-0022	2008	0.0152 ng/m^3	28.0022	130.98%
A	Hexavalent Chromium	Providence, RI	44-007-0022	2009	0.0076 ng/m^3	0	62.93%
A	Hexavalent Chromium	Providence, RI	44-007-0022	2010	0.0188 ng/m^3	0	53.86%
A	Hexavalent Chromium	Chesterfield, SC	45-025-0001	2008	0.0027 ng/m^3	0	136.66%
A	Hexavalent Chromium	Chesterfield, SC	45-025-0001	2009	0.0011 ng/m^3	0	0.00%
A	Hexavalent Chromium	Chesterfield, SC	45-025-0001	2010	0.0072 ng/m^3	0	31.30%
A	Hexavalent Chromium	Bountiful, UT	49-011-0004	2008	0.0336 ng/m^3	5.3003	88.98%
A	Hexavalent Chromium	Bountiful, UT	49-011-0004	2009	0.0173 ng/m^3	6.8672	30.58%
A	Hexavalent Chromium	Bountiful, UT	49-011-0004	2010	0.0227 ng/m^3	5.3431	55.94%
A	Hexavalent Chromium	Underhill, VT	50-007-0007	2008	0.0006 ng/m^3	0	0.00%
A	Hexavalent Chromium	Underhill, VT	50-007-0007	2009	0.0011 ng/m^3	0	0.00%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average		Seasonality Ratio	CV%
A	Hexavalent Chromium	Underhill, VT	50-007-0007	2010	0.0035	ng/m^3	0	36.77%
A	Hexavalent Chromium	Seattle, WA	53-033-0080	2008	0.0368	ng/m^3	6.3749	94.96%
A	Hexavalent Chromium	Seattle, WA	53-033-0080	2009	0.034	ng/m^3	8.931	75.19%
A	Hexavalent Chromium	Seattle, WA	53-033-0080	2010	0.029	ng/m^3	3.6285	48.34%
			PAHs - Benzo(a)pyrene					
A	Benzo(a)pyrene	Phoenix, AZ	04-013-9997	2008	0.0991	ng/m^3	0	87.40%
A	Benzo(a)pyrene	Phoenix, AZ	04-013-9997	2009	0.1802	ng/m^3	0	103.15%
A	Benzo(a)pyrene	Phoenix, AZ	04-013-9997	2010	0.0667	ng/m^3	0	59.56%
A	Benzo(a)pyrene	Los Angeles, CA	06-037-1103	2008	0.0637	ng/m^3	0	83.29%
A	Benzo(a)pyrene	Los Angeles, CA	06-037-1103	2009	0.0888	ng/m^3	111.6984	55.76%
A	Benzo(a)pyrene	Los Angeles, CA	06-037-1103	2010	0.0674	ng/m^3	0	115.63%
A	Benzo(a)pyrene	Rubidoux, CA	06-065-8001	2008	0.0446	ng/m^3	0	75.62%
A	Benzo(a)pyrene	Rubidoux, CA	06-065-8001	2009	0.0782	ng/m^3	76.763	64.13%
A	Benzo(a)pyrene	Rubidoux, CA	06-065-8001	2010	0.0369	ng/m^3	0	72.67%
A	Benzo(a)pyrene	Pinellas County, FL	12-103-0026	2008	0.0445	ng/m^3	6.4649	61.26%
A	Benzo(a)pyrene	Pinellas County, FL	12-103-0026	2009	0.1066	ng/m^3	16.8366	53.37%
A	Benzo(a)pyrene	Pinellas County, FL	12-103-0026	2010	0.0541	ng/m^3	0	54.43%
A	Benzo(a)pyrene	South DeKalb, GA	13-089-0002	2008	0.0423	ng/m^3	74.3328	47.13%
A	Benzo(a)pyrene	South DeKalb, GA	13-089-0002	2009	0.0611	ng/m^3	0	74.71%
A	Benzo(a)pyrene	South DeKalb, GA	13-089-0002	2010	0.0628	ng/m^3	0	65.35%
A	Benzo(a)pyrene	Chesterfield, SC	45-025-0001	2008	0.0088	ng/m^3	0	0.00%
A	Benzo(a)pyrene	Chesterfield, SC	45-025-0001	2009	0.0086	ng/m^3	0	53.84%
A	Benzo(a)pyrene	Chesterfield, SC	45-025-0001	2010	0.015	ng/m^3	0	21.91%
A	Benzo(a)pyrene	Houston, TX	48-201-1039	2008	0.0305	ng/m^3	8.9614	83.56%
A	Benzo(a)pyrene	Houston, TX	48-201-1039	2009	0.0468	ng/m^3	17.4104	99.30%
A	Benzo(a)pyrene	Houston, TX	48-201-1039	2010	0	ng/m^3	0	0.00%
A	Benzo(a)pyrene	Karnack, TX	48-203-0002	2008	0.019	ng/m^3	20.6249	72.22%
A	Benzo(a)pyrene	Karnack, TX	48-203-0002	2009	0.0547	ng/m^3	160.0461	106.00%
A	Benzo(a)pyrene	Karnack, TX	48-203-0002	2010	0	ng/m^3	0	0.00%
A	Benzo(a)pyrene	Seattle, WA	53-033-0080	2008	0.0254	ng/m^3	0	126.32%
A	Benzo(a)pyrene	Seattle, WA	53-033-0080	2009	0.0699	ng/m^3	0	77.93%
A	Benzo(a)pyrene	Seattle, WA	53-033-0080	2010	0.0264	ng/m^3	0	91.42%
			PAHs - Naphthalene					
A	Naphthalene	Phoenix, AZ	04-013-9997	2008	82.1002	ng/m^3	5.81	53.96%
A	Naphthalene	Phoenix, AZ	04-013-9997	2009	117.1857	ng/m^3	4.6761	59.37%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Naphthalene	Phoenix, AZ	04-013-9997	2010	86.4993 ng/m^3	3.9172	49.61%
A	Naphthalene	Los Angeles, CA	06-037-1103	2008	122.3373 ng/m^3	4.536	51.50%
A	Naphthalene	Los Angeles, CA	06-037-1103	2009	169.4338 ng/m^3	3.3738	55.32%
A	Naphthalene	Los Angeles, CA	06-037-1103	2010	145.6727 ng/m^3	2.9793	58.58%
A	Naphthalene	Rubidoux, CA	06-065-8001	2008	63.4218 ng/m^3	4.1079	74.27%
A	Naphthalene	Rubidoux, CA	06-065-8001	2009	85.3384 ng/m^3	3.6635	91.81%
A	Naphthalene	Rubidoux, CA	06-065-8001	2010	84.3747 ng/m^3	4.3278	104.52%
A	Naphthalene	Pinellas County, FL	12-103-0026	2008	83.4464 ng/m^3	2.8925	91.79%
A	Naphthalene	Pinellas County, FL	12-103-0026	2009	93.4446 ng/m^3	5.0667	72.28%
A	Naphthalene	Pinellas County, FL	12-103-0026	2010	91.5235 ng/m^3	3.0813	80.02%
A	Naphthalene	South DeKalb, GA	13-089-0002	2008	85.0215 ng/m^3	2.0927	79.75%
A	Naphthalene	South DeKalb, GA	13-089-0002	2009	105.2085 ng/m^3	4.2158	79.15%
A	Naphthalene	South DeKalb, GA	13-089-0002	2010	127.9211 ng/m^3	2.6351	92.68%
A	Naphthalene	Chesterfield, SC	45-025-0001	2008	16.106 ng/m^3	2.9542	52.47%
A	Naphthalene	Chesterfield, SC	45-025-0001	2009	21.9237 ng/m^3	5.5981	78.16%
A	Naphthalene	Chesterfield, SC	45-025-0001	2010	19.5772 ng/m^3	2.8627	51.17%
A	Naphthalene	Houston, TX	48-201-1039	2008	63.3049 ng/m^3	4.3162	61.91%
A	Naphthalene	Houston, TX	48-201-1039	2009	66.8759 ng/m^3	3.5281	68.67%
A	Naphthalene	Houston, TX	48-201-1039	2010	0 ng/m^3	0	0.00%
A	Naphthalene	Karnack, TX	48-203-0002	2008	42.1554 ng/m^3	4.2608	59.13%
A	Naphthalene	Karnack, TX	48-203-0002	2009	73.7746 ng/m^3	16.8487	82.55%
A	Naphthalene	Karnack, TX	48-203-0002	2010	0 ng/m^3	0	0.00%
A	Naphthalene	Seattle, WA	53-033-0080	2008	63.0502 ng/m^3	2.9079	90.82%
A	Naphthalene	Seattle, WA	53-033-0080	2009	81.6938 ng/m^3	3.6961	82.12%
A	Naphthalene	Seattle, WA	53-033-0080	2010	63.3938 ng/m^3	2.9782	107.91%
PM_{10} Metals - Arsenic (PM_{10})							
A	Arsenic (PM_{10})	Phoenix, AZ	04-013-9997	2008	0.6812 ng/m^3	3.2551	81.62%
A	Arsenic (PM_{10})	Phoenix, AZ	04-013-9997	2009	0.5667 ng/m^3	3.5412	76.43%
A	Arsenic (PM_{10})	Phoenix, AZ	04-013-9997	2010	0.4936 ng/m^3	4.3586	86.88%
A	Arsenic (PM_{10})	Rubidoux, CA	06-065-8001	2008	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Rubidoux, CA	06-065-8001	2009	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Rubidoux, CA	06-065-8001	2010	0.5555 ng/m^3	9.7273	78.05%
A	Arsenic (PM_{10})	San Jose, CA	06-085-0005	2008	0.4212 ng/m^3	4.4405	74.35%
A	Arsenic (PM_{10})	San Jose, CA	06-085-0005	2009	0.3262 ng/m^3	6.359	72.62%
A	Arsenic (PM_{10})	San Jose, CA	06-085-0005	2010	0.3806 ng/m^3	3.9798	82.42%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Arsenic (PM_{10})	Chicago, IL	17-031-4201	2008	0.7619 ng/m^3	3.3198	90.67%
A	Arsenic (PM_{10})	Chicago, IL	17-031-4201	2009	0.7435 ng/m^3	6.0693	74.46%
A	Arsenic (PM_{10})	Chicago, IL	17-031-4201	2010	0.7766 ng/m^3	4.1536	81.49%
A	Arsenic (PM_{10})	Roxbury, MA	25-025-0042	2008	0.6363 ng/m^3	6.1486	67.47%
A	Arsenic (PM_{10})	Roxbury, MA	25-025-0042	2009	0.4983 ng/m^3	2.64	60.00%
A	Arsenic (PM_{10})	Roxbury, MA	25-025-0042	2010	0.3693 ng/m^3	2.8608	56.67%
A	Arsenic (PM_{10})	Detroit, MI	26-163-0033	2008	1.7127 ng/m^3	3.386	55.80%
A	Arsenic (PM_{10})	Detroit, MI	26-163-0033	2009	1.3764 ng/m^3	2.2486	64.99%
A	Arsenic (PM_{10})	Detroit, MI	26-163-0033	2010	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	St. Louis, MO	29-510-0085	2008	0.981 ng/m^3	3.2076	69.65%
A	Arsenic (PM_{10})	St. Louis, MO	29-510-0085	2009	1.6031 ng/m^3	9.5207	119.08%
A	Arsenic (PM_{10})	St. Louis, MO	29-510-0085	2010	1.0367 ng/m^3	2.919	104.64%
A	Arsenic (PM_{10})	La Grande, OR	41-061-0119	2008	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	La Grande, OR	41-061-0119	2009	0.1453 ng/m^3	2.0813	59.13%
A	Arsenic (PM_{10})	La Grande, OR	41-061-0119	2010	0.1376 ng/m^3	4	57.30%
A	Arsenic (PM_{10})	Portland, OR	41-051-0246	2008	1.0524 ng/m^3	7.8231	93.96%
A	Arsenic (PM_{10})	Portland, OR	41-051-0246	2009	0.9261 ng/m^3	9.8333	85.08%
A	Arsenic (PM_{10})	Portland, OR	41-051-0246	2010	0.7824 ng/m^3	4.7731	73.30%
A	Arsenic (PM_{10})	Providence, RI	44-007-0022	2008	0.5401 ng/m^3	2.5525	63.29%
A	Arsenic (PM_{10})	Providence, RI	44-007-0022	2009	1.2455 ng/m^3	256.2445	127.25%
A	Arsenic (PM_{10})	Providence, RI	44-007-0022	2010	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Chesterfield, SC	45-025-0001	2008	0.7168 ng/m^3	1.769	51.26%
A	Arsenic (PM_{10})	Chesterfield, SC	45-025-0001	2009	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Chesterfield, SC	45-025-0001	2010	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Houston, TX	48-201-1039	2008	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Houston, TX	48-201-1039	2009	1.17 ng/m^3	2.4211	76.58%
A	Arsenic (PM_{10})	Houston, TX	48-201-1039	2010	1.1511 ng/m^3	1.7758	54.26%
A	Arsenic (PM_{10})	Karnack, TX	48-203-0002	2008	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Karnack, TX	48-203-0002	2009	0.7236 ng/m^3	2.0545	39.10%
A	Arsenic (PM_{10})	Karnack, TX	48-203-0002	2010	0.5864 ng/m^3	2.0934	48.02%
A	Arsenic (PM_{10})	Bountiful, UT	49-011-0004	2008	0.6011 ng/m^3	4.2875	87.06%
A	Arsenic (PM_{10})	Bountiful, UT	49-011-0004	2009	0 ng/m^3	0	0.00%
A	Arsenic (PM_{10})	Bountiful, UT	49-011-0004	2010	0.553 ng/m^3	8.7152	71.45%
A	Arsenic (PM_{10})	Underhill, VT	50-007-0007	2008	0.2447 ng/m^3	2.1591	61.38%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Arsenic (PM_{10})	Underhill, VT	50-007-0007	2009	0.2378 ng/m^3	3.3246	84.47%
A	Arsenic (PM_{10})	Underhill, VT	50-007-0007	2010	0.2102 ng/m^3	3.1042	135.44%
A	Arsenic (PM_{10})	Seattle, WA	53-033-0080	2008	0.7283 ng/m^3	4.286	84.71%
A	Arsenic (PM_{10})	Seattle, WA	53-033-0080	2009	0.7443 ng/m^3	3.3089	78.26%
A	Arsenic (PM_{10})	Seattle, WA	53-033-0080	2010	0.6091 ng/m^3	1.9179	63.34%
PM_{10} Metals - Beryllium (PM_{10})							
A	Beryllium (PM_{10})	Phoenix, AZ	04-013-9997	2008	0.0166 ng/m^3	6.7777	65.89%
A	Beryllium (PM_{10})	Phoenix, AZ	04-013-9997	2009	0.0075 ng/m^3	0	125.03%
A	Beryllium (PM_{10})	Phoenix, AZ	04-013-9997	2010	0.0057 ng/m^3	477.8474	131.26%
A	Beryllium (PM_{10})	San Jose, CA	06-085-0005	2008	0.0018 ng/m^3	4.2421	110.39%
A	Beryllium (PM_{10})	San Jose, CA	06-085-0005	2009	0.0031 ng/m^3	24.517	63.69%
A	Beryllium (PM_{10})	San Jose, CA	06-085-0005	2010	0.0024 ng/m^3	12.0876	75.30%
A	Beryllium (PM_{10})	Grand Junction, CO	08-077-0017	2008	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Grand Junction, CO	08-077-0017	2009	0.0207 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Grand Junction, CO	08-077-0017	2010	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Pinellas County, FL	12-103-0026	2008	0.0808 ng/m^3	1.0494	1.15%
A	Beryllium (PM_{10})	Pinellas County, FL	12-103-0026	2009	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Pinellas County, FL	12-103-0026	2010	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Tampa, FL	12-057-3002	2008	0.0808 ng/m^3	1.0511	1.04%
A	Beryllium (PM_{10})	Tampa, FL	12-057-3002	2009	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Tampa, FL	12-057-3002	2010	0.0997 ng/m^3	1.3304	0.88%
A	Beryllium (PM_{10})	South DeKalb, GA	13-089-0002	2008	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	South DeKalb, GA	13-089-0002	2009	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	South DeKalb, GA	13-089-0002	2010	0.0025 ng/m^3	0	58.86%
A	Beryllium (PM_{10})	Chicago, IL	17-031-4201	2008	0.0046 ng/m^3	10.3416	89.09%
A	Beryllium (PM_{10})	Chicago, IL	17-031-4201	2009	0.0041 ng/m^3	13.2213	80.68%
A	Beryllium (PM_{10})	Chicago, IL	17-031-4201	2010	0.0045 ng/m^3	42.3392	95.70%
A	Beryllium (PM_{10})	Roxbury, MA	25-025-0042	2008	0.0027 ng/m^3	12.8442	95.32%
A	Beryllium (PM_{10})	Roxbury, MA	25-025-0042	2009	0.0021 ng/m^3	35.7715	139.67%
A	Beryllium (PM_{10})	Roxbury, MA	25-025-0042	2010	0.0026 ng/m^3	0	110.60%
A	Beryllium (PM_{10})	Detroit, MI	26-163-0033	2008	0.0318 ng/m^3	3.0846	81.63%
A	Beryllium (PM_{10})	Detroit, MI	26-163-0033	2009	0.0224 ng/m^3	5.7562	129.03%
A	Beryllium (PM_{10})	Detroit, MI	26-163-0033	2010	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	St. Louis, MO	29-510-0085	2008	0.006 ng/m^3	5.8277	129.31%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Beryllium (PM_{10})	St. Louis, MO	29-510-0085	2009	0.0048 ng/m^3	8.4943	81.64%
A	Beryllium (PM_{10})	St. Louis, MO	29-510-0085	2010	0.0071 ng/m^3	4.952	85.66%
A	Beryllium (PM_{10})	La Grande, OR	41-061-0119	2008	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	La Grande, OR	41-061-0119	2009	0.0048 ng/m^3	12.0155	81.84%
A	Beryllium (PM_{10})	La Grande, OR	41-061-0119	2010	0.0041 ng/m^3	8.0264	69.58%
A	Beryllium (PM_{10})	Portland, OR	41-051-0246	2008	0.0029 ng/m^3	5.5053	97.32%
A	Beryllium (PM_{10})	Portland, OR	41-051-0246	2009	0.0027 ng/m^3	8.1436	86.04%
A	Beryllium (PM_{10})	Portland, OR	41-051-0246	2010	0.0022 ng/m^3	4.2309	62.22%
A	Beryllium (PM_{10})	Providence, RI	44-007-0022	2008	0.004 ng/m^3	5.7558	146.91%
A	Beryllium (PM_{10})	Providence, RI	44-007-0022	2009	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Providence, RI	44-007-0022	2010	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Chesterfield, SC	45-025-0001	2008	0.0093 ng/m^3	0	6.02%
A	Beryllium (PM_{10})	Chesterfield, SC	45-025-0001	2009	0.0157 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Chesterfield, SC	45-025-0001	2010	0 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Houston, TX	48-201-1039	2008	0.4534 ng/m^3	0	1.27%
A	Beryllium (PM_{10})	Houston, TX	48-201-1039	2009	0.5078 ng/m^3	1.0729	1.37%
A	Beryllium (PM_{10})	Houston, TX	48-201-1039	2010	0.0711 ng/m^3	1.0854	18.49%
A	Beryllium (PM_{10})	Bountiful, UT	49-011-0004	2008	0.0076 ng/m^3	0	47.75%
A	Beryllium (PM_{10})	Bountiful, UT	49-011-0004	2009	0.0003 ng/m^3	0	0.00%
A	Beryllium (PM_{10})	Bountiful, UT	49-011-0004	2010	0.002 ng/m^3	0	17.75%
A	Beryllium (PM_{10})	Underhill, VT	50-007-0007	2008	0.0008 ng/m^3	0	143.85%
A	Beryllium (PM_{10})	Underhill, VT	50-007-0007	2009	0.0007 ng/m^3	0	56.77%
A	Beryllium (PM_{10})	Underhill, VT	50-007-0007	2010	0.0009 ng/m^3	0	131.40%
A	Beryllium (PM_{10})	Seattle, WA	53-033-0080	2008	0.0024 ng/m^3	103.7038	183.46%
A	Beryllium (PM_{10})	Seattle, WA	53-033-0080	2009	0.0025 ng/m^3	12.3002	227.64%
A	Beryllium (PM_{10})	Seattle, WA	53-033-0080	2010	0.0017 ng/m^3	0	108.08%
PM_{10} Metals - Cadmium (PM_{10})							
A	Cadmium (PM_{10})	Phoenix, AZ	04-013-9997	2008	0.1366 ng/m^3	3.4904	66.66%
A	Cadmium (PM_{10})	Phoenix, AZ	04-013-9997	2009	0.1272 ng/m^3	4.7492	71.17%
A	Cadmium (PM_{10})	Phoenix, AZ	04-013-9997	2010	0.101 ng/m^3	5.1624	61.40%
A	Cadmium (PM_{10})	San Jose, CA	06-085-0005	2008	0.0844 ng/m^3	6.7136	73.34%
A	Cadmium (PM_{10})	San Jose, CA	06-085-0005	2009	0.075 ng/m^3	6.9808	71.90%
A	Cadmium (PM_{10})	San Jose, CA	06-085-0005	2010	0.0606 ng/m^3	5.2739	88.40%
A	Cadmium (PM_{10})	Grand Junction, CO	08-077-0017	2008	0.0304 ng/m^3	0	15.69%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Cadmium (PM_{10})	Grand Junction, CO	08-077-0017	2009	0.0138 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Grand Junction, CO	08-077-0017	2010	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Washington, DC	11-001-0043	2008	0.3966 ng/m^3	56.1242	64.82%
A	Cadmium (PM_{10})	Washington, DC	11-001-0043	2009	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Washington, DC	11-001-0043	2010	0.1111 ng/m^3	1.7992	54.71%
A	Cadmium (PM_{10})	Pinellas County, FL	12-103-0026	2008	0.1159 ng/m^3	2.5782	51.04%
A	Cadmium (PM_{10})	Pinellas County, FL	12-103-0026	2009	0.1146 ng/m^3	2.7562	45.23%
A	Cadmium (PM_{10})	Pinellas County, FL	12-103-0026	2010	0.1088 ng/m^3	2.3022	44.05%
A	Cadmium (PM_{10})	Tampa, FL	12-057-3002	2008	0.1461 ng/m^3	3.3858	70.72%
A	Cadmium (PM_{10})	Tampa, FL	12-057-3002	2009	0.1634 ng/m^3	3.5782	64.12%
A	Cadmium (PM_{10})	Tampa, FL	12-057-3002	2010	0.1586 ng/m^3	2.9973	61.31%
A	Cadmium (PM_{10})	Chicago, IL	17-031-4201	2008	0.1885 ng/m^3	2.7923	76.60%
A	Cadmium (PM_{10})	Chicago, IL	17-031-4201	2009	0.1508 ng/m^3	4.7791	59.36%
A	Cadmium (PM_{10})	Chicago, IL	17-031-4201	2010	0.1405 ng/m^3	3.0093	82.41%
A	Cadmium (PM_{10})	Roxbury, MA	25-025-0042	2008	0.2336 ng/m^3	1.6582	32.70%
A	Cadmium (PM_{10})	Roxbury, MA	25-025-0042	2009	0.2755 ng/m^3	2.8533	44.32%
A	Cadmium (PM_{10})	Roxbury, MA	25-025-0042	2010	0.1984 ng/m^3	2.555	35.49%
A	Cadmium (PM_{10})	Detroit, MI	26-163-0033	2008	0.4437 ng/m^3	3.8673	65.21%
A	Cadmium (PM_{10})	Detroit, MI	26-163-0033	2009	0.3276 ng/m^3	6.7621	101.35%
A	Cadmium (PM_{10})	Detroit, MI	26-163-0033	2010	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	St. Louis, MO	29-510-0085	2008	0.7663 ng/m^3	9.5643	108.73%
A	Cadmium (PM_{10})	St. Louis, MO	29-510-0085	2009	1.0203 ng/m^3	6.9862	125.67%
A	Cadmium (PM_{10})	St. Louis, MO	29-510-0085	2010	0.6363 ng/m^3	2.3221	86.40%
A	Cadmium (PM_{10})	Rochester, NY	36-055-1007	2008	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Rochester, NY	36-055-1007	2009	0.0812 ng/m^3	2.2396	51.18%
A	Cadmium (PM_{10})	Rochester, NY	36-055-1007	2010	0.089 ng/m^3	2.4999	69.34%
A	Cadmium (PM_{10})	La Grande, OR	41-061-0119	2008	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	La Grande, OR	41-061-0119	2009	0.0602 ng/m^3	14.6348	86.82%
A	Cadmium (PM_{10})	La Grande, OR	41-061-0119	2010	0.0321 ng/m^3	5.5005	89.13%
A	Cadmium (PM_{10})	Portland, OR	41-051-0246	2008	1.2409 ng/m^3	54.7136	297.62%
A	Cadmium (PM_{10})	Portland, OR	41-051-0246	2009	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Portland, OR	41-051-0246	2010	0.7662 ng/m^3	26.0267	181.45%
A	Cadmium (PM_{10})	Providence, RI	44-007-0022	2008	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Providence, RI	44-007-0022	2009	0 ng/m^3	0	0.00%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Cadmium (PM_{10})	Providence, RI	44-007-0022	2010	0.023 ng/m^3	0	169.32%
A	Cadmium (PM_{10})	Houston, TX	48-201-1039	2008	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Houston, TX	48-201-1039	2009	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Houston, TX	48-201-1039	2010	0 ng/m^3	0	0.00%
A	Cadmium (PM_{10})	Bountiful, UT	49-011-0004	2008	0.1802 ng/m^3	11.1044	134.89%
A	Cadmium (PM_{10})	Bountiful, UT	49-011-0004	2009	0.1009 ng/m^3	0	128.77%
A	Cadmium (PM_{10})	Bountiful, UT	49-011-0004	2010	0.0917 ng/m^3	6.8349	75.98%
A	Cadmium (PM_{10})	Underhill, VT	50-007-0007	2008	0.0654 ng/m^3	2.6133	60.08%
A	Cadmium (PM_{10})	Underhill, VT	50-007-0007	2009	0.0611 ng/m^3	2.2928	47.00%
A	Cadmium (PM_{10})	Underhill, VT	50-007-0007	2010	0.0564 ng/m^3	2	66.44%
A	Cadmium (PM_{10})	Seattle, WA	53-033-0080	2008	0.1299 ng/m^3	3.8831	83.26%
A	Cadmium (PM_{10})	Seattle, WA	53-033-0080	2009	0.1074 ng/m^3	4.2173	73.88%
A	Cadmium (PM_{10})	Seattle, WA	53-033-0080	2010	0.091 ng/m^3	3.3581	74.70%
PM_{10} Metals - Lead (PM_{10})							
A	Lead (PM_{10})	Phoenix, AZ	04-013-9997	2008	4.72 ng/m^3	4.0585	54.97%
A	Lead (PM_{10})	Phoenix, AZ	04-013-9997	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Phoenix, AZ	04-013-9997	2010	3.115 ng/m^3	3.9986	56.51%
A	Lead (PM_{10})	Rubidoux, CA	06-065-8001	2008	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Rubidoux, CA	06-065-8001	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Rubidoux, CA	06-065-8001	2010	6.7742 ng/m^3	10.7857	95.71%
A	Lead (PM_{10})	San Jose, CA	06-085-0005	2008	3.3085 ng/m^3	6.4231	63.85%
A	Lead (PM_{10})	San Jose, CA	06-085-0005	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	San Jose, CA	06-085-0005	2010	2.2218 ng/m^3	3.2584	78.91%
A	Lead (PM_{10})	Grand Junction, CO	08-077-0017	2008	2.1106 ng/m^3	0	63.86%
A	Lead (PM_{10})	Grand Junction, CO	08-077-0017	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Grand Junction, CO	08-077-0017	2010	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Washington, DC	11-001-0043	2008	3.7496 ng/m^3	2.1467	49.39%
A	Lead (PM_{10})	Washington, DC	11-001-0043	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Washington, DC	11-001-0043	2010	3.7362 ng/m^3	2.1947	54.58%
A	Lead (PM_{10})	Pinellas County, FL	12-103-0026	2008	1.6335 ng/m^3	2.8825	21.18%
A	Lead (PM_{10})	Pinellas County, FL	12-103-0026	2009	1.3524 ng/m^3	2.3472	23.78%
A	Lead (PM_{10})	Pinellas County, FL	12-103-0026	2010	2.0996 ng/m^3	2.448	24.13%
A	Lead (PM_{10})	Tampa, FL	12-057-3002	2008	1.4207 ng/m^3	1.8262	20.18%
A	Lead (PM_{10})	Tampa, FL	12-057-3002	2009	0 ng/m^3	0	0.00%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Lead (PM_{10})	Tampa, FL	12-057-3002	2010	1.3383 ng/m^3	2.6455	27.77%
A	Lead (PM_{10})	Chicago, IL	17-031-4201	2008	4.4227 ng/m^3	1.976	92.61%
A	Lead (PM_{10})	Chicago, IL	17-031-4201	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Chicago, IL	17-031-4201	2010	3.2223 ng/m^3	2.8799	83.26%
A	Lead (PM_{10})	Roxbury, MA	25-025-0042	2008	4.5968 ng/m^3	3.6987	55.17%
A	Lead (PM_{10})	Roxbury, MA	25-025-0042	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Roxbury, MA	25-025-0042	2010	2.6286 ng/m^3	2.2267	52.23%
A	Lead (PM_{10})	St. Louis, MO	29-510-0085	2008	14.7037 ng/m^3	5.0067	105.27%
A	Lead (PM_{10})	St. Louis, MO	29-510-0085	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	St. Louis, MO	29-510-0085	2010	11.754 ng/m^3	4.0948	93.01%
A	Lead (PM_{10})	Rochester, NY	36-055-1007	2008	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Rochester, NY	36-055-1007	2009	2.3731 ng/m^3	2.3307	59.51%
A	Lead (PM_{10})	Rochester, NY	36-055-1007	2010	2.6417 ng/m^3	3.0468	68.93%
A	Lead (PM_{10})	La Grande, OR	41-061-0119	2008	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	La Grande, OR	41-061-0119	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	La Grande, OR	41-061-0119	2010	0.9318 ng/m^3	5.037	53.83%
A	Lead (PM_{10})	Portland, OR	41-051-0246	2008	4.978 ng/m^3	2.281	80.70%
A	Lead (PM_{10})	Portland, OR	41-051-0246	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Portland, OR	41-051-0246	2010	4.3481 ng/m^3	5.4168	80.13%
A	Lead (PM_{10})	Providence, RI	44-007-0022	2008	3.7806 ng/m^3	2.4471	53.12%
A	Lead (PM_{10})	Providence, RI	44-007-0022	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Providence, RI	44-007-0022	2010	2.8306 ng/m^3	2.3972	64.39%
A	Lead (PM_{10})	Houston, TX	48-201-1039	2008	2.1474 ng/m^3	3.9975	61.69%
A	Lead (PM_{10})	Houston, TX	48-201-1039	2009	1.9922 ng/m^3	3.1504	67.43%
A	Lead (PM_{10})	Houston, TX	48-201-1039	2010	2.0532 ng/m^3	3.2121	50.21%
A	Lead (PM_{10})	Bountiful, UT	49-011-0004	2008	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Bountiful, UT	49-011-0004	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Bountiful, UT	49-011-0004	2010	2.4282 ng/m^3	4.2633	74.14%
A	Lead (PM_{10})	Underhill, VT	50-007-0007	2008	1.3057 ng/m^3	5.6093	78.70%
A	Lead (PM_{10})	Underhill, VT	50-007-0007	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Underhill, VT	50-007-0007	2010	1.4462 ng/m^3	2.2977	107.27%
A	Lead (PM_{10})	Seattle, WA	53-033-0080	2008	4.2573 ng/m^3	5.5098	86.44%
A	Lead (PM_{10})	Seattle, WA	53-033-0080	2009	0 ng/m^3	0	0.00%
A	Lead (PM_{10})	Seattle, WA	53-033-0080	2010	2.7359 ng/m^3	2.1041	51.95%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average		Seasonality Ratio	CV%
PM_{10} Metals - Manganese (PM_{10})								
A	Manganese (PM_{10})	Phoenix, AZ	04-013-9997	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Phoenix, AZ	04-013-9997	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Phoenix, AZ	04-013-9997	2010	10.8715	ng/m^3	2.3088	49.85%
A	Manganese (PM_{10})	San Jose, CA	06-085-0005	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	San Jose, CA	06-085-0005	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	San Jose, CA	06-085-0005	2010	3.9205	ng/m^3	2.313	67.84%
A	Manganese (PM_{10})	Grand Junction, CO	08-077-0017	2008	13.1526	ng/m^3	4.7995	71.34%
A	Manganese (PM_{10})	Grand Junction, CO	08-077-0017	2009	7.7566	ng/m^3	4.3044	70.55%
A	Manganese (PM_{10})	Grand Junction, CO	08-077-0017	2010	7.7779	ng/m^3	3.0204	69.49%
A	Manganese (PM_{10})	Washington, DC	11-001-0043	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Washington, DC	11-001-0043	2009	4.4998	ng/m^3	3.1414	58.76%
A	Manganese (PM_{10})	Washington, DC	11-001-0043	2010	5.8046	ng/m^3	4.1266	73.42%
A	Manganese (PM_{10})	Pinellas County, FL	12-103-0026	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Pinellas County, FL	12-103-0026	2009	2.8539	ng/m^3	8.2636	45.98%
A	Manganese (PM_{10})	Pinellas County, FL	12-103-0026	2010	3.0607	ng/m^3	4.5334	86.50%
A	Manganese (PM_{10})	Tampa, FL	12-057-3002	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Tampa, FL	12-057-3002	2009	2.1063	ng/m^3	5.1508	39.47%
A	Manganese (PM_{10})	Tampa, FL	12-057-3002	2010	3.0506	ng/m^3	4.0979	69.68%
A	Manganese (PM_{10})	Chicago, IL	17-031-4201	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Chicago, IL	17-031-4201	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Chicago, IL	17-031-4201	2010	7.1189	ng/m^3	4.3641	86.80%
A	Manganese (PM_{10})	Roxbury, MA	25-025-0042	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Roxbury, MA	25-025-0042	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Roxbury, MA	25-025-0042	2010	3.2798	ng/m^3	2.3316	48.66%
A	Manganese (PM_{10})	St. Louis, MO	29-510-0085	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	St. Louis, MO	29-510-0085	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	St. Louis, MO	29-510-0085	2010	17.2889	ng/m^3	8.7956	125.29%
A	Manganese (PM_{10})	Rochester, NY	36-055-1007	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Rochester, NY	36-055-1007	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	Rochester, NY	36-055-1007	2010	3.6935	ng/m^3	3.1086	63.85%
A	Manganese (PM_{10})	La Grande, OR	41-061-0119	2008	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	La Grande, OR	41-061-0119	2009	0	ng/m^3	0	0.00%
A	Manganese (PM_{10})	La Grande, OR	41-061-0119	2010	3.9242	ng/m^3	13.557	61.86%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Manganese (PM_{10})	Portland, OR	41-051-0246	2008	14.2665 ng/m^3	12.2505	154.38%
A	Manganese (PM_{10})	Portland, OR	41-051-0246	2009	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Portland, OR	41-051-0246	2010	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Providence, RI	44-007-0022	2008	3.3849 ng/m^3	2.6298	63.25%
A	Manganese (PM_{10})	Providence, RI	44-007-0022	2009	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Providence, RI	44-007-0022	2010	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Chesterfield, SC	45-025-0001	2008	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Chesterfield, SC	45-025-0001	2009	2.3481 ng/m^3	3.0414	56.75%
A	Manganese (PM_{10})	Chesterfield, SC	45-025-0001	2010	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Houston, TX	48-201-1039	2008	5.0343 ng/m^3	5.3072	53.84%
A	Manganese (PM_{10})	Houston, TX	48-201-1039	2009	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Houston, TX	48-201-1039	2010	5.614 ng/m^3	7.9042	71.63%
A	Manganese (PM_{10})	Bountiful, UT	49-011-0004	2008	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Bountiful, UT	49-011-0004	2009	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Bountiful, UT	49-011-0004	2010	4.9841 ng/m^3	3.0525	73.54%
A	Manganese (PM_{10})	Underhill, VT	50-007-0007	2008	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Underhill, VT	50-007-0007	2009	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Underhill, VT	50-007-0007	2010	1.9375 ng/m^3	4.8122	80.86%
A	Manganese (PM_{10})	Seattle, WA	53-033-0080	2008	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Seattle, WA	53-033-0080	2009	0 ng/m^3	0	0.00%
A	Manganese (PM_{10})	Seattle, WA	53-033-0080	2010	5.9542 ng/m^3	6.2752	100.58%
PM_{10} Metals - Nickel (PM_{10})							
A	Nickel (PM_{10})	Phoenix, AZ	04-013-9997	2008	1.4996 ng/m^3	6.1887	82.61%
A	Nickel (PM_{10})	Phoenix, AZ	04-013-9997	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Phoenix, AZ	04-013-9997	2010	1.122 ng/m^3	2.1769	55.45%
A	Nickel (PM_{10})	San Jose, CA	06-085-0005	2008	1.2023 ng/m^3	2.058	44.20%
A	Nickel (PM_{10})	San Jose, CA	06-085-0005	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	San Jose, CA	06-085-0005	2010	0.8689 ng/m^3	1.7111	40.21%
A	Nickel (PM_{10})	Pinellas County, FL	12-103-0026	2008	2.5165 ng/m^3	2.7226	37.27%
A	Nickel (PM_{10})	Pinellas County, FL	12-103-0026	2009	2.7396 ng/m^3	1.712	17.86%
A	Nickel (PM_{10})	Pinellas County, FL	12-103-0026	2010	2.8035 ng/m^3	2.5993	27.24%
A	Nickel (PM_{10})	Tampa, FL	12-057-3002	2008	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Tampa, FL	12-057-3002	2009	3.4418 ng/m^3	2.7306	26.58%
A	Nickel (PM_{10})	Tampa, FL	12-057-3002	2010	0 ng/m^3	0	0.00%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Nickel (PM_{10})	Chicago, IL	17-031-4201	2008	1.0354 ng/m^3	1.7528	45.23%
A	Nickel (PM_{10})	Chicago, IL	17-031-4201	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Chicago, IL	17-031-4201	2010	1.1152 ng/m^3	5.1124	37.77%
A	Nickel (PM_{10})	Roxbury, MA	25-025-0042	2008	1.8654 ng/m^3	2.2219	44.04%
A	Nickel (PM_{10})	Roxbury, MA	25-025-0042	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Roxbury, MA	25-025-0042	2010	1.2943 ng/m^3	2.5337	44.99%
A	Nickel (PM_{10})	St. Louis, MO	29-510-0085	2008	1.1951 ng/m^3	1.807	48.07%
A	Nickel (PM_{10})	St. Louis, MO	29-510-0085	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	St. Louis, MO	29-510-0085	2010	1.065 ng/m^3	2.5309	39.64%
A	Nickel (PM_{10})	Rochester, NY	36-055-1007	2008	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Rochester, NY	36-055-1007	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Rochester, NY	36-055-1007	2010	0.7585 ng/m^3	1.9711	48.24%
A	Nickel (PM_{10})	La Grande, OR	41-061-0119	2008	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	La Grande, OR	41-061-0119	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	La Grande, OR	41-061-0119	2010	0.1358 ng/m^3	9.9994	52.60%
A	Nickel (PM_{10})	Portland, OR	41-051-0246	2008	1.7044 ng/m^3	4.9003	112.74%
A	Nickel (PM_{10})	Portland, OR	41-051-0246	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Portland, OR	41-051-0246	2010	1.3722 ng/m^3	2.3728	82.15%
A	Nickel (PM_{10})	Providence, RI	44-007-0022	2008	1.52 ng/m^3	3.0862	64.68%
A	Nickel (PM_{10})	Providence, RI	44-007-0022	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Providence, RI	44-007-0022	2010	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Houston, TX	48-201-1039	2008	2.3304 ng/m^3	1.5516	23.85%
A	Nickel (PM_{10})	Houston, TX	48-201-1039	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Houston, TX	48-201-1039	2010	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Underhill, VT	50-007-0007	2008	0.0719 ng/m^3	0	109.22%
A	Nickel (PM_{10})	Underhill, VT	50-007-0007	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Underhill, VT	50-007-0007	2010	0.2616 ng/m^3	2.8611	53.79%
A	Nickel (PM_{10})	Seattle, WA	53-033-0080	2008	2.2699 ng/m^3	5.1	99.98%
A	Nickel (PM_{10})	Seattle, WA	53-033-0080	2009	0 ng/m^3	0	0.00%
A	Nickel (PM_{10})	Seattle, WA	53-033-0080	2010	1.9691 ng/m^3	4.4269	101.70%
VOCs - Benzene							
A	Benzene	Phoenix, AZ	04-013-9997	2008	1.592 μg/m^3	4.7153	46.95%
A	Benzene	Phoenix, AZ	04-013-9997	2009	1.7839 μg/m^3	5.825	52.75%
A	Benzene	Phoenix, AZ	04-013-9997	2010	1.3791 μg/m^3	4.2356	39.86%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Benzene	San Jose, CA	06-085-0005	2008	0.9988 µg/m^3	4.8438	50.12%
A	Benzene	San Jose, CA	06-085-0005	2009	0.8318 µg/m^3	7.9167	52.61%
A	Benzene	San Jose, CA	06-085-0005	2010	0.8857 µg/m^3	7.2439	53.28%
A	Benzene	Grand Junction, CO	08-077-0018	2008	1.5984 µg/m^3	2.5126	46.84%
A	Benzene	Grand Junction, CO	08-077-0018	2009	1.9229 µg/m^3	3.5674	43.14%
A	Benzene	Grand Junction, CO	08-077-0018	2010	1.3805 µg/m^3	2.2219	45.12%
A	Benzene	Washington, DC	11-001-0043	2008	0.7651 µg/m^3	2.6154	34.02%
A	Benzene	Washington, DC	11-001-0043	2009	0.7992 µg/m^3	3.4306	38.46%
A	Benzene	Washington, DC	11-001-0043	2010	0.7046 µg/m^3	3.6429	33.37%
A	Benzene	Pinellas County, FL	12-103-0026	2008	0.849 µg/m^3	2.1365	67.31%
A	Benzene	Pinellas County, FL	12-103-0026	2009	0.7469 µg/m^3	3.1367	53.88%
A	Benzene	Pinellas County, FL	12-103-0026	2010	0.741 µg/m^3	4.0774	56.73%
A	Benzene	Tampa, FL	12-057-3002	2008	0.4268 µg/m^3	2.2868	42.47%
A	Benzene	Tampa, FL	12-057-3002	2009	0.4015 µg/m^3	2.3708	36.03%
A	Benzene	Tampa, FL	12-057-3002	2010	0.4068 µg/m^3	3.4896	36.83%
A	Benzene	Chicago, IL	17-031-4201	2008	0.5461 µg/m^3	2.3933	61.69%
A	Benzene	Chicago, IL	17-031-4201	2009	0.5578 µg/m^3	3.7718	51.08%
A	Benzene	Chicago, IL	17-031-4201	2010	0.7265 µg/m^3	2.8559	38.80%
A	Benzene	Roxbury, MA	25-025-0042	2008	0.9258 µg/m^3	1.9869	37.60%
A	Benzene	Roxbury, MA	25-025-0042	2009	0.8036 µg/m^3	2.4826	40.75%
A	Benzene	Roxbury, MA	25-025-0042	2010	0.5559 µg/m^3	2.3179	32.60%
A	Benzene	Detroit, MI	26-163-0033	2008	0.959 µg/m^3	1.8293	45.54%
A	Benzene	Detroit, MI	26-163-0033	2009	0.8126 µg/m^3	2.1792	47.97%
A	Benzene	Detroit, MI	26-163-0033	2010	0.9361 µg/m^3	1.8044	46.20%
A	Benzene	St. Louis, MO	29-510-0085	2008	0.9927 µg/m^3	2.6262	48.27%
A	Benzene	St. Louis, MO	29-510-0085	2009	0.8339 µg/m^3	3.1432	41.16%
A	Benzene	St. Louis, MO	29-510-0085	2010	1.0301 µg/m^3	2.6959	41.88%
A	Benzene	Rochester, NY	36-055-1007	2008	0.7093 µg/m^3	2.2141	31.31%
A	Benzene	Rochester, NY	36-055-1007	2009	0.6502 µg/m^3	2.4593	34.37%
A	Benzene	Rochester, NY	36-055-1007	2010	0.5075 µg/m^3	2.3023	36.22%
A	Benzene	La Grande, OR	41-061-0119	2008	0 µg/m^3	0	0.00%
A	Benzene	La Grande, OR	41-061-0119	2009	0 µg/m^3	0	0.00%
A	Benzene	La Grande, OR	41-061-0119	2010	0.3768 µg/m^3	0	65.35%
A	Benzene	Providence, RI	44-007-0022	2008	0.8406 µg/m^3	3.61	37.24%
A	Benzene	Providence, RI	44-007-0022	2009	0.8921 µg/m^3	3.3798	47.31%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Benzene	Providence, RI	44-007-0022	2010	0.6211 µg/m^3	3.071	40.49%
A	Benzene	Bountiful, UT	49-011-0004	2008	1.3991 µg/m^3	2.9418	48.82%
A	Benzene	Bountiful, UT	49-011-0004	2009	1.6724 µg/m^3	4.8185	60.97%
A	Benzene	Bountiful, UT	49-011-0004	2010	1.2078 µg/m^3	3.0685	35.07%
A	Benzene	Underhill, VT	50-007-0007	2008	0.2728 µg/m^3	11.5861	31.28%
A	Benzene	Underhill, VT	50-007-0007	2009	0.3269 µg/m^3	3.0449	27.89%
A	Benzene	Underhill, VT	50-007-0007	2010	0.4116 µg/m^3	2.2607	27.13%
A	Benzene	Seattle, WA	53-033-0080	2008	0.7669 µg/m^3	2.3013	39.49%
A	Benzene	Seattle, WA	53-033-0080	2009	0.8057 µg/m^3	3.6089	53.16%
A	Benzene	Seattle, WA	53-033-0080	2010	0.6895 µg/m^3	2.1152	32.13%
VOCs - Butadiene, 1,3-							
A	Butadiene, 1,3-	Phoenix, AZ	04-013-9997	2008	0.2242 µg/m^3	8.6667	62.60%
A	Butadiene, 1,3-	Phoenix, AZ	04-013-9997	2009	0.2304 µg/m^3	12.6964	71.70%
A	Butadiene, 1,3-	Phoenix, AZ	04-013-9997	2010	0.2067 µg/m^3	12.7592	65.86%
A	Butadiene, 1,3-	Grand Junction, CO	08-077-0018	2008	0.1453 µg/m^3	3.5118	59.26%
A	Butadiene, 1,3-	Grand Junction, CO	08-077-0018	2009	0.1611 µg/m^3	4.6264	70.77%
A	Butadiene, 1,3-	Grand Junction, CO	08-077-0018	2010	0.1318 µg/m^3	6.0087	46.47%
A	Butadiene, 1,3-	Pinellas County, FL	12-103-0026	2008	0.0905 µg/m^3	2.8872	71.71%
A	Butadiene, 1,3-	Pinellas County, FL	12-103-0026	2009	0.0983 µg/m^3	6.3548	59.24%
A	Butadiene, 1,3-	Pinellas County, FL	12-103-0026	2010	0 µg/m^3	0	0.00%
A	Butadiene, 1,3-	Tampa, FL	12-057-3002	2008	0.0506 µg/m^3	3.0429	69.81%
A	Butadiene, 1,3-	Tampa, FL	12-057-3002	2009	0.0528 µg/m^3	4.8465	48.84%
A	Butadiene, 1,3-	Tampa, FL	12-057-3002	2010	0 µg/m^3	0	0.00%
A	Butadiene, 1,3-	South DeKalb, GA	13-089-0002	2008	0 µg/m^3	0	0.00%
A	Butadiene, 1,3-	South DeKalb, GA	13-089-0002	2009	0 µg/m^3	0	0.00%
A	Butadiene, 1,3-	South DeKalb, GA	13-089-0002	2010	0 µg/m^3	0	0.00%
A	Butadiene, 1,3-	Chicago, IL	17-031-4201	2008	0.0433 µg/m^3	4.8	105.15%
A	Butadiene, 1,3-	Chicago, IL	17-031-4201	2009	0.0332 µg/m^3	5.3448	89.11%
A	Butadiene, 1,3-	Chicago, IL	17-031-4201	2010	0.0664 µg/m^3	43.1944	67.34%
A	Butadiene, 1,3-	Detroit, MI	26-163-0033	2008	0.0885 µg/m^3	3.3437	63.24%
A	Butadiene, 1,3-	Detroit, MI	26-163-0033	2009	0.066 µg/m^3	2.7198	63.93%
A	Butadiene, 1,3-	Detroit, MI	26-163-0033	2010	0.0885 µg/m^3	2.8077	58.78%
A	Butadiene, 1,3-	St. Louis, MO	29-510-0085	2008	0.0897 µg/m^3	6.5945	61.57%
A	Butadiene, 1,3-	St. Louis, MO	29-510-0085	2009	0.0633 µg/m^3	7.3143	47.84%
A	Butadiene, 1,3-	St. Louis, MO	29-510-0085	2010	0.1239 µg/m^3	7.2807	65.23%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Butadiene, 1,3-	Rochester, NY	36-055-1007	2008	0 µg/m^3	0	0.00%
A	Butadiene, 1,3-	Rochester, NY	36-055-1007	2009	0.0531 µg/m^3	2.4194	50.23%
A	Butadiene, 1,3-	Rochester, NY	36-055-1007	2010	0.0299 µg/m^3	3.3659	46.24%
A	Butadiene, 1,3-	Providence, RI	44-007-0022	2008	0.1147 µg/m^3	5.2405	49.78%
A	Butadiene, 1,3-	Providence, RI	44-007-0022	2009	0.1097 µg/m^3	4.2203	62.62%
A	Butadiene, 1,3-	Providence, RI	44-007-0022	2010	0.079 µg/m^3	3.3579	53.44%
A	Butadiene, 1,3-	Bountiful, UT	49-011-0004	2008	0.0993 µg/m^3	4.7273	54.72%
A	Butadiene, 1,3-	Bountiful, UT	49-011-0004	2009	0.108 µg/m^3	8.164	67.30%
A	Butadiene, 1,3-	Bountiful, UT	49-011-0004	2010	0.0998 µg/m^3	9.5161	50.56%
A	Butadiene, 1,3-	Underhill, VT	50-007-0007	2008	0.0075 µg/m^3	0	37.81%
A	Butadiene, 1,3-	Underhill, VT	50-007-0007	2009	0.003 µg/m^3	0	24.97%
A	Butadiene, 1,3-	Underhill, VT	50-007-0007	2010	0.0043 µg/m^3	0	21.66%
A	Butadiene, 1,3-	Seattle, WA	53-033-0080	2008	0.0642 µg/m^3	3.5742	48.77%
A	Butadiene, 1,3-	Seattle, WA	53-033-0080	2009	0.0724 µg/m^3	7.039	70.54%
A	Butadiene, 1,3-	Seattle, WA	53-033-0080	2010	0.0658 µg/m^3	2.8343	41.31%
			VOCs - Carbon Tetrachloride				
A	Carbon Tetrachloride	Phoenix, AZ	04-013-9997	2008	0.757 µg/m^3	1.85	16.51%
A	Carbon Tetrachloride	Phoenix, AZ	04-013-9997	2009	0.7042 µg/m^3	1.4964	15.45%
A	Carbon Tetrachloride	Phoenix, AZ	04-013-9997	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	San Jose, CA	06-085-0005	2008	0.605 µg/m^3	1.1667	10.02%
A	Carbon Tetrachloride	San Jose, CA	06-085-0005	2009	0.5711 µg/m^3	1.4474	12.60%
A	Carbon Tetrachloride	San Jose, CA	06-085-0005	2010	0.6673 µg/m^3	1.3556	10.56%
A	Carbon Tetrachloride	Grand Junction, CO	08-077-0018	2008	0.6517 µg/m^3	1.8178	37.08%
A	Carbon Tetrachloride	Grand Junction, CO	08-077-0018	2009	0.5922 µg/m^3	1.5553	42.48%
A	Carbon Tetrachloride	Grand Junction, CO	08-077-0018	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Washington, DC	11-001-0043	2008	0.6477 µg/m^3	1.4118	5.61%
A	Carbon Tetrachloride	Washington, DC	11-001-0043	2009	0.6529 µg/m^3	1.2211	7.96%
A	Carbon Tetrachloride	Washington, DC	11-001-0043	2010	0.6335 µg/m^3	1.4524	8.75%
A	Carbon Tetrachloride	Pinellas County, FL	12-103-0026	2008	0.5337 µg/m^3	1.2284	8.46%
A	Carbon Tetrachloride	Pinellas County, FL	12-103-0026	2009	0.504 µg/m^3	1.1755	5.18%
A	Carbon Tetrachloride	Pinellas County, FL	12-103-0026	2010	0.5297 µg/m^3	1.1269	5.20%
A	Carbon Tetrachloride	Tampa, FL	12-057-3002	2008	0.544 µg/m^3	1.245	5.60%
A	Carbon Tetrachloride	Tampa, FL	12-057-3002	2009	0.5157 µg/m^3	1.1777	3.39%
A	Carbon Tetrachloride	Tampa, FL	12-057-3002	2010	0.5321 µg/m^3	1.1336	3.37%
A	Carbon Tetrachloride	South DeKalb, GA	13-089-0002	2008	0.4742 µg/m^3	1.3231	14.75%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Carbon Tetrachloride	South DeKalb, GA	13-089-0002	2009	0.4765 µg/m^3	1.3438	11.56%
A	Carbon Tetrachloride	South DeKalb, GA	13-089-0002	2010	0.4393 µg/m^3	1.5185	17.36%
A	Carbon Tetrachloride	Chicago, IL	17-031-4201	2008	0.8294 µg/m^3	1.6375	17.49%
A	Carbon Tetrachloride	Chicago, IL	17-031-4201	2009	0.7526 µg/m^3	1.5173	18.78%
A	Carbon Tetrachloride	Chicago, IL	17-031-4201	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Roxbury, MA	25-025-0042	2008	0.6125 µg/m^3	1.4776	7.71%
A	Carbon Tetrachloride	Roxbury, MA	25-025-0042	2009	0.5325 µg/m^3	1.5242	5.92%
A	Carbon Tetrachloride	Roxbury, MA	25-025-0042	2010	0.4672 µg/m^3	1.3954	8.09%
A	Carbon Tetrachloride	Detroit, MI	26-163-0033	2008	0.7584 µg/m^3	1.6535	20.60%
A	Carbon Tetrachloride	Detroit, MI	26-163-0033	2009	0.7319 µg/m^3	1.9366	19.18%
A	Carbon Tetrachloride	Detroit, MI	26-163-0033	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	St. Louis, MO	29-510-0085	2008	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	St. Louis, MO	29-510-0085	2009	0.6843 µg/m^3	2.0543	55.85%
A	Carbon Tetrachloride	St. Louis, MO	29-510-0085	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Rochester, NY	36-055-1007	2008	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Rochester, NY	36-055-1007	2009	0.674 µg/m^3	1.5967	5.40%
A	Carbon Tetrachloride	Rochester, NY	36-055-1007	2010	0.5821 µg/m^3	1.4314	4.86%
A	Carbon Tetrachloride	Providence, RI	44-007-0022	2008	0.6096 µg/m^3	1.3657	6.39%
A	Carbon Tetrachloride	Providence, RI	44-007-0022	2009	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Providence, RI	44-007-0022	2010	0.4603 µg/m^3	1.559	10.48%
A	Carbon Tetrachloride	Bountiful, UT	49-011-0004	2008	0.6496 µg/m^3	1.8021	24.78%
A	Carbon Tetrachloride	Bountiful, UT	49-011-0004	2009	0.6366 µg/m^3	1.3341	22.63%
A	Carbon Tetrachloride	Bountiful, UT	49-011-0004	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Underhill, VT	50-007-0007	2008	0.4667 µg/m^3	1.4044	7.93%
A	Carbon Tetrachloride	Underhill, VT	50-007-0007	2009	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Underhill, VT	50-007-0007	2010	0 µg/m^3	0	0.00%
A	Carbon Tetrachloride	Seattle, WA	53-033-0080	2008	0.8344 µg/m^3	1.4486	17.56%
A	Carbon Tetrachloride	Seattle, WA	53-033-0080	2009	0.7669 µg/m^3	1.4503	18.69%
A	Carbon Tetrachloride	Seattle, WA	53-033-0080	2010	0 µg/m^3	0	0.00%
VOCs - Chloroform							
A	Chloroform	Phoenix, AZ	04-013-9997	2008	0.441 µg/m^3	3.0294	58.92%
A	Chloroform	Phoenix, AZ	04-013-9997	2009	0.4332 µg/m^3	1.8692	59.40%
A	Chloroform	Phoenix, AZ	04-013-9997	2010	0.3716 µg/m^3	2.9515	50.98%
A	Chloroform	Los Angeles, CA	06-037-1103	2008	0.1605 µg/m^3	2.1667	38.75%
A	Chloroform	Los Angeles, CA	06-037-1103	2009	0 µg/m^3	0	0.00%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Chloroform	Los Angeles, CA	06-037-1103	2010	0.1569 µg/m^3	2	48.46%
A	Chloroform	Rubidoux, CA	06-065-8001	2008	0.1431 µg/m^3	3.8	46.77%
A	Chloroform	Rubidoux, CA	06-065-8001	2009	0 µg/m^3	0	0.00%
A	Chloroform	Rubidoux, CA	06-065-8001	2010	0.152 µg/m^3	2.7778	40.48%
A	Chloroform	San Jose, CA	06-085-0005	2008	0.084 µg/m^3	4.2	40.85%
A	Chloroform	San Jose, CA	06-085-0005	2009	0.1045 µg/m^3	6.9	34.10%
A	Chloroform	San Jose, CA	06-085-0005	2010	0 µg/m^3	0	0.00%
A	Chloroform	Grand Junction, CO	08-077-0018	2008	0.0998 µg/m^3	3.0147	31.37%
A	Chloroform	Grand Junction, CO	08-077-0018	2009	0.1211 µg/m^3	2.5846	23.41%
A	Chloroform	Grand Junction, CO	08-077-0018	2010	0.0862 µg/m^3	2.3922	27.93%
A	Chloroform	Washington, DC	11-001-0043	2008	0.2721 µg/m^3	3.8571	48.64%
A	Chloroform	Washington, DC	11-001-0043	2009	0.3498 µg/m^3	8.72	44.49%
A	Chloroform	Washington, DC	11-001-0043	2010	0.2981 µg/m^3	4.3077	33.95%
A	Chloroform	Pinellas County, FL	12-103-0026	2008	0.202 µg/m^3	2.163	50.37%
A	Chloroform	Pinellas County, FL	12-103-0026	2009	0.2105 µg/m^3	3.0472	50.40%
A	Chloroform	Pinellas County, FL	12-103-0026	2010	0.1911 µg/m^3	2.3136	52.88%
A	Chloroform	Tampa, FL	12-057-3002	2008	0.1728 µg/m^3	3.3913	50.53%
A	Chloroform	Tampa, FL	12-057-3002	2009	0.1462 µg/m^3	2.4433	31.70%
A	Chloroform	Tampa, FL	12-057-3002	2010	0.193 µg/m^3	8.4458	27.82%
A	Chloroform	South DeKalb, GA	13-089-0002	2008	0.0723 µg/m^3	0	44.54%
A	Chloroform	South DeKalb, GA	13-089-0002	2009	0.0949 µg/m^3	10.5	47.36%
A	Chloroform	South DeKalb, GA	13-089-0002	2010	0.0375 µg/m^3	0	20.55%
A	Chloroform	Chicago, IL	17-031-4201	2008	0.6812 µg/m^3	17.8829	64.74%
A	Chloroform	Chicago, IL	17-031-4201	2009	0.6329 µg/m^3	14.3704	92.32%
A	Chloroform	Chicago, IL	17-031-4201	2010	1.0485 µg/m^3	26.6296	88.78%
A	Chloroform	Roxbury, MA	25-025-0042	2008	0.1099 µg/m^3	1.8568	19.54%
A	Chloroform	Roxbury, MA	25-025-0042	2009	0.1018 µg/m^3	1.7895	20.10%
A	Chloroform	Roxbury, MA	25-025-0042	2010	0.0821 µg/m^3	1.6613	15.72%
A	Chloroform	Detroit, MI	26-163-0033	2008	0.9629 µg/m^3	2.4069	28.76%
A	Chloroform	Detroit, MI	26-163-0033	2009	0.6477 µg/m^3	3.9834	38.18%
A	Chloroform	Detroit, MI	26-163-0033	2010	0.6226 µg/m^3	4.7852	27.49%
A	Chloroform	St. Louis, MO	29-510-0085	2008	0.2154 µg/m^3	9.1273	47.88%
A	Chloroform	St. Louis, MO	29-510-0085	2009	0.212 µg/m^3	4.6489	77.84%
A	Chloroform	St. Louis, MO	29-510-0085	2010	0.1916 µg/m^3	2.76	53.18%
A	Chloroform	Rochester, NY	36-055-1007	2008	0.1324 µg/m^3	2.4306	19.13%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Chloroform	Rochester, NY	36-055-1007	2009	0.1308 µg/m³	2.0417	16.20%
A	Chloroform	Rochester, NY	36-055-1007	2010	0.1066 µg/m³	2.6684	20.13%
A	Chloroform	Providence, RI	44-007-0022	2008	0.1373 µg/m³	2.3351	31.88%
A	Chloroform	Providence, RI	44-007-0022	2009	0.1259 µg/m³	2	28.70%
A	Chloroform	Providence, RI	44-007-0022	2010	0.1014 µg/m³	1.9279	27.20%
A	Chloroform	Bountiful, UT	49-011-0004	2008	0.1016 µg/m³	2.7193	20.86%
A	Chloroform	Bountiful, UT	49-011-0004	2009	0.1223 µg/m³	2.5263	25.10%
A	Chloroform	Bountiful, UT	49-011-0004	2010	0.2797 µg/m³	198.0833	27.79%
A	Chloroform	Underhill, VT	50-007-0007	2008	0.0457 µg/m³	0	25.00%
A	Chloroform	Underhill, VT	50-007-0007	2009	0.0882 µg/m³	18.2243	28.73%
A	Chloroform	Underhill, VT	50-007-0007	2010	0.0438 µg/m³	0	18.03%
A	Chloroform	Seattle, WA	53-033-0080	2008	0.1433 µg/m³	1.4303	18.80%
A	Chloroform	Seattle, WA	53-033-0080	2009	0.1484 µg/m³	2.0273	27.78%
A	Chloroform	Seattle, WA	53-033-0080	2010	0.1415 µg/m³	1.8636	21.45%
VOCs - Tetrachloroethylene							
A	Tetrachloroethylene	Phoenix, AZ	04-013-9997	2008	0.4651 µg/m³	6.0584	80.69%
A	Tetrachloroethylene	Phoenix, AZ	04-013-9997	2009	0.4593 µg/m³	7.0017	105.18%
A	Tetrachloroethylene	Phoenix, AZ	04-013-9997	2010	0.4017 µg/m³	11.0959	53.44%
A	Tetrachloroethylene	San Jose, CA	06-085-0005	2008	0.4231 µg/m³	8.6154	95.71%
A	Tetrachloroethylene	San Jose, CA	06-085-0005	2009	0.22 µg/m³	8.075	67.56%
A	Tetrachloroethylene	San Jose, CA	06-085-0005	2010	0.2596 µg/m³	5.873	86.13%
A	Tetrachloroethylene	Grand Junction, CO	08-077-0018	2008	0.3237 µg/m³	3.725	74.74%
A	Tetrachloroethylene	Grand Junction, CO	08-077-0018	2009	0.4244 µg/m³	3.4846	87.84%
A	Tetrachloroethylene	Grand Junction, CO	08-077-0018	2010	0.3891 µg/m³	4.5315	76.57%
A	Tetrachloroethylene	Washington, DC	11-001-0043	2008	0.3313 µg/m³	2.9333	51.13%
A	Tetrachloroethylene	Washington, DC	11-001-0043	2009	0.3191 µg/m³	2.7692	66.79%
A	Tetrachloroethylene	Washington, DC	11-001-0043	2010	0 µg/m³	0	0.00%
A	Tetrachloroethylene	Pinellas County, FL	12-103-0026	2008	0.1845 µg/m³	3.9189	74.25%
A	Tetrachloroethylene	Pinellas County, FL	12-103-0026	2009	0.1288 µg/m³	3.5897	46.97%
A	Tetrachloroethylene	Pinellas County, FL	12-103-0026	2010	0.1176 µg/m³	4.488	59.89%
A	Tetrachloroethylene	Tampa, FL	12-057-3002	2008	0.0796 µg/m³	3.2593	40.72%
A	Tetrachloroethylene	Tampa, FL	12-057-3002	2009	0.0729 µg/m³	3.5652	30.88%
A	Tetrachloroethylene	Tampa, FL	12-057-3002	2010	0.056 µg/m³	2.816	43.00%
A	Tetrachloroethylene	Chicago, IL	17-031-4201	2008	0.1992 µg/m³	5.9392	78.05%
A	Tetrachloroethylene	Chicago, IL	17-031-4201	2009	0.1872 µg/m³	5.4898	96.99%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Tetrachloroethylene	Chicago, IL	17-031-4201	2010	0.2101 μg/m^3	7.25	55.99%
A	Tetrachloroethylene	Roxbury, MA	25-025-0042	2008	0.2544 μg/m^3	4.6353	72.37%
A	Tetrachloroethylene	Roxbury, MA	25-025-0042	2009	0.1818 μg/m^3	2.7143	58.81%
A	Tetrachloroethylene	Roxbury, MA	25-025-0042	2010	0.119 μg/m^3	1.9077	50.23%
A	Tetrachloroethylene	Detroit, MI	26-163-0033	2008	0.2253 μg/m^3	5.2113	58.20%
A	Tetrachloroethylene	Detroit, MI	26-163-0033	2009	0.1724 μg/m^3	4.3827	67.14%
A	Tetrachloroethylene	Detroit, MI	26-163-0033	2010	0.2101 μg/m^3	3.6129	51.59%
A	Tetrachloroethylene	St. Louis, MO	29-510-0085	2008	0.177 μg/m^3	3.6	56.47%
A	Tetrachloroethylene	St. Louis, MO	29-510-0085	2009	0.1555 μg/m^3	5.2857	56.81%
A	Tetrachloroethylene	St. Louis, MO	29-510-0085	2010	0.2328 μg/m^3	6.4545	73.12%
A	Tetrachloroethylene	Rochester, NY	36-055-1007	2008	0.1462 μg/m^3	3.2	29.40%
A	Tetrachloroethylene	Rochester, NY	36-055-1007	2009	0.1753 μg/m^3	3.1911	39.54%
A	Tetrachloroethylene	Rochester, NY	36-055-1007	2010	0.1212 μg/m^3	3.0298	51.16%
A	Tetrachloroethylene	Providence, RI	44-007-0022	2008	0.2469 μg/m^3	3.3467	67.99%
A	Tetrachloroethylene	Providence, RI	44-007-0022	2009	0.2088 μg/m^3	1.5354	76.85%
A	Tetrachloroethylene	Providence, RI	44-007-0022	2010	0.151 μg/m^3	2.9478	71.61%
A	Tetrachloroethylene	Bountiful, UT	49-011-0004	2008	0.2912 μg/m^3	11.0294	67.28%
A	Tetrachloroethylene	Bountiful, UT	49-011-0004	2009	0.225 μg/m^3	6.3468	81.83%
A	Tetrachloroethylene	Bountiful, UT	49-011-0004	2010	0.1523 μg/m^3	3.5417	54.00%
A	Tetrachloroethylene	Underhill, VT	50-007-0007	2008	0.0175 μg/m^3	0	48.46%
A	Tetrachloroethylene	Underhill, VT	50-007-0007	2009	0.0243 μg/m^3	0	28.99%
A	Tetrachloroethylene	Underhill, VT	50-007-0007	2010	0.0238 μg/m^3	0	40.24%
A	Tetrachloroethylene	Seattle, WA	53-033-0080	2008	0.1333 μg/m^3	2.561	62.75%
A	Tetrachloroethylene	Seattle, WA	53-033-0080	2009	0.1214 μg/m^3	4.3704	71.10%
A	Tetrachloroethylene	Seattle, WA	53-033-0080	2010	0.1206 μg/m^3	2.4798	35.96%
VOCs - Trichloroethylene							
A	Trichloroethylene	Phoenix, AZ	04-013-9997	2008	0 μg/m^3	0	0.00%
A	Trichloroethylene	Phoenix, AZ	04-013-9997	2009	0.0319 μg/m^3	0	45.04%
A	Trichloroethylene	Phoenix, AZ	04-013-9997	2010	0.0345 μg/m^3	0	33.30%
A	Trichloroethylene	San Jose, CA	06-085-0005	2008	0.0784 μg/m^3	2.6	33.88%
A	Trichloroethylene	San Jose, CA	06-085-0005	2009	0.0622 μg/m^3	3.3333	54.28%
A	Trichloroethylene	San Jose, CA	06-085-0005	2010	0 μg/m^3	0	0.00%
A	Trichloroethylene	Grand Junction, CO	08-077-0018	2008	0.0254 μg/m^3	0	65.92%
A	Trichloroethylene	Grand Junction, CO	08-077-0018	2009	0.0586 μg/m^3	0	55.00%
A	Trichloroethylene	Grand Junction, CO	08-077-0018	2010	0.0263 μg/m^3	0	51.82%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Trichloroethylene	Washington, DC	11-001-0043	2008	0.0255 µg/m^3	0	11.93%
A	Trichloroethylene	Washington, DC	11-001-0043	2009	0.0476 µg/m^3	9	19.96%
A	Trichloroethylene	Washington, DC	11-001-0043	2010	0 µg/m^3	0	0.00%
A	Trichloroethylene	Pinellas County, FL	12-103-0026	2008	0.0391 µg/m^3	36	53.56%
A	Trichloroethylene	Pinellas County, FL	12-103-0026	2009	0.0387 µg/m^3	4.9167	45.09%
A	Trichloroethylene	Pinellas County, FL	12-103-0026	2010	0.015 µg/m^3	0	27.32%
A	Trichloroethylene	Tampa, FL	12-057-3002	2008	0.0259 µg/m^3	0	59.34%
A	Trichloroethylene	Tampa, FL	12-057-3002	2009	0.0202 µg/m^3	0	41.76%
A	Trichloroethylene	Tampa, FL	12-057-3002	2010	0.0014 µg/m^3	0	0.00%
A	Trichloroethylene	South DeKalb, GA	13-089-0002	2008	0 µg/m^3	0	0.00%
A	Trichloroethylene	South DeKalb, GA	13-089-0002	2009	0.002 µg/m^3	0	0.00%
A	Trichloroethylene	South DeKalb, GA	13-089-0002	2010	0 µg/m^3	0	0.00%
A	Trichloroethylene	Chicago, IL	17-031-4201	2008	0.1014 µg/m^3	12.8444	64.46%
A	Trichloroethylene	Chicago, IL	17-031-4201	2009	0.0878 µg/m^3	14.3571	195.12%
A	Trichloroethylene	Chicago, IL	17-031-4201	2010	0.0721 µg/m^3	5.75	59.97%
A	Trichloroethylene	Roxbury, MA	25-025-0042	2008	0 µg/m^3	0	0.00%
A	Trichloroethylene	Roxbury, MA	25-025-0042	2009	0.0472 µg/m^3	2.8929	81.81%
A	Trichloroethylene	Roxbury, MA	25-025-0042	2010	0.0203 µg/m^3	1.7857	47.91%
A	Trichloroethylene	Detroit, MI	26-163-0033	2008	0.0171 µg/m^3	0	113.26%
A	Trichloroethylene	Detroit, MI	26-163-0033	2009	0.0176 µg/m^3	0	3.97%
A	Trichloroethylene	Detroit, MI	26-163-0033	2010	0.0222 µg/m^3	0	56.27%
A	Trichloroethylene	St. Louis, MO	29-510-0085	2008	0.0979 µg/m^3	3.0556	82.48%
A	Trichloroethylene	St. Louis, MO	29-510-0085	2009	0.0458 µg/m^3	0	77.23%
A	Trichloroethylene	St. Louis, MO	29-510-0085	2010	0.0463 µg/m^3	0	54.52%
A	Trichloroethylene	Rochester, NY	36-055-1007	2008	0.074 µg/m^3	2.5172	38.90%
A	Trichloroethylene	Rochester, NY	36-055-1007	2009	0.0662 µg/m^3	2.6774	30.68%
A	Trichloroethylene	Rochester, NY	36-055-1007	2010	0.0565 µg/m^3	3.8143	75.43%
A	Trichloroethylene	La Grande, OR	41-061-0119	2008	0 µg/m^3	0	0.00%
A	Trichloroethylene	La Grande, OR	41-061-0119	2009	0 µg/m^3	0	0.00%
A	Trichloroethylene	La Grande, OR	41-061-0119	2010	0 µg/m^3	0	0.00%
A	Trichloroethylene	Portland, OR	41-051-0246	2008	0 µg/m^3	0	0.00%
A	Trichloroethylene	Portland, OR	41-051-0246	2009	0 µg/m^3	0	0.00%
A	Trichloroethylene	Portland, OR	41-051-0246	2010	0.009 µg/m^3	0	0.00%
A	Trichloroethylene	Providence, RI	44-007-0022	2008	0.1198 µg/m^3	5.0286	72.97%
A	Trichloroethylene	Providence, RI	44-007-0022	2009	0.0806 µg/m^3	2.7679	81.98%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Trichloroethylene	Providence, RI	44-007-0022	2010	0.0685 $\mu g/m^3$	3.0857	93.45%
A	Trichloroethylene	Bountiful, UT	49-011-0004	2008	0 $\mu g/m^3$	0	0.00%
A	Trichloroethylene	Bountiful, UT	49-011-0004	2009	0 $\mu g/m^3$	0	0.00%
A	Trichloroethylene	Bountiful, UT	49-011-0004	2010	0.0776 $\mu g/m^3$	0	460.78%
A	Trichloroethylene	Underhill, VT	50-007-0007	2008	0.0008 $\mu g/m^3$	0	0.00%
A	Trichloroethylene	Underhill, VT	50-007-0007	2009	0 $\mu g/m^3$	0	0.00%
A	Trichloroethylene	Underhill, VT	50-007-0007	2010	0.0003 $\mu g/m^3$	0	0.00%
A	Trichloroethylene	Seattle, WA	53-033-0080	2008	0.0175 $\mu g/m^3$	0	39.57%
A	Trichloroethylene	Seattle, WA	53-033-0080	2009	0.0155 $\mu g/m^3$	0	35.13%
A	Trichloroethylene	Seattle, WA	53-033-0080	2010	0.0037 $\mu g/m^3$	0	0.00%
VOCs - Vinyl Chloride							
A	Vinyl Chloride	Phoenix, AZ	04-013-9997	2008	0.0012 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Phoenix, AZ	04-013-9997	2009	0.0015 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Phoenix, AZ	04-013-9997	2010	0.0001 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Grand Junction, CO	08-077-0018	2008	0.0015 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Grand Junction, CO	08-077-0018	2009	0.0029 $\mu g/m^3$	0	4.81%
A	Vinyl Chloride	Grand Junction, CO	08-077-0018	2010	0.0004 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Washington, DC	11-001-0043	2008	0.0008 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Washington, DC	11-001-0043	2009	0.0088 $\mu g/m^3$	0	14.86%
A	Vinyl Chloride	Washington, DC	11-001-0043	2010	0 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Pinellas County, FL	12-103-0026	2008	0.0108 $\mu g/m^3$	0	40.73%
A	Vinyl Chloride	Pinellas County, FL	12-103-0026	2009	0.0104 $\mu g/m^3$	0	38.64%
A	Vinyl Chloride	Pinellas County, FL	12-103-0026	2010	0.0006 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Tampa, FL	12-057-3002	2008	0.0104 $\mu g/m^3$	0	26.23%
A	Vinyl Chloride	Tampa, FL	12-057-3002	2009	0.0105 $\mu g/m^3$	0	29.29%
A	Vinyl Chloride	Tampa, FL	12-057-3002	2010	0.0008 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	South DeKalb, GA	13-089-0002	2008	0 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	South DeKalb, GA	13-089-0002	2009	0 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	South DeKalb, GA	13-089-0002	2010	0 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Chicago, IL	17-031-4201	2008	0 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Chicago, IL	17-031-4201	2009	0.0008 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Chicago, IL	17-031-4201	2010	0.0015 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Roxbury, MA	25-025-0042	2008	0.0026 $\mu g/m^3$	3.3333	34.41%
A	Vinyl Chloride	Roxbury, MA	25-025-0042	2009	0.0025 $\mu g/m^3$	13.3333	22.32%
A	Vinyl Chloride	Roxbury, MA	25-025-0042	2010	0.001 $\mu g/m^3$	0	48.05%

Appendix B1. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using A-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
A	Vinyl Chloride	Detroit, MI	26-163-0033	2008	0.0031 $\mu g/m^3$	0	27.55%
A	Vinyl Chloride	Detroit, MI	26-163-0033	2009	0.0032 $\mu g/m^3$	0	43.59%
A	Vinyl Chloride	Detroit, MI	26-163-0033	2010	0.0026 $\mu g/m^3$	0	17.98%
A	Vinyl Chloride	St. Louis, MO	29-510-0085	2008	0.0041 $\mu g/m^3$	0	21.52%
A	Vinyl Chloride	St. Louis, MO	29-510-0085	2009	0.0053 $\mu g/m^3$	0	83.06%
A	Vinyl Chloride	St. Louis, MO	29-510-0085	2010	0.0014 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Rochester, NY	36-055-1007	2008	0.0305 $\mu g/m^3$	7.04	19.85%
A	Vinyl Chloride	Rochester, NY	36-055-1007	2009	0.0336 $\mu g/m^3$	3.4643	22.36%
A	Vinyl Chloride	Rochester, NY	36-055-1007	2010	0.0145 $\mu g/m^3$	0	29.81%
A	Vinyl Chloride	Providence, RI	44-007-0022	2008	0.0035 $\mu g/m^3$	4.6667	44.45%
A	Vinyl Chloride	Providence, RI	44-007-0022	2009	0.0033 $\mu g/m^3$	0	41.40%
A	Vinyl Chloride	Providence, RI	44-007-0022	2010	0.001 $\mu g/m^3$	0	26.07%
A	Vinyl Chloride	Bountiful, UT	49-011-0004	2008	0.0019 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Bountiful, UT	49-011-0004	2009	0.0051 $\mu g/m^3$	0	58.47%
A	Vinyl Chloride	Bountiful, UT	49-011-0004	2010	0.0022 $\mu g/m^3$	0	28.87%
A	Vinyl Chloride	Underhill, VT	50-007-0007	2008	0.0042 $\mu g/m^3$	0	3.67%
A	Vinyl Chloride	Underhill, VT	50-007-0007	2009	0.0007 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Underhill, VT	50-007-0007	2010	0.0011 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Seattle, WA	53-033-0080	2008	0.0003 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Seattle, WA	53-033-0080	2009	0.0005 $\mu g/m^3$	0	0.00%
A	Vinyl Chloride	Seattle, WA	53-033-0080	2010	0 $\mu g/m^3$	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
Carbonyls - Acetaldehyde							
B	Acetaldehyde	Los Angeles, CA	06-037-1103	2008	2.9926 μg/m^3	3.0475	68.17%
B	Acetaldehyde	Los Angeles, CA	06-037-1103	2009	2.5268 μg/m^3	5.1063	49.34%
B	Acetaldehyde	Los Angeles, CA	06-037-1103	2010	2.3262 μg/m^3	1.8465	59.65%
B	Acetaldehyde	Rubidoux, CA	06-065-8001	2008	2.5868 μg/m^3	3.3691	71.27%
B	Acetaldehyde	Rubidoux, CA	06-065-8001	2009	2.7099 μg/m^3	2.6092	50.21%
B	Acetaldehyde	Rubidoux, CA	06-065-8001	2010	2.258 μg/m^3	3.0418	61.24%
B	Acetaldehyde	Roxbury, MA	25-025-0042	2008	0 μg/m^3	0	0.00%
B	Acetaldehyde	Roxbury, MA	25-025-0042	2009	1.501 μg/m^3	2.1391	54.80%
B	Acetaldehyde	Roxbury, MA	25-025-0042	2010	0 μg/m^3	0	0.00%
B	Acetaldehyde	La Grande, OR	41-061-0119	2008	1.2834 μg/m^3	2.0638	42.47%
B	Acetaldehyde	La Grande, OR	41-061-0119	2009	0 μg/m^3	0	0.00%
B	Acetaldehyde	La Grande, OR	41-061-0119	2010	1.3506 μg/m^3	2.7956	28.70%
B	Acetaldehyde	Providence, RI	44-007-0022	2008	0 μg/m^3	0	0.00%
B	Acetaldehyde	Providence, RI	44-007-0022	2009	1.7591 μg/m^3	2.0789	36.54%
B	Acetaldehyde	Providence, RI	44-007-0022	2010	0 μg/m^3	0	0.00%
B	Acetaldehyde	Chesterfield, SC	45-025-0001	2008	0 μg/m^3	0	0.00%
B	Acetaldehyde	Chesterfield, SC	45-025-0001	2009	0 μg/m^3	0	0.00%
B	Acetaldehyde	Chesterfield, SC	45-025-0001	2010	2.4429 μg/m^3	1.9468	48.48%
B	Acetaldehyde	Underhill, VT	50-007-0007	2008	0 μg/m^3	0	0.00%
B	Acetaldehyde	Underhill, VT	50-007-0007	2009	0.6913 μg/m^3	2.1829	33.27%
B	Acetaldehyde	Underhill, VT	50-007-0007	2010	0 μg/m^3	0	0.00%
Carbonyls - Formaldehyde							
B	Formaldehyde	Los Angeles, CA	06-037-1103	2008	5.2314 μg/m^3	4.2231	58.89%
B	Formaldehyde	Los Angeles, CA	06-037-1103	2009	3.7332 μg/m^3	5.4544	46.64%
B	Formaldehyde	Los Angeles, CA	06-037-1103	2010	3.5952 μg/m^3	1.7273	46.00%
B	Formaldehyde	Rubidoux, CA	06-065-8001	2008	4.6175 μg/m^3	3.4308	57.34%
B	Formaldehyde	Rubidoux, CA	06-065-8001	2009	4.7202 μg/m^3	2.6604	40.33%
B	Formaldehyde	Rubidoux, CA	06-065-8001	2010	3.2448 μg/m^3	3.9063	51.77%
B	Formaldehyde	San Jose, CA	06-085-0005	2008	2.5759 μg/m^3	1.895	47.36%
B	Formaldehyde	San Jose, CA	06-085-0005	2009	0 μg/m^3	0	0.00%
B	Formaldehyde	San Jose, CA	06-085-0005	2010	0 μg/m^3	0	0.00%
B	Formaldehyde	Washington, DC	11-001-0043	2008	3.8039 μg/m^3	3.0768	35.30%
B	Formaldehyde	Washington, DC	11-001-0043	2009	0 μg/m^3	0	0.00%
B	Formaldehyde	Washington, DC	11-001-0043	2010	0 μg/m^3	0	0.00%
B	Formaldehyde	South DeKalb, GA	13-089-0002	2008	4.7763 μg/m^3	2.4042	30.29%
B	Formaldehyde	South DeKalb, GA	13-089-0002	2009	8.1073 μg/m^3	5.1887	52.46%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average		Seasonality Ratio	CV%
B	Formaldehyde	South DeKalb, GA	13-089-0002	2010	4.2676	μg/m³	2.0941	36.62%
B	Formaldehyde	La Grande, OR	41-061-0119	2008	1.6923	μg/m³	2.0819	37.81%
B	Formaldehyde	La Grande, OR	41-061-0119	2009	0	μg/m³	0	0.00%
B	Formaldehyde	La Grande, OR	41-061-0119	2010	1.8416	μg/m³	2.7175	58.02%
B	Formaldehyde	Portland, OR	41-051-0246	2008	0	μg/m³	0	0.00%
B	Formaldehyde	Portland, OR	41-051-0246	2009	2.1421	μg/m³	2.3142	42.62%
B	Formaldehyde	Portland, OR	41-051-0246	2010	0	μg/m³	0	0.00%
			Hexavalent Chromium					
B	Hexavalent Chromium	Los Angeles, CA	06-037-1103	2008	0.1221	ng/m³	4.9501	70.65%
B	Hexavalent Chromium	Los Angeles, CA	06-037-1103	2009	0.0977	ng/m³	2.448	42.51%
B	Hexavalent Chromium	Los Angeles, CA	06-037-1103	2010	0.0894	ng/m³	2.1626	60.10%
B	Hexavalent Chromium	Rubidoux, CA	06-065-8001	2008	0.2143	ng/m³	8.2576	98.84%
B	Hexavalent Chromium	Rubidoux, CA	06-065-8001	2009	0.1466	ng/m³	5.0078	87.63%
B	Hexavalent Chromium	Rubidoux, CA	06-065-8001	2010	0.0711	ng/m³	2.7193	47.64%
B	Hexavalent Chromium	Rochester, NY	36-055-1007	2008	0.0072	ng/m³	0	80.78%
B	Hexavalent Chromium	Rochester, NY	36-055-1007	2009	0	ng/m³	0	0.00%
B	Hexavalent Chromium	Rochester, NY	36-055-1007	2010	0	ng/m³	0	0.00%
B	Hexavalent Chromium	La Grande, OR	41-061-0119	2008	0	ng/m³	0	0.00%
B	Hexavalent Chromium	La Grande, OR	41-061-0119	2009	0	ng/m³	0	0.00%
B	Hexavalent Chromium	La Grande, OR	41-061-0119	2010	0	ng/m³	0	0.00%
			PAHs - Benzo(a)pyrene					
B	Benzo(a)pyrene	Houston, TX	48-201-1039	2008	0.0461	ng/m³	14.5412	100.56%
B	Benzo(a)pyrene	Houston, TX	48-201-1039	2009	0	ng/m³	0	0.00%
B	Benzo(a)pyrene	Houston, TX	48-201-1039	2010	0	ng/m³	0	0.00%
B	Benzo(a)pyrene	Karnack, TX	48-203-0002	2008	0.0707	ng/m³	225.0385	147.91%
B	Benzo(a)pyrene	Karnack, TX	48-203-0002	2009	0	ng/m³	0	0.00%
B	Benzo(a)pyrene	Karnack, TX	48-203-0002	2010	0	ng/m³	0	0.00%
			PAHs - Naphthalene					
B	Naphthalene	Houston, TX	48-201-1039	2008	54.8579	ng/m³	1.7495	58.78%
B	Naphthalene	Houston, TX	48-201-1039	2009	0	ng/m³	0	0.00%
B	Naphthalene	Houston, TX	48-201-1039	2010	0	ng/m³	0	0.00%
B	Naphthalene	Karnack, TX	48-203-0002	2008	43.1811	ng/m³	5.0309	74.06%
B	Naphthalene	Karnack, TX	48-203-0002	2009	0	ng/m³	0	0.00%
B	Naphthalene	Karnack, TX	48-203-0002	2010	0	ng/m³	0	0.00%
			PM_{10} Metals - Beryllium (PM_{10})					
B	Beryllium (PM_{10})	Grand Junction, CO	08-077-0017	2008	0	ng/m³	0	0.00%
B	Beryllium (PM_{10})	Grand Junction, CO	08-077-0017	2009	0	ng/m³	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Beryllium (PM_{10})	Grand Junction, CO	08-077-0017	2010	0.0662 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Pinellas County, FL	12-103-0026	2008	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Pinellas County, FL	12-103-0026	2009	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Pinellas County, FL	12-103-0026	2010	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Tampa, FL	12-057-3002	2008	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Tampa, FL	12-057-3002	2009	0.1011 ng/m^3	1.053	1.31%
B	Beryllium (PM_{10})	Tampa, FL	12-057-3002	2010	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	South DeKalb, GA	13-089-0002	2008	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	South DeKalb, GA	13-089-0002	2009	0.0005 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	South DeKalb, GA	13-089-0002	2010	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Detroit, MI	26-163-0033	2008	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Detroit, MI	26-163-0033	2009	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Detroit, MI	26-163-0033	2010	0.024 ng/m^3	3.8572	173.38%
B	Beryllium (PM_{10})	Rochester, NY	36-055-1007	2008	0.0052 ng/m^3	17.1691	114.48%
B	Beryllium (PM_{10})	Rochester, NY	36-055-1007	2009	0.003 ng/m^3	0	95.33%
B	Beryllium (PM_{10})	Rochester, NY	36-055-1007	2010	0.0041 ng/m^3	6.7498	74.87%
B	Beryllium (PM_{10})	La Grande, OR	41-061-0119	2008	0.0046 ng/m^3	7.7559	88.27%
B	Beryllium (PM_{10})	La Grande, OR	41-061-0119	2009	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	La Grande, OR	41-061-0119	2010	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Providence, RI	44-007-0022	2008	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Providence, RI	44-007-0022	2009	0.0033 ng/m^3	0	85.11%
B	Beryllium (PM_{10})	Providence, RI	44-007-0022	2010	0.002 ng/m^3	0	108.28%
B	Beryllium (PM_{10})	Chesterfield, SC	45-025-0001	2008	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Chesterfield, SC	45-025-0001	2009	0 ng/m^3	0	0.00%
B	Beryllium (PM_{10})	Chesterfield, SC	45-025-0001	2010	0.0141 ng/m^3	0	85.50%
PM_{10} Metals - Cadmium (PM_{10})							
B	Cadmium (PM_{10})	Los Angeles, CA	06-037-1103	2008	0.2109 ng/m^3	14.375	56.78%
B	Cadmium (PM_{10})	Los Angeles, CA	06-037-1103	2009	0.1491 ng/m^3	0	53.87%
B	Cadmium (PM_{10})	Los Angeles, CA	06-037-1103	2010	0.1173 ng/m^3	0	89.02%
B	Cadmium (PM_{10})	Rubidoux, CA	06-065-8001	2008	0.0691 ng/m^3	0	69.13%
B	Cadmium (PM_{10})	Rubidoux, CA	06-065-8001	2009	0.1418 ng/m^3	4.5	31.82%
B	Cadmium (PM_{10})	Rubidoux, CA	06-065-8001	2010	0.0856 ng/m^3	0	77.72%
B	Cadmium (PM_{10})	Grand Junction, CO	08-077-0017	2008	0 ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Grand Junction, CO	08-077-0017	2009	0 ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Grand Junction, CO	08-077-0017	2010	0.1098 ng/m^3	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average		Seasonality Ratio	CV%
B	Cadmium (PM_{10})	Washington, DC	11-001-0043	2008	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Washington, DC	11-001-0043	2009	0.1138	ng/m^3	6.5386	565.99%
B	Cadmium (PM_{10})	Washington, DC	11-001-0043	2010	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	South DeKalb, GA	13-089-0002	2008	0.0679	ng/m^3	4.665	43.11%
B	Cadmium (PM_{10})	South DeKalb, GA	13-089-0002	2009	0.0671	ng/m^3	2.6375	51.47%
B	Cadmium (PM_{10})	South DeKalb, GA	13-089-0002	2010	0.0938	ng/m^3	3.8676	58.29%
B	Cadmium (PM_{10})	Detroit, MI	26-163-0033	2008	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Detroit, MI	26-163-0033	2009	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Detroit, MI	26-163-0033	2010	0.4067	ng/m^3	3.5699	113.66%
B	Cadmium (PM_{10})	Rochester, NY	36-055-1007	2008	0.1107	ng/m^3	4.007	65.36%
B	Cadmium (PM_{10})	Rochester, NY	36-055-1007	2009	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Rochester, NY	36-055-1007	2010	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	La Grande, OR	41-061-0119	2008	0.0499	ng/m^3	4.3696	64.13%
B	Cadmium (PM_{10})	La Grande, OR	41-061-0119	2009	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	La Grande, OR	41-061-0119	2010	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Portland, OR	41-051-0246	2008	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Portland, OR	41-051-0246	2009	1.51	ng/m^3	45.3124	260.08%
B	Cadmium (PM_{10})	Portland, OR	41-051-0246	2010	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Providence, RI	44-007-0022	2008	0.0966	ng/m^3	3.859	84.39%
B	Cadmium (PM_{10})	Providence, RI	44-007-0022	2009	0.0329	ng/m^3	0	194.18%
B	Cadmium (PM_{10})	Providence, RI	44-007-0022	2010	0	ng/m^3	0	0.00%
B	Cadmium (PM_{10})	Chesterfield, SC	45-025-0001	2008	0.1179	ng/m^3	4.6125	45.65%
B	Cadmium (PM_{10})	Chesterfield, SC	45-025-0001	2009	0.084	ng/m^3	34.4782	87.65%
B	Cadmium (PM_{10})	Chesterfield, SC	45-025-0001	2010	0.134	ng/m^3	0	104.57%
PM_{10} Metals - Lead (PM_{10})								
B	Lead (PM_{10})	Phoenix, AZ	04-013-9997	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Phoenix, AZ	04-013-9997	2009	3.9325	ng/m^3	3.5685	59.97%
B	Lead (PM_{10})	Phoenix, AZ	04-013-9997	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Los Angeles, CA	06-037-1103	2008	7.9891	ng/m^3	2.52	59.39%
B	Lead (PM_{10})	Los Angeles, CA	06-037-1103	2009	6.5351	ng/m^3	4.6408	48.46%
B	Lead (PM_{10})	Los Angeles, CA	06-037-1103	2010	7.1964	ng/m^3	8.125	63.05%
B	Lead (PM_{10})	Rubidoux, CA	06-065-8001	2008	5.7727	ng/m^3	2.2873	89.00%
B	Lead (PM_{10})	Rubidoux, CA	06-065-8001	2009	6.0164	ng/m^3	3.9809	53.17%
B	Lead (PM_{10})	Rubidoux, CA	06-065-8001	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	San Jose, CA	06-085-0005	2008	0	ng/m^3	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average		Seasonality Ratio	CV%
B	Lead (PM_{10})	San Jose, CA	06-085-0005	2009	2.4482	ng/m^3	4.4884	59.10%
B	Lead (PM_{10})	San Jose, CA	06-085-0005	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Grand Junction, CO	08-077-0017	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Grand Junction, CO	08-077-0017	2009	1.3815	ng/m^3	0	58.89%
B	Lead (PM_{10})	Grand Junction, CO	08-077-0017	2010	2.2787	ng/m^3	2.899	68.36%
B	Lead (PM_{10})	Washington, DC	11-001-0043	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Washington, DC	11-001-0043	2009	3.2194	ng/m^3	2.619	55.69%
B	Lead (PM_{10})	Washington, DC	11-001-0043	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Tampa, FL	12-057-3002	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Tampa, FL	12-057-3002	2009	1.2174	ng/m^3	1.6982	20.29%
B	Lead (PM_{10})	Tampa, FL	12-057-3002	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	South DeKalb, GA	13-089-0002	2008	1.6408	ng/m^3	2.5962	50.09%
B	Lead (PM_{10})	South DeKalb, GA	13-089-0002	2009	1.3813	ng/m^3	2.6722	51.06%
B	Lead (PM_{10})	South DeKalb, GA	13-089-0002	2010	1.759	ng/m^3	2.913	55.99%
B	Lead (PM_{10})	Chicago, IL	17-031-4201	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Chicago, IL	17-031-4201	2009	3.4152	ng/m^3	3.5487	64.64%
B	Lead (PM_{10})	Chicago, IL	17-031-4201	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Roxbury, MA	25-025-0042	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Roxbury, MA	25-025-0042	2009	3.0741	ng/m^3	1.9645	55.68%
B	Lead (PM_{10})	Roxbury, MA	25-025-0042	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	St. Louis, MO	29-510-0085	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	St. Louis, MO	29-510-0085	2009	10.2266	ng/m^3	6.7216	89.30%
B	Lead (PM_{10})	St. Louis, MO	29-510-0085	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Rochester, NY	36-055-1007	2008	3.3761	ng/m^3	5.109	69.35%
B	Lead (PM_{10})	Rochester, NY	36-055-1007	2009	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Rochester, NY	36-055-1007	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	La Grande, OR	41-061-0119	2008	1.1613	ng/m^3	5.6556	63.71%
B	Lead (PM_{10})	La Grande, OR	41-061-0119	2009	1.196	ng/m^3	3.6635	81.73%
B	Lead (PM_{10})	La Grande, OR	41-061-0119	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Portland, OR	41-051-0246	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Portland, OR	41-051-0246	2009	5.1159	ng/m^3	4.5231	88.03%
B	Lead (PM_{10})	Portland, OR	41-051-0246	2010	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Providence, RI	44-007-0022	2008	0	ng/m^3	0	0.00%
B	Lead (PM_{10})	Providence, RI	44-007-0022	2009	2.8803	ng/m^3	2.7999	64.93%
B	Lead (PM_{10})	Providence, RI	44-007-0022	2010	0	ng/m^3	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Lead (PM_{10})	Chesterfield, SC	45-025-0001	2008	2.0986 ng/m^3	2.8682	65.05%
B	Lead (PM_{10})	Chesterfield, SC	45-025-0001	2009	1.259 ng/m^3	17.4286	72.83%
B	Lead (PM_{10})	Chesterfield, SC	45-025-0001	2010	5.6811 ng/m^3	3127.0967	121.94%
B	Lead (PM_{10})	Bountiful, UT	49-011-0004	2008	2.9402 ng/m^3	2.448	88.34%
B	Lead (PM_{10})	Bountiful, UT	49-011-0004	2009	3.2774 ng/m^3	6.6609	102.43%
B	Lead (PM_{10})	Bountiful, UT	49-011-0004	2010	0 ng/m^3	0	0.00%
B	Lead (PM_{10})	Underhill, VT	50-007-0007	2008	0 ng/m^3	0	0.00%
B	Lead (PM_{10})	Underhill, VT	50-007-0007	2009	1.2031 ng/m^3	1.9608	65.27%
B	Lead (PM_{10})	Underhill, VT	50-007-0007	2010	0 ng/m^3	0	0.00%
B	Lead (PM_{10})	Seattle, WA	53-033-0080	2008	0 ng/m^3	0	0.00%
B	Lead (PM_{10})	Seattle, WA	53-033-0080	2009	3.799 ng/m^3	3.2789	71.54%
B	Lead (PM_{10})	Seattle, WA	53-033-0080	2010	0 ng/m^3	0	0.00%
PM_{10} Metals - Manganese (PM_{10})							
B	Manganese (PM_{10})	Phoenix, AZ	04-013-9997	2008	14.4977 ng/m^3	2.7997	46.13%
B	Manganese (PM_{10})	Phoenix, AZ	04-013-9997	2009	15.8465 ng/m^3	2.6648	58.93%
B	Manganese (PM_{10})	Phoenix, AZ	04-013-9997	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	San Jose, CA	06-085-0005	2008	4.7577 ng/m^3	2.5042	61.52%
B	Manganese (PM_{10})	San Jose, CA	06-085-0005	2009	3.9506 ng/m^3	2.9297	55.25%
B	Manganese (PM_{10})	San Jose, CA	06-085-0005	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Washington, DC	11-001-0043	2008	4.1778 ng/m^3	3.1223	54.84%
B	Manganese (PM_{10})	Washington, DC	11-001-0043	2009	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Washington, DC	11-001-0043	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Pinellas County, FL	12-103-0026	2008	2.9814 ng/m^3	4.4393	67.20%
B	Manganese (PM_{10})	Pinellas County, FL	12-103-0026	2009	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Pinellas County, FL	12-103-0026	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Tampa, FL	12-057-3002	2008	2.5508 ng/m^3	3.3583	69.13%
B	Manganese (PM_{10})	Tampa, FL	12-057-3002	2009	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Tampa, FL	12-057-3002	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	South DeKalb, GA	13-089-0002	2008	2.512 ng/m^3	2.176	43.84%
B	Manganese (PM_{10})	South DeKalb, GA	13-089-0002	2009	2.0839 ng/m^3	2.0558	56.25%
B	Manganese (PM_{10})	South DeKalb, GA	13-089-0002	2010	4.636 ng/m^3	7.5668	72.55%
B	Manganese (PM_{10})	Chicago, IL	17-031-4201	2008	7.2531 ng/m^3	5.3119	81.13%
B	Manganese (PM_{10})	Chicago, IL	17-031-4201	2009	5.6338 ng/m^3	3.827	63.99%
B	Manganese (PM_{10})	Chicago, IL	17-031-4201	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Roxbury, MA	25-025-0042	2008	3.72 ng/m^3	2.2501	48.36%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Manganese (PM_{10})	Roxbury, MA	25-025-0042	2009	3.2674 ng/m^3	2.509	44.60%
B	Manganese (PM_{10})	Roxbury, MA	25-025-0042	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	St. Louis, MO	29-510-0085	2008	22.9034 ng/m^3	28.3511	108.03%
B	Manganese (PM_{10})	St. Louis, MO	29-510-0085	2009	8.2235 ng/m^3	3.2089	62.32%
B	Manganese (PM_{10})	St. Louis, MO	29-510-0085	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Rochester, NY	36-055-1007	2008	3.4704 ng/m^3	2.5312	65.28%
B	Manganese (PM_{10})	Rochester, NY	36-055-1007	2009	3.2831 ng/m^3	2.5891	68.39%
B	Manganese (PM_{10})	Rochester, NY	36-055-1007	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	La Grande, OR	41-061-0119	2008	4.9173 ng/m^3	8.7989	63.27%
B	Manganese (PM_{10})	La Grande, OR	41-061-0119	2009	5.1818 ng/m^3	12.409	73.91%
B	Manganese (PM_{10})	La Grande, OR	41-061-0119	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Portland, OR	41-051-0246	2008	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Portland, OR	41-051-0246	2009	8.9823 ng/m^3	5.3623	126.60%
B	Manganese (PM_{10})	Portland, OR	41-051-0246	2010	6.5617 ng/m^3	4.7014	96.80%
B	Manganese (PM_{10})	Providence, RI	44-007-0022	2008	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Providence, RI	44-007-0022	2009	2.7982 ng/m^3	4.7684	60.10%
B	Manganese (PM_{10})	Providence, RI	44-007-0022	2010	2.4774 ng/m^3	2.8507	58.24%
B	Manganese (PM_{10})	Chesterfield, SC	45-025-0001	2008	2.9581 ng/m^3	2.4615	57.84%
B	Manganese (PM_{10})	Chesterfield, SC	45-025-0001	2009	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Chesterfield, SC	45-025-0001	2010	3.2615 ng/m^3	5.9589	87.69%
B	Manganese (PM_{10})	Houston, TX	48-201-1039	2008	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Houston, TX	48-201-1039	2009	4.6394 ng/m^3	6.6349	73.23%
B	Manganese (PM_{10})	Houston, TX	48-201-1039	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Bountiful, UT	49-011-0004	2008	7.677 ng/m^3	4.7765	74.45%
B	Manganese (PM_{10})	Bountiful, UT	49-011-0004	2009	6.2121 ng/m^3	2.985	87.75%
B	Manganese (PM_{10})	Bountiful, UT	49-011-0004	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Underhill, VT	50-007-0007	2008	1.0076 ng/m^3	3.6751	96.61%
B	Manganese (PM_{10})	Underhill, VT	50-007-0007	2009	0.8864 ng/m^3	2.9033	74.25%
B	Manganese (PM_{10})	Underhill, VT	50-007-0007	2010	0 ng/m^3	0	0.00%
B	Manganese (PM_{10})	Seattle, WA	53-033-0080	2008	11.5233 ng/m^3	3.9665	149.17%
B	Manganese (PM_{10})	Seattle, WA	53-033-0080	2009	7.4495 ng/m^3	11.9808	92.86%
B	Manganese (PM_{10})	Seattle, WA	53-033-0080	2010	0 ng/m^3	0	0.00%
PM_{10} Metals - Nickel (PM_{10})							
B	Nickel (PM_{10})	Phoenix, AZ	04-013-9997	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Phoenix, AZ	04-013-9997	2009	1.3889 ng/m^3	2.3559	53.57%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Nickel (PM_{10})	Phoenix, AZ	04-013-9997	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Los Angeles, CA	06-037-1103	2008	6.4087 ng/m^3	64.7158	109.52%
B	Nickel (PM_{10})	Los Angeles, CA	06-037-1103	2009	3.2246 ng/m^3	7.15	63.49%
B	Nickel (PM_{10})	Los Angeles, CA	06-037-1103	2010	2.9464 ng/m^3	4.32	76.66%
B	Nickel (PM_{10})	Rubidoux, CA	06-065-8001	2008	2.0382 ng/m^3	17.0118	84.00%
B	Nickel (PM_{10})	Rubidoux, CA	06-065-8001	2009	2.2018 ng/m^3	1.872	43.63%
B	Nickel (PM_{10})	Rubidoux, CA	06-065-8001	2010	1.8081 ng/m^3	4.1316	56.55%
B	Nickel (PM_{10})	San Jose, CA	06-085-0005	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	San Jose, CA	06-085-0005	2009	1.0561 ng/m^3	2.1185	36.07%
B	Nickel (PM_{10})	San Jose, CA	06-085-0005	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Grand Junction, CO	08-077-0017	2008	1.2912 ng/m^3	37.8835	59.44%
B	Nickel (PM_{10})	Grand Junction, CO	08-077-0017	2009	0.6535 ng/m^3	0	41.36%
B	Nickel (PM_{10})	Grand Junction, CO	08-077-0017	2010	1.7651 ng/m^3	1.9949	22.03%
B	Nickel (PM_{10})	Tampa, FL	12-057-3002	2008	2.2164 ng/m^3	3.3266	39.45%
B	Nickel (PM_{10})	Tampa, FL	12-057-3002	2009	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Tampa, FL	12-057-3002	2010	3.838 ng/m^3	2.857	52.77%
B	Nickel (PM_{10})	South DeKalb, GA	13-089-0002	2008	0.8694 ng/m^3	1.8065	26.51%
B	Nickel (PM_{10})	South DeKalb, GA	13-089-0002	2009	1.3205 ng/m^3	5.3953	56.67%
B	Nickel (PM_{10})	South DeKalb, GA	13-089-0002	2010	1.9316 ng/m^3	6.1475	75.64%
B	Nickel (PM_{10})	Chicago, IL	17-031-4201	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Chicago, IL	17-031-4201	2009	0.9991 ng/m^3	2.3758	43.75%
B	Nickel (PM_{10})	Chicago, IL	17-031-4201	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Roxbury, MA	25-025-0042	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Roxbury, MA	25-025-0042	2009	1.4666 ng/m^3	2.7517	36.95%
B	Nickel (PM_{10})	Roxbury, MA	25-025-0042	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Detroit, MI	26-163-0033	2008	2.5179 ng/m^3	6.2032	54.86%
B	Nickel (PM_{10})	Detroit, MI	26-163-0033	2009	1.9974 ng/m^3	8.2696	82.00%
B	Nickel (PM_{10})	Detroit, MI	26-163-0033	2010	1.8982 ng/m^3	6.5451	92.45%
B	Nickel (PM_{10})	St. Louis, MO	29-510-0085	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	St. Louis, MO	29-510-0085	2009	1.136 ng/m^3	3.7955	52.44%
B	Nickel (PM_{10})	St. Louis, MO	29-510-0085	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Rochester, NY	36-055-1007	2008	0.8495 ng/m^3	3.4549	72.50%
B	Nickel (PM_{10})	Rochester, NY	36-055-1007	2009	0.7249 ng/m^3	2.5104	66.68%
B	Nickel (PM_{10})	Rochester, NY	36-055-1007	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	La Grande, OR	41-061-0119	2008	0.1902 ng/m^3	3.462	54.52%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Nickel (PM_{10})	La Grande, OR	41-061-0119	2009	0.1604 ng/m^3	8.0767	60.09%
B	Nickel (PM_{10})	La Grande, OR	41-061-0119	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Portland, OR	41-051-0246	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Portland, OR	41-051-0246	2009	1.1305 ng/m^3	4.2653	82.71%
B	Nickel (PM_{10})	Portland, OR	41-051-0246	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Providence, RI	44-007-0022	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Providence, RI	44-007-0022	2009	1.4077 ng/m^3	6.2999	58.80%
B	Nickel (PM_{10})	Providence, RI	44-007-0022	2010	0.9211 ng/m^3	8.0072	82.44%
B	Nickel (PM_{10})	Chesterfield, SC	45-025-0001	2008	0.7486 ng/m^3	0	120.70%
B	Nickel (PM_{10})	Chesterfield, SC	45-025-0001	2009	2.4441 ng/m^3	46.3064	154.78%
B	Nickel (PM_{10})	Chesterfield, SC	45-025-0001	2010	6.374 ng/m^3	0	273.14%
B	Nickel (PM_{10})	Houston, TX	48-201-1039	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Houston, TX	48-201-1039	2009	2.2732 ng/m^3	1.8221	20.54%
B	Nickel (PM_{10})	Houston, TX	48-201-1039	2010	2.3501 ng/m^3	1.9179	77.94%
B	Nickel (PM_{10})	Bountiful, UT	49-011-0004	2008	2.449 ng/m^3	15.5122	70.76%
B	Nickel (PM_{10})	Bountiful, UT	49-011-0004	2009	0.6917 ng/m^3	0	50.71%
B	Nickel (PM_{10})	Bountiful, UT	49-011-0004	2010	0.8468 ng/m^3	2.5244	47.28%
B	Nickel (PM_{10})	Underhill, VT	50-007-0007	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Underhill, VT	50-007-0007	2009	0.1519 ng/m^3	5.1225	106.98%
B	Nickel (PM_{10})	Underhill, VT	50-007-0007	2010	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Seattle, WA	53-033-0080	2008	0 ng/m^3	0	0.00%
B	Nickel (PM_{10})	Seattle, WA	53-033-0080	2009	2.7055 ng/m^3	8.9697	93.23%
B	Nickel (PM_{10})	Seattle, WA	53-033-0080	2010	0 ng/m^3	0	0.00%
			VOCs - Benzene				
B	Benzene	Los Angeles, CA	06-037-1103	2008	1.5108 $\mu g/m^3$	2.8284	46.68%
B	Benzene	Los Angeles, CA	06-037-1103	2009	1.5146 $\mu g/m^3$	3.8838	51.37%
B	Benzene	Los Angeles, CA	06-037-1103	2010	1.3656 $\mu g/m^3$	3.2932	48.44%
B	Benzene	Rubidoux, CA	06-065-8001	2008	1.0526 $\mu g/m^3$	2.9888	60.75%
B	Benzene	Rubidoux, CA	06-065-8001	2009	1.1095 $\mu g/m^3$	3.35	52.71%
B	Benzene	Rubidoux, CA	06-065-8001	2010	1.0017 $\mu g/m^3$	3.1892	52.28%
B	Benzene	South DeKalb, GA	13-089-0002	2008	0.7129 $\mu g/m^3$	3.675	61.61%
B	Benzene	South DeKalb, GA	13-089-0002	2009	0.7952 $\mu g/m^3$	4.9474	46.74%
B	Benzene	South DeKalb, GA	13-089-0002	2010	0.5426 $\mu g/m^3$	2.1587	58.02%
B	Benzene	La Grande, OR	41-061-0119	2008	0.5763 $\mu g/m^3$	0	29.30%
B	Benzene	La Grande, OR	41-061-0119	2009	0.688 $\mu g/m^3$	0	40.54%
B	Benzene	La Grande, OR	41-061-0119	2010	0 $\mu g/m^3$	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
			VOCs - Butadiene, 1,3-				
B	Butadiene, 1,3-	Los Angeles, CA	06-037-1103	2008	0.1729 $\mu g/m^3$	4	74.44%
B	Butadiene, 1,3-	Los Angeles, CA	06-037-1103	2009	0.1999 $\mu g/m^3$	4.4841	71.69%
B	Butadiene, 1,3-	Los Angeles, CA	06-037-1103	2010	0.1659 $\mu g/m^3$	29	61.86%
B	Butadiene, 1,3-	Rubidoux, CA	06-065-8001	2008	0.0866 $\mu g/m^3$	4.625	70.15%
B	Butadiene, 1,3-	Rubidoux, CA	06-065-8001	2009	0.1297 $\mu g/m^3$	7.5556	79.18%
B	Butadiene, 1,3-	Rubidoux, CA	06-065-8001	2010	0.1069 $\mu g/m^3$	11	112.05%
B	Butadiene, 1,3-	San Jose, CA	06-085-0005	2008	0.1095 $\mu g/m^3$	10	67.19%
B	Butadiene, 1,3-	San Jose, CA	06-085-0005	2009	0.1199 $\mu g/m^3$	24.375	113.69%
B	Butadiene, 1,3-	San Jose, CA	06-085-0005	2010	0.0904 $\mu g/m^3$	13	78.26%
B	Butadiene, 1,3-	Washington, DC	11-001-0043	2008	0.1204 $\mu g/m^3$	3.5	65.15%
B	Butadiene, 1,3-	Washington, DC	11-001-0043	2009	0.1331 $\mu g/m^3$	4.3333	68.50%
B	Butadiene, 1,3-	Washington, DC	11-001-0043	2010	0.1075 $\mu g/m^3$	5.5	52.17%
B	Butadiene, 1,3-	Pinellas County, FL	12-103-0026	2008	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	Pinellas County, FL	12-103-0026	2009	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	Pinellas County, FL	12-103-0026	2010	0.0955 $\mu g/m^3$	6.6471	71.62%
B	Butadiene, 1,3-	Tampa, FL	12-057-3002	2008	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	Tampa, FL	12-057-3002	2009	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	Tampa, FL	12-057-3002	2010	0.0522 $\mu g/m^3$	4.9846	62.91%
B	Butadiene, 1,3-	South DeKalb, GA	13-089-0002	2008	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	South DeKalb, GA	13-089-0002	2009	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	South DeKalb, GA	13-089-0002	2010	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	Roxbury, MA	25-025-0042	2008	0.1106 $\mu g/m^3$	3.3828	73.83%
B	Butadiene, 1,3-	Roxbury, MA	25-025-0042	2009	0.0816 $\mu g/m^3$	2.4223	52.29%
B	Butadiene, 1,3-	Roxbury, MA	25-025-0042	2010	0.0607 $\mu g/m^3$	2.6667	53.14%
B	Butadiene, 1,3-	Rochester, NY	36-055-1007	2008	0.0561 $\mu g/m^3$	1.8647	48.69%
B	Butadiene, 1,3-	Rochester, NY	36-055-1007	2009	0 $\mu g/m^3$	0	0.00%
B	Butadiene, 1,3-	Rochester, NY	36-055-1007	2010	0 $\mu g/m^3$	0	0.00%
			VOCs - Carbon Tetrachloride				
B	Carbon Tetrachloride	Phoenix, AZ	04-013-9997	2008	0 $\mu g/m^3$	0	0.00%
B	Carbon Tetrachloride	Phoenix, AZ	04-013-9997	2009	0 $\mu g/m^3$	0	0.00%
B	Carbon Tetrachloride	Phoenix, AZ	04-013-9997	2010	0.6581 $\mu g/m^3$	1.4828	21.53%
B	Carbon Tetrachloride	Los Angeles, CA	06-037-1103	2008	0.499 $\mu g/m^3$	1.269	7.11%
B	Carbon Tetrachloride	Los Angeles, CA	06-037-1103	2009	0.5214 $\mu g/m^3$	1.522	11.50%
B	Carbon Tetrachloride	Los Angeles, CA	06-037-1103	2010	0.5083 $\mu g/m^3$	1.25	5.07%
B	Carbon Tetrachloride	Rubidoux, CA	06-065-8001	2008	0.4945 $\mu g/m^3$	1.3895	6.00%
B	Carbon Tetrachloride	Rubidoux, CA	06-065-8001	2009	0.5172 $\mu g/m^3$	1.4455	8.99%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Carbon Tetrachloride	Rubidoux, CA	06-065-8001	2010	0.5057 μg/m^3	1.25	9.83%
B	Carbon Tetrachloride	Grand Junction, CO	08-077-0018	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Grand Junction, CO	08-077-0018	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Grand Junction, CO	08-077-0018	2010	0.5338 μg/m^3	1.969	56.60%
B	Carbon Tetrachloride	Chicago, IL	17-031-4201	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Chicago, IL	17-031-4201	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Chicago, IL	17-031-4201	2010	0.7208 μg/m^3	1.3555	13.93%
B	Carbon Tetrachloride	Detroit, MI	26-163-0033	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Detroit, MI	26-163-0033	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Detroit, MI	26-163-0033	2010	0.694 μg/m^3	1.3483	16.52%
B	Carbon Tetrachloride	St. Louis, MO	29-510-0085	2008	0.7131 μg/m^3	3.0741	39.96%
B	Carbon Tetrachloride	St. Louis, MO	29-510-0085	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	St. Louis, MO	29-510-0085	2010	0.5783 μg/m^3	2.0177	42.87%
B	Carbon Tetrachloride	Rochester, NY	36-055-1007	2008	0.6909 μg/m^3	1.2678	8.96%
B	Carbon Tetrachloride	Rochester, NY	36-055-1007	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Rochester, NY	36-055-1007	2010	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Providence, RI	44-007-0022	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Providence, RI	44-007-0022	2009	0.5176 μg/m^3	1.5281	10.83%
B	Carbon Tetrachloride	Providence, RI	44-007-0022	2010	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Bountiful, UT	49-011-0004	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Bountiful, UT	49-011-0004	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Bountiful, UT	49-011-0004	2010	0.5714 μg/m^3	1.3256	30.89%
B	Carbon Tetrachloride	Underhill, VT	50-007-0007	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Underhill, VT	50-007-0007	2009	0.6662 μg/m^3	1.6823	11.51%
B	Carbon Tetrachloride	Underhill, VT	50-007-0007	2010	0.6323 μg/m^3	1.3931	19.13%
B	Carbon Tetrachloride	Seattle, WA	53-033-0080	2008	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Seattle, WA	53-033-0080	2009	0 μg/m^3	0	0.00%
B	Carbon Tetrachloride	Seattle, WA	53-033-0080	2010	0.7248 μg/m^3	1.3836	19.19%
VOCs - Chloroform							
B	Chloroform	Los Angeles, CA	06-037-1103	2008	0 μg/m^3	0	0.00%
B	Chloroform	Los Angeles, CA	06-037-1103	2009	0.1705 μg/m^3	3.75	48.75%
B	Chloroform	Los Angeles, CA	06-037-1103	2010	0 μg/m^3	0	0.00%
B	Chloroform	Rubidoux, CA	06-065-8001	2008	0 μg/m^3	0	0.00%
B	Chloroform	Rubidoux, CA	06-065-8001	2009	0.1465 μg/m^3	2.6667	38.71%
B	Chloroform	Rubidoux, CA	06-065-8001	2010	0 μg/m^3	0	0.00%
B	Chloroform	San Jose, CA	06-085-0005	2008	0 μg/m^3	0	0.00%
B	Chloroform	San Jose, CA	06-085-0005	2009	0 μg/m^3	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Chloroform	San Jose, CA	06-085-0005	2010	0.0956 µg/m^3	6.8	37.13%
B	Chloroform	La Grande, OR	41-061-0119	2008	0 µg/m^3	0	0.00%
B	Chloroform	La Grande, OR	41-061-0119	2009	0.0413 µg/m^3	0	0.00%
B	Chloroform	La Grande, OR	41-061-0119	2010	0.0184 µg/m^3	0	0.00%
B	Chloroform	Portland, OR	41-051-0246	2008	0.0023 µg/m^3	0	0.00%
B	Chloroform	Portland, OR	41-051-0246	2009	0.0588 µg/m^3	0	0.00%
B	Chloroform	Portland, OR	41-051-0246	2010	0.0612 µg/m^3	0	0.00%
B	Chloroform	Chesterfield, SC	45-025-0001	2008	0 µg/m^3	0	0.00%
B	Chloroform	Chesterfield, SC	45-025-0001	2009	0 µg/m^3	0	0.00%
B	Chloroform	Chesterfield, SC	45-025-0001	2010	0.0592 µg/m^3	0	35.81%
			VOCs - Tetrachloroethylene				
B	Tetrachloroethylene	Los Angeles, CA	06-037-1103	2008	0.2472 µg/m^3	3.5	65.61%
B	Tetrachloroethylene	Los Angeles, CA	06-037-1103	2009	0.2414 µg/m^3	5.2381	54.46%
B	Tetrachloroethylene	Los Angeles, CA	06-037-1103	2010	0.2265 µg/m^3	5	67.70%
B	Tetrachloroethylene	Rubidoux, CA	06-065-8001	2008	0.1547 µg/m^3	16.8	63.35%
B	Tetrachloroethylene	Rubidoux, CA	06-065-8001	2009	0.1586 µg/m^3	2.2857	46.66%
B	Tetrachloroethylene	Rubidoux, CA	06-065-8001	2010	0.119 µg/m^3	3.4	42.10%
B	Tetrachloroethylene	Washington, DC	11-001-0043	2008	0 µg/m^3	0	0.00%
B	Tetrachloroethylene	Washington, DC	11-001-0043	2009	0 µg/m^3	0	0.00%
B	Tetrachloroethylene	Washington, DC	11-001-0043	2010	0.2903 µg/m^3	2.5	70.29%
B	Tetrachloroethylene	South DeKalb, GA	13-089-0002	2008	0.0553 µg/m^3	0	16.67%
B	Tetrachloroethylene	South DeKalb, GA	13-089-0002	2009	0.0804 µg/m^3	0	28.40%
B	Tetrachloroethylene	South DeKalb, GA	13-089-0002	2010	0.0642 µg/m^3	0	0.00%
			VOCs - Trichloroethylene				
B	Trichloroethylene	Phoenix, AZ	04-013-9997	2008	0.0446 µg/m^3	0	24.52%
B	Trichloroethylene	Phoenix, AZ	04-013-9997	2009	0 µg/m^3	0	0.00%
B	Trichloroethylene	Phoenix, AZ	04-013-9997	2010	0 µg/m^3	0	0.00%
B	Trichloroethylene	Los Angeles, CA	06-037-1103	2008	0.1293 µg/m^3	2.4286	68.01%
B	Trichloroethylene	Los Angeles, CA	06-037-1103	2009	0.1485 µg/m^3	15.4667	61.09%
B	Trichloroethylene	Los Angeles, CA	06-037-1103	2010	0.1193 µg/m^3	8.625	98.39%
B	Trichloroethylene	Rubidoux, CA	06-065-8001	2008	0.0236 µg/m^3	0	17.46%
B	Trichloroethylene	Rubidoux, CA	06-065-8001	2009	0.0118 µg/m^3	0	35.72%
B	Trichloroethylene	Rubidoux, CA	06-065-8001	2010	0.0122 µg/m^3	0	48.15%
B	Trichloroethylene	San Jose, CA	06-085-0005	2008	0 µg/m^3	0	0.00%
B	Trichloroethylene	San Jose, CA	06-085-0005	2009	0 µg/m^3	0	0.00%
B	Trichloroethylene	San Jose, CA	06-085-0005	2010	0.067 µg/m^3	3.6667	43.88%
B	Trichloroethylene	Washington, DC	11-001-0043	2008	0 µg/m^3	0	0.00%

Appendix B2. Initial Means, Seasonality, and Population CV by Pollutant and NATTS Site Using B-Rated Data, 2008-2010.

Data Rating	MQO Core HAP	NATTS Site	AQS Site Code	Year	Average	Seasonality Ratio	CV%
B	Trichloroethylene	Washington, DC	11-001-0043	2009	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Washington, DC	11-001-0043	2010	0.0368 $\mu g/m^3$	0	21.23%
B	Trichloroethylene	Roxbury, MA	25-025-0042	2008	0.063 $\mu g/m^3$	5.6923	66.15%
B	Trichloroethylene	Roxbury, MA	25-025-0042	2009	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Roxbury, MA	25-025-0042	2010	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	La Grande, OR	41-061-0119	2008	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	La Grande, OR	41-061-0119	2009	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	La Grande, OR	41-061-0119	2010	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Portland, OR	41-051-0246	2008	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Portland, OR	41-051-0246	2009	0.008 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Portland, OR	41-051-0246	2010	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Chesterfield, SC	45-025-0001	2008	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Chesterfield, SC	45-025-0001	2009	0 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Chesterfield, SC	45-025-0001	2010	0.0026 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Bountiful, UT	49-011-0004	2008	0.0212 $\mu g/m^3$	0	0.00%
B	Trichloroethylene	Bountiful, UT	49-011-0004	2009	0.028 $\mu g/m^3$	0	39.14%
B	Trichloroethylene	Bountiful, UT	49-011-0004	2010	0 $\mu g/m^3$	0	0.00%
VOCs - Vinyl Chloride							
B	Vinyl Chloride	Los Angeles, CA	06-037-1103	2008	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Los Angeles, CA	06-037-1103	2009	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Los Angeles, CA	06-037-1103	2010	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Rubidoux, CA	06-065-8001	2008	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Rubidoux, CA	06-065-8001	2009	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Rubidoux, CA	06-065-8001	2010	0.001 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Washington, DC	11-001-0043	2008	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Washington, DC	11-001-0043	2009	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Washington, DC	11-001-0043	2010	0.0179 $\mu g/m^3$	0	16.04%
B	Vinyl Chloride	Chicago, IL	17-031-4201	2008	0.0014 $\mu g/m^3$	0	36.41%
B	Vinyl Chloride	Chicago, IL	17-031-4201	2009	0 $\mu g/m^3$	0	0.00%
B	Vinyl Chloride	Chicago, IL	17-031-4201	2010	0 $\mu g/m^3$	0	0.00%

Appendix C – Pollutant-Specific Model Run Outputs

Appendic C1 - Monte Carlo Simulation Results for Benzene Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Benzene			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (μg/m^3)	0.98	2,841 (16)	0.80	1.65
Population CV	0.50	2,841 (16)	0.42	0.62
Seasonality	3.61	2,788 (15)	2.94	6.96

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	1.4%	97.6%	Yes	Yes	Yes	Yes
5%	21.7%	76.9%	No	No	No	No
20%	0.3%	99.3%	Yes	Yes	Yes	Yes
25%	0.0%	99.8%	Yes	Yes	Yes	Yes
Completeness						
75%	1.7%	96.8%	Yes	Yes	Yes	Yes
95%	0.9%	97.9%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	5.8%	91.4%	No	Yes	Yes	Yes
Precision-Overall (CV)						
25%	2.3%	96.3%	Yes	Yes	Yes	Yes
5%	0.9%	97.9%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for 1,3-Butadiene Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	1,3-Butadiene			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (µg/m^3)	0.11	2,162 (13)	0.08	0.21
Population CV	0.67	2,040 (12)	0.59	0.79
Seasonality	7.22	1,855 (11)	4.82	12.73

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	6.2%	91.7%	No	Yes	Yes	Yes
5%	29.2%	70.3%	No	No	No	No
20%	1.7%	96.1%	Yes	Yes	Yes	Yes
25%	0.6%	98.0%	Yes	Yes	Yes	Yes
Completeness						
75%	6.6%	90.9%	No	Yes	Yes	Yes
95%	4.5%	93.3%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	13.1%	84.1%	No	No	No	Yes
Precision-Overall (CV)						
25%	6.5%	90.6%	No	Yes	Yes	Yes
5%	5.4%	92.6%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Carbon Tetrachloride Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Carbon Tetrachloride			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (µg/m^3)	0.68	2,233 (16)	0.61	0.78
Population CV	0.18	2,233 (16)	0.11	0.38
Seasonality	1.56	2,233 (16)	1.45	1.87

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	0.0%	100.0%	Yes	Yes	Yes	Yes
5%	3.0%	96.1%	Yes	Yes	Yes	Yes
20%	0.0%	100.0%	Yes	Yes	Yes	Yes
25%	0.0%	100.0%	Yes	Yes	Yes	Yes
Completeness						
75%	0.0%	100.0%	Yes	Yes	Yes	Yes
95%	0.0%	100.0%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	0.0%	99.9%	Yes	Yes	Yes	Yes
Precision-Overall (CV)						
25%	0.0%	100.0%	Yes	Yes	Yes	Yes
5%	0.0%	100.0%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Chloroform Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Chloroform			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration ($\mu g/m^3$)	0.24	3,129 (18)	0.15	0.66
Population CV	0.49	3,129 (18)	0.32	0.71
Seasonality	4.48	2,884 (18)	2.76	18.12

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	1.3%	97.2%	Yes	Yes	Yes	Yes
5%	21.4%	77.3%	No	No	No	No
20%	0.2%	99.3%	Yes	Yes	Yes	Yes
25%	0.0%	99.8%	Yes	Yes	Yes	Yes
Completeness						
75%	1.5%	96.7%	Yes	Yes	Yes	Yes
95%	0.8%	98.2%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	5.8%	91.5%	No	Yes	Yes	Yes
Precision-Overall (CV)						
25%	2.0%	96.3%	Yes	Yes	Yes	Yes
5%	0.9%	98.1%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Tetrachloroethylene Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Tetrachloroethylene			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (μg/m^3)	0.26	2,728 (15)	0.19	0.42
Population CV	0.74	2,728 (15)	0.61	0.95
Seasonality	5.87	2,543 (14)	3.73	8.62

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	7.3%	90.0%	No	No	Yes	Yes
5%	30.3%	68.8%	No	No	No	No
20%	2.8%	94.8%	No	Yes	Yes	Yes
25%	1.1%	97.2%	Yes	Yes	Yes	Yes
Completeness						
75%	8.0%	88.5%	No	No	Yes	Yes
95%	6.0%	91.7%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	14.7%	81.4%	No	No	No	Yes
Precision-Overall (CV)						
25%	8.4%	89.3%	No	No	Yes	Yes
5%	6.7%	90.5%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Trichloroethylene Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Trichloroethylene			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (μg/m^3)	0.06	2,817 (18)	0.03	0.10
Population CV	0.75	2,089 (14)	0.54	1.42
Seasonality	5.75	1,037 (8)	3.33	18.69

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	7.4%	90.1%	No	Yes	Yes	Yes
5%	30.4%	68.4%	No	No	No	No
20%	2.9%	94.0%	No	Yes	Yes	Yes
25%	0.9%	97.1%	Yes	Yes	Yes	Yes
Completeness						
75%	8.5%	88.8%	No	No	Yes	Yes
95%	6.1%	91.5%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	15.1%	81.8%	No	No	No	Yes
Precision-Overall (CV)						
25%	8.7%	88.9%	No	No	Yes	Yes
5%	6.8%	90.6%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Acetaldehyde Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Acetaldehyde			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (µg/m^3)	1.85	2,386 (15)	1.37	2.95
Population CV	0.52	2,386 (15)	0.46	0.74
Seasonality	3.06	2,386 (15)	2.49	4.79

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	1.5%	96.9%	Yes	Yes	Yes	Yes
5%	22.9%	76.2%	No	No	No	No
20%	0.3%	99.0%	Yes	Yes	Yes	Yes
25%	0.0%	99.7%	Yes	Yes	Yes	Yes
Completeness						
75%	2.2%	96.4%	Yes	Yes	Yes	Yes
95%	1.0%	97.8%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	6.5%	91.0%	No	Yes	Yes	Yes
Precision-Overall (CV)						
25%	2.3%	95.8%	Yes	Yes	Yes	Yes
5%	1.2%	97.5%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendix C1 - Monte Carlo Simulation Results for Formaldehyde Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Formaldehyde			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (µg/m^3)	2.81	2,801 (17)	2.43	3.74
Population CV	0.47	2,801 (17)	0.39	0.89
Seasonality	4.09	2,801 (17)	2.85	15.27

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	1.2%	97.9%	Yes	Yes	Yes	Yes
5%	20.9%	77.9%	No	No	No	No
20%	0.2%	99.4%	Yes	Yes	Yes	Yes
25%	0.0%	99.8%	Yes	Yes	Yes	Yes
Completeness						
75%	1.5%	97.1%	Yes	Yes	Yes	Yes
95%	0.7%	98.5%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	5.0%	91.9%	No	Yes	Yes	Yes
Precision-Overall (CV)						
25%	1.8%	96.5%	Yes	Yes	Yes	Yes
5%	0.7%	98.1%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendix C1 - Monte Carlo Simulation Results for Arsenic (PM_{10}) Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Arsenic			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (ng/m^3)	0.89	2,289 (16)	0.66	1.41
Population CV	0.85	2,289 (16)	0.74	1.20
Seasonality	4.69	2,289 (16)	3.36	9.74

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	9.7%	87.6%	No	No	Yes	Yes
5%	32.2%	67.1%	No	No	No	No
20%	4.1%	92.6%	No	Yes	Yes	Yes
25%	1.7%	95.6%	Yes	Yes	Yes	Yes
Completeness						
75%	10.5%	86.8%	No	No	Yes	Yes
95%	7.8%	89.4%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	17.6%	79.3%	No	No	No	No
Precision-Overall (CV)						
25%	10.3%	87.0%	No	No	Yes	Yes
5%	8.9%	88.4%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Cadmium (PM_{10}) Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Cadmium (PM 10)			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (ng/m³)	0.19	2,773 (18)	0.11	0.77
Population CV	0.87	2,529 (17)	0.71	1.68
Seasonality	6.74	2,348 (15)	3.58	28.90

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	10.8%	86.8%	No	No	Yes	Yes
5%	32.5%	65.9%	No	No	No	No
20%	5.2%	91.3%	No	Yes	Yes	Yes
25%	2.2%	94.8%	No	Yes	Yes	Yes
Completeness						
75%	12.0%	85.3%	No	No	Yes	Yes
95%	9.4%	87.9%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	18.8%	78.1%	No	No	No	No
Precision-Overall (CV)						
25%	12.1%	85.3%	No	No	Yes	Yes
5%	10.1%	86.7%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Lead (PM_{10}) Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Lead (PM10)			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (ng/m^3)	4.14	2,049 (18)	2.69	8.52
Population CV	0.80	2,049 (18)	0.63	0.99
Seasonality	4.09	1,988 (17)	3.05	5.93

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	8.3%	88.6%	No	No	Yes	Yes
5%	31.3%	68.5%	No	No	No	No
20%	3.1%	94.0%	No	Yes	Yes	Yes
25%	1.3%	96.6%	Yes	Yes	Yes	Yes
Completeness						
75%	9.0%	87.8%	No	No	Yes	Yes
95%	6.4%	90.1%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	16.0%	80.3%	No	No	No	Yes
Precision-Overall (CV)						
25%	9.1%	87.5%	No	No	Yes	Yes
5%	7.4%	89.1%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Manganese (PM_{10}) Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Manganese			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (ng/m^3)	7.28	1,448 (18)	4.74	14.10
Population CV	0.75	1,448 (18)	0.70	1.22
Seasonality	5.55	1,448 (18)	4.33	11.73

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	7.6%	89.5%	No	No	Yes	Yes
5%	31.1%	68.2%	No	No	No	No
20%	2.9%	94.7%	No	Yes	Yes	Yes
25%	1.0%	97.0%	Yes	Yes	Yes	Yes
Completeness						
75%	8.6%	88.7%	No	No	Yes	Yes
95%	5.9%	91.1%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	14.8%	81.6%	No	No	No	Yes
Precision-Overall (CV)						
25%	8.5%	89.2%	No	No	Yes	Yes
5%	7.2%	90.4%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Nickel (PM_{10}) Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Nickel (PM10)			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (ng/m^3)	2.04	1,444 (14)	1.33	2.79
Population CV	0.69	1,444 (14)	0.47	1.08
Seasonality	3.76	1,383 (14)	2.53	6.08

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	5.0%	92.0%	No	Yes	Yes	Yes
5%	28.7%	70.5%	No	No	No	No
20%	1.7%	96.1%	Yes	Yes	Yes	Yes
25%	0.6%	98.3%	Yes	Yes	Yes	Yes
Completeness						
75%	6.4%	91.0%	No	Yes	Yes	Yes
95%	4.1%	93.5%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	12.3%	84.5%	No	No	No	Yes
Precision-Overall (CV)						
25%	6.3%	91.5%	No	Yes	Yes	Yes
5%	4.8%	92.8%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Hexavalent Chromium Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Hexavalent Chromium			
Site Type	Urban and Rural			
Dataset Rating	A			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (ng/m^3)	0.03	2,657 (15)	0.02	0.07
Population CV	0.95	2,297 (14)	0.66	1.52
Seasonality	9.42	1,301 (10)	6.87	51.28

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	13.5%	83.5%	No	No	No	Yes
5%	34.7%	64.6%	No	No	No	No
20%	7.6%	89.2%	No	No	Yes	Yes
25%	3.7%	93.0%	No	Yes	Yes	Yes
Completeness						
75%	14.3%	82.6%	No	No	No	Yes
95%	11.4%	85.1%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	21.3%	76.1%	No	No	No	No
Precision-Overall (CV)						
25%	13.7%	82.8%	No	No	No	Yes
5%	12.8%	84.4%	No	No	No	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C1 - Monte Carlo Simulation Results for Naphthalene Using A-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Naphthalene			
Site Type	Urban and Rural			
Dataset Rating	A			
Initial Concentration (ng/m^3)	93.44	1,503 (9)	83.45	142.12
Population CV	0.83	1,503 (9)	0.74	1.02
Seasonality	4.33	1,503 (9)	3.70	5.77

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	8.6%	88.6%	No	No	Yes	Yes
5%	31.4%	67.4%	No	No	No	No
20%	3.6%	93.1%	No	Yes	Yes	Yes
25%	1.6%	96.2%	Yes	Yes	Yes	Yes
Completeness						
75%	10.0%	86.9%	No	No	Yes	Yes
95%	7.7%	89.7%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	17.0%	79.9%	No	No	No	No
Precision-Overall (CV)						
25%	9.5%	86.7%	No	No	Yes	Yes
5%	8.6%	88.5%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Benzene Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Benzene			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (μg/m^3)	1.24	627 (4)	1.00	1.51
Population CV	0.55	627 (4)	0.51	0.61
Seasonality	3.68	519 (3)	3.29	4.52

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action		Meets Criteria for Acceptable Likelihood for			
	Zero	2x Action Limit	5%	10%	15%	20%
Action Limit						
15% (Baseline)	2.2%	96.0%	Yes	Yes	Yes	Yes
5%	24.4%	74.5%	No	No	No	No
20%	0.5%	98.6%	Yes	Yes	Yes	Yes
25%	0.1%	99.4%	Yes	Yes	Yes	Yes
Completeness						
75%	2.8%	95.2%	Yes	Yes	Yes	Yes
95%	1.4%	97.0%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	7.3%	89.1%	No	No	Yes	Yes
Precision-Overall (CV)						
25%	3.2%	95.1%	Yes	Yes	Yes	Yes
5%	2.0%	96.4%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true

Appendic C2 - Monte Carlo Simulation Results for 1,3-Butadiene Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	1,3-Butadiene			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (µg/m^3)	0.13	1,146 (9)	0.11	0.18
Population CV	0.74	1,086 (8)	0.69	1.12
Seasonality	9.39	1,086 (8)	4.80	25.07

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	2x Action Limit	5%	10%	15%	20%
Action Limit						
15% (Baseline)	8.0%	89.3%	No	No	Yes	Yes
5%	30.4%	68.1%	No	No	No	No
20%	3.5%	94.3%	No	Yes	Yes	Yes
25%	1.3%	96.5%	Yes	Yes	Yes	Yes
Completeness						
75%	9.2%	88.1%	No	No	Yes	Yes
95%	6.5%	90.7%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	15.6%	81.2%	No	No	No	Yes
Precision-Overall (CV)						
25%	8.8%	88.2%	No	No	Yes	Yes
5%	7.4%	89.6%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendix C2 - Monte Carlo Simulation Results for Carbon Tetrachloride Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Carbon Tetrachloride			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (µg/m^3)	0.68	1,069 (12)	0.57	0.72
Population CV	0.21	1,069 (12)	0.13	0.45
Seasonality	1.53	1,069 (12)	1.39	2.18

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	2x Action Limit	5%	10%	15%	20%
Action Limit						
15% (Baseline)	0.0%	100.0%	Yes	Yes	Yes	Yes
5%	4.8%	94.6%	No	Yes	Yes	Yes
20%	0.0%	100.0%	Yes	Yes	Yes	Yes
25%	0.0%	100.0%	Yes	Yes	Yes	Yes
Completeness						
75%	0.0%	100.0%	Yes	Yes	Yes	Yes
95%	0.0%	100.0%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	0.1%	99.9%	Yes	Yes	Yes	Yes
Precision-Overall (CV)						
25%	0.0%	100.0%	Yes	Yes	Yes	Yes
5%	0.0%	100.0%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Chloroform Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Chloroform			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (μg/m^3)	0.07	690 (6)	0.05	0.16
Population CV	0.41	240 (4)	0.38	0.47
Seasonality	5.28	179 (3)	3.75	6.50

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	2x Action Limit	5%	10%	15%	20%
Action Limit						
15% (Baseline)	0.6%	98.8%	Yes	Yes	Yes	Yes
5%	19.1%	79.8%	No	No	No	No
20%	0.1%	99.8%	Yes	Yes	Yes	Yes
25%	0.0%	100.0%	Yes	Yes	Yes	Yes
Completeness						
75%	0.6%	98.2%	Yes	Yes	Yes	Yes
95%	0.3%	99.2%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	3.3%	94.4%	No	Yes	Yes	Yes
Precision-Overall (CV)						
25%	1.2%	97.6%	Yes	Yes	Yes	Yes
5%	0.4%	99.1%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Tetrachloroethylene Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Tetrachloroethylene			
Site Type	Urban and Rural			
Dataset Rating	B			
Initial Concentration (μg/m^3)	0.24	580 (4)	0.16	0.27
Population CV	0.65	580 (4)	0.51	0.69
Seasonality	5.12	398 (3)	3.50	13.33

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	4.9%	92.7%	No	Yes	Yes	Yes
5%	28.3%	71.5%	No	No	No	No
20%	1.2%	96.6%	Yes	Yes	Yes	Yes
25%	0.4%	98.6%	Yes	Yes	Yes	Yes
Completeness						
75%	5.7%	91.7%	No	Yes	Yes	Yes
95%	3.7%	94.0%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	12.0%	85.2%	No	No	Yes	Yes
Precision-Overall (CV)						
25%	6.0%	91.7%	No	Yes	Yes	Yes
5%	4.1%	93.5%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Trichloroethylene Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Trichloroethylene			
Site Type	Urban and Rural			
Dataset Rating	B			
Initial Concentration ($\mu g/m^3$)	0.06	1,003 (10)	0.02	0.13
Population CV	0.64	645 (7)	0.44	0.83
Seasonality	8.63	290 (3)	5.69	14.10

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	5.0%	92.9%	No	Yes	Yes	Yes
5%	28.3%	71.3%	No	No	No	No
20%	1.5%	96.4%	Yes	Yes	Yes	Yes
25%	0.5%	98.3%	Yes	Yes	Yes	Yes
Completeness						
75%	6.1%	91.9%	No	Yes	Yes	Yes
95%	4.1%	94.1%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	11.8%	84.7%	No	No	No	Yes
Precision-Overall (CV)						
25%	5.9%	92.1%	No	Yes	Yes	Yes
5%	4.5%	93.5%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Acetaldehyde Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Acetaldehyde			
Site Type	Urban and Rural			
Dataset Rating	B			
Initial Concentration (µg/m^3)	2.54	707 (7)	2.29	2.84
Population CV	0.60	707 (7)	0.50	0.70
Seasonality	3.04	707 (7)	2.40	4.15

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	3.3%	95.3%	Yes	Yes	Yes	Yes
5%	25.6%	73.4%	No	No	No	No
20%	0.7%	98.1%	Yes	Yes	Yes	Yes
25%	0.1%	99.3%	Yes	Yes	Yes	Yes
Completeness						
75%	3.6%	94.2%	No	Yes	Yes	Yes
95%	1.9%	96.1%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	9.2%	87.8%	No	No	Yes	Yes
Precision-Overall (CV)						
25%	3.8%	93.8%	No	Yes	Yes	Yes
5%	2.5%	95.7%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Formaldehyde Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Formaldehyde			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (μg/m^3)	4.69	829 (7)	3.77	6.24
Population CV	0.52	829 (7)	0.46	0.58
Seasonality	3.79	829 (7)	2.69	5.28

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	1.8%	96.6%	Yes	Yes	Yes	Yes
5%	23.0%	75.8%	No	No	No	No
20%	0.4%	99.1%	Yes	Yes	Yes	Yes
25%	0.0%	99.7%	Yes	Yes	Yes	Yes
Completeness						
75%	2.3%	96.0%	Yes	Yes	Yes	Yes
95%	1.2%	97.6%	Yes	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	6.7%	90.5%	No	Yes	Yes	Yes
Precision-Overall (CV)						
25%	2.8%	95.9%	Yes	Yes	Yes	Yes
5%	1.6%	97.1%	Yes	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Arsenic (PM_{10}) Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Arsenic			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (ng/m^3)	1.40	1,326 (12)	0.88	1.84
Population CV	0.98	1,326 (12)	0.80	1.17
Seasonality	15.46	1,143 (12)	9.07	47.46

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	13.8%	82.9%	No	No	No	Yes
5%	36.1%	64.0%	No	No	No	No
20%	8.0%	88.0%	No	No	Yes	Yes
25%	4.4%	92.1%	No	Yes	Yes	Yes
Completeness						
75%	15.4%	81.4%	No	No	No	Yes
95%	12.7%	83.9%	No	No	No	Yes
Monitoring Frequency						
1-in-12 days	22.0%	75.1%	No	No	No	No
Precision-Overall (CV)						
25%	15.5%	81.9%	No	No	No	Yes
5%	13.6%	83.6%	No	No	No	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Cadmium (PM_{10}) Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Cadmium (PM 10)			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (ng/m^3)	0.14	1,204 (11)	0.11	0.46
Population CV	0.97	1,145 (10)	0.69	2.91
Seasonality	6.54	779 (10)	4.50	38.81

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	12.9%	83.5%	No	No	No	Yes
5%	34.8%	64.3%	No	No	No	No
20%	7.3%	89.1%	No	No	Yes	Yes
25%	3.6%	92.7%	No	Yes	Yes	Yes
Completeness						
75%	13.7%	82.7%	No	No	No	Yes
95%	11.2%	85.4%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	20.7%	76.1%	No	No	No	No
Precision-Overall (CV)						
25%	13.8%	82.6%	No	No	No	Yes
5%	12.6%	84.4%	No	No	No	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Lead (PM_{10}) Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Lead (PM10)			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (ng/m^3)	5.12	1,746 (19)	3.07	7.67
Population CV	0.73	1,746 (19)	0.65	0.97
Seasonality	4.76	1,685 (19)	3.41	14.17

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	6.7%	90.3%	No	Yes	Yes	Yes
5%	29.9%	69.0%	No	No	No	No
20%	2.5%	95.2%	Yes	Yes	Yes	Yes
25%	1.0%	97.6%	Yes	Yes	Yes	Yes
Completeness						
75%	7.8%	89.7%	No	No	Yes	Yes
95%	5.6%	92.7%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	14.2%	82.6%	No	No	No	Yes
Precision-Overall (CV)						
25%	7.7%	89.7%	No	No	Yes	Yes
5%	6.3%	91.1%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Lead (PM_{10}) Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Manganese			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (ng/m^3)	7.25	1,978 (18)	4.64	15.04
Population CV	0.81	1,978 (18)	0.67	1.15
Seasonality	5.31	1,978 (18)	3.36	12.15

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	8.6%	88.1%	No	No	Yes	Yes
5%	32.3%	67.6%	No	No	No	No
20%	4.1%	92.9%	No	Yes	Yes	Yes
25%	1.6%	96.2%	Yes	Yes	Yes	Yes
Completeness						
75%	9.7%	87.0%	No	No	Yes	Yes
95%	7.1%	90.4%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	16.8%	79.9%	No	No	No	No
Precision-Overall (CV)						
25%	9.6%	86.9%	No	No	Yes	Yes
5%	8.5%	88.7%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Nickel (PM_{10}) Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

MQO Core HAP	Nickel (PM10)			
Site Type	Urban and Rural			
Dataset Rating	B			
	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
Initial Concentration (ng/m^3)	2.31	2,353 (20)	1.47	4.09
Population CV	0.82	2,353 (20)	0.59	1.24
Seasonality	7.58	2,111 (20)	4.27	40.41

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	9.6%	87.4%	No	No	Yes	Yes
5%	32.3%	66.4%	No	No	No	No
20%	4.6%	92.1%	No	Yes	Yes	Yes
25%	2.0%	95.5%	Yes	Yes	Yes	Yes
Completeness						
75%	10.8%	86.4%	No	No	Yes	Yes
95%	8.3%	88.8%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	17.7%	79.4%	No	No	No	No
Precision-Overall (CV)						
25%	10.6%	86.2%	No	No	Yes	Yes
5%	8.9%	88.2%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Hexavalent Chlromium Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Hexavalent Chromium			
Site Type	Urban and Rural			
Dataset Rating	B			
Initial Concentration (ng/m^3)	0.13	473 (4)	0.09	0.19
Population CV	0.84	425 (3)	0.71	0.95
Seasonality	4.99	364 (2)	3.83	7.45

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	2x Action Limit	5%	10%	15%	20%
Action Limit						
15% (Baseline)	9.7%	87.4%	No	No	Yes	Yes
5%	32.2%	67.1%	No	No	No	No
20%	4.5%	92.5%	No	Yes	Yes	Yes
25%	1.9%	95.4%	Yes	Yes	Yes	Yes
Completeness						
75%	10.5%	85.9%	No	No	Yes	Yes
95%	7.8%	89.6%	No	No	Yes	Yes
Monitoring Frequency						
1-in-12 days	17.8%	80.0%	No	No	No	No
Precision-Overall (CV)						
25%	10.5%	87.1%	No	No	Yes	Yes
5%	8.6%	87.9%	No	No	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendic C2 - Monte Carlo Simulation Results for Naphthalene Using B-rated NATTS Data

Baseline Model Parameters

Pollutant Characteristics (2008-2010)

	75th Pctile[1]	Obs. (Sites)	50th Pctile	95th Pctile
MQO Core HAP	Naphthalene			
Site Type	Urban and Rural			
Dataset Rating	B			
Initial Concentration (ng/m^3)	51.94	112 (2)	49.02	54.27
Population CV	0.70	112 (2)	0.66	0.73
Seasonality	4.21	112 (2)	3.39	4.87

Model Parameters

Significance Level	10%
Action Limit	15%
Average Type	3-yr block
Averaging Non-Detects	0

Model MQOs

Completeness	85%
Monitoring Frequency	1-in-6 days
Bias	0
Precision-Overall (CV)	15%

Model Results

	Probability of Observing Action Limit if True Change is:		Meets Criteria for Acceptable Likelihood for Decision Errors of:[2]			
	Zero	**2x Action Limit**	**5%**	**10%**	**15%**	**20%**
Action Limit						
15% (Baseline)	5.6%	91.4%	No	Yes	Yes	Yes
5%	29.2%	70.0%	No	No	No	No
20%	1.7%	96.0%	Yes	Yes	Yes	Yes
25%	0.6%	98.1%	Yes	Yes	Yes	Yes
Completeness						
75%	6.4%	90.4%	No	Yes	Yes	Yes
95%	4.4%	92.9%	No	Yes	Yes	Yes
Monitoring Frequency						
1-in-12 days	13.0%	83.8%	No	No	No	Yes
Precision-Overall (CV)						
25%	6.6%	90.3%	No	Yes	Yes	Yes
5%	5.3%	92.6%	No	Yes	Yes	Yes

[1] The initial values used are the 75th percentile of all the annual site means, seasonality ratios, and population CVs.

[2] For example, based on a 5 percent decision error, this indicates whether the probability of observing the action limit when the true change is zero is less than 5 percent **and** the probability of observing the action limit when the true change is twice the action limit is greater than 95 percent.

Appendix D – Pollutant-Specific Model Evaluation Reports

D1. Evaluation for Measuring the Percent Decrease of Benzene at All Locations Using a Rated Data

Table D.1.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of benzene at all locations using NATTS A-rated data for the years 2008-2010. Table D.1.2 shows the output values from the simulations. Figure D-1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.2.2 suggests that the specified air toxics Program-Level DQO will be met for benzene at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.1.1. Evaluation Input Parameters for Benzene at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	3.61	50%	0.98
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.13	0.13

Table D.1.2. Evaluation Output Parameters for Benzene at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
1%	98%

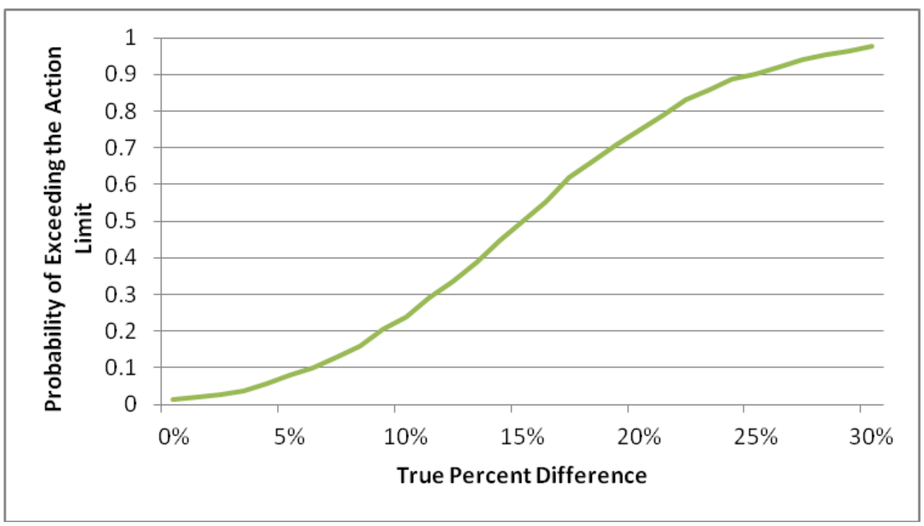


Figure D.1.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Benzene Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D2. Evaluation for Measuring the Percent Decrease of 1,3-Butadiene at All Locations Using A-Rated Data

Table D.2.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of 1,3-butadiene at all locations using NATTS A-rated data for the years 2008-2010. Table D.2.2 shows the output values from the simulations. Figure D.2.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.2.2 suggests that the specified air toxics Program-Level DQO will be met for 1,3-butadiene at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.2.1. Evaluation Input Parameters for 1,3-Butadiene at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	7.22	67%	0.11
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.10	0.03

Table D.2.2. Evaluation Output Parameters for 1,3-Butadiene at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
6%	92%

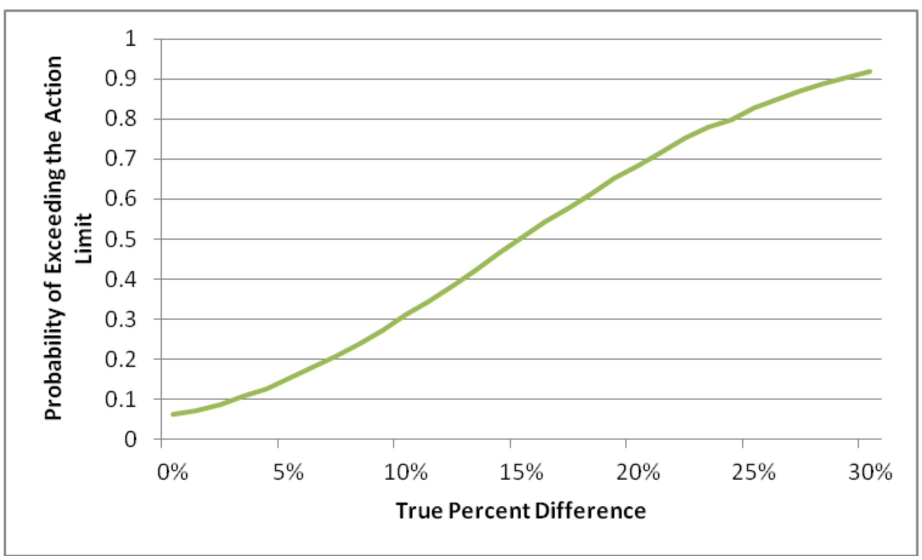


Figure D.2.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of 1,3-Butadiene Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D3. Evaluation for Measuring the Percent Decrease of Carbon Tetrachloride at All Locations Using A-Rated Data

Table D.3.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of carbon tetrachloride at all locations using NATTS A-rated data for the years 2008-2010. Table D.3.2 shows the output values from the simulations. Figure D.3.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.3.2 suggests that the specified air toxics Program-Level DQO will be met for carbon tetrachloride at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.3.1. Evaluation Input Parameters for Carbon Tetrachloride at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	1.56	18%	0.68
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.17	0.17

Table D.3.2. Evaluation Output Parameters for Carbon Tetrachloride at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
0%	100%

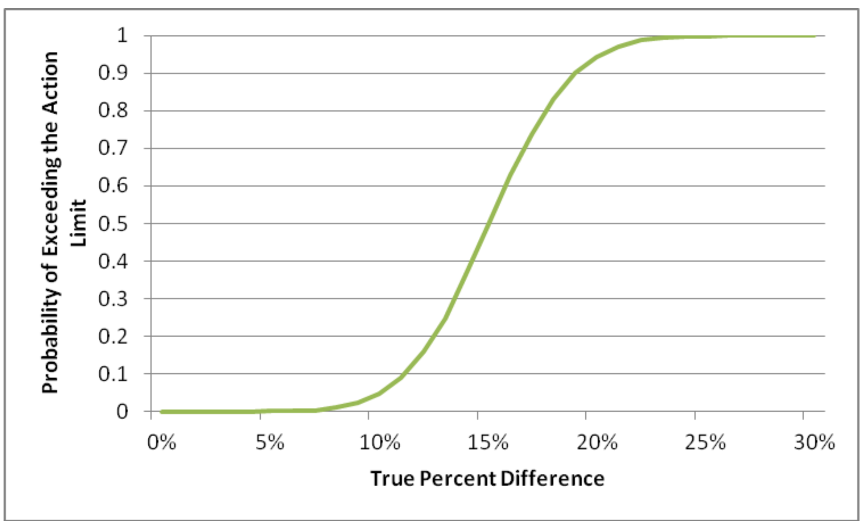


Figure D.3.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Carbon Tetrachloride Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D4. Evaluation for Measuring the Percent Decrease of Chloroform at All Locations Using A-Rated Data

Table D.4.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of chloroform at all locations using NATTS A-rated data for the years 2008-2010. Table D.4.2 shows the output values from the simulations. Figure D.4.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.4.2 suggests that the specified air toxics Program-Level DQO will be met for chloroform at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.4.1. Evaluation Input Parameters for Chloroform at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	4.48	49%	0.24
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.50	9.8

Table D.4.2. Evaluation Output Parameters for Chloroform at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
1%	97%

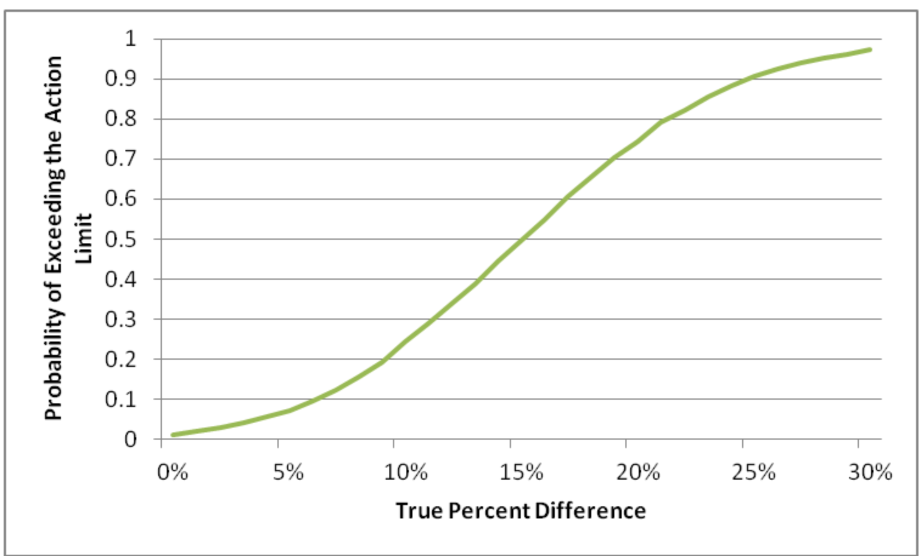


Figure D.4.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Chloroform Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D5. Evaluation for Measuring the Percent Decrease of Tetrachloroethylene at All Locations Using A-Rated Data

Table D.5.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of tetrachloroethylene at all locations using NATTS A-rated data for the years 2008-2010. Table D.5.2 shows the output values from the simulations. Figure D.5.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.5.2 suggests that the specified air toxics Program-Level DQO will be met for tetrachloroethylene at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.5.1. Evaluation Input Parameters for Tetrachloroethylene at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	5.87	74%	0.26
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.17	0.17

Table D.5.2. Evaluation Output Parameters for Tetrachloroethylene at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
7%	90%

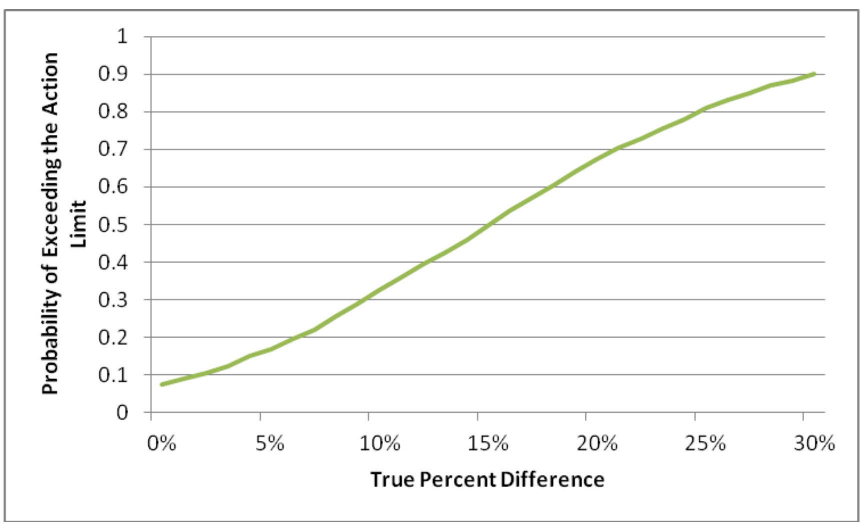


Figure D.5.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Tetrachloroethylene Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D6. Evaluation for Measuring the Percent Decrease of Trichloroethylene at All Locations Using A-Rated Data

Table D.6.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of trichloroethylene at all locations using NATTS A-rated data for the years 2008-2010. Table D.6.2 shows the output values from the simulations. Figure D.6.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.6.2 suggests that the specified air toxics Program-Level DQO will be met for trichloroethylene at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.6.1. Evaluation Input Parameters for Trichloroethylene at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	5.75	75%	0.06
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.50	0.50

Table D.6.2. Evaluation Output Parameters for Trichloroethylene at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
7%	90%

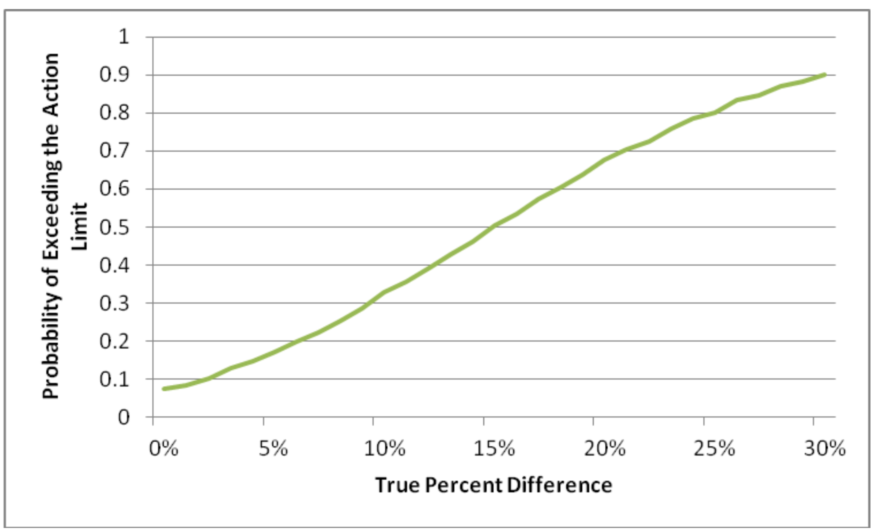


Figure D.6.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Trichloroethylene Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D7. Evaluation for Measuring the Percent Decrease of Acetaldehyde at All Locations Using A-Rated Data

Table D.7.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of acetaldehyde at all locations using NATTS A-rated data for the years 2008-2010. Table D.7.2 shows the output values from the simulations. Figure D.7.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.7.2 suggests that the specified air toxics Program-Level DQO will be met for acetaldehyde at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.7.1. Evaluation Input Parameters for Acetaldehyde at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	3.06	52%	1.85
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.45	0.45

Table D.7.2 Evaluation Output Parameters for Acetaldehyde at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
1%	97%

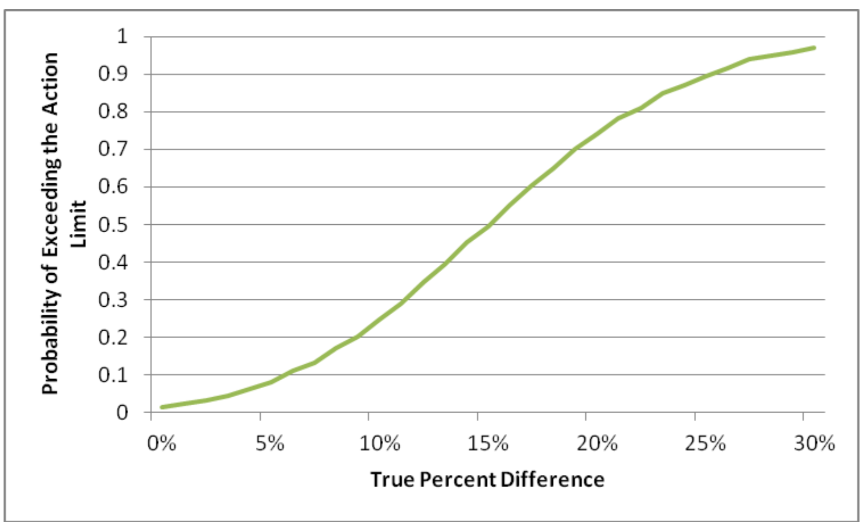


Figure D.7.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Acetaldehyde Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D8. Evaluation for Measuring the Percent Decrease of Formaldehyde at All Locations Using A-Rated Data

Table D.8.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of formaldehyde at all locations using NATTS A-rated data for the years 2008-2010. Table D.8.2 shows the output values from the simulations. Figure D.8.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.8.2 suggests that the specified air toxics Program-Level DQO will be met for formaldehyde at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.8.1. Evaluation Input Parameters for Formaldehyde at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	4.09	47%	2.81
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
10%	15%	85%	0	0.98	0.98

Table D.8.2. Evaluation Output Parameters for Formaldehyde at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
1%	98%

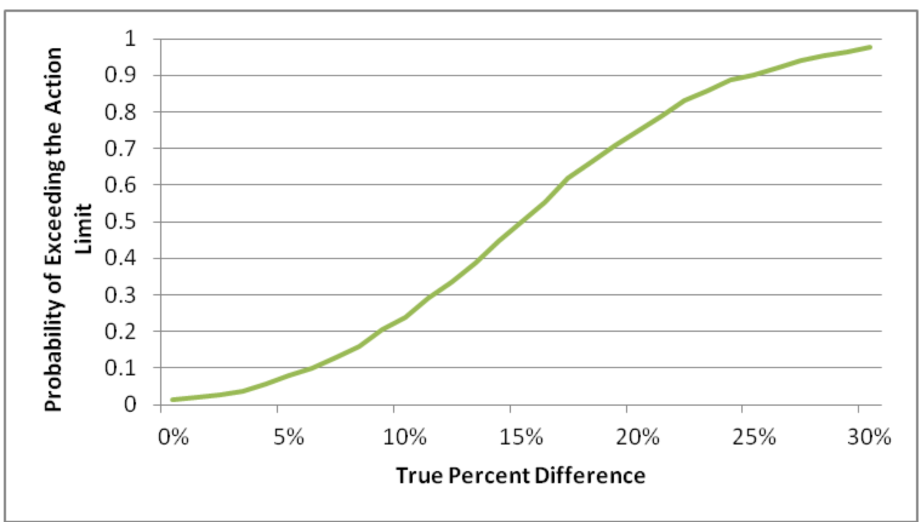


Figure D.8.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Formaldehyde Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D9. Evaluation for Measuring the Percent Decrease of Arsenic (PM_{10}) at All Locations Using A-Rated Data

Table D.9.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of arsenic (PM_{10}) at all locations using NATTS A-rated data for the years 2008-2010. Table D.9.2 shows the output values from the simulations. Figure D.9.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.9.2 suggests that the specified air toxics Program-Level DQO is close to being met for arsenic (PM_{10}) at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.9.1. Evaluation Input Parameters for Arsenic (PM_{10}) at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	4.69	85%	0.00089
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
15%	15%	85%	0	0.00023	0.00023

Table D.9.2. Evaluation Output Parameters for Arsenic (PM_{10}) at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
10%	88%

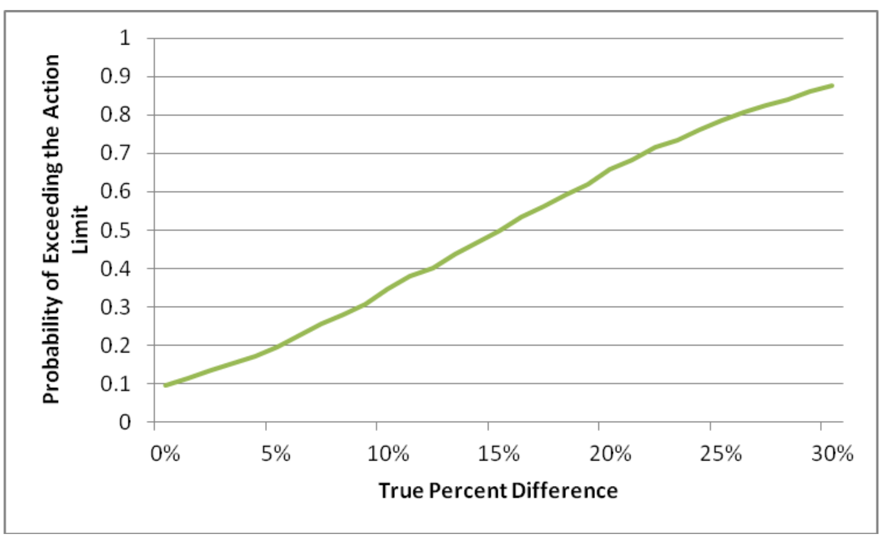


Figure D.9.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Arsenic (PM_{10}) Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D10. Evaluation for Measuring the Percent Decrease of Cadmium (PM_{10}) at All Locations Using A-Rated Data

Table D.10.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of cadmium (PM_{10}) at all locations using NATTS A-rated data for the years 2008-2010. Table D.10.2 shows the output values from the simulations. Figure D.10.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.10.2 suggests that the specified air toxics Program-Level DQO is close to being met for cadmium (PM_{10}) at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.10.1. Evaluation Input Parameters for Cadmium (PM_{10}) at all Locations Using A-rated Data

T1	**Action Limit**	**Sampling Rate**	**Seasonality**	**Population CV**	**Initial Concentration (μg/m^3)**
15%	15%	1 in 6 day	6.74	87%	0.00019
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
15%	15%	85%	0	0.00056	0.00056

Table D.10.2. Evaluation Output Parameters for Cadmium (PM_{10}) at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
11%	87%

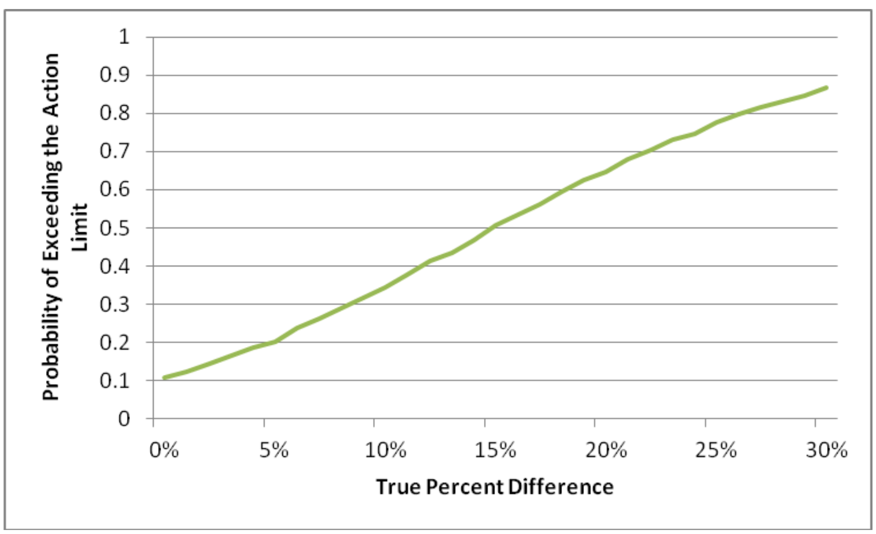


Figure D.10.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Cadmium (PM_{10}) Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D11. Evaluation for Measuring the Percent Decrease of Lead (PM_{10}) at All Locations Using A-Rated Data

Table D.11.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of lead (PM_{10}) at all locations using NATTS A-rated data for the years 2008-2010. Table D.11.2 shows the output values from the simulations. Figure D.11.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.11.2 suggests that the specified air toxics Program-Level DQO is close to being met for lead (PM_{10}) at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.11.1. Evaluation Input Parameters for Lead (PM_{10}) at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	4.09	80%	0.00414
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
15%	15%	85%	0	0.015	0.150

Table D.11.2. Evaluation Output Parameters for Lead (PM_{10}) at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
8%	87%

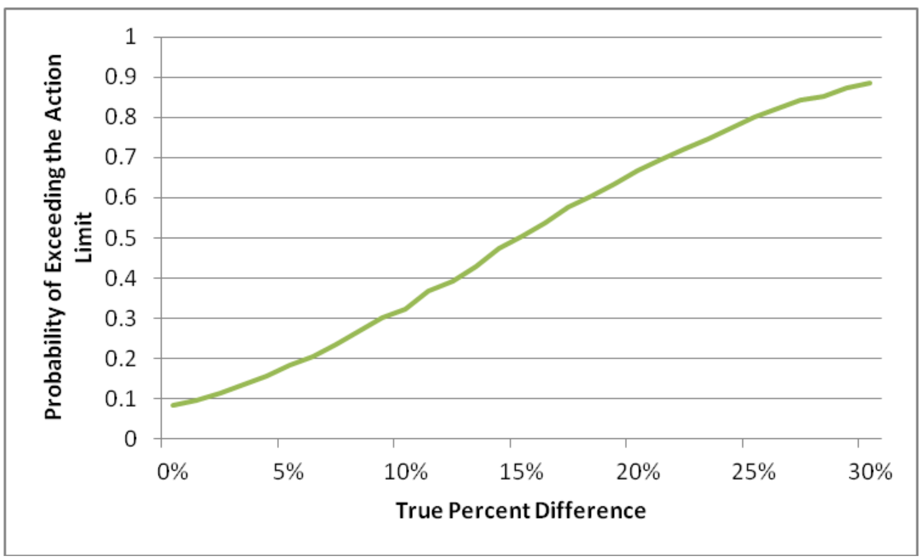


Figure D.11.1 Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Lead (PM_{10}) Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D12. Evaluation for Measuring the Percent Decrease of Manganese (PM_{10}) at All Locations Using A-Rated Data

Table D.12.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of manganese (PM_{10}) at all locations using NATTS A-rated data for the years 2008-2010. Table D.12.2 shows the output values from the simulations. Figure D.12.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.12.2 suggests that the specified air toxics Program-Level DQO will be met for manganese (PM_{10}) at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.12.1. Evaluation Input Parameters for Manganese (PM_{10}) at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (µg/m^3)
10%	15%	1 in 6 day	5.55	75%	0.00728
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (µg/m^3)**	**Risk Standard (µg/m^3)**
10%	15%	85%	0	0.005	0.050

Table D.12.2 Evaluation Output Parameters for Manganese (PM_{10}) at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
8%	90%

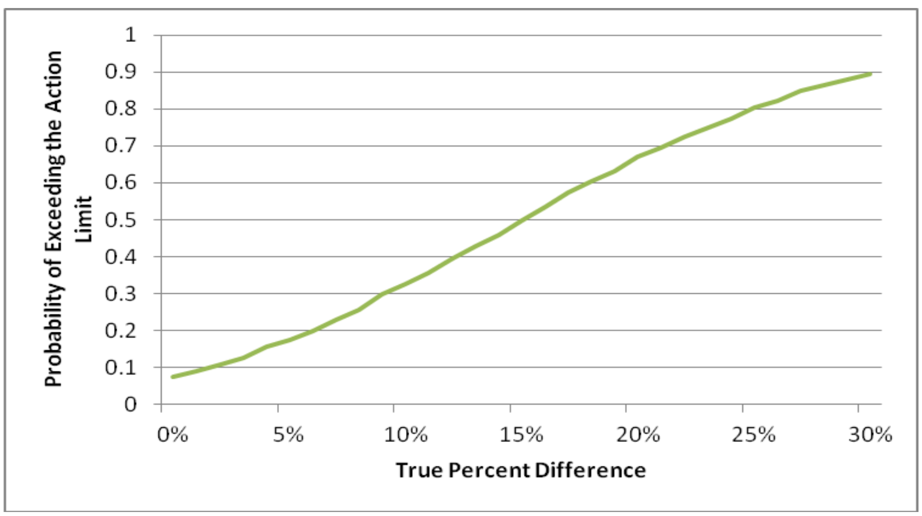


Figure D.12.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Manganese (PM_{10}) Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D13. Evaluation for Measuring the Percent Decrease of Nickel (PM_{10}) at All Locations Using A-Rated Data

Table D.13.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of nickel (PM_{10}) at all locations using NATTS A-rated data for the years 2008-2010. Table D.13.2 shows the output values from the simulations. Figure D.13.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.13.2 suggests that the specified air toxics Program-Level DQO will be met for nickel (PM_{10}) at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.13.1. Evaluation Input Parameters for Nickel (PM_{10}) at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m³)
10%	15%	1 in 6 day	3.76	69%	0.00204
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m³)**	**Risk Standard (μg/m³)**
10%	15%	85%	0	0.0021	0.0042

Table D.13.2. Evaluation Output Parameters for Nickel (PM_{10}) at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
5%	92%

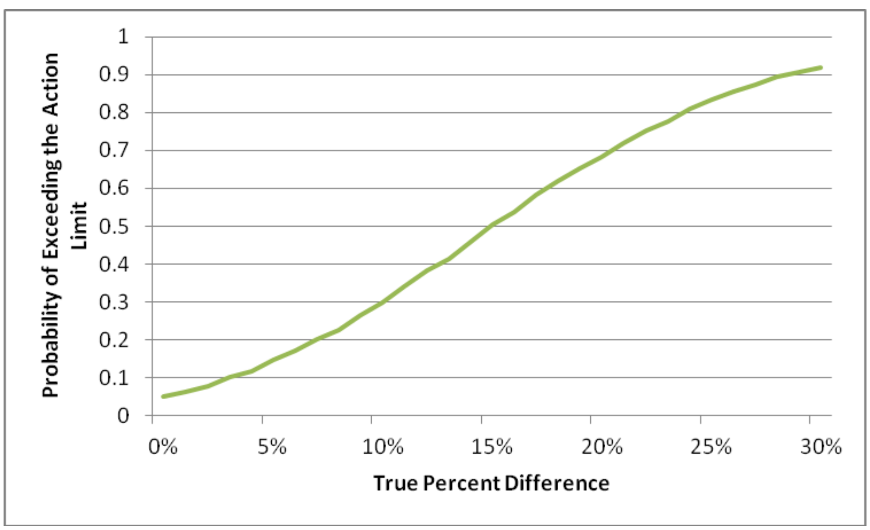


Figure D.13.1. Power Curve For Detecting a 15 Percent Decrease Between Successive 3-year Means of Nickel (PM_{10}) Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D14. Evaluation for Measuring the Percent Decrease of Hexavalent Chromium at All Locations Using A-Rated Data

Table D.14.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of hexavalent chromium at all locations using NATTS A-rated data for the years 2008-2010. Table D.14.2 shows the output values from the simulations. Figure D.14.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.14.2 suggests that the specified air toxics Program-Level DQO is close to being met for hexavalent chromium at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.14.1. Evaluation Input Parameters for Hexavalent Chromium at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (µg/m^3)
15%	15%	1 in 6 day	9.42	95%	0.00003
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (µg/m^3)**	**Risk Standard (µg/m^3)**
20%	15%	85%	0	0.00008	0.00008

Table D.14.2. Evaluation Output Parameters for Hexavalent Chromium at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
14%	84%

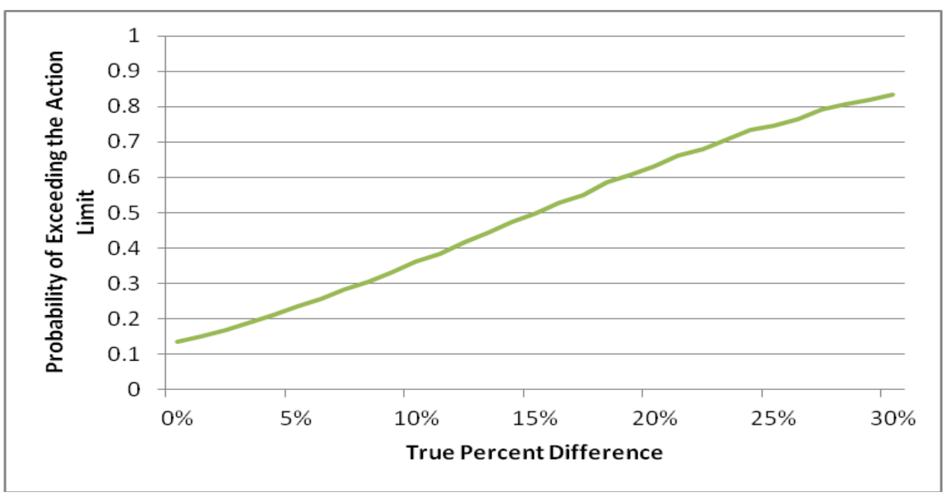


Figure D.14.1 Power Curve For Detecting a 15 Percent Decrease Between Successive 3-year Means of Hexavalent Chromium Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

D15. Evaluation for Measuring the Percent Decrease of Naphthalene at All Locations Using A-Rated Data

Table D.15.1 shows the input parameters used in the simulation model in developing the DQO for measuring the percent decrease between 3-year mean concentrations of naphthalene at all locations using NATTS A-rated data for the years 2008-2010. Table D.15.2 shows the output values from the simulations. Figure D.15.1 shows the associated power curve, which shows the probability of observing a 15 percent difference between successive 3-year means as a function of the true percent difference in the distinct 3-year means. In summary, based on variability and uncertainty estimates from the NATTS A-rated data, Table D.15.2 suggests that the specified air toxics Program-Level DQO will be met for naphthalene at all sites with A-rated data that satisfy the goals of 1-in-6 day sampling, 85 percent completeness, and 15 percent measurement CV. (See Section 3.0 for definitions of the input parameters and output values.)

Table D.15.1. Evaluation Input Parameters for Naphthalene at all Locations Using A-rated Data

T1	Action Limit	Sampling Rate	Seasonality	Population CV	Initial Concentration (μg/m^3)
10%	15%	1 in 6 day	4.33	83%	0.09344
T2	**Measurement CV**	**Completeness**	**Autocorrelation**	**MDL (μg/m^3)**	**Risk Standard (μg/m^3)**
15%	15%	85%	0	0.029	0.029

Table D.15.2. Evaluation Output Parameters for Naphthalene at all Locations Using A-rated Data

Error rate for no true change	Error rate for 30% decrease
9%	89%

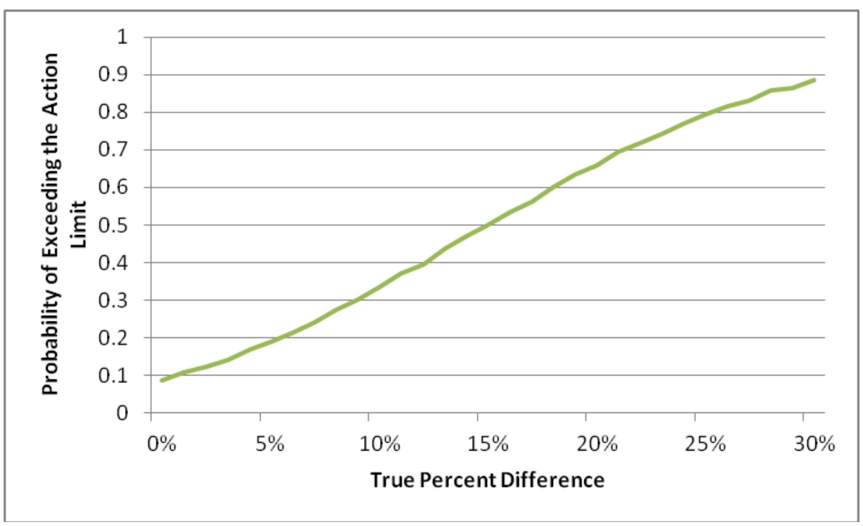
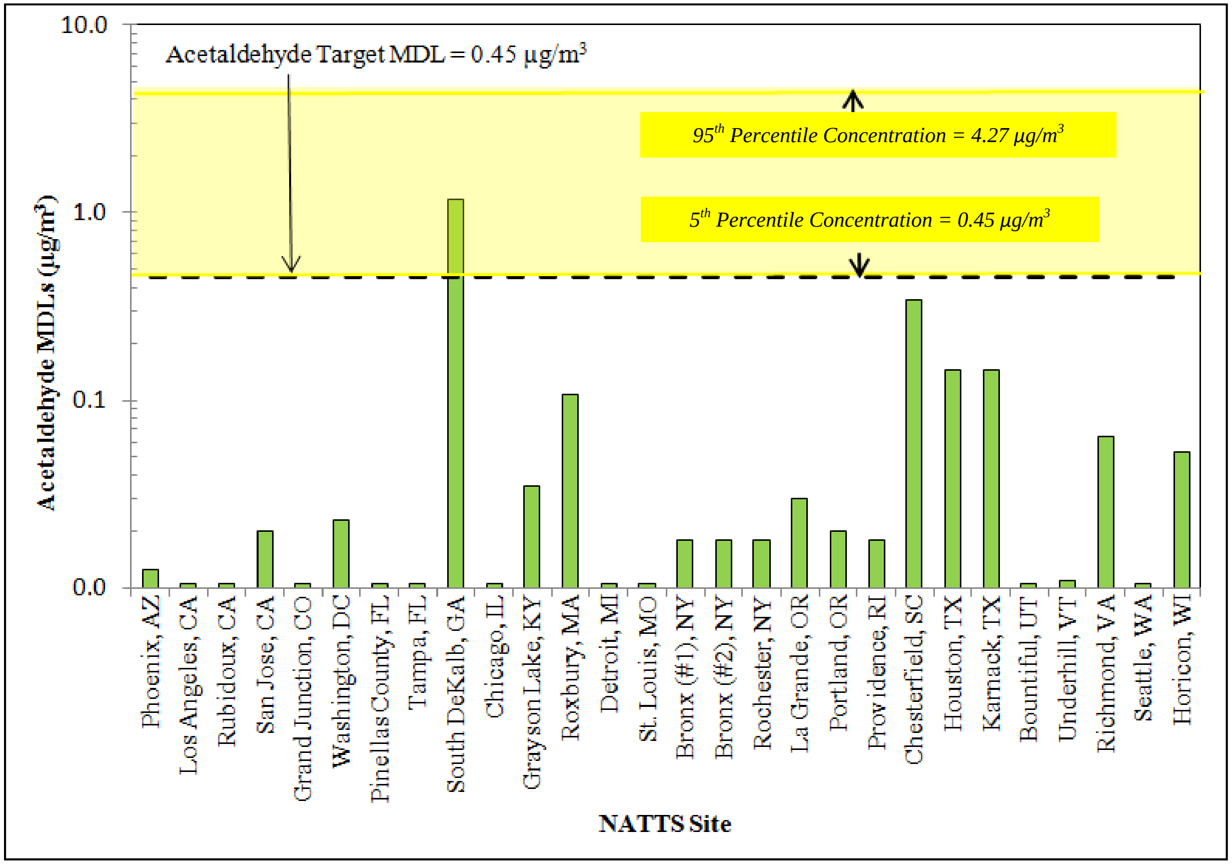


Figure D.15.1. Power Curve for Detecting a 15 Percent Decrease Between Successive 3-year Means of Naphthalene Concentrations Based on the Data Variation Found in all Locations Using A-Rated Data of the NATTS Data.

Appendix E – 2010 Method Detection Limit Data for the NATTS Network Sites

Figure E-1. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Acetaldehyde

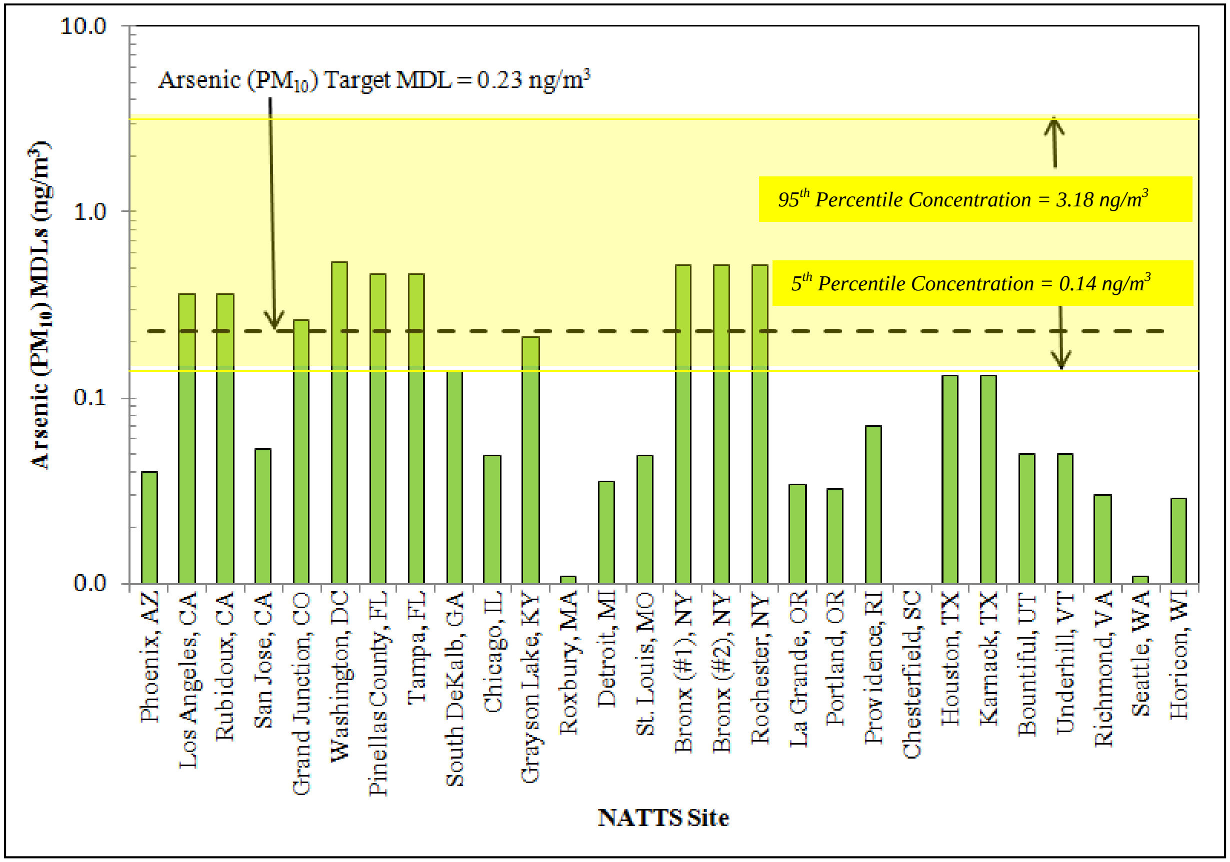


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for acetaldehyd**e** (0.45 µg/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

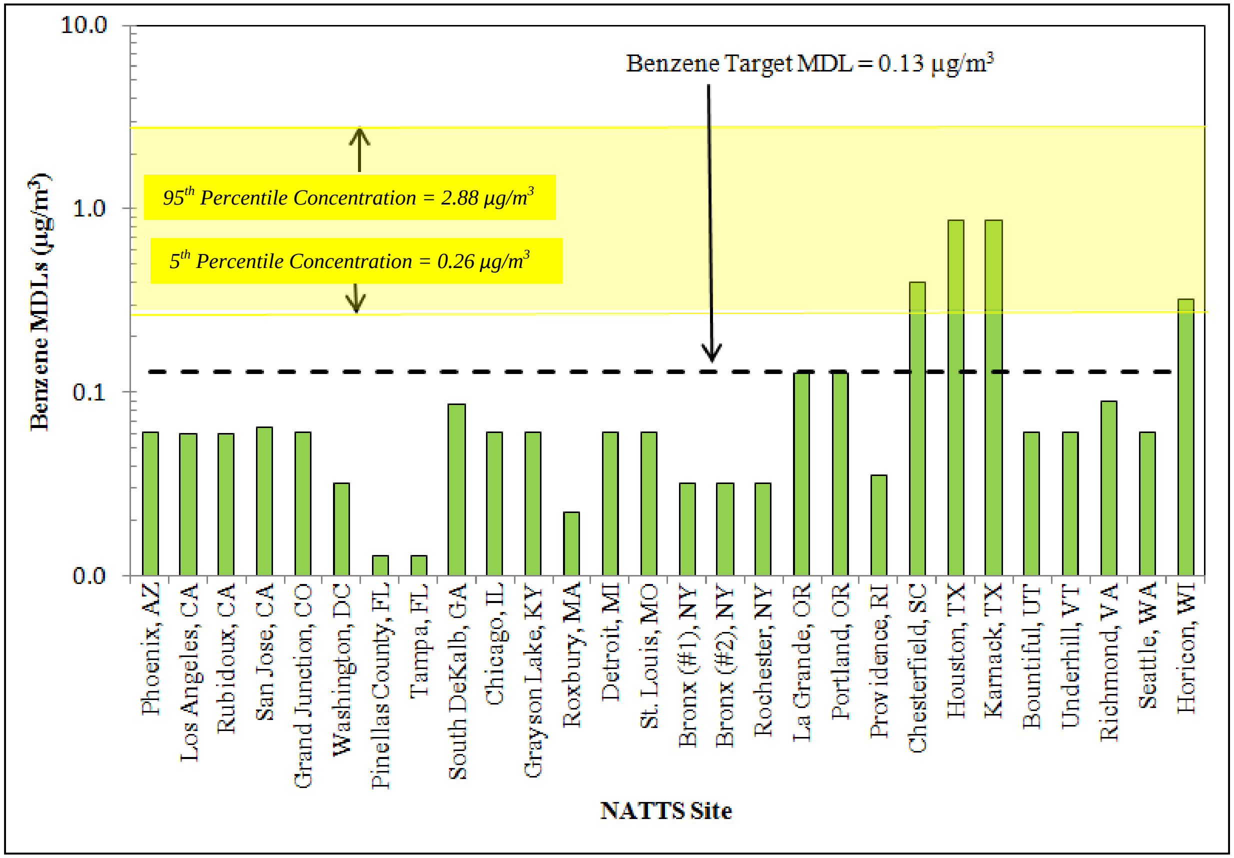
[3] From 2003-2010, there were over 10,200 detected acetaldehyde concentration at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.45 and 4.27 µg/m^3, respectively) of the complete acetaldehyde data set.

Figure E-2. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Arsenic (PM_{10})



1 Method Detection Limits (MDLs) are plotted on a logarithmic scale.
2 The target MDL for arsenic (PM_{10}) (0.23 ng/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
3 From 2003-2010, there were over 8,500 detected arsenic (PM_{10}) concentration at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.14 and 3.18 ng/m^3, respectively) of the complete arsenic (PM_{10}) data set.

Figure E-3. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Benzene

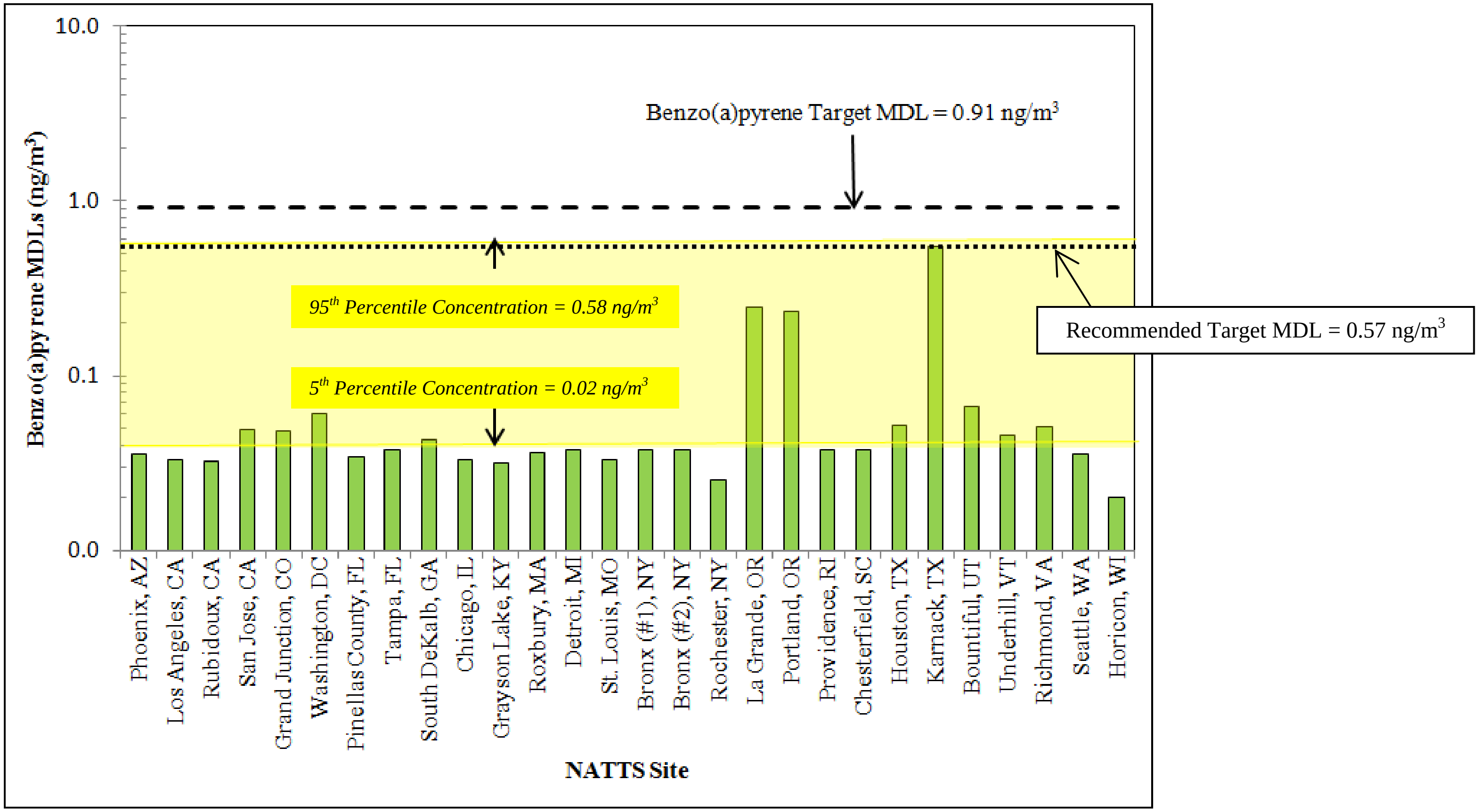


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for benzene (0.13 µg/m³) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

[3] From 2003-2010, there were over 9,600 detected benzene concentration at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.26 and 2.88 µg/m³, respectively) of the complete benzene data set.

Figure E-4. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Benzo(a)pyrene

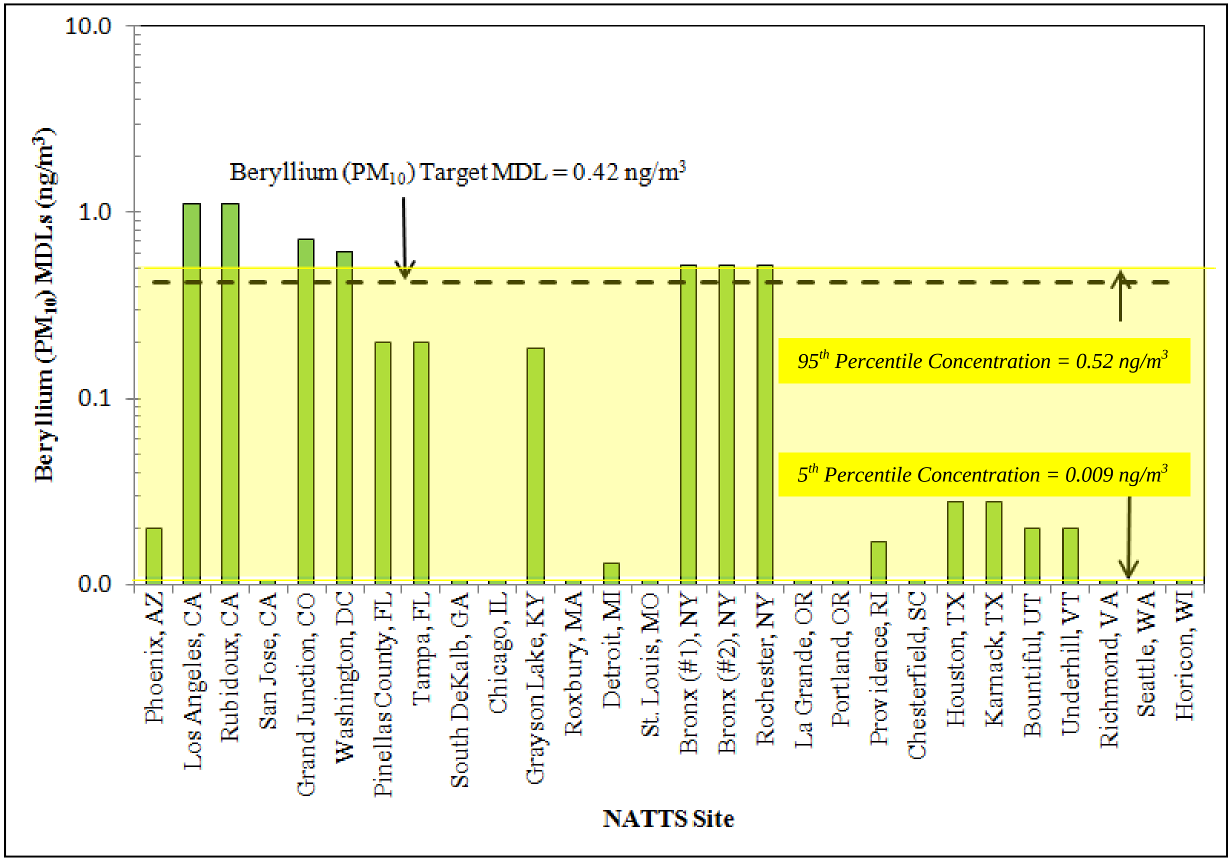


1 Method Detection Limits (MDLs) are plotted on a logarithmic scale.

2 The target MDL for benzo(a)pyrene (0.91 ng/m^3) is based on a concentration for a slightly higher than a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

3 From 2007-2010, there were over 2,600 detected benzo(a)pyrene concentration at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.02 and 0.58 ng/m^3, respectively) of the complete benzo(a)pyrene data set.

Figure E-5. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Beryllium (PM_{10})

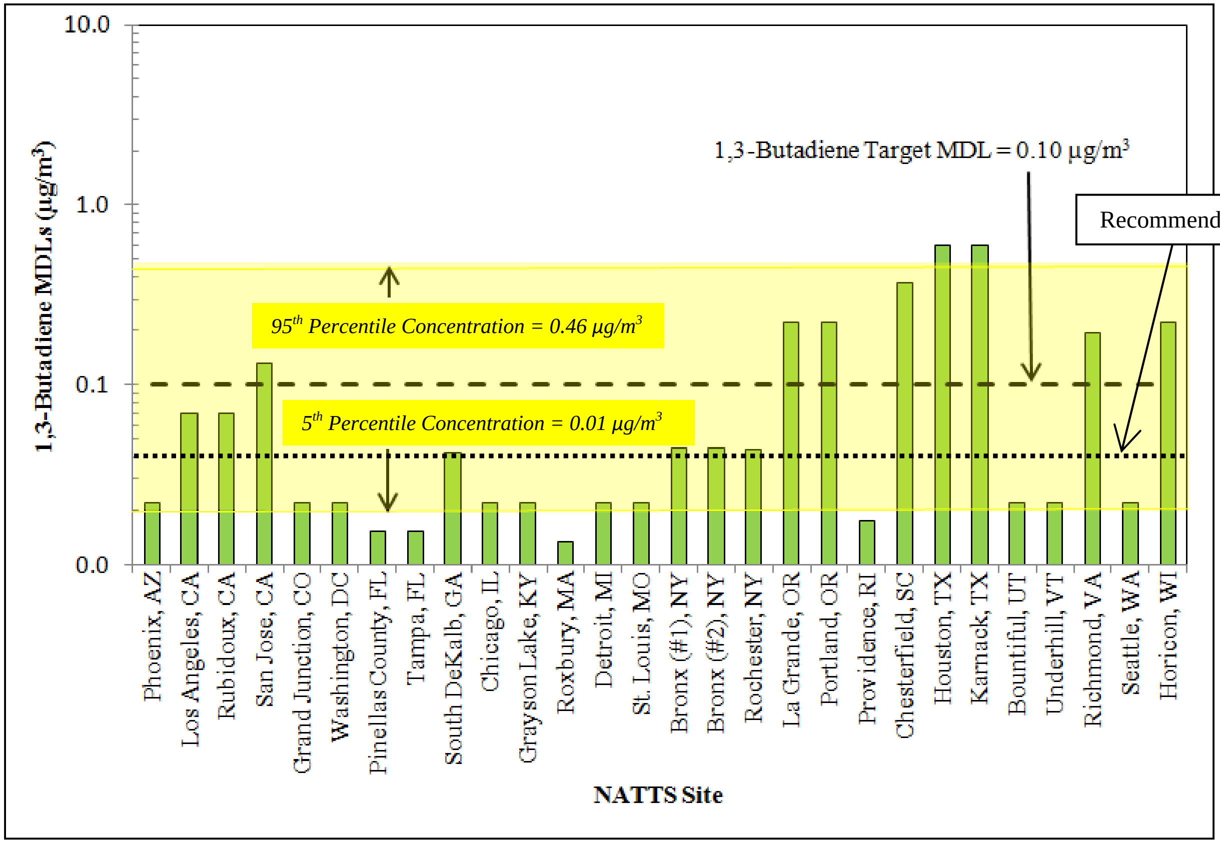


1 Method Detection Limits (MDLs) are plotted on a logarithmic scale.

2 The target MDL for beryllium (PM_{10}) (0.42 ng/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

3 From 2003-2010, there were over 5,800 detected beryllium (PM_{10}) concentration at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.0009 and 0.52 ng/m^3, respectively) of the complete beryllium (PM_{10}) data set.

Figure E-6. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–1,3-Butadiene

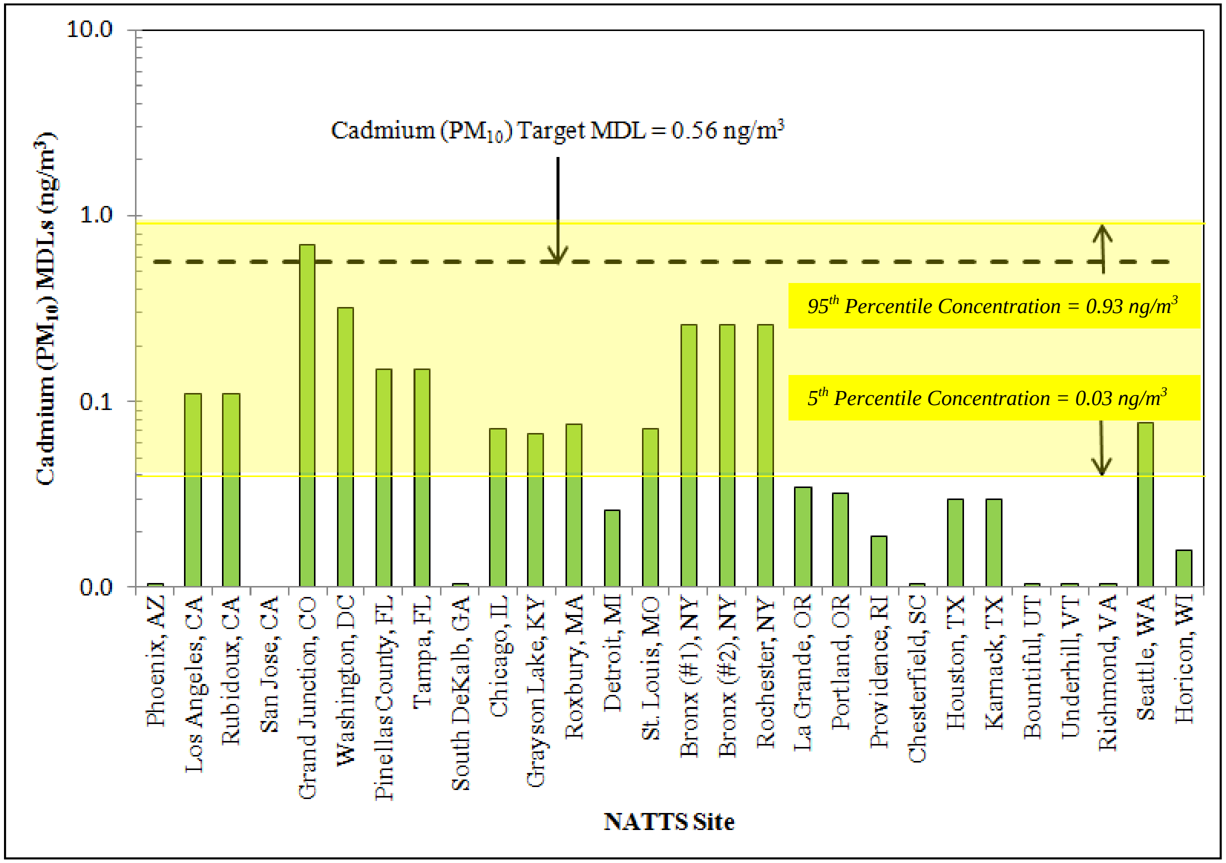


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for 1,3-butadiene (0.10 µg/m^3) is based on the concentration for a slightly higher than 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf)

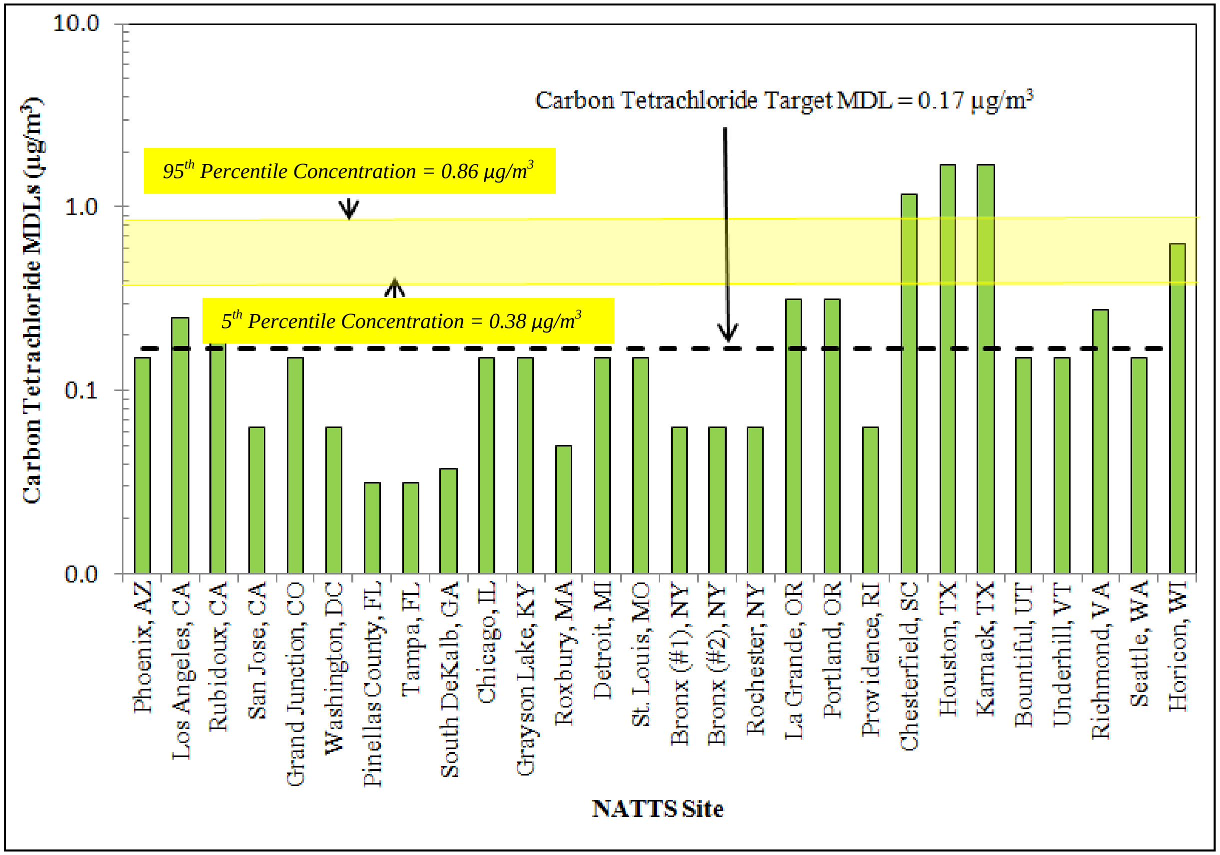
[3] From 2003-2010, there were over 7,000 detected 1,3-butadiene concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.01 and 0.46 µg/m^3, respectively) of the complete 1,3-butadiene data set.

Figure E-7. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Cadmium (PM_{10})



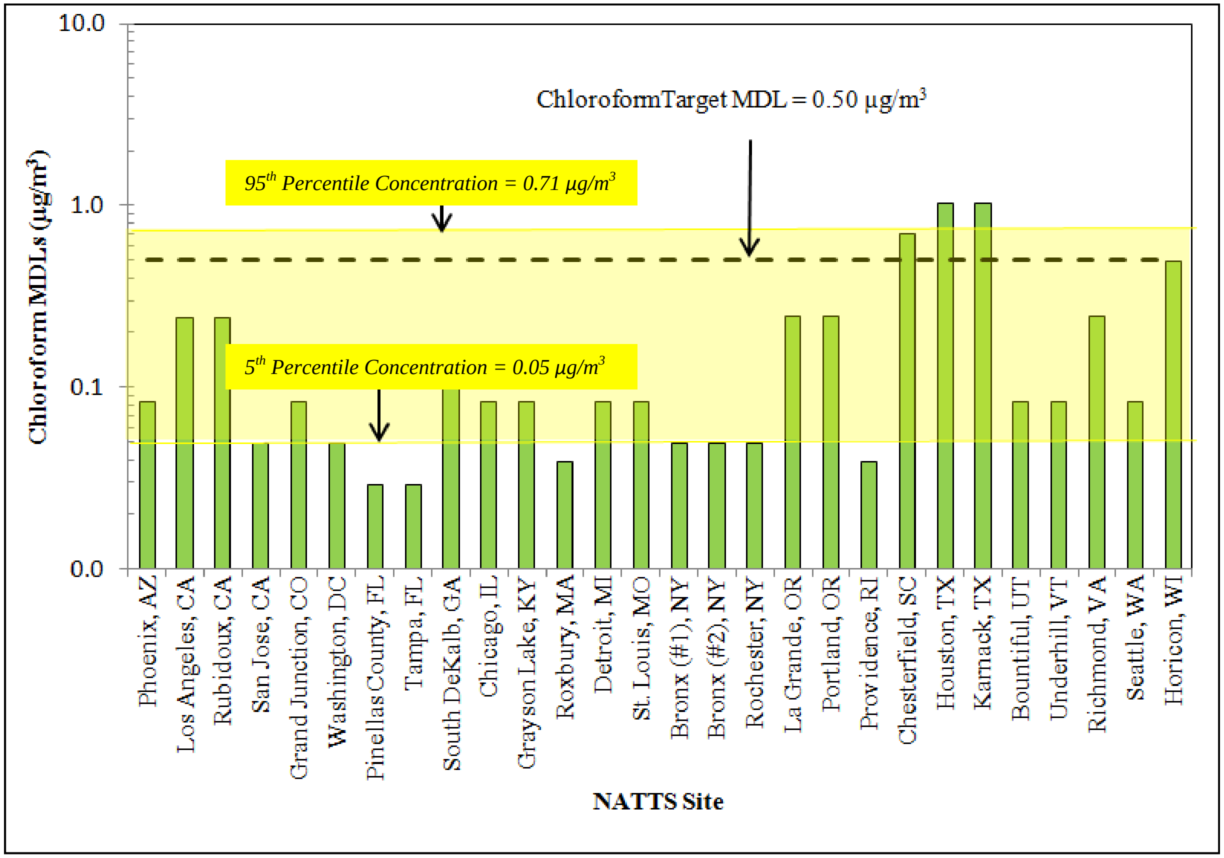
[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.
[2] The target MDL for cadmium (PM_{10}) (0.56 ng/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
[3] From 2003-2010, there were over 7,500 detected cadmium (PM_{10}) concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.03 and 0.93 ng/m^3, respectively) of the complete cadmium (PM_{10}) data set.

Figure E-8. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Carbon Tetrachloride



[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.
[2] The target MDL for carbon tetrachloride (0.17 µg/m³) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
[3] From 2003-2010, there were over 9,000 detected carbon tetrachloride concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.38 and 0.86 µg/m³, respectively) of the complete carbon tetrachloride data set.

Figure E-9. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Chloroform

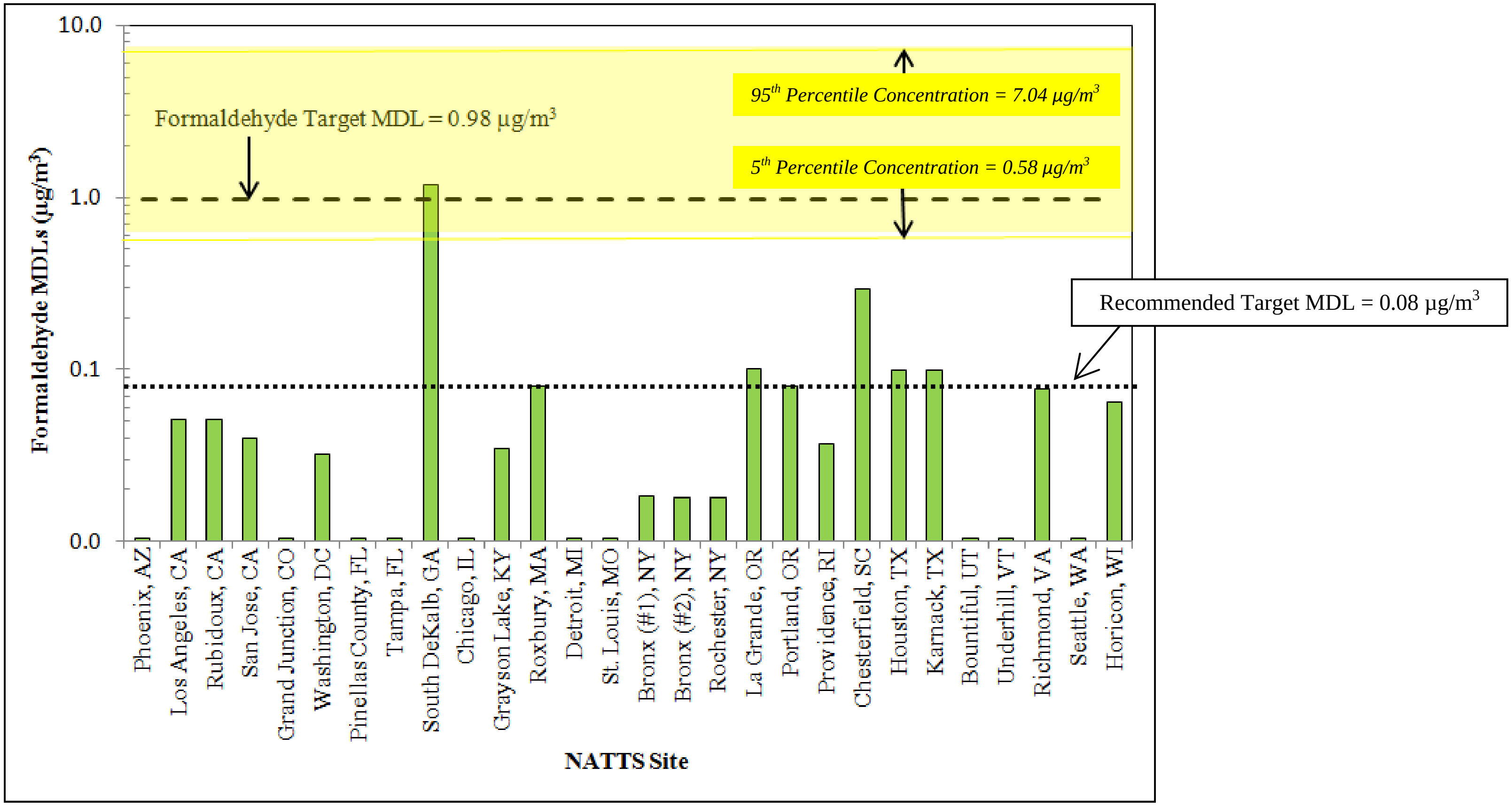


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for chloroform (0.50 µg/m^3) is based on the concentration for the hazard quotient/10, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

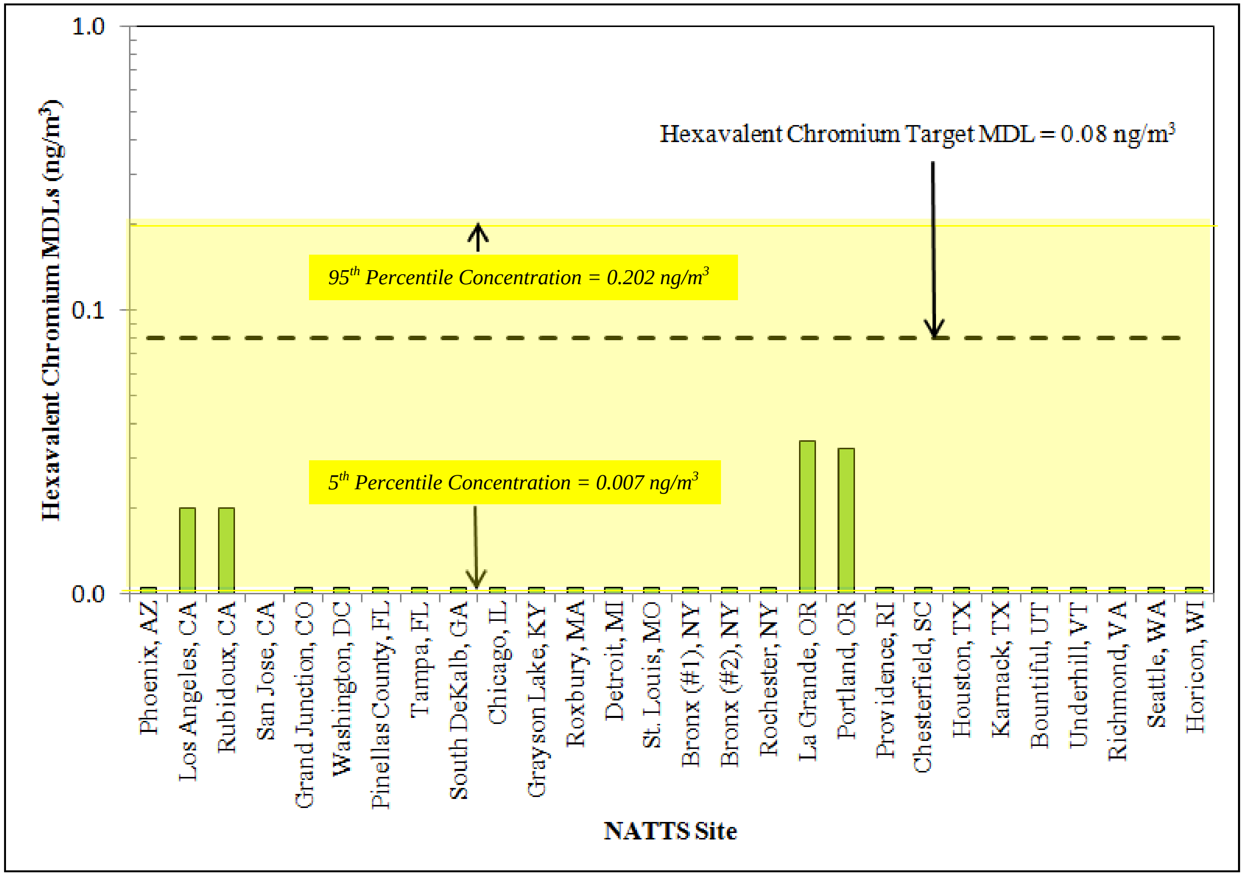
[3] From 2003-2010, there were over 7,600 detected chloroform concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.05 and 0.71µg/m^3, respectively) of the complete chloroform data set.

Figure E-10. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Formaldehyde



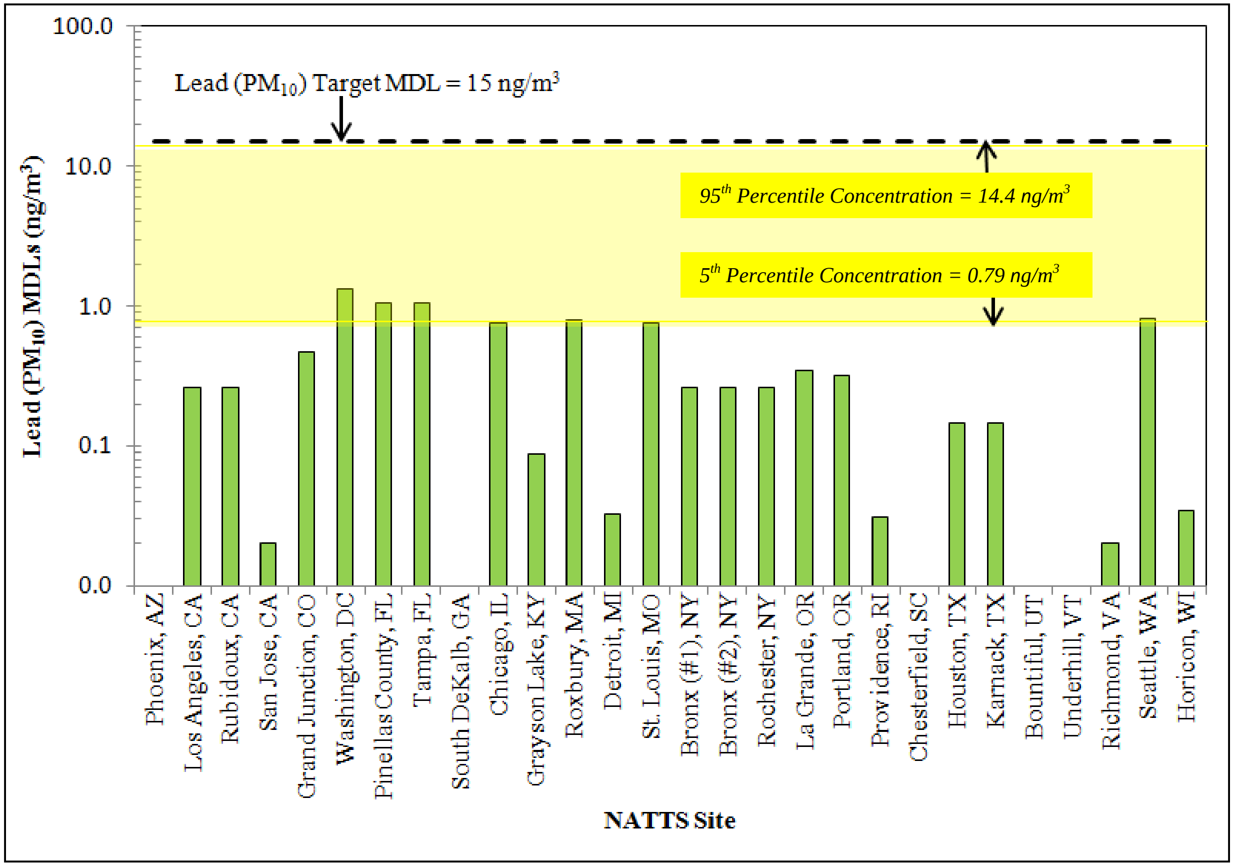
[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.
[2] The target MDL for formaldehyde (0.98 µg/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
[3] From 2003-2010, there were over 10,300 detected formaldehyde concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.58 and 7.04 µg/m^3, respectively) of the complete formaldehyde data set.

Figure E-11. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Hexavalent Chromium



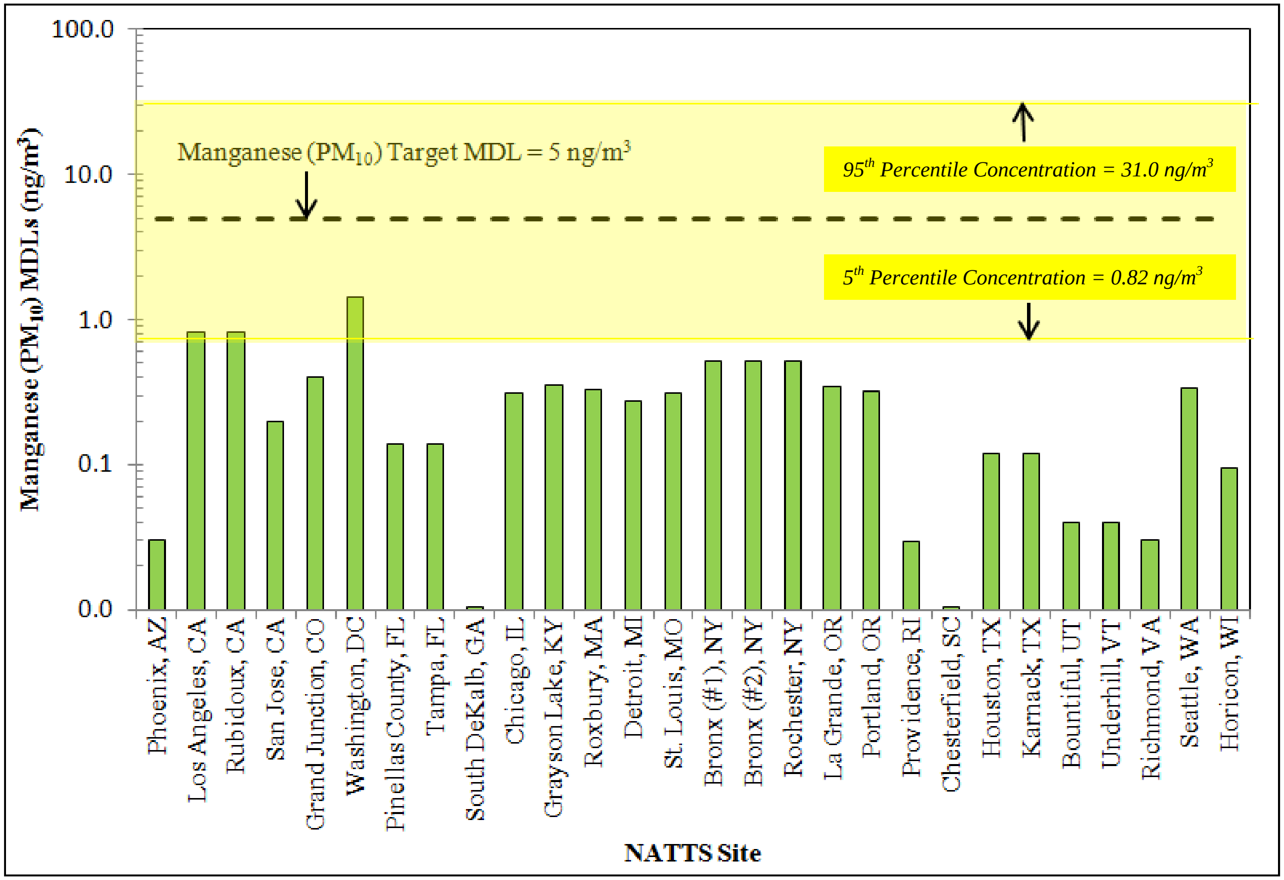
1 Method Detection Limits (MDLs) are plotted on a logarithmic scale. Hexavalent chromium were not sampled at the San Jose, CA NATTS site.
2 The target MDL for hexavalent chromium (0.083 ng/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
3 From 2005-2010, there were over 4,900 detected hexavalent chromium concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.007 and 0.202 ng/m^3, respectively) of the complete hexavalent chromium data set.

Figure E-12. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Lead (PM_{10})



1 Method Detection Limits (MDLs) are plotted on a logarithmic scale.
2 The target MDL for lead (PM_{10}) (15 ng/m^3) is based on the concentration for the hazard quotient/10, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
3 From 2003-2010, there were over 9,200 detected lead (PM_{10}) concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.79 and 14.4 ng/m^3, respectively) of the complete lead (PM_{10}) data set.

Figure E-13. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Manganese (PM_{10})

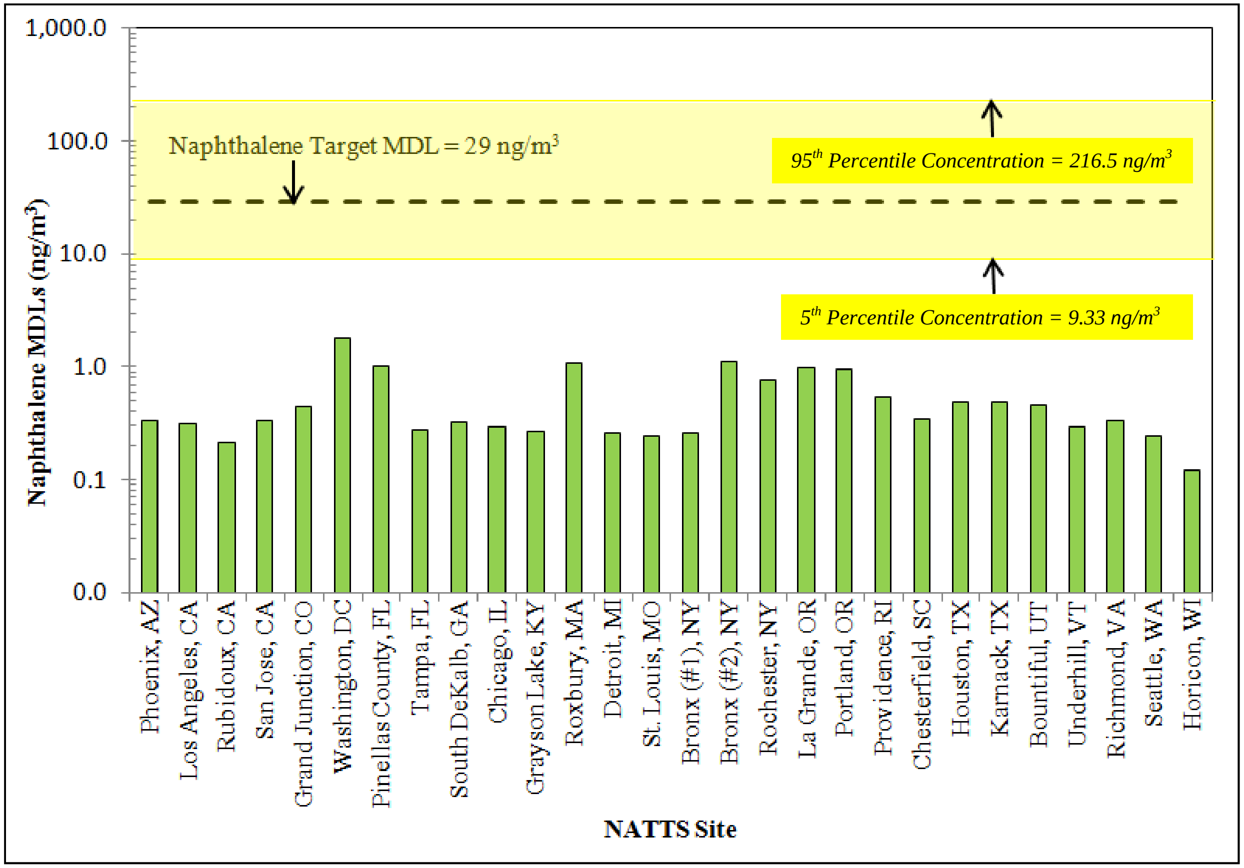


1 Method Detection Limits (MDLs) are plotted on a logarithmic scale.

2 The target MDL for manganese (PM_{10}) (5.0 ng/m^3) is based on the concentration for the hazard quotient/10, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

3 From 2003-2010, there were over 9,100 detected manganese (PM_{10}) concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.82 and 31.0 ng/m^3, respectively) of the complete manganese (PM_{10}) data set.

Figure E-14. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Naphthalene

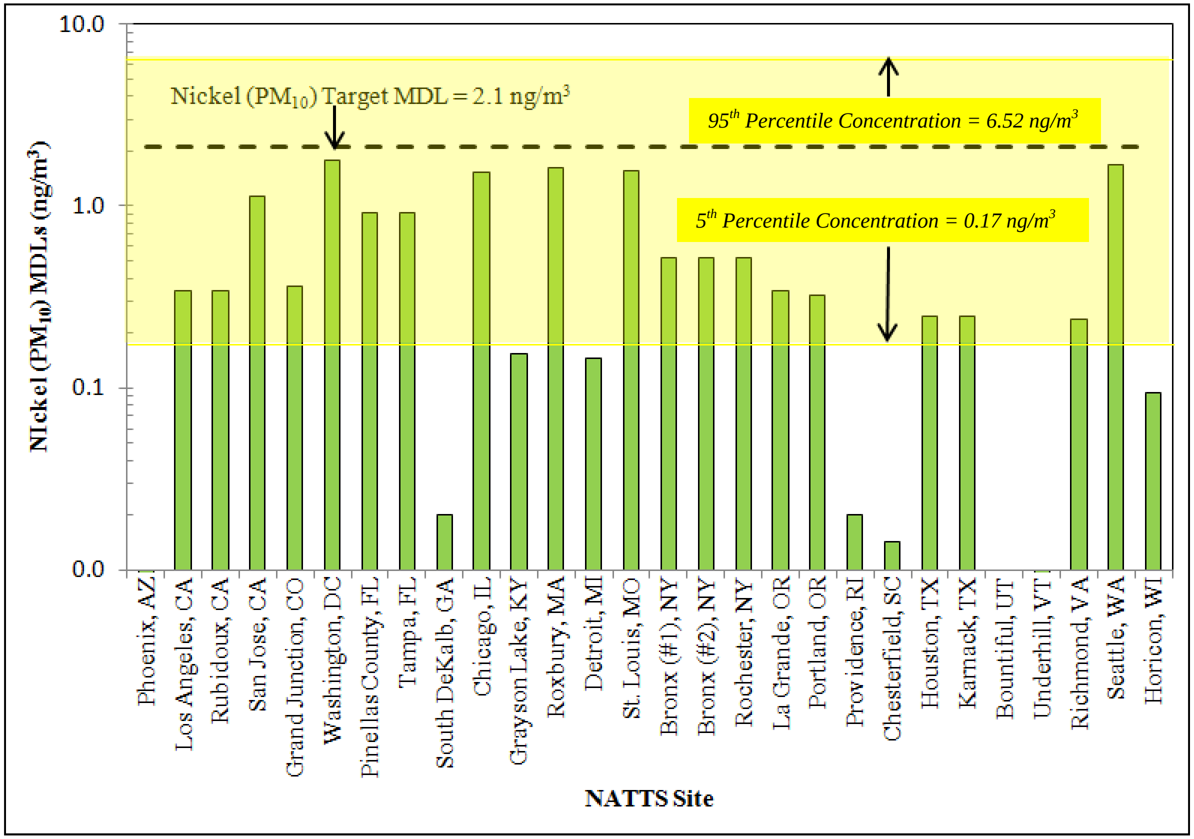


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for naphthalene (29 ng/m³) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

[3] From 2007-2010, there were over 4,300 detected naphthalene concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (9.33 and 216.5 ng/m³, respectively) of the complete naphthalene data set.

Figure E-15. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Nickel (PM_{10})

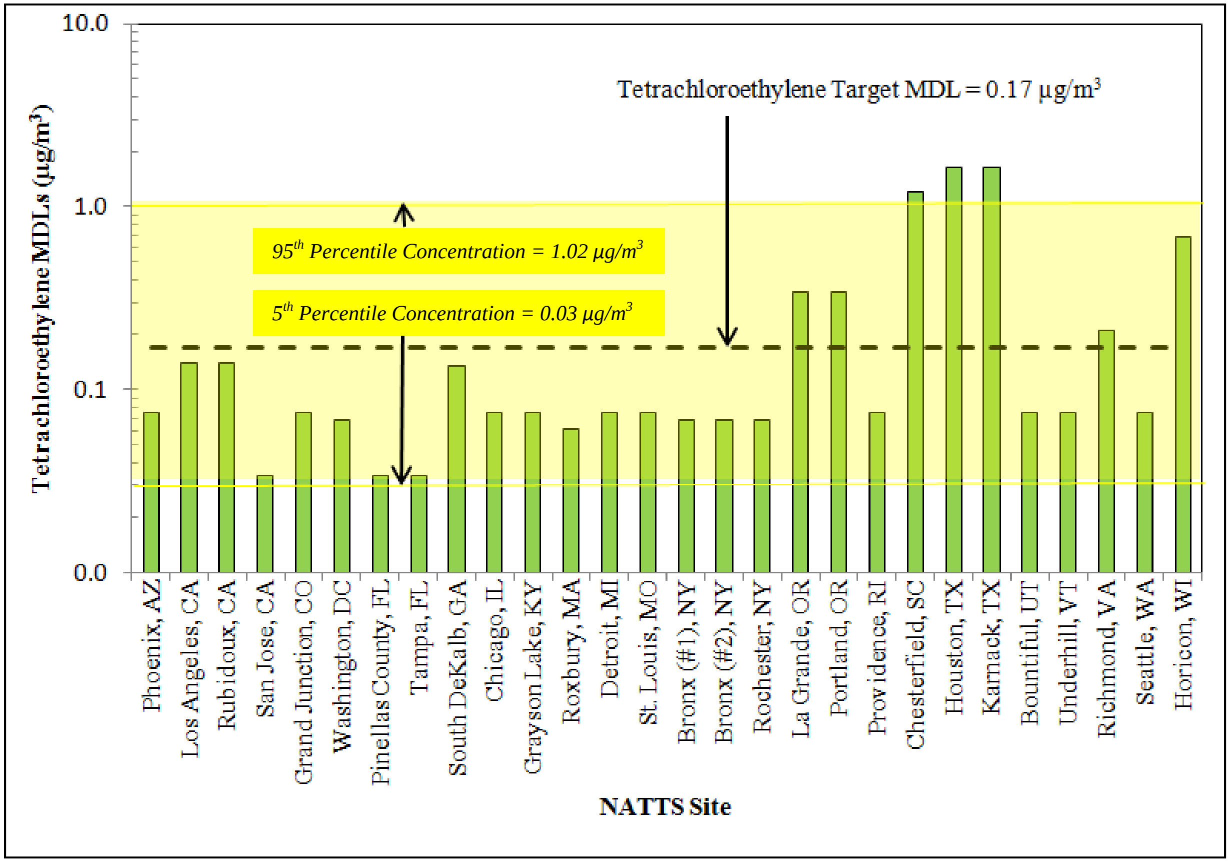


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for nickel (PM_{10}) (2.1 ng/m^3) is based on the concentration for less than 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

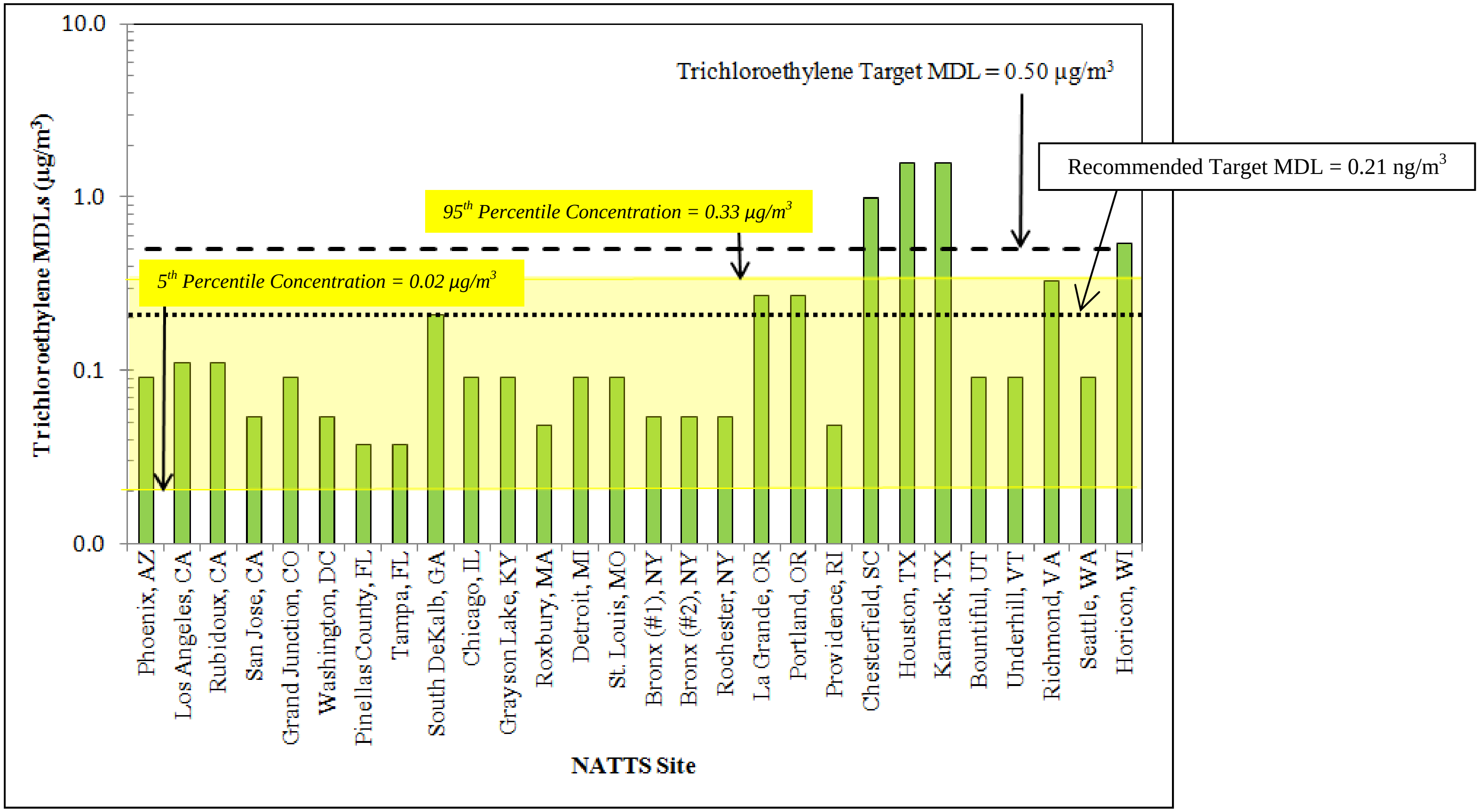
[3] From 2003-2010, there were over 8,600 detected nickel (PM_{10}) concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.17 and 6.52 ng/m^3, respectively) of the complete nickel (PM_{10}) data set.

Figure E-16. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Tetrachloroethylene



1 Method Detection Limits (MDLs) are plotted on a logarithmic scale.
2 The target MDL for tetrachloroethylene (0.17 µg/m3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).
3 From 2003-2010, there were over 7,300 detected tetrachloroethylene concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.03 and 1.02 µg/m3, respectively) of the complete tetrachloroethylene data set.

Figure E-17. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Trichloroethylene

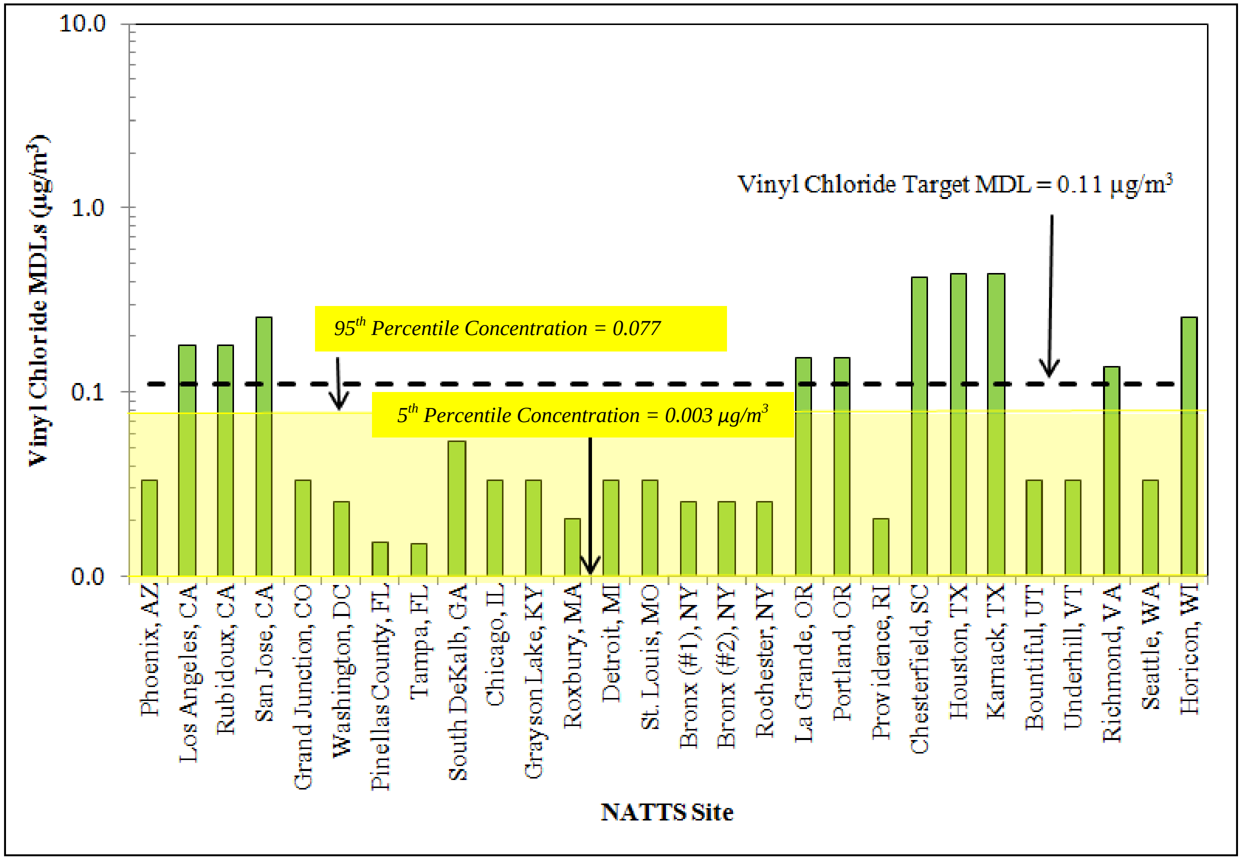


[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for trichloroethylene (0.50 µg/m³) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

[3] From 2003-2010, there were over 4,600 detected trichloroethylene concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.02 and 0.33µg/m³, respectively) of the complete trichloroethylene data set.

Figure E-18. Comparison of the 2010 Method Detection Limits (MDLs) by NATTS Site,[1] the Target MDL,[2] and the 5th and 95th Percentile Concentrations of All NATTS Detects[3]–Vinyl Chloride



[1] Method Detection Limits (MDLs) are plotted on a logarithmic scale.

[2] The target MDL for vinyl chloride (0.11 µg/m^3) is based on the concentration for a 1-in-a-million cancer risk, as presented in the NATTS Workplan Template (http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsworkplantemplate.pdf).

[3] From 2003-2010, there were over 1,800 detected vinyl chloride concentrations at NATTS Sites. The shaded area represents the 5th and 95th percentiles of detected concentrations (0.003 and 0.077 µg/m^3, respectively) of the complete vinyl chloride data set.

Appendix F – 2010 Proficiency Test Data for the NATTS Network Sites

Table F-1. Bias Results at NATTS Sites for 2010 (% difference)

Year	Benzene	Butadiene, 1,3-	Carbon tetrachloride	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM_{10})	Beryllium (PM_{10})	Cadmium (PM_{10})	Lead (PM_{10})	Manganese (PM_{10})	Nickel (PM_{10})	Hexavalent Chromium	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM_{10} Metals						Cr^{+6}	PAHs	
Phoenix, AZ (AQS Site Code: 04-013-9997)																		
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	10.5[a]	-2.3	-17.1
Los Angeles, CA (AQS Site Code: 06-037-1103)																		
2010	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]	0.8	-3.5	-11.6	-18.0	-9.8	-7.7	-13.7	-11.2	--[c]	-2.3	-17.1
Rubidoux, CA (AQS Site Code: 06-065-8001)																		
2010	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]	0.8	-3.5	-11.6	-18.0	-9.8	-7.7	-13.7	-11.2	--[c]	-2.3	-17.1
San Jose, CA (AQS Site Code: 06-085-0005)																		
2010	-6.6	-8.5	20.4	-9.3	-8.6	5.5	18.8	-4.3	-3.1	7.3	11.2	4.9	-3.5	0.6	4.7	--[d]	-2.3	-17.1
Grand Junction, CO (AQS Site Code: 08-077-0017/-0018)																		
2010	-13.2	-3.7	31.6	1.0	-16.1	-6.4	-14.1	0.7	-2.8	6.7	9.0	-1.1	-7.5	-5.1	-0.8	10.5[a]	-2.3	-17.1
Washington, DC (AQS Site Code: 11-001-0043)																		
2010	1.1	22.0	16.3	-4.1	-1.1	3.7	5.9	1.6	-0.8	17.6	20.0	12.8	3.5	5.9	8.2	10.5[a]	-2.3	-17.1
Pinellas County, FL (AQS Site Code: 12-103-0026)																		
2010	-10.9	29.4	-9.6	-16.6	-23.5	-17.1	0.9	0.7	-2.8	1.0	3.0	0.0	-8.8	-4.9	7.1	10.5[a]	-2.3	-17.1
Tampa, FL (AQS Site Code: 12-057-3002)																		
2010	-10.9	29.4	-9.6	-16.6	-23.5	-17.1	0.9	0.7	-2.8	1.0	3.0	0.0	-8.8	-4.9	7.1	10.5[a]	-2.3	-17.1
South DeKalb, GA (AQS Site Code: 13-089-0002)																		
2010	-13.2	25.6	2.0	-16.5	-10.8	-10.1	-2.4	-2.7	-4.3	5.9	4.8	0.0	-1.1	1.0	8.6	10.5[a]	-2.3	-17.1
Chicago, IL (AQS Site Code: 17-031-4201)																		
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	10.5[a]	-2.3	-17.1
Grayson Lake, KY (AQS Site Code: 21-043-0500)																		
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	10.5[a]	-2.3	-17.1
Roxbury, MA (AQS Site Code: 25-025-0042)																		
2010	-8.8	3.7	-2.0	-7.2	-8.6	-12.8	-11.8	-9.0	-8.2	7.3	11.2	4.9	-3.5	0.6	4.7	10.5[a]	-2.3	-17.1

Table F-1. Bias Results at NATTS Sites for 2010 (% difference)

Year	Benzene	Butadiene, 1,3-	Carbon tetrachloride	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM_{10})	Beryllium (PM_{10})	Cadmium (PM_{10})	Lead (PM_{10})	Manganese (PM_{10})	Nickel (PM_{10})	Hexavalent Chromium	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM_{10} Metals						Cr^{+6}	PAHs	
Detroit, MI (AQS Site Code: 26-163-0033)																		
2010	-13.2	-3.7	31.6	1.0	-16.1	-6.4	-14.1	0.7	-2.8	-2.0	0.0	-10.6	47.4	98.0	2.0	10.5[a]	-2.3	-17.1
St. Louis, MO (AQS Site Code: 29-510-0085)																		
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	10.5[a]	-2.3	-17.1
Bronx (#1), NY (AQS Site Code: 36-005-0110)																		
2010	-8.8	15.9	-11.2	-22.7	-11.8	-15.6	-12.9	-2.4	-3.1	23.1	18.6	9.8	4.0	1.6	10.4	10.5[a]	-2.3	-17.1
Bronx (#2), NY (AQS Site Code: 36-005-0080)																		
2010	-8.8	15.9	-11.2	-22.7	-11.8	-15.6	-12.9	-2.4	-3.1	23.1	18.6	9.8	4.0	1.6	10.4	10.5[a]	-2.3	-17.1
Rochester, NY (AQS Site Code: 36-055-1007)																		
2010	-8.8	15.9	-11.2	-22.7	-11.8	-15.6	-12.9	-2.4	-3.1	23.1	18.6	9.8	4.0	1.6	10.4	10.5[a]	-2.3	-17.1
La Grande, OR (AQS Site Code: 41-061-0119)																		
2010	-12.1	-11.0	-30.6	-41.2	8.6	-14.7	-23.5	2.7	-2.0	12.0	11.6	5.1	-6.0	-2.5	-1.4	10.5[a]	-40.7	-42.3
Portland, OR (AQS Site Code: 41-051-0246)																		
2010	-12.1	-11.0	-30.6	-41.2	8.6	-14.7	-23.5	2.7	-2.0	12.0	11.6	5.1	-6.0	-2.5	-1.4	--[c]	-40.7	-42.3
Providence, RI (AQS Site Code: 44-007-0022)																		
2010	-8.8	3.7	-2.0	-7.2	-8.6	-12.8	-11.8	3.9	8.2	56.1	41.4	-6.0	-5.1	5.3	5.5	10.5[a]	-2.3	-17.1
Chesterfield, SC (AQS Site Code: 45-025-0001)																		
2010	-18.7	9.8	-24.5	-24.7	-16.1	-22.9	-23.5	--[c]	--[c]	-32.6	-19.2	-24.9	-28.4	-6.1	-5.2	10.5[a]	-2.3	-17.1
Houston, TX (AQS Site Code: 48-201-1039)																		
2010	-5.5	34.1	5.1	-17.5	-39.8	-23.9	-4.7	-0.4	1.2	15.7	16.8	10.0	-2.5	10.4	9.2	10.5[a]	-41.3	-49.6
Karnack, TX (AQS Site Code: 48-203-0002)																		
2010	-5.5	34.1	5.1	-17.5	-39.8	-23.9	-4.7	-0.4	1.2	15.7	16.8	10.0	-2.5	10.4	9.2	10.5[a]	-41.3	-49.6
Bountiful, UT (AQS Site Code: 49-011-0004)																		
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	10.5[a]	-2.3	-17.1

Table F-1. Bias Results at NATTS Sites for 2010 (% difference)

Year	Benzene	Butadiene, 1,3-	Carbon tetrachloride	Chloroform	Tetrachloroethylene	Trichloroethylene	Vinyl chloride	Acetaldehyde	Formaldehyde	Arsenic (PM_{10})	Beryllium (PM_{10})	Cadmium (PM_{10})	Lead (PM_{10})	Manganese (PM_{10})	Nickel (PM_{10})	Hexavalent Chromium	Benzo(a)pyrene	Naphthalene
	VOCs							Carbonyls		PM_{10} Metals						Cr^{+6}	PAHs	
Underhill, VT (AQS Site Code: 50-007-0007)																		
2010	-13.2	-3.7	31.6	1.0	-16.1	-6.4	-14.1	4.0	2.6	7.3	11.2	4.9	-3.5	0.6	4.7	10.5[a]	-2.3	-17.1
Richmond, VA (AQS Site Code: 51-087-0014)																		
2010	-13.2	6.1	9.2	-9.3	-6.5	-1.8	-5.9	1.6	2.4	-8.0	-9.4	-15.1	-21.6	-17.8	-6.1	10.5[a]	-2.3	-17.1
Seattle, WA (AQS Site Code: 53-033-0080)																		
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	10.5[a]	-2.3	-17.1
Horicon, WI (AQS Site Code: 55-027-0001)																		
2010	18.7	50.0	36.7	8.2	7.5	29.4	31.8	2.0	2.0	-15.5	-6.0	-17.0	-18.9	-17.3	-13.7	10.5[a]	-1.3	-23.1
Min.	**-18.7**	**-11.0**	**-30.6**	**-41.2**	**-39.8**	**-23.9**	**-23.5**	**-9.0**	**-8.2**	**-32.6**	**-19.2**	**-24.9**	**-28.4**	**-17.8**	**-13.7**	**10.5**	**-41.3**	**-49.6**
Max.	**18.7**	**50.0**	**36.7**	**8.2**	**8.6**	**29.4**	**31.8**	**4.0**	**8.2**	**56.1**	**41.4**	**12.8**	**47.4**	**98.0**	**10.4**	**10.5**	**-1.3**	**-17.1**

Green = Bias ≤ ± 25%

Yellow = Bias between 25% and 35% or between -35% and -25%

Red = Bias greater than 35% or less than -35%

Gray = dataset was not rated

--: No bias data were expected for this pollutant because the pollutant was not scheduled for sampling.

[a]: Proficiency Test results are from the National Contract Lab for EPA's School Air Toxics Monitoring Program.

[b]: Pollutant was sampled at this site and year, but no bias data were reported.

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

[d]: Pollutant was expected, but not sampled at this site for this year.