Iowa Ambient Air Monitoring
2014 Network Plan

Iowa Department of Natural Resources
Air Quality Bureau

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Introduction

States and other agencies delegated to perform air monitoring under the Clean Air Act are required to examine their networks annually to verify that they meet federal requirements (Appendix A). These requirements[1] include the number and type of monitors operated and the frequency of sampling. Certain monitors in the network, known as State and Local Air Monitoring Stations (SLAMS), are required by federal regulations and discontinuing a SLAMS monitor requires concurrence from Environmental Protection Agency (EPA) (Appendix B). Special purpose monitors (SPMs) provide important additional air quality information (such as background concentrations for permitting activities[2,3]), but changes to the SPM network do not require concurrence from EPA.

One of the requirements of the annual network plan is to provide specific information for monitors that produce data that may be compared with federal air standards. This information, along with information concerning various types of monitors operated in the Iowa air monitoring network, is contained in Appendix C and Appendix D.

Ozone Monitoring Network Analysis

EPA's population-based monitoring requirements for ozone are reproduced in Appendix E. These requirements apply to metropolitan statistical areas (MSAs)—more recently denoted as core based statistical areas (CBSAs) by the Census Bureau—and depend on the population of the MSA (Appendix F) and the ozone levels monitored in or downwind of the MSA over the past three years (Appendix G). Based on this information, the minimum number of population- based SLAMS ozone monitoring sites is indicated below:

MSA	Number of Monitors Required
Omaha-Council Bluffs, NE-IA	2
Des Moines-West Des Moines, IA	2
Davenport-Moline-Rock Island, IA-IL	2
Cedar Rapids, IA	1
Sioux City, IA-NE-SD	1
Waterloo-Cedar Falls, IA	1

In Iowa, there is one SLAMS monitoring site for the Omaha-Council Bluffs MSA, two SLAMS monitoring sites for the Des Moines MSA, two SLAMS monitoring sites for the Davenport- Moline-Rock Island MSA, one SLAMS monitoring site for the Cedar Rapids MSA, and one SLAMS monitoring site for the Waterloo-Cedar Falls MSA that fulfill the ozone monitoring requirements. The state of Iowa shares the responsibility for ozone monitoring in the Omaha- Council Bluffs MSA with Nebraska agencies, in the Sioux City MSA with South Dakota and Nebraska agencies, and in the Davenport-Moline-Rock Island MSA with Illinois agencies (Appendix H). Currently Nebraska agencies operate three SLAMS ozone sites in the Omaha, Nebraska MSA. Illinois agencies operate one SLAMS ozone site is operated in Rock Island, Illinois which resides in the Davenport-Moline-Rock Island, IA-IL MSA. South Dakota operates one SLAMS site in the Sioux City, IA-NE-SD MSA.

In addition to population-based requirements, each state is required to operate one multi- pollutant NCore site. Year-round ozone monitoring is required at an NCore site. Iowa operates two ozone analyzers at its NCore site in Davenport to meet this requirement.

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[1] For the convenience of the reader, relevant CFR sections are included in the appendices of this document. The CFR is updated continuously, for the latest version of the CFR see: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=27d0dad4dd3d4c1969aad205b798e315&c=ecfr&tpl=/ecfrbrowse/Title40/40tab_02.tpl

[2] For examples of the way monitoring data is used to develop background concentrations for permitting activities, see the discussions of $PM_{2.5}$, NO_2 and SO_2 at: http://www.epa.gov/ttn/scram/guidance_clarificationmemos.htm

[3] The federal statute that requires baseline ambient air quality data in an area before initiating construction of a new "major source" of air pollution is available here: http://www.gpo.gov/fdsys/pkg/USCODE-2010- title42/pdf/USCODE-2010-title42-chap85-subchapI-partC-subparti-sec7475.pdf

EPA's AQI reporting requirements for ozone are reproduced in Appendix I. AQI reporting for ozone is required in MSAs with populations over 350,000. MSAs in this category include Omaha-Council Bluffs, Des Moines-West Des Moines, and Davenport-Moline-Rock Island (Appendix F). All Iowa ozone monitoring data, including data from each of these MSAs, is uploaded to EPA's AirNow[4] Real-Time Reporting System and included in the national ozone and AQI maps. Ozone concentration data and AQI values are publically available on EPA's AirData[5] web site a few days after the data is uploaded to EPA. The DNR regularly updates a list of dates when monitoring sites record AQIs greater than 100 on its website[6]. AQI and real-time information is also available on the Polk County[7], Linn County[8] and State Hygienic Laboratory[9] websites.

There are no EPA requirements for collocated ozone monitoring. EPA's collocated monitoring requirements are indicated in Appendix J. A comparison of Iowa's monitoring network to these requirements is located in Appendix K.

Iowa's ozone monitoring network meets the minimum federal requirements. The total number of ozone monitoring sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding ozone related atmospheric processes includes more sites than these minimum numbers. All Iowa ozone monitors are listed in Appendix D and displayed in Appendix L. There are no anticipated reductions to the SLAMS ozone monitoring network prior to the submission of the next network plan. Changes to the SPM network that are expected to occur before the submission of the next network plan are indicated in Appendix M.

$PM_{2.5}$ Monitoring Network Analysis

EPA's population-based monitoring requirements for $PM_{2.5}$ are contained in 40 CFR Part 58, Appendix D (reproduced in Appendix E). These requirements apply to metropolitan statistical areas (MSAs) and depend on the population of the MSA (Appendix F) and the $PM_{2.5}$ levels monitored in the MSA over the past three years (Appendix N). Based on this information, the minimum number of required population-based SLAMS $PM_{2.5}$ monitoring sites is indicated below:

MSA	Number of Monitors Required
Omaha-Council Bluffs, NE-IA	2
Des Moines-West Des Moines, IA	1
Davenport-Moline-Rock Island, IA-IL	1
Cedar Rapids, IA	0
Waterloo-Cedar Falls, IA	0
Iowa City, IA	0

Iowa operates filter samplers at SLAMS $PM_{2.5}$ monitoring sites in Des Moines (two sites), Davenport (two sites), Cedar Rapids (one site), Waterloo (one site), and Iowa City (one site). Iowa shares the responsibility for $PM_{2.5}$ monitoring in the Omaha-Council Bluffs MSA with Nebraska agencies, and in the Davenport-Moline-Rock Island MSA with Illinois agencies (Appendix H). Currently, four SLAMS $PM_{2.5}$ monitoring sites are operated by Nebraska in the Omaha-Council Bluffs MSA; and one SLAMS $PM_{2.5}$ monitoring site is operated by Illinois in the Davenport-Moline-Rock Island MSA (Appendix H).

In addition to population-based minimum requirements, 40 CFR Part 58 also specifies that each state operate at least one $PM_{2.5}$ monitoring site to measure background concentrations, and at least one site to measure regional transport of $PM_{2.5}$. A SLAMS background monitoring site is located at Emmetsburg in northwest Iowa, and SLAMS transport monitoring sites are located at Lake Sugema in Southeast Iowa and Viking Lake in Southwest Iowa.

[4] http://www.airnow.gov/
[5] http://www.epa.gov/airdata/
[6] http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx
[7] http://cms.polkcountyiowa.gov/airquality/pages/CurrentAQI.aspx
[8] http://www.linncleanair.org/Content/Current-Air-Quality.aspx
[9] http://www.shl.uiowa.edu/env/ambient/realtime.xml

40 CFR Part 58 indicates that population-oriented monitoring sites near industrial sources produce data that may be compared to the 24-hour $PM_{2.5}$ NAAQS, but not to the annual $PM_{2.5}$ NAAQS. The $PM_{2.5}$ monitoring sites near Chancy Park in Clinton, and Musser Park in Muscatine, are adjacent to industrial sources and are not comparable to the annual $PM_{2.5}$ NAAQS.

EPA's AQI reporting requirements for $PM_{2.5}$ are reproduced in Appendix I. AQI reporting is required in MSAs with required $PM_{2.5}$ monitors and populations over 350,000. MSA's in this category include Omaha-Council Bluffs, Des Moines-West Des Moines, and Davenport-Moline- Rock Island (Appendix F). Nebraska provides real-time $PM_{2.5}$ data the Omaha-Council Bluffs MSA; Iowa provides real-time $PM_{2.5}$ monitoring data for the Des Moines-West Des Moines, and Davenport-Moline-Rock Island MSAs. This real-time data is uploaded to EPA's AirNow[10] Real- Time Reporting System and included in the national ozone and AQI maps. $PM_{2.5}$ data and AQI values from continuous and filter samplers are publically available on EPA's AirData[11] web site a few days after the data is uploaded to EPA. The DNR regularly updates a list of dates when monitoring sites record AQIs greater than 100 on its website[12]. AQI and real-time information is also available on the Polk County[13], Linn County[14] and State Hygienic Laboratory[15] websites.

EPA's collocated monitoring requirements for $PM_{2.5}$ are indicated in Appendix J. Iowa's monitoring network meets these requirements (Appendix K).

40 CFR Part 58 specifies that the minimum frequency for manual $PM_{2.5}$ sampling at required SLAMS sites is one sample every three days. Required SLAMS sites with a 24-hour design value within 5% of the 24-hour $PM_{2.5}$ NAAQS (34 $\mu g/m^3$ to 36 $\mu g/m^3$) must assume a daily sampling schedule. No $PM_{2.5}$ samplers recorded design values in this range in 2013.

In addition to these $PM_{2.5}$ monitoring requirements, EPA requires that each state operate at least one multi-pollutant NCore site (Appendix O). Continuous and filter-based $PM_{2.5}$ monitors as well as $PM_{2.5}$ chemical speciation samplers are required at each NCore site. Iowa operates these three types of $PM_{2.5}$ samplers at its NCore site in Davenport to meet this requirement.

The $PM_{2.5}$ chemical speciation monitor operated at Iowa's NCore site is needed to meet federal requirements. The remaining four chemical speciation sites in the Iowa network are Special Purpose Monitors.

EPA also requires CBSAs with a population of 1,000,000 or more persons to collocate at least one $PM_{2.5}$ monitor at a near-road NO_2 station (Appendix P). Iowa does not contain or share any MSAs with populations this large, so additional near-road monitors are not required.

Iowa's $PM_{2.5}$ monitoring network meets the minimum federal requirements. The total number of $PM_{2.5}$ monitoring sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding $PM_{2.5}$-related atmospheric processes includes more sites than these minimum numbers. Iowa's complete $PM_{2.5}$ monitoring network is listed in Appendix D and displayed in Appendix L**.** Changes to monitors in the SPM $PM_{2.5}$ network that are expected to occur before the submission of the next network plan are detailed in Appendix M**.**

PM_{10} Monitoring Network Analysis

EPA's population-based monitoring requirements for PM_{10} are reproduced in Appendix E. These requirements apply to metropolitan statistical areas (MSAs) and depend on the population of the MSA (Appendix F) and PM_{10} levels in the MSA (Appendix Q). Based on this information, the minimum numbers of population-based SLAMS PM_{10} monitoring sites is indicated below:

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[10] http://www.airnow.gov/
[11] http://www.epa.gov/airdata/
[12] http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx
[13] http://cms.polkcountyiowa.gov/airquality/pages/CurrentAQI.aspx
[14] http://www.linncleanair.org/Content/Current-Air-Quality.aspx
[15] http://www.shl.uiowa.edu/env/ambient/realtime.xml

MSA	Number of Monitors Required
Omaha-Council Bluffs, NE-IA	4-8
Des Moines-West Des Moines, IA	1-2
Davenport-Moline-Rock Island, IA-IL	1-2
Cedar Rapids, IA	0-1

Iowa operates two SLAMS PM_{10} monitoring sites in the Des Moines-West Des Moines MSA, three in the Davenport-Moline-Rock Island MSA, and one in the Cedar Rapids MSA. Iowa shares the responsibility for PM_{10} monitoring in the Omaha-Council Bluffs MSA with Nebraska agencies, and in the Davenport-Moline-Rock Island MSA with Illinois agencies (Appendix H). Currently five SLAMS PM_{10} sites are operated by Nebraska in the Omaha MSA, and no SLAMS PM_{10} monitors are operated by Illinois in the Davenport-Moline-Rock Island MSA.

In addition to population-oriented PM_{10} monitoring requirements, EPA requires that each State operate at least one multi-pollutant NCore site (Appendix O). PM_{10} samplers are required at each NCore site. Iowa operates a PM_{10} sampler at its NCore site in Davenport to meet this requirement.

EPA's AQI reporting requirements for PM_{10} are reproduced in Appendix I. AQI reporting is required in MSAs with required PM_{10} monitors and populations over 350,000. MSA's in this category include Omaha-Council Bluffs, Des Moines-West Des Moines, and Davenport-Moline- Rock Island (Appendix F)**.** Nebraska provides real-time PM_{10} data for the Omaha-Council Bluffs MSA. Iowa has only one site that produces real-time PM_{10} monitoring data. It is located near Buffalo inside the Davenport-Moline-Rock Island MSA. A graph of the real-time data from this site is publically available on the SHL website[16]. PM_{10} data from all filter samplers, including data from monitoring sites in each of the three MSA's, is publically available on EPA's AirData[17] web site a few days after the data is uploaded to EPA. The DNR regularly updates a list of dates when monitoring sites recorded AQIs greater than 100 on its website[18].

EPA's collocated monitoring requirements for PM_{10} are indicated in Appendix J. Iowa's monitoring network meets these requirements (Appendix K).

Iowa's PM_{10} monitoring network meets the minimum federal requirements. Iowa's complete PM_{10} monitoring network is listed in Appendix D and displayed in Appendix L. Changes to monitors in the SPM network that are expected to occur before the submission of the next network plan are detailed in Appendix M**.**

Sulfur Dioxide Monitoring Network Analysis

Federal requirements for SO_2 monitoring are reproduced in Appendix R. These rules require monitors in populated areas with high SO_2 emissions. To implement these requirements EPA uses the population weighted emissions index (PWEI) to determine if SO_2 monitoring is required in an MSA. The PWEI is calculated by multiplying the population of the MSA by the total SO_2 emissions in the MSA and dividing by 1,000,000. The PWEI for Iowa Metropolitan Statistical Areas is computed in Appendix S. Based on this information, the minimum number of SLAMS SO_2 monitoring sites for Iowa MSAs where monitoring is required are indicated below:

MSA	Number of Monitors Required
Omaha-Council Bluffs, NE-IA	1
Sioux City, IA-NE	1

Currently, Nebraska operates two SLAMS SO_2 sites in the Omaha-Council Bluffs MSA and South Dakota operates one SLAMS SO_2 monitoring site in the Sioux City MSA. Iowa operates an additional SLAMS SO_2 site in the Sioux City MSA near

[16] http://www.shl.uiowa.edu/env/ambient/realtime.xml
[17] http://www.epa.gov/airdata
[18] http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx

MidAmerican's George Neal North Generating Station in Sergeant Bluff.

In addition to the PWEI-based monitoring requirements, sulfur dioxide is included in the suite of pollutants to be monitored at EPA National Core (NCore) monitoring sites. Iowa operates a sulfur dioxide analyzer at its NCore site in Davenport to meet this requirement.

EPA's AQI reporting requirements for SO_2 are reproduced in Appendix I. AQI reporting is required in MSAs with required SO_2 monitors and populations over 350,000. MSAs in this population category include Omaha-Council Bluffs, Des Moines-West Des Moines, and Davenport-Moline-Rock Island (Appendix F)**.** Nebraska provides real-time SO_2 data the Omaha- Council Bluffs MSA; Iowa provides real-time SO_2 monitoring data for the Des Moines-West Des Moines, and Davenport-Moline-Rock Island MSAs. This real-time data is uploaded to EPA's AirNow[19] Real-Time Reporting System. SO_2 concentration data and AQI are publically available on EPA's AirData[20] web site a few days after measurement. The DNR regularly updates a list of dates when monitoring sites recorded AQIs greater than 100 on its website[21]. AQI and real-time information is also available on the Polk County[22], Linn County[23] and State Hygienic Laboratory[24] websites.

There are no EPA requirements for collocated SO_2 monitoring. EPA's collocated monitoring requirements are indicated in Appendix J. A comparison of Iowa's monitoring network to these requirements is located in Appendix K.

Iowa's SO_2 monitoring network meets the minimum federal requirements. Existing SO_2 monitors are listed in Appendix D and displayed in Appendix L. There are no planned reductions to the SLAMS monitoring network for sulfur dioxide scheduled before submission of the next network plan. Changes to SPM monitors in the SO_2 network that are anticipated before the submission of the next network plan are indicated in Appendix M.

Nitrogen Dioxide Monitoring Network Analysis

On January 22, 2010, the U.S. Environmental Protection Agency revised the nitrogen dioxide (NO_2) NAAQS. The new NAAQS included population-based monitoring requirements and traffic- based (near road) monitoring requirements.

EPA's population-based NO_2 monitoring requirements are reproduced in Appendix E. EPA requires one monitor in any CBSA with a population of more than 1 million in order to measure community-wide concentrations. Iowa does not contain or share any MSAs with populations this large and these monitors are not required.

EPA's near road based NO_2 monitoring requirements are reproduced in Appendix P. The rule requires a near road monitor to be installed in CBSA's with a population of greater than 500,000 but less than one million. The Des Moines-West Des Moines and Omaha-Council Bluffs CBSAs both have populations in this range.

In addition, the rule requires an additional monitor in CBSAs with a population greater than 500,000 that contain roadway segments with annual average daily traffic counts of more than 250,000. The rule also requires another near-road monitor in CBSAs with populations of more than 2,500,000. Iowa does not contain or share any CBSAs that meet these criteria[25,26] and the additional near-road monitors are not required.

Working with the Polk County Local Program, the DNR submitted a siting plan for a near road monitor in the Des Moines CBSA to EPA, and began operating a new near road NO_2 monitor along Interstate 235, on January 1, 2013.

On March 7, 2013, the EPA made revisions to the monitor deployment requirements contained in the NO_2 NAAQS. In the Des Moines-West Des Moines and Omaha-Council Bluffs CBSAs, the new deadline for deployment of near road SLAMS

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[19] http://www.airnow.gov/
[20] http://www.epa.gov/airdata/
[21] http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx
[22] http://cms.polkcountyiowa.gov/airquality/pages/CurrentAQI.aspx
[23] http://www.linncleanair.org/Content/Current-Air-Quality.aspx
[24] http://www.shl.uiowa.edu/env/ambient/realtime.xml
[25] http://www.iowadot.gov/about/traffic.html
[26] http://www.fhwa.dot.gov/policyinformation/tables/02.cfm

monitors is January 1, 2017.

At NCore sites, EPA requires NO_y instead NO_2 monitoring in order to quantify more of the oxidation products of NO. These additional oxidation products are relevant to secondary formation of ozone and PM.

There are currently no minimum federal requirements for NO_2 monitors applicable to Iowa, and there are no monitors designated as SLAMS in the Iowa network. Several SPM NO_2 monitors are operated to provide a general knowledge of pollutant levels and to support permitting activities.

EPA's AQI reporting requirements for NO_2 are reproduced in Appendix I. AQI reporting is required in MSAs with required NO_2 monitors and populations over 350,000. MSAs in this population category include Omaha-Council Bluffs, Des Moines-West Des Moines, and Davenport-Moline-Rock Island (Appendix F)**.** Nebraska provides real-time NO_2 data for the Omaha-Council Bluffs MSA; Iowa provides real-time NO_2 monitoring data for the Des Moines- West Des Moines, and Davenport-Moline-Rock Island MSAs. This real-time data is uploaded to EPA's AirNow[27] Real-Time Reporting System. NO_2 concentration data and the AQI are publically available on EPA's AirData[28] web site a few days after the data is uploaded to EPA. The DNR regularly updates a list of dates and locations of recorded AQIs greater than 100 on its website[29]. AQI information is also available on the Polk County[30], Linn County[31] and State Hygienic Laboratory[32] websites.

There are no EPA requirements for collocated NO_2 monitoring. EPA's collocated monitoring requirements are indicated in Appendix J. A comparison of Iowa's monitoring network to these requirements is located in Appendix K.

Iowa's NO_2 monitoring network meets the minimum federal requirements. NO_2 monitors are listed in Appendix D and displayed in Appendix L. Changes to SPM monitors that are anticipated before the submission of the next network plan are indicated in Appendix M.

Carbon Monoxide Monitoring Network Analysis

EPA requires that each State operate at least one multi-pollutant NCore site (Appendix O). Carbon monoxide monitoring is required at each NCore site. Iowa operates a carbon monoxide monitor at its NCore site in Davenport to meet this requirement.

EPA also requires CBSA's with a population of 1,000,000 or more persons to collocate at least one CO monitor at a near-road NO_2 station (Appendix P). Iowa does not contain or share any MSAs with populations this large, so these near-road CO monitors are not required.

EPA's AQI reporting requirements for CO are reproduced in Appendix I. AQI reporting is required in MSAs with required CO monitors and populations over 350,000. MSAs in this population category include Omaha-Council Bluffs, Des Moines-West Des Moines, and Davenport-Moline-Rock Island (Appendix F)**.** Nebraska provides real-time CO data the Omaha-Council Bluffs MSA; Iowa provides real-time CO monitoring data for the Des Moines-West Des Moines, and Davenport-Moline-Rock Island MSAs. This real-time data is uploaded to EPA's AirNow[33] Real-Time Reporting System. CO data and the AQI are publically available on EPA's AirData[34] web site a few days after the data is uploaded to EPA. The DNR regularly updates a list of dates when monitoring sites recorded AQIs greater than 100 on its website[35]. AQI information is also available on the Polk County[36], Linn County[37] and State Hygienic Laboratory[38] websites.

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[27] http://www.airnow.gov/
[28] http://www.epa.gov/airdata/
[29] http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx
[30] http://cms.polkcountyiowa.gov/airquality/pages/CurrentAQI.aspx
[31] http://www.linncleanair.org/Content/Current-Air-Quality.aspx
[32] http://www.shl.uiowa.edu/env/ambient/realtime.xml
[33] http://www.airnow.gov/
[34] http://www.epa.gov/airdata/
[35] http://www.iowadnr.gov/InsideDNR/RegulatoryAir/MonitoringAmbientAir.aspx
[36] http://cms.polkcountyiowa.gov/airquality/pages/CurrentAQI.aspx
[37] http://www.linncleanair.org/Content/Current-Air-Quality.aspx

There are no EPA requirements for collocated CO monitoring. EPA's collocated monitoring requirements are indicated in Appendix J. A comparison of Iowa's monitoring network to these requirements is located in Appendix K.

Iowa's carbon monoxide monitoring network meets the minimum federal requirements. Iowa's carbon monoxide monitors are listed in Appendix D and displayed in Appendix L. There are no planned reductions to the SLAMS monitoring network for carbon monoxide scheduled before submission of the next network plan. Changes to SPM monitors in the CO network that are anticipated before the submission of the next network plan are indicated in Appendix M.

Toxics Monitoring Network Analysis

There are no federal requirements for minimum numbers of air toxics sites contained in 40 CFR Part 58.

Iowa currently operates five SPM air toxics sites. Details concerning Iowa's air toxics network are contained in Appendix D and displayed in Appendix L.

NCore Monitoring Network Analysis

Requirements for a multi-pollutant "NCore" site are contained in 40 CFR Part 58, and reproduced in Appendix O. The Department operates an NCore site at Jefferson School in Davenport (AQS ID 191630015) to meet this requirement.

Lead Monitoring Network Analysis

EPA requires source-oriented SLAMS lead monitoring near industries that emit over 0.5 tons per year (tpy) of lead. The rule allows for a waiver of monitoring requirements if air dispersion modeling predicts ambient air concentrations less than half the NAAQS. These waivers must be renewed as an element of each State's five year network assessment. Current federal lead monitoring rules are reproduced in Appendix T.

According to the Department's latest (2012 NEI) emissions estimates, two facilities in Iowa have emissions that round to 0.5 tpy or greater (Appendix U). Grain Processing Corporation (GPC) in Muscatine and MidAmerican Energy's Walter Scott Jr. Energy Center (WSEC) in Council Bluffs have emissions of 1.922 tpy and 0.451 tpy respectively.

EPA has previously approved waivers of the monitoring requirements for both of these facilities; the GPC waiver was granted with EPA approval of Iowa's five year network assessment published in 2010, and the WSEC waiver was granted with the approval of Iowa's 2012 network plan. Dispersion modeling of the most recent emissions estimates suggests that these waivers are appropriate, as the predicted lead levels are considerably less than half the NAAQS. These dispersion modeling results are contained in Appendix V.

The Department sited a SLAMS lead monitoring site near Griffin Pipe in 2009. The site recorded levels over the National Ambient Air Quality Standard (NAAQS) for lead in 2010 and 2012. The area around Griffin Pipe has been declared a non-attainment area by EPA. The DNR will submit a State Implementation Plan (SIP) later this year that provides for ongoing attainment of the lead NAAQS by establishing federally enforceable permit limits at Griffin Pipe and a nearby facility, Alter Metal Recycling. The DNR intends to continue monitoring at the site to establish the efficacy of the SIP.

EPA's collocated monitoring requirements for lead are indicated in Appendix J. Iowa's monitoring network meets these requirements (Appendix K).

Iowa's lead monitoring network meets the minimum federal requirements. The location of Iowa's lead monitor is listed in Appendix D and displayed in Appendix L.

There are no planned reductions to the SLAMS monitoring network for lead scheduled before submission of the next network plan. Changes to SPM monitors in the lead network that are anticipated before the submission of the next network plan are indicated in Appendix M.

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[38] http://www.shl.uiowa.edu/env/ambient/realtime.xml

Appendix A: Federal Requirements for Annual Network Plans & Completion

40 CFR Part 58, § 58.10 Annual monitoring network plan and periodic network assessment.

(a) (1) Beginning July 1, 2007, the State, or where applicable local, agency shall adopt and submit to the Regional Administrator an annual monitoring network plan which shall provide for the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, STN stations, State speciation stations, SPM stations, and/or, in serious, severe and extreme ozone nonattainment areas, PAMS stations, and SPM monitoring stations. The plan shall include a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of this part, where applicable. The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA.

(2) Any annual monitoring network plan that proposes SLAMS network modifications (including new monitoring sites, new determinations that data are not of sufficient quality to be compared to the NAAQS, and changes in identification of monitors as suitable or not suitable for comparison against the annual $PM_{2.5}$ NAAQS) is subject to the approval of the EPA Regional Administrator, who shall provide opportunity for public comment and shall approve or disapprove the plan and schedule within 120 days. If the State or local agency has already provided a public comment opportunity on its plan and has made no changes subsequent to that comment opportunity, and has submitted the received comments together with the plan, the Regional Administrator is not required to provide a separate opportunity for comment.

(3) The plan for establishing required NCore multipollutant stations shall be submitted to the Administrator not later than July 1, 2009. The plan shall provide for all required stations to be operational by January 1, 2011.

(4) A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting 1.0 tpy or greater shall be submitted to the EPA Regional Administrator no later than July 1, 2009, as part of the annual network plan required in paragraph (a)(1) of this section. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting 1.0 tpy or greater to be operational by January 1, 2010. A plan for establishing source- oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy shall be submitted to the EPA Regional Administrator no later than July 1, 2011. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy to be operational by December 27, 2011.

(5) (i) A plan for establishing or identifying an area-wide NO_2 monitor, in accordance with the requirements of Appendix D, section 4.3.3 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(ii) A plan for establishing or identifying any NO_2 monitor intended to characterize vulnerable and susceptible populations, as required in Appendix D, section 4.3.4 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(iii) A plan for establishing a single near-road NO_2 monitor in CBSAs having 1,000,000 or more persons, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2013. The plan shall provide for these required monitors to be operational by January 1, 2014.

(iv) A plan for establishing a second near-road NO2 monitor in any CBSA with a population of 2,500,000 or more persons, or a second monitor in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitors to be operational by January 1, 2015.

(v) A plan for establishing a single near-road NO_2 monitor in all CBSAs having 500,000 or more persons, but less than 1,000,000, not already required by paragraph (a)(5)(iv) of this section, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these monitors to

be operational by January 1, 2017.

(6) A plan for establishing SO_2 monitoring sites in accordance with the requirements of appendix D to this part shall be submitted to the EPA Regional Administrator by July 1, 2011 as part of the annual network plan required in paragraph (a) (1). The plan shall provide for all required SO_2 monitoring sites to be operational by January 1, 2013.

(7) A plan for establishing CO monitoring sites in accordance with the requirements of appendix D to this part shall be submitted to the EPA Regional Administrator. Plans for required CO monitors shall be submitted at least six months prior to the date such monitors must be established as required by section 58.13.

(8) (i) A plan for establishing near-road $PM_{2.5}$ monitoring sites in CBSAs having 2.5 million or more persons, in accordance with the requirements of appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitoring stations to be operational by January 1, 2015.

(ii) A plan for establishing near-road $PM_{2.5}$ monitoring sites in CBSAs having 1 million or more persons, but less than 2.5 million persons, in accordance with the requirements of appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these required monitoring stations to be operational by January 1, 2017.

(b) The annual monitoring network plan must contain the following information for each existing and proposed site:

(1) The AQS site identification number.

(2) The location, including street address and geographical coordinates.

(3) The sampling and analysis method(s) for each measured parameter.

(4) The operating schedules for each monitor.

(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.

(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in appendix D to this part.

(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS as described in §58.30.

(8) The MSA, CBSA, CSA or other area represented by the monitor.

(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.

(10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.

(11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM_{10} monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.

(12) The identification of required NO_2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.

(13) The identification of any $PM_{2.5}$ FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS. For required SLAMS where the agency identifies that the $PM_{2.5}$ Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in §58.12 or other Class III PM2.5 FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in appendix D to this part.

(c) The annual monitoring network plan must document how state and local agencies provide for the review of changes to a $PM_{2.5}$ monitoring network that impact the location of a violating PM2.5 monitor. The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

(d) The state, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g.,

children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby states and tribes or health effects studies. The state, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The assessments are due every five years beginning July 1, 2010.

(e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to §58.14.

[71 FR 61298, Oct. 17, 2006, as amended at 72 FR 32210, June 12, 2007; 73 FR 67059, Nov. 12, 2008; 73 FR 77517, Dec. 19, 2008; 75 FR 6534, Feb. 9, 2010; 75 FR 35601, June 22, 2010; 75 FR 81137, Dec. 27, 2010; 76 FR 54341, Aug. 31, 2011; 78 FR 16188, Mar. 14, 2013; 78 FR 3282, Jan. 15, 2013]

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40 CFR Part 58, § 58.13 Monitoring network completion.

(a) The network of NCore multipollutant sites must be physically established no later than January 1, 2011, and at that time, operating under all of the requirements of this part, including the requirements of appendices A, C, D, E, and G to this part. NCore sites required to conduct Pb monitoring as required under 40 CFR part 58 appendix D paragraph 3(b), or approved alternative non- source-oriented Pb monitoring sites, shall begin Pb monitoring in accordance with all of the requirements of this part, including the requirements of appendices A, C, D, E, and G to this part no later than December 27, 2011.

(b) Notwithstanding specific dates included in this part, beginning January 1, 2008, when existing networks are not in conformance with the minimum number of required monitors specified in this part, additional required monitors must be identified in the next applicable annual monitoring network plan, with monitoring operation beginning by January 1 of the following year. To allow sufficient time to prepare and comment on Annual Monitoring Network Plans, only monitoring requirements effective 120 days prior to the required submission date of the plan (i.e., 120 days prior to July 1 of each year) shall be included in that year's annual monitoring network plan.

(c) The NO_2 monitors required under Appendix D, section 4.3 of this part must be physically established and operating under all of the requirements of this part, including the requirements of appendices A, C, D, and E to this part, no later than:
   (1) January 1, 2013, for area-wide NO_2 monitors required in Appendix D, section 4.3.3;
   (2) January 1, 2013, for NO_2 monitors intended to characterize vulnerable and susceptible populations that are required in Appendix D, section 4.3.4;
   (3) January 1, 2014, for an initial near-road NO_2 monitor in CBSAs having 1,000,000 million or more persons that is required in Appendix D, section 4.3.2;
   (4) January 1, 2015, for a second near-road NO_2 monitor in CBSAs that have a population of 2,500,000 or more persons or a second monitor in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts that is required in Appendix D, section 4.3.2;
   (5) January 1, 2017, for a near-road NO_2 monitor in CBSAs having 500,000 or more persons, but less than 1,000,000, not already required by paragraph (c)(4) of this section, that is required in Appendix D, section 4.3.2.

(d) The network of SO_2 monitors must be physically established no later than January 1, 2013, and at that time, must be operating under all of the requirements of this part, including the requirements of appendices A, C, D, and E to this part.

(e) The CO monitors required under Appendix D, section 4.2 of this part must be physically established and operating under all of the requirements of this part, including the requirements of appendices A, C, D, and E to this part, no later than:
   (1) January 1, 2015 for CO monitors in CBSAs having 2.5 million persons or more; or
   (2) January 1, 2017 for other CO monitors.

(f) $PM_{2.5}$ monitors required in near-road environments as described in appendix D to this part, must be physically established and operating under all of the requirements of this part, including the requirements of appendices A, C, D, and E to this part, no later than:
   (1) January 1, 2015 for $PM_{2.5}$ monitors in CBSAs having 2.5 million persons or more; or
   (2) January 1, 2017 for $PM_{2.5}$ monitors in CBSAs having 1 million or more, but less than 2.5 million persons.

[71 FR 61298, Oct. 17, 2006, as amended at 73 FR 67059, Nov. 12, 2008; 75 FR 6534, Feb. 9, 2010; 75 FR 35601, June 22, 2010; 75 FR 81137, Dec. 27, 2010; 76 FR 54341, Aug. 31, 2011; 78 FR 16188, Mar. 14, 2013; 78 FR 3283, Jan. 15, 2013]

Appendix B: SLAMS Network Modification

40 CFR Part 58, § 58.14 System modification.

(a) The State, or where appropriate local, agency shall develop and implement a plan and schedule to modify the ambient air quality monitoring network that complies with the findings of the network assessments required every 5 years by §58.10(e). The State or local agency shall consult with the EPA Regional Administrator during the development of the schedule to modify the monitoring program, and shall make the plan and schedule available to the public for 30 days prior to submission to the EPA Regional Administrator. The final plan and schedule with respect to the SLAMS network are subject to the approval of the EPA Regional Administrator. Plans containing modifications to NCore Stations or PAMS Stations shall be submitted to the Administrator. The Regional Administrator shall provide opportunity for public comment and shall approve or disapprove submitted plans and schedules within 120 days.

(b) Nothing in this section shall preclude the State, or where appropriate local, agency from making modifications to the SLAMS network for reasons other than those resulting from the periodic network assessments. These modifications must be reviewed and approved by the Regional Administrator. Each monitoring network may make or be required to make changes between the 5-year assessment periods, including for example, site relocations or the addition of PAMS networks in bumped-up ozone nonattainment areas. These modifications must address changes invoked by a new census and changes due to changing air quality levels. The State, or where appropriate local, agency shall provide written communication describing the network changes to the Regional Administrator for review and approval as these changes are identified.

(c) State, or where appropriate, local agency requests for SLAMS monitor station discontinuation, subject to the review of the Regional Administrator, will be approved if any of the following criteria are met and if the requirements of appendix D to this part, if any, continue to be met. Other requests for discontinuation may also be approved on a case-by-case basis if discontinuance does not compromise data collection needed for implementation of a NAAQS and if the requirements of appendix D to this part, if any, continue to be met.

   (1) Any PM2.5, O3, CO, PM10, SO2, Pb, or NO2 SLAMS monitor which has shown attainment during the previous five years, that has a probability of less than 10 percent of exceeding 80 percent of the applicable NAAQS during the next three years based on the levels, trends, and variability observed in the past, and which is not specifically required by an attainment plan or maintenance plan. In a nonattainment or maintenance area, if the most recent attainment or maintenance plan adopted by the State and approved by EPA contains a contingency measure to be triggered by an air quality concentration and the monitor to be discontinued is the only SLAMS monitor operating in the nonattainment or maintenance area, the monitor may not be discontinued.

   (2) Any SLAMS monitor for CO, PM10, SO2, or NO2 which has consistently measured lower concentrations than another monitor for the same pollutant in the same county (or portion of a county within a distinct attainment area, nonattainment area, or maintenance area, as applicable) during the previous five years, and which is not specifically required by an attainment plan or maintenance plan, if control measures scheduled to be implemented or discontinued during the next five years would apply to the areas around both monitors and have similar effects on measured concentrations, such that the retained monitor would remain the higher reading of the two monitors being compared.

   (3) For any pollutant, any SLAMS monitor in a county (or portion of a county within a distinct attainment, nonattainment, or maintenance area, as applicable) provided the monitor has not measured violations of the applicable NAAQS in the previous five years, and the approved SIP provides for a specific, reproducible approach to representing the air quality of the affected county in the absence of actual monitoring data.

   (4) A PM2.5 SLAMS monitor which EPA has determined cannot be compared to the relevant NAAQS because of the siting of the monitor, in accordance with §58.30.

   (5) A SLAMS monitor that is designed to measure concentrations upwind of an urban area for purposes of characterizing transport into the area and that has not recorded violations of the relevant NAAQS in the previous five years, if discontinuation of the monitor is tied to start-up of another station also characterizing transport.

   (6) A SLAMS monitor not eligible for removal under any of the criteria in paragraphs (c)(1) through (c)(5) of this section may be moved to a nearby location with the same scale of representation if logistical problems beyond the State's control make it impossible to continue operation at its current site.

Appendix C: 2014 Iowa Ambient Air Monitoring Sites

City	Site	Address	County	MSA	Latitude	Longitude	AQS Site ID	Responsible Agency
Buffalo	Linwood Mining	11100 110th Ave	Scott	DMR	41.46724	-90.68845	191630017	DNR
Cedar Rapids	Kirkwood College	6301 Kirkwood Blvd SW	Linn	CDR	41.91056	-91.65194	191130028	Linn Local Prog.
	Public Health	500 11th St NW	Linn	CDR	41.97677	-91.68766	191130040	Linn Local Prog.
	Tait Cummins Park (Prairie Creek)	3000 C St SW	Linn	CDR	41.94867	-91.63954	191130041	Linn Local Prog.
Clinton	Chancy Park	23rd & Camanche	Clinton	-	41.82328	-90.21198	190450019	DNR
	Rainbow Park	Roosevelt St	Clinton	-	41.87500	-90.17757	190450021	DNR
Clive	Indian Hills Jr. High School	9401 Indian Hills	Polk	DSM	41.60352	-93.74790	191532510	Polk Local Prog.
Coggon	Coggon Elementary School	408 E Linn St	Linn	CDR	42.28056	-91.52694	191130033	Linn Local Prog.
Council Bluffs	Franklin School	3130 C Ave	Pottawattamie	OMC	41.26417	-95.89612	191550009	DNR
	Griffin Pipe	8th Ave and 27th St	Pottawattamie	OMC	41.25425	-95.88725	191550011	DNR
Davenport	Jefferson School	10th St. & Vine St	Scott	DMR	41.53001	-90.58761	191630015	DNR
	Adams School	3029 N Division St	Scott	DMR	41.55001	-90.60012	191630018	DNR
	Hayes School	622 S Concord St	Scott	DMR	41.51208	-90.62404	191630020	DNR
Des Moines	Health Dept.	1907 Carpenter	Polk	DSM	41.60318	-93.64330	191530030	Polk Local Prog.
	Near Road NO2	6011 Rollins Ave	Polk	DSM	41.59257	-93.70014	191536011	Polk Local Prog.
Emmetsburg	Iowa Lakes College	Iowa Lakes Community College	Palo Alto	-	43.12370	-94.69352	191471002	DNR
Indianola	Lake Ahquabi State Park	1650 118th Ave	Warren	DSM	41.28553	-93.58398	191810022	DNR
Iowa City	Hoover School	2200 East Ct	Johnson	IAC	41.65723	-91.50348	191032001	DNR
Keokuk	Fire Station	111S. 13th St	Lee	-	40.40096	-91.39101	191110008	DNR
Mason City	Holcim Cement	17th St & Washington St	Cerro Gordo	-	43.16944	-93.20243	190330018	DNR
	Washington School	700 N Washington Ave	Cerro Gordo	-	43.15856	-93.20301	190330020	DNR
Muscatine	Muscatine HS, East Campus Roof	1409 Wisconsin	Muscatine	-	41.40095	-91.06781	191390015	DNR
	Greenwood Cemetery	Fletcher St & Kimble St	Muscatine	-	41.41943	-91.07098	191390016	DNR
	Franklin School	210 Taylor St	Muscatine	-	41.41439	-91.06261	191390018	DNR
	Muscatine HS, East Campus Trailer	1409 Wisconsin	Muscatine		41.40145	-91.06845	191390019	DNR
	Musser Park	Oregon St & Earl Ave	Muscatine	-	41.40780	-91.06265	191390020	DNR
Pisgah	Forestry Office	206 Polk St	Harrison	OMC	41.83226	-95.92819	190850007	DNR

City	Site	Address	County	MSA	Latitude	Longitude	AQS Site ID	Responsible Agency
	Highway Maintenance Shed	1575 Hwy 183	Harrison	OMC	41.78026	-95.94844	190851101	DNR
Sergeant Bluff	George Neal North	2761 Port Neal Cir	Woodbury	SXC	42.32767	-96.36807	191930020	DNR
Sioux City	Bryant School	821 30th St	Woodbury	SXC	42.52236	-96.40021	191930019	DNR
Slater	City Hall	105 Greene	Story	DSM	41.88287	-93.68780	191690011	Polk Local Prog.
Waterloo	Water Tower	Vine St & Steely	Black Hawk	WTL	42.50154	-92.31602	190130009	DNR
Waverly	Waverly Airport	Waverly Airport	Bremer	WTL	42.74306	-92.51306	190170011	DNR
-	Scott County Park	Scott County Park	Scott	DMR	41.69917	-90.52194	191630014	DNR
-	Backbone State Park	Backbone State Park	Delaware	-	42.60083	-91.53833	190550001	DNR
-	Viking Lake State Park	2780 Viking Lake Rd	Montgomery	-	40.96911	-95.04495	191370002	DNR
-	Lake Sugema	24430 Lacey Trl, Keosauqua	Van Buren	-	40.69508	-92.00632	191770006	DNR

Site Table Definitions:

City – the city closest to the monitor location.
Site – the name of the monitoring site.
Address – an intersection or street address close to the monitoring site.
County – the county where the monitoring site resides.
MSA – Metropolitan Statistical Area. Iowa's Metropolitan Statistical Areas (MSAs) according to July, 2013 U.S. Census Bureau estimates:

U.S. Census Geographic area	Abbreviation
Omaha-Council Bluffs, NE-IA	OMC
Des Moines-West Des Moines, IA	DSM
Davenport-Moline-Rock Island, IA-IL	DMR
Cedar Rapids, IA	CDR
Sioux City, IA-NE-SD	SXC
Waterloo-Cedar Falls, IA	WTL
Iowa City, IA	IAC
Dubuque, IA	-
Ames, IA	-

From: http://www.census.gov/popest/data/metro/totals/2013/index.html Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2010 to July 1, 2013 (CBSA-EST2013-alldata).

Maximum ozone concentrations are typically measured 10-30 miles downwind of an MSA. The site intended to record the maximum ozone concentration resulting from a given MSA may be located outside the MSA boundaries. Sites intended to measure background levels of pollutants for an MSA may also be located upwind and outside of that particular MSA.

Latitude – the latitude of a monitoring site**,** given in decimal degrees using the WGS (World Geodetic System) 84 datum.
Longitude – the longitude of a monitoring site, given in decimal degrees using the WGS (World Geodetic System) 84 datum.
AQS Site ID – The identifier of a monitoring site used in the US EPA Air Quality System (AQS) database. It has the form XX-XXX-XXXX where the first two digits specify the state (19 for Iowa), the next set of three digits the county, and the last four digits the site.
Responsible Agency – The agency responsible for performing ambient air monitoring at a monitoring site. The Polk County Local Program operates sites in or near Polk County. The Linn County Local Program operates sites in or near Linn County. The Department of Natural Resources (DNR) contracts with the State Hygienic Laboratory at the University of Iowa (SHL) to operate monitoring sites not operated by the Polk or Linn County Local Programs.

Appendix D: 2014 Iowa Ambient Air Monitors

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Backbone State Park	PM10	2	SPM			Low Volume FRM	Gravimetric	1 in 3	General / Background	Regional	Yes	Yes	NAAQS Compliance
Backbone State Park	PM2.5	1	SPM	22 / 9.4	No	Low Volume FRM	Gravimetric	1 in 3	General / Background	Regional	Yes	Yes	NAAQS Compliance
Buffalo, Linwood Mining	PM10	2	SLAMS			Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Buffalo, Linwood Mining	PM10	3	SLAMS			Beta Attenuation		Continuous	Source Oriented	Middle	No	Yes	QA NAAQS Compliance
Buffalo, Linwood Mining	PM10	5	SLAMS			Beta Attenuation		Continuous	Source Oriented	Middle	No	Yes	Real-Time AQI Reporting
Cedar Rapids, Kirkwood College	Ozone	1	SPM	65	Yes	UV Absorption		Continuous	Regional Transport	Urban	Yes	Yes	NAAQS Compliance
Cedar Rapids, Kirkwood College	Ozone	2	SPM			UV Absorption		Continuous	Regional Transport	Urban	No	Yes	QA Real-Time AQI Reporting
Cedar Rapids, Public Health	CO	1	SPM			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Cedar Rapids, Public Health	NO3	2	SPM			Low Volume	Ion Chromatography	1 in 6	Population Exposure	Neighborhood	No	na	
Cedar Rapids, Public Health	Ozone	1	SPM	63	No	UV Absorption		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Cedar Rapids, Public Health	Ozone	2	SPM			UV Absorption		Continuous	Population Exposure	Neighborhood	No	Yes	QA Real-Time AQI Reporting
Cedar Rapids, Public Health	PM10	1	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Cedar Rapids, Public Health	PM10	2	SLAMS			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Cedar Rapids, Public Health	PM2.5	1	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Cedar Rapids, Public Health	PM2.5	2	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Cedar Rapids, Public Health	PM2.5	1	SLAMS	23 / 9.7	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Cedar Rapids, Public Health	PM2.5	2	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Cedar Rapids, Public Health	PM2.5	5	Supplemental Speciation			PM2.5 Speciation	CSN Protocol	1 in 6	Population Exposure	Neighborhood	No	No	
Cedar Rapids, Public Health	SO2	1	SPM			UV Fluorescent		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Cedar Rapids, Public Health	SO4	2	SPM			Low Volume	Ion Chromatography	1 in 6	Population Exposure	Neighborhood	No	na	
Cedar Rapids, Public Health	Toxics	16	SPM			Canister	TO-15	1 in 12	Population Exposure	Neighborhood	No	na	
Cedar Rapids, Public Health	Toxics	18	SPM			Canister	GC-FID	1 in 12	Population Exposure	Neighborhood	No	na	
Cedar Rapids, Public Health	Toxics	16	SPM			Cartridge	TO-11A	1 in 12	Population Exposure	Neighborhood	No	na	
Cedar Rapids, Tait Cummins Park	SO2	1	SPM			UV Fluorescent		Continuous	Source Oriented	Middle	Yes	Yes	NAAQS Compliance

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Clinton, Chancy Park	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	Source Oriented	Middle	No	No	
Clinton, Chancy Park	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	Source Oriented	Middle	No	No	
Clinton, Chancy Park	PM2.5	1	SPM	25 / na	No	Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	24 Hour Only	Yes	NAAQS Compliance
Clinton, Chancy Park	SO2	1	SPM			UV Fluorescent		Continuous	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Clinton, Chancy Park	Toxics	16	SPM			Cartridge	TO-11A	1 in 12	Population Exposure	Middle	No	na	
Clinton, Rainbow Park	Ozone	1	SLAMS	68	Yes	UV Absorption		Continuous	Population Exposure	Urban	Yes	Yes	NAAQS Compliance
Clinton, Rainbow Park	Ozone	2	SLAMS			UV Absorption		Continuous	Population Exposure	Urban	No	Yes	QA Real-Time AQI Reporting
Clinton, Rainbow Park	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Clinton, Rainbow Park	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Clinton, Rainbow Park	PM2.5	1	SPM	24 / 9.9	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Clive, Indian Hills Jr. High School	PM10	1	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Clive, Indian Hills Jr. High School	PM2.5	1	SLAMS	21 / 9.2	No	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Coggon Elementary School	Ozone	1	SLAMS	64	Yes	UV Absorption		Continuous	Max Ozone Concentration	Urban	Yes	Yes	NAAQS Compliance
Coggon Elementary School	Ozone	2	SLAMS			UV Absorption		Continuous	Max Ozone Concentration	Urban	No	Yes	QA Real-Time AQI Reporting
Council Bluffs, Franklin School	PM10	1	SPM			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Council Bluffs, Franklin School	PM2.5	1	SPM	24 / 10.2	Yes	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Council Bluffs, Franklin School	PM2.5	2	SPM			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Council Bluffs, Griffin Pipe	Lead	1	SLAMS			High Volume FRM	GFAA or ICP-MS	1 in 3	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Council Bluffs, Griffin Pipe	Lead	2	SLAMS			High Volume FRM	GFAA or ICP- MS	1 in 3	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Council Bluffs, Griffin Pipe	Lead	3	SLAMS			High Volume FRM	GFAA or ICP- MS	1 in 3	Source Oriented	Middle	No	Yes	QA NAAQS Compliance
Council Bluffs, Griffin Pipe	Mn	1	SPM			High Volume	ICP Mass Spec	1 in 3	Source Oriented	Middle	No	na	
Council Bluffs, Griffin Pipe	Mn	2	SPM			High Volume	ICP Mass Spec	1 in 3	Source Oriented	Middle	No	na	
Council Bluffs, Griffin Pipe	Mn	3	SPM			High Volume	ICP Mass Spec	1 in 3	Source Oriented	Middle	No	na	
Davenport, Adams Sch.	PM10	1	SPM			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Adams Sch.	PM2.5	1	SPM	24 / 10.4	Yes	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Davenport, Hayes Sch.	PM10	1	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Hayes Sch.	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Davenport, Hayes Sch.	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Davenport, Hayes Sch.	PM2.5	1	SLAMS	25 / 10.7	Yes	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	CO	1	NCORE			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	NO2	1	SPM			Chemi-luminescence		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	NO3	2	SPM			Low Volume	Ion Chromatography	1 in 3	Population Exposure	Neighborhood	No	na	
Davenport, Jefferson Sch.	NOy	2	NCORE			Chemi-luminescence		Continuous	Population Exposure	Neighborhood	No	na	
Davenport, Jefferson Sch.	Ozone	1	NCORE	66	Yes	UV Absorption		Continuous	Population Exposure	Urban	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	Ozone	2	NCORE			UV Absorption		Continuous	Population Exposure	Urban	No	Yes	QA Real-Time AQI Reporting
Davenport, Jefferson Sch.	PM10	1	NCORE			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	PM10	2	NCORE			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Davenport, Jefferson Sch.	PM2.5	3	NCORE			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Davenport, Jefferson Sch.	PM2.5	4	NCORE			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Davenport, Jefferson Sch.	PM2.5	1	NCORE	24 / 10.2	Yes	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	PM2.5	2	NCORE			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Davenport, Jefferson Sch.	PM2.5	5	NCORE			PM2.5 Speciation	CSN Protocol	1 in 3	Population Exposure	Neighborhood	No	No	
Davenport, Jefferson Sch.	SO2	1	NCORE			UV Fluorescent		Continuous	Population Exposure	Urban	Yes	Yes	NAAQS Compliance
Davenport, Jefferson Sch.	SO4	2	SPM			Low Volume	Ion Chromatography	1 in 3	Population Exposure	Neighborhood	No	na	
Davenport, Jefferson Sch.	Toxics	16	SPM			Canister	TO-15	1 in 12	Population Exposure	Neighborhood	No	na	
Davenport, Jefferson Sch.	Toxics	16	SPM			Cartridge	TO-11A	1 in 12	Population Exposure	Neighborhood	No	na	
Davenport, Jefferson Sch.	Toxics	18	SPM			Canister	GC-FID	1 in 12	Population Exposure	Neighborhood	No	na	
Des Moines, Health Dept.	CO	1	SPM			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Des Moines, Health Dept.	NO2	1	SPM			Chemi-luminescence		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Des Moines, Health Dept.	NO3	2	SPM			Low Volume	Ion Chromatography	1 in 6	Population Exposure	Neighborhood	No	na	

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Des Moines, Health Dept.	Ozone	1	SLAMS	61	No	UV Absorption		Continuous	Population Exposure	Urban	Yes	Yes	NAAQS Compliance
Des Moines, Health Dept.	Ozone	2	SLAMS			UV Absorption		Continuous	Population Exposure	Urban	No	Yes	QA Real-Time AQI Reporting
Des Moines, Health Dept.	PM10	1	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Des Moines, Health Dept.	PM10	2	SLAMS			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Des Moines, Health Dept.	PM2.5	1	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Des Moines, Health Dept.	PM2.5	2	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Des Moines, Health Dept.	PM2.5	1	SLAMS	22 / 9.2	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Des Moines, Health Dept.	PM2.5	2	SLAMS			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Des Moines, Health Dept.	PM2.5	5	Supplemental Speciation			PM2.5 Speciation	CSN Protocol	1 in 6	Population Exposure	Neighborhood	No	No	
Des Moines, Health Dept.	SO2	1	SPM			UV Fluorescent		Continuous	Population Exposure	Urban	Yes	Yes	NAAQS Compliance
Des Moines, Health Dept.	SO4	2	SPM			Low Volume	Ion Chromatography	1 in 6	Population Exposure	Neighborhood	No	na	
Des Moines, Health Dept.	Toxics	16	SPM			Canister	TO-15	1 in 12	Population Exposure	Neighborhood	No	na	
Des Moines, Health Dept.	Toxics	16	SPM			Cartridge	TO-11A	1 in 12	Population Exposure	Neighborhood	No	na	
Des Moines, Health Dept.	Toxics	18	SPM			Canister	GC-FID	1 in 12	Population Exposure	Neighborhood	No	na	
Des Moines, Near Road NO2	NO2	1	SPM			Chemi-luminescence		Continuous	Source Oriented	Micro	Yes	Yes	NAAQS Compliance
Emmetsburg, Iowa Lakes Coll.	Ozone	1	SLAMS	67	Yes	UV Absorption		Continuous	Regional Transport	Regional	Yes	Yes	NAAQS Compliance
Emmetsburg, Iowa Lakes Coll.	Ozone	2	SLAMS			UV Absorption		Continuous	Regional Transport	Regional	No	Yes	QA Real-Time AQI Reporting
Emmetsburg, Iowa Lakes Coll.	PM10	2	SPM			Low Volume FRM	Gravimetric	1 in 3	General / Background	Regional	Yes	Yes	NAAQS Compliance
Emmetsburg, Iowa Lakes Coll.	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	General / Background	Regional	No	No	
Emmetsburg, Iowa Lakes Coll.	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	General / Background	Regional	No	No	
Emmetsburg, Iowa Lakes Coll.	PM2.5	1	SLAMS	22 / 8.6	No	Low Volume FRM	Gravimetric	1 in 3	General / Background	Regional	Yes	Yes	NAAQS Compliance
George Neal North	SO2	1	SLAMS			UV Fluorescent		Continuous	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Iowa City, Hoover Sch.	PM10	1	SPM			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Iowa City, Hoover Sch.	PM2.5	3	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Iowa City, Hoover Sch.	PM2.5	4	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Iowa City, Hoover Sch.	PM2.5	1	SLAMS	23 / 9.6	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Keokuk, Fire Station	PM2.5	1	SPM	24 / 11.0	Yes	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Keosauqua, Lake Sugema	IMPROVE Speciation	1	IMPROVE			IMPROVE Sampler	IMPROVE Protocol	1 in 3	Regional Transport	Regional	No	na	
Keosauqua, Lake Sugema	NO2	1	SPM			Chemi-luminescence		Continuous	General / Background	Regional	Yes	Yes	NAAQS Compliance
Keosauqua, Lake Sugema	Ozone	1	SLAMS	66	Yes	UV Absorption		Continuous	Regional Transport	Regional	Yes	Yes	NAAQS Compliance
Keosauqua, Lake Sugema	Ozone	2	SLAMS			UV Absorption		Continuous	Regional Transport	Regional	No	Yes	QA Real-Time AQI Reporting
Keosauqua, Lake Sugema	PM10	1	SPM			Low Volume FRM	Gravimetric	1 in 3	General / Background	Regional	Yes	Yes	NAAQS Compliance
Keosauqua, Lake Sugema	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	Regional Transport	Regional	No	No	
Keosauqua, Lake Sugema	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	Regional Transport	Regional	No	No	
Keosauqua, Lake Sugema	PM2.5	1	SLAMS	21 / 9.0	No	Low Volume FRM	Gravimetric	1 in 3	Regional Transport	Regional	Yes	Yes	NAAQS Compliance
Keosauqua, Lake Sugema	SO2	1	SPM			UV Fluorescent		Continuous	General / Background	Regional	Yes	Yes	NAAQS Compliance
Lake Ahquabi State Park	Ozone	1	SPM	64	Yes	UV Absorption		Continuous	Upwind Background	Regional	Yes	Yes	NAAQS Compliance
Lake Ahquabi State Park	Ozone	2	SPM			UV Absorption		Continuous	Upwind Background	Regional	No	Yes	QA Real-Time AQI Reporting
Mason City, Holcim Cement	PM10	1	SLAMS			Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Mason City, Holcim Cement	PM10	2	SLAMS			Low Volume FRM	Gravimetric	1 in 6	Source Oriented	Middle	No	Yes	QA NAAQS Compliance
Mason City, Washington School	PM10	2	SPM			Low Volume FRM	Gravimetric	1 in 2	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Muscatine HS, East Campus Roof	PM10	1	SPM			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Muscatine HS, East Campus Roof	PM2.5	1	SLAMS	28 / 11.3	Yes	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Muscatine HS, East Campus Roof	PM2.5	2	SLAMS			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Muscatine HS, East Campus Trailer	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Muscatine HS, East Campus Trailer	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Muscatine HS, East Campus Trailer	SO2	1	SPM			UV Fluorescent		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Muscatine, Franklin School	PM2.5	1	SPM	24 / 10.9	Yes	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Muscatine, Greenwood Cemetery	PM2.5	1	SPM	24 / 10.4	Yes	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Muscatine, Greenwood Cemetery	SO2	1	SPM			UV Fluorescent		Continuous	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Muscatine, Musser Park	PM2.5	1	SPM	26 / na	Yes	Low Volume FRM	Gravimetric	1 in 3	Source Oriented	Middle	24 Hour Only	Yes	NAAQS Compliance
Muscatine, Musser Park	SO2	1	SLAMS			UV Fluorescent		Continuous	Source Oriented	Middle	Yes	Yes	NAAQS Compliance
Muscatine, Musser Park	Toxics	16	SPM			Cartridge	TO-11A	1 in 12	Source Oriented	Middle	No	na	
Pisgah, Forestry Office	Ozone	1	SPM	68	Yes	UV Absorption		Continuous	Max Ozone Concentration	Urban	Yes	Yes	NAAQS Compliance
Pisgah, Forestry Office	Ozone	2	SPM			UV Absorption		Continuous	Max Ozone Concentration	Urban	No	Yes	QA Real-Time AQI Reporting
Pisgah, Highway Maintenance Shed	Ozone	1	SLAMS	69	Yes	UV Absorption		Continuous	Max Ozone Concentration	Urban	Yes	Yes	NAAQS Compliance
Pisgah, Highway Maintenance Shed	Ozone	2	SLAMS			UV Absorption		Continuous	Max Ozone Concentration	Urban	No	Yes	QA Real-Time AQI Reporting
Scott County Park	Ozone	1	SLAMS	64*	Yes	UV Absorption		Continuous	Max Ozone Concentration	Urban	Yes	Yes	NAAQS Compliance
Scott County Park	Ozone	2	SLAMS			UV Absorption		Continuous	Max Ozone Concentration	Urban	No	Yes	QA Real-Time AQI Reporting
Sioux City, Bryant School	PM10	1	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Sioux City, Bryant School	PM10	2	SLAMS			Low Volume FRM	Gravimetric	1 in 6	Population Exposure	Neighborhood	No	Yes	QA NAAQS Compliance
Sioux City, Bryant School	PM2.5	1	SPM	23 / 9.4	No	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Slater, City Hall	Ozone	1	SLAMS	62	No	UV Absorption		Continuous	Max Ozone Concentration	Urban	Yes	Yes	NAAQS Compliance
Slater, City Hall	Ozone	2	SLAMS			UV Absorption		Continuous	Max Ozone Concentration	Urban	No	Yes	QA Real-Time AQI Reporting
Viking Lake State Park	IMPROVE Speciation	1	IMPROVE			IMPROVE Sampler	IMPROVE Protocol	1 in 3	Regional Transport	Regional	No	na	
Viking Lake State Park	Ozone	1	SLAMS	65	Yes	UV Absorption		Continuous	Regional Transport	Regional	Yes	Yes	NAAQS Compliance
Viking Lake State Park	Ozone	2	SLAMS			UV Absorption		Continuous	Regional Transport	Regional	No	Yes	QA Real-Time AQI Reporting
Viking Lake State Park	PM10	1	SPM			Low Volume FRM	Gravimetric	1 in 3	General / Background	Regional	Yes	Yes	NAAQS Compliance
Viking Lake State Park	PM2.5	3	SPM			Beta Attenuation	BAM 1020	Continuous	Regional Transport	Regional	No	No	
Viking Lake State Park	PM2.5	4	SPM			Beta Attenuation	BAM 1020	Continuous	Regional Transport	Regional	No	No	
Viking Lake State Park	PM2.5	1	SLAMS	21 / 8.7	No	Low Volume FRM	Gravimetric	1 in 3	Regional Transport	Regional	Yes	Yes	NAAQS Compliance
Waterloo, Water Tower	PM10	1	SLAMS			Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance

Site Name	Pollutant	POC	Monitor Type	Design Value 11-13	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	FRM / FEM	FRM / FEM Purpose
Waterloo, Water Tower	PM2.5	3	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Waterloo, Water Tower	PM2.5	4	SLAMS			Beta Attenuation	BAM 1020	Continuous	Population Exposure	Neighborhood	No	No	
Waterloo, Water Tower	PM2.5	1	SLAMS	21 / 9.9	No	Low Volume FRM	Gravimetric	1 in 3	Population Exposure	Neighborhood	Yes	Yes	NAAQS Compliance
Waverly Airport	Ozone	1	SLAMS	64	Yes	UV Absorption		Continuous	Population Exposure	Urban	Yes	Yes	NAAQS Compliance
Waverly Airport	Ozone	2	SLAMS			UV Absorption		Continuous	Population Exposure	Urban	No	Yes	QA Real-Time AQI Reporting

*Denotes invalid design values due to incomplete quarters.

Monitor Table Definitions:

Site Name – a combination of the city and site name from the previous table

Pollutants Measured – indicates the pollutant, or set of pollutants, measured by each monitor

- CO – carbon monoxide
- IMPROVE - Interagency Monitoring of Protected Visual Environments; a federal program to protect visibility in national parks
- IMPROVE speciation – a speciation monitor and suite of lab analysis procedures developed by the IMPROVE program to identify and quantify the chemical components of $PM_{2.5}$
- NO_2 – nitrogen dioxide
- NO_3 – the nitrate anion
- NOy – reactive nitrogen; NO and its oxidation products; a common definition is:
  NOy = NO + NO_2 + HNO_3 + NO_3 (aerosol) + NO_3 (radical) + N_2O_5 + HNO_4 + PAN (peroxyacyl nitrates) + other organic nitrates
- Ozone – an unstable molecule consisting of three oxygen atoms
- Pb - lead
- PM_{10} – particles with a diameter of 10 micrometers or less
- $PM_{2.5}$ – particles with a diameter of 2.5 micrometers or less, also known as "fine particles".
- $PM_{2.5}$ speciation – a speciation monitor and suite of lab analysis procedures developed by EPA for their national speciation trends network (STN), to identify and quantify the chemical components of $PM_{2.5}$
- SO_2 – sulfur dioxide
- SO_4 – the sulfate anion
- Toxics – sampling that quantifies volatile organic compounds (VOC's), and carbonyls, including some known urban air toxics

POC – "Parameter Occurrence Code" an integer in the AQS database that labels monitors at a monitoring site. If there are multiple monitors for a given pollutant at a monitoring site, each monitor will have its own POC.

Monitor Type – This column indicates how the monitor is classified in the AQS database.

- IMPROVE – a speciation monitor developed by the IMPROVE program to identify and quantify the chemical components of $PM_{2.5}$. An IMPROVE monitor is a type of special purpose monitor (SPM) – see below.
- NCore – monitors operated at a site which has been accepted into EPA's national network of long term multi-pollutant sites.
- SLAMS – State and Local Air Monitoring Stations. SLAMS make up the ambient air quality monitoring sites that are primarily needed for NAAQS comparisons, but may serve other data purposes. SLAMS exclude special purpose monitor (SPM) stations and include NCore, and all other State or locally operated stations that have not been designated as SPM stations.
- SPM – means a monitor that is designated as a special purpose monitor in the monitoring network plan and in EPA's AQS database. SPM monitors do not count when showing compliance with minimum SLAMS requirements for monitor numbers and siting.
- Supplemental Speciation – a speciation site with monitors that are operated according to CSN protocols, but not contained in the STN Network. A supplemental speciation monitor is a type of special purpose monitor (SPM).

Design Value – A design value is a number computed from monitoring data (see 40 CFR Part 50, Appendix N) that is used for comparisons to the National Ambient Air Quality Standards (NAAQS). For $PM_{2.5}$ and ozone, the monitoring requirements depend on these design values. For $PM_{2.5}$, there are two design values—a 24 hour design value (in $\mu g/m^3$) and an annual design value (also in $\mu g/m^3$). For $PM_{2.5}$ monitors in the table, 24 hour design value is listed first and an annual design value is listed second, i.e. 27/10.3. For ozone, there is a single design value; the 8-hour design value (in ppb) is indicated in the table.

High Design Value? – A "Yes" in this column indicates that the design value is within 85% of the NAAQS. For $PM_{2.5}$, 24

hour design values of 30 ⍰g/m^3 or greater are considered greater than or equal to 85% of the 24-hour NAAQS (35 ⍰g/m^3) and values of 10.2 ⍰g/m^3 or greater are considered greater than or equal to the 85% of the annual NAAQS (12.0 ⍰g/m^3). For ozone, 8-hour design values of 64 ppb or greater are considered greater than or equal to 85% of the 8-hour NAAQS (75 ppb).

Sampling Method – Indicates how the sample is collected. This column also shows how the sample is analyzed, if it is analyzed on site at the time of collection.

- Continuous $PM_{2.5}$- a monitor that reports $PM_{2.5}$ levels in real time. Continuous $PM_{2.5}$ monitors typically have three components: a size selective inlet (cyclone) that knocks out all but the fine particles, a conditioning system that rapidly dries the fine particles, and a mass measurement system that determines the mass of the conditioned sample. The type of continuous $PM_{2.5}$ monitor currently used in the Iowa Network is the BAM (BAM=Beta Attenuation Monitor). This monitor conditions particles using a heater that is actuated when the relative humidity exceeds 35%. Mass measurements are made by measuring the attenuation of beta particles caused by fine particles collected on a sampling tape during the sampling period.
- Canister – Specially treated stainless steel canisters are used to collect VOC's.
- Cartridge – A 2,4-Dinitrophenylhydrazine (DNPH) cartridge is used to collect toxics that contain a carbonyl group.
- Chemiluminescence – When a nitric oxide (NO) molecule collides with an ozone molecule, a nitrogen dioxide (NO_2) molecule and an oxygen (O_2) molecule result. The NO_2 molecule is in an excited state, and subsequently emits infrared light that can be measured by a photomultiplier tube.
- IMPROVE Sampler – See IMPROVE in the "Pollutants Measured" section above.
- Low Volume – a sampler that uses a flow of 16.67 liters per minute.
- Low Volume FRM – a sampler that uses a flow of 16.67 liters per minute, which has been designated as a Federal Reference Method.
- Non-Dispersive Infrared – Carbon Monoxide absorbs infrared radiation; this property is the basis of the analytical method used by continuous CO monitors to quantify CO concentrations.
- $PM_{2.5}$ Speciation – See $PM_{2.5}$ Speciation in the "Pollutants Measured" section above.
- UV Absorption – Ozone absorbs ultraviolet light; this property is the basis of the analytical method used by continuous ozone monitors to quantify ozone concentrations.
- UV Fluorescent – When excited by ultraviolet light, SO_2 molecules emit light at a lower frequency that may be detected by a photomultiplier tube. This property is the basis for the analytical method used for continuous SO_2 gas analyzers.

Analysis – indicates the method of post-collection analysis that is done in a lab environment.

- GFAA – Graphite Furnace Atomic Absorption is used to measure the concentration of trace metals. The sample is placed in a graphite tube and heated to atomize the sample. Light of a wavelength that is absorbed by the metal atoms of interest is directed down the tube. The amount of light absorbed is proportional to the concentration of metal atoms.
- Gravimetric – A filter is weighed before and after collecting a particulate sample.
- ICP-MS – Inductively Coupled Plasma Mass Spectrometry is a highly sensitive analytical technique capable of determining a range of metals. The metal sample is atomized and ionized by argon plasma, and the ions are separated and quantified via a mass spectrometer.
- IMPROVE Protocol – This protocol uses a suite of analytical procedures (X-Ray Fluorescence, Ion Chromatography, and Thermal Optical Reflectance) to identify and quantify the components of $PM_{2.5}$. See http://vista.cira.colostate.edu/improve/ for further details.
- Ion Chromatography – a liquid chromatography method used to analyze the extract from filters for the nitrate and sulfate anion.
- CSN Protocol – refers to EPA's chemical speciation network protocol. This protocol utilizes X- Ray Fluorescence, Ion Chromatography, and Thermal Optical Reflectance to identify and quantify the components of $PM_{2.5}$.
- Thermal Optical Reflectance- a carbon containing sample is subjected to a programmed, progressive heating in a controlled atmosphere, and the evolved carbon at each step is quantified by a flame ionization detector. Organic carbon (OC) evolves from the sample without an oxygen atmosphere for combustion, Elemental Carbon (EC) does not. A laser is used to detect charring in the sample, so that the charring of the high temperature OC

component does not result in an over estimation of the EC in the sample.

- TO-11A – an EPA protocol in which carbonyl cartridge extracts are analyzed using High Performance Liquid Chromatography and an ultraviolet detector.
- TO-15, GC-FID – These analysis methods are used for air samples collected in specially treated stainless steel canisters. EPA protocol TO-15 is used for UATMP (Urban Air Toxics Monitoring Program) compounds. According to method TO-15, toxic gases are separated with a gas chromatograph, and quantified by a mass spectrometer (GCMS). The SNMOC (Speciated Non- Methane Organic Carbon) pollutants are also separated by a gas chromatograph, but are quantified by a flame ionization detector (GC-FID).
- X-Ray Fluorescence-when illuminated with x-rays, metallic atoms emit characteristic fluorescent radiation, which may be quantified with a semiconductor detector or gas proportional counter to obtain metallic concentrations in a filter sample.

Operating Schedule – Continuous monitors run constantly and measure hourly average concentrations in real time. Manual samplers, such as PM filter samplers or toxics samplers, collect a single 24 hour sample from midnight to midnight on a particular day, which is quantified later in an analytical laboratory. A fractional (e.g. 1/2, 1/3, 1/6, and 1/12) schedule for a manual samplers refers to collecting a sample every second, third, sixth, and twelfth day, respectively. Ozone monitors in Iowa (except the one at the NCore site) are operated only during ozone season (April to October) when higher temperatures favor ozone formation. Cartridges for toxic carbonyl compounds are normally collected every twelfth day, but the schedule is accelerated to 1/6 days during ozone season.

Monitoring Objective – the primary reason a monitor is operated at a particular location.

- General Background – The objective is to establish the background levels of a pollutant.
- Highest Conc. – The objective is to measure at a site where the concentration of the pollutant is highest.
- Max. Ozone Conc. – The objective is to record the maximum ozone concentration. Because ozone is a secondary pollutant, ozone concentrations are typically highest 10-30 miles downwind of an urban area.
- Population Exposure – The objective is to monitor the exposure of individuals in the area represented by the monitor.
- Regional Transport – The objective is to assess the extent to which pollutants are transported between two regions that are separated by tens to hundreds of kilometers.
- Source Oriented – The objective is to determine the impact of a nearby source.
- Transport – The objective is to assess the extent to which pollutants are transported from one location to another.
- Upwind Background – The objective is to establish the background levels of a pollutant, typically upwind of a source or urban area.

Spatial Scale – The scale of representativeness is described in terms of the physical dimensions of the air parcel nearest to a monitoring site throughout which actual pollutant concentrations are reasonably similar. Monitors are classified according to the largest applicable scale below:

- Microscale - defines the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
- Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.
- Neighborhood scale - defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range. The neighborhood and urban scales listed below have the potential to overlap in applications that concern secondarily formed or homogeneously distributed air pollutants.
- Urban scale - defines concentrations within an area of city-like dimensions, on the order of 4 to 50 kilometers. Within a city, the geographic placement of sources may result in there being no single site that can be said to represent air quality on an urban scale.
- Regional scale – usually defines a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.

NAAQS Comparable? - This column shows whether the data from the monitor can be compared to the National Ambient Air Quality Standards (NAAQS). Entries under this column are Yes, No, and 24 Hour Only. For a monitor's data to be eligible for comparison against the NAAQS, the type of monitor used must be defined as a federal reference method or federal equivalent method by EPA.

EPA has designated the BAM-1020 as a Federal Equivalent Method (FEM) for $PM_{2.5}$ when configured and operated as prescribed in the federal equivalence designation. Iowa operates several BAM-1020 analyzers, but they are not configured in accordance with the designation, and the data cannot be compared with the NAAQS.

For $PM_{2.5}$, there is both an annual and a 24 hour NAAQS. To be comparable to either $PM_{2.5}$ NAAQS a site must be population-oriented. In 40 CFR Part 58, EPA defines a population-oriented monitoring site as follows:

Population-oriented monitoring (or sites) means residential areas, commercial areas, recreational areas, industrial areas where workers from more than one company are located and other areas where a substantial number of people may spend a significant fraction of their day.

Following this definition, all $PM_{2.5}$ monitoring sites in Iowa are population-oriented.

In a populated area near an industrial source, monitoring data may only be comparable to the 24 hour $PM_{2.5}$ NAAQS. According to Subpart D of 40 CFR Part 58:

$PM_{2.5}$ measurement data from monitors that are not representative of area-wide air quality but rather of relatively unique micro-scale, or localized hot spot, or unique middle-scale impact sites are not eligible for comparison to the annual $PM_{2.5}$ NAAQS. PM2.5 measurement data from these monitors are eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS. For example, if a micro- or middle-scale $PM_{2.5}$ monitoring site is adjacent to a unique dominating local $PM_{2.5}$ source, then the PM2.5 measurement data from such a site would only be eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS.

FRM/FEM – "Federal Reference Method/Federal Equivalent Method" EPA specifies that only these types of monitors or monitoring methods may be used to establish attainment with the NAAQS. The first method that EPA declares to have sufficient accuracy and repeatability for ambient measurements is the reference method. Once the reference method is defined, other methods or equipment may be used for NAAQS comparisons, provided the candidate method passes tests that demonstrate comparability to the reference method. A criteria pollutant monitor that is not a FRM/FEM may not be used for NAAQS comparisons, but may still be useful for other purposes, such as real time reporting.

FRM/FEM Purpose – When more than one FRM/FEM is operated at a monitoring site at the same time (i.e. multiple POCs for the same pollutant), there is the potential for ambiguity in the attainment status at a monitoring site. To avoid this ambiguity, we declare one of the monitors to be the NAAQS compliance (primary) monitor at the monitoring site and indicate the purpose for the other monitors at the site.

- NAAQS Compliance – denotes a monitor that is the primary monitor used to establish attainment with the NAAQS.
- QA NAAQS Compliance – denotes a monitor that is used to satisfy a federal requirement to provide quality assurance data for the primary NAAQS monitor.
- Real-time AQI Reporting – Denotes a monitor used for real-time reporting.
- QA Real-Time AQI Reporting – Denotes a monitor that is used to provide real-time QA of a continuous monitor used for real-time reporting.

Appendix E: Population-Based Minimum Monitoring Requirements

Ozone

40 CFR Part 58 Appendix D, Table D-2 specifies the minimum number of SLAMS (State and Local Air Monitoring Stations) ozone monitors required based on population and the most recent three years of monitoring data (design value).

TABLE D-2 OF APPENDIX D TO PART 58 - SLAMS MINIMUM O_3 MONITORING REQUIREMENTS

MSA population[1, 2]	Most recent 3- year design value concentrations ≥85% of any O_3 NAAQS[3]	Most recent 3- year design value concentrations <85% of any O_3 NAAQS[3, 4]
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2]Population based on latest available census figures.
[3]The ozone (O3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR Part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

PM2.5

40 CFR Part 58 Appendix D, Table D-5 specifies the minimum number of SLAMS $PM_{2.5}$ monitors required based on population and 3-year design values.

TABLE D-5 OF APPENDIX D TO PART 58 - $PM_{2.5}$ MINIMUM MONITORING REQUIREMENTS

MSA population[1, 2]	Most recent 3- year design value ≥85% of any $PM_{2.5}$ NAAQS[3]	Most recent 3- year design value <85% of any $PM_{2.5}$ NAAQS[3, 4]
>1,000,000	3	2
500,000–1,000,000	2	1
50,000–<500,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA)
[2]Population based on latest available census figures.
[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR Part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

PM_{10}

40 CFR Part 58 Appendix D, Table D-4 lists the minimum requirements for the number of PM_{10} stations per MSA based on population and measured levels:

TABLE D-4 OF APPENDIX D TO PART 58 - PM_{10} MINIMUM MONITORING REQUIREMENTS (Approximate NUMBER OF STATIONS PER MSA)[1]

Population category	High concentration[2]	Medium concentration[3]	Low concentration[4, 5]
>1,000,000	6-10	4-8	2-4
500,000–1,000,000	4-8	2-4	1-2
250,000–500,000	3-4	1-2	0-1
100,000–250,000	1-2	0-1	0

[1]Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State Agency.
[2]High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10}

NAAQS by 20 percent or more.
[3]Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS.
[4]Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.
[5]These minimum monitoring requirements apply in the absence of a design value.

Nitrogen Dioxide
40 CFR Part 58 Appendix D, section 4.3.3 contains the minimum requirement for population-based NO_2 Monitoring:

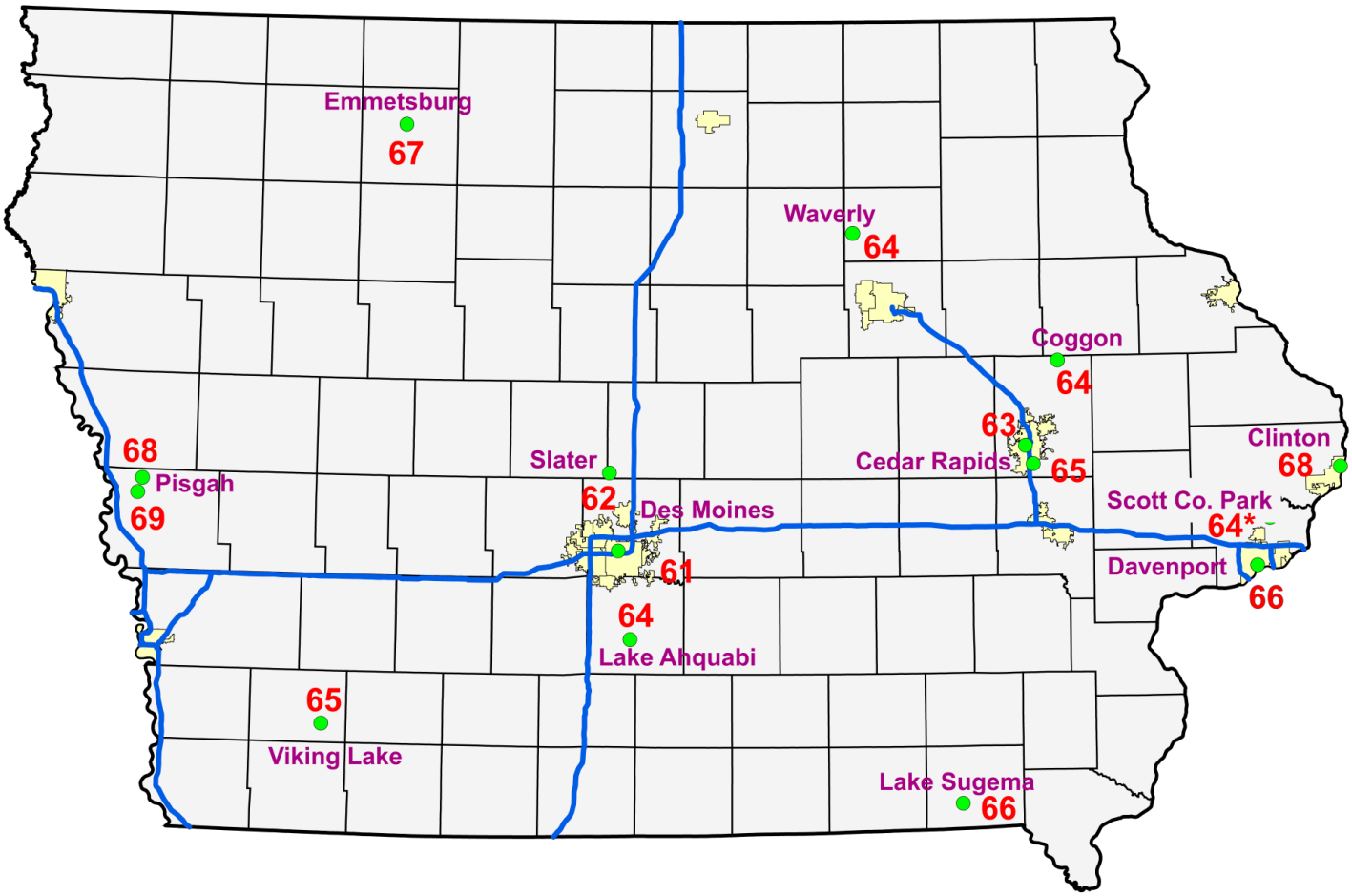
…
(a) Within the NO_2 network, there must be one monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales. PAMS sites collecting NO_2 data that are situated in an area of expected high NO_2 concentrations at the neighborhood or larger spatial scale may be used to satisfy this minimum monitoring requirement when the NO_2 monitor is operated year round. Emission inventories and meteorological analysis should be used to identify the appropriate locations within a CBSA for locating required area-wide NO_2 monitoring stations. CBSA populations shall be based on the latest available census figures.

Appendix F: Census Bureau Estimates for Iowa MSAs

US Census Geographic Area	Counties in MSA	Population
Omaha-Council Bluffs, NE-IA	IA: Harrison, Mills, Pottawattamie NE: Cass, Douglas, Sarpy, Saunders, Washington	895,151
Des Moines-West Des Moines, IA	Dallas, Guthrie, Madison, Polk, Warren	599,789
Davenport-Moline-Rock Island, IA-IL	IA: Scott IL: Henry, Mercer, Rock Island	383,681
Cedar Rapids, IA	Benton, Jones, Linn	262,421
Waterloo-Cedar Falls, IA	Black Hawk, Bremer, Grundy	169,484
Sioux City, IA-NE-SD	IA: Plymouth, Woodbury NE: Dakota, Dixon SD: Union	168,714
Iowa City, IA	Johnson, Washington	161,170
Dubuque, IA	Dubuque	95,697
Ames, IA	Story	92,406

Source for Counties: http://www.census.gov/population/metro/data/def.html
Source for Population: http://www.census.gov/popest/data/metro/totals/2013/index.html

Appendix G: Design Value Map for Ozone

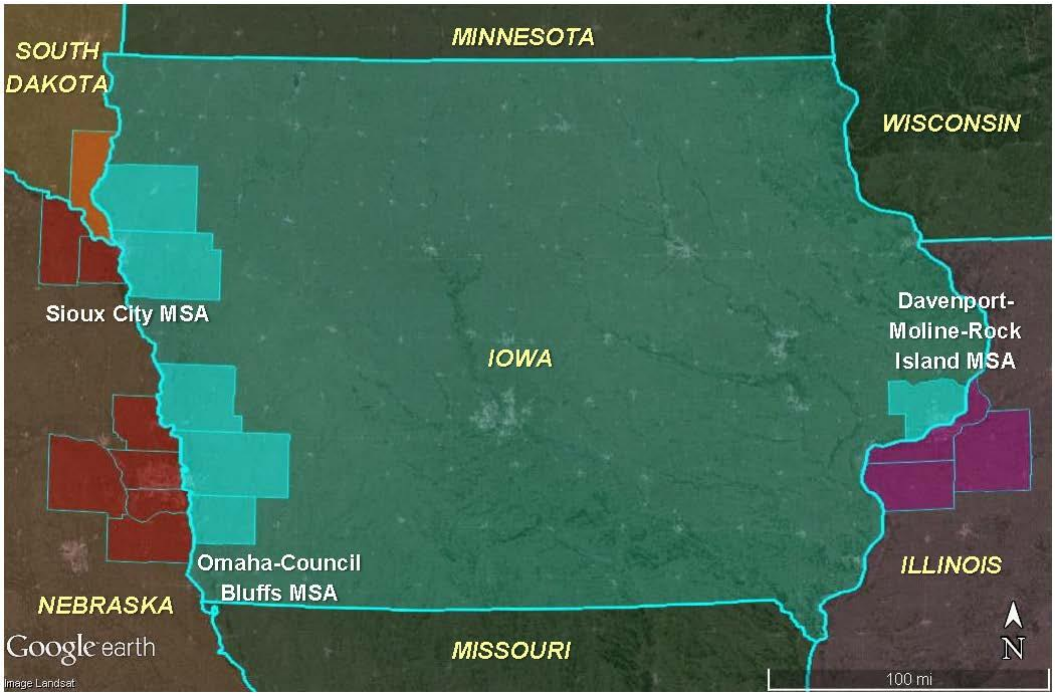


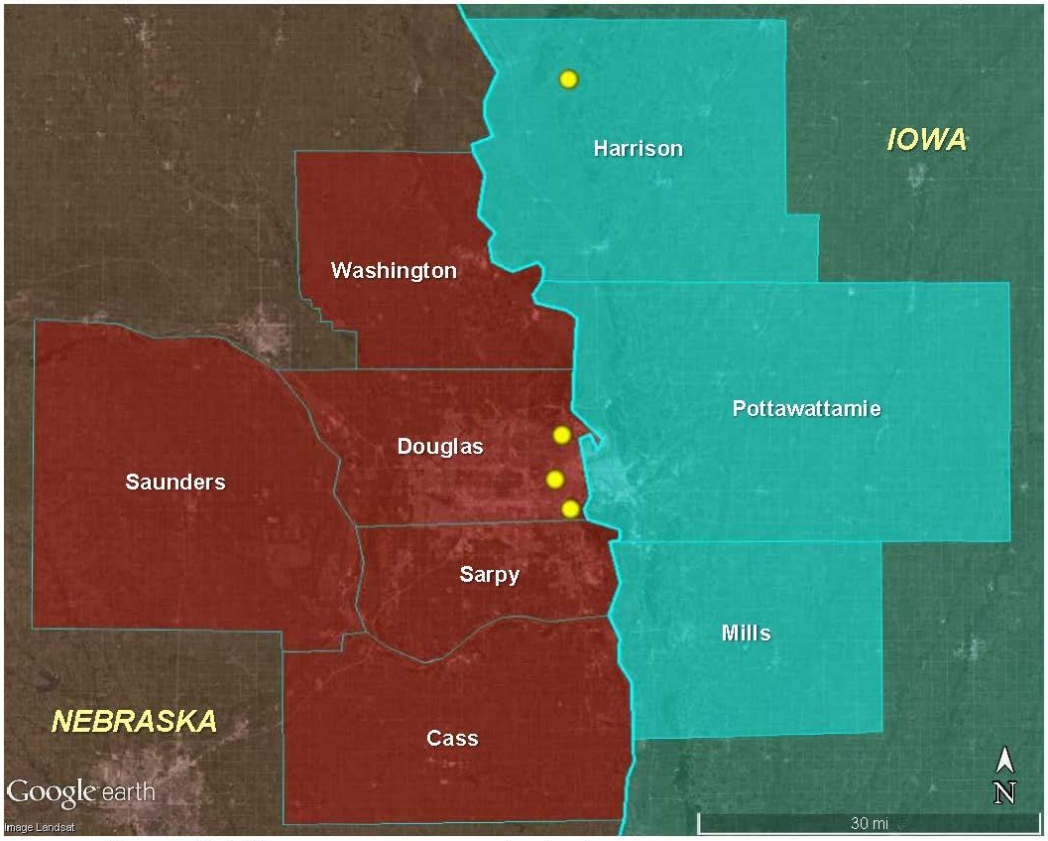
*Denotes an invalid design value due to failure to meet quarterly completeness standards.

2011-2013 Ozone Design Values (ppb)

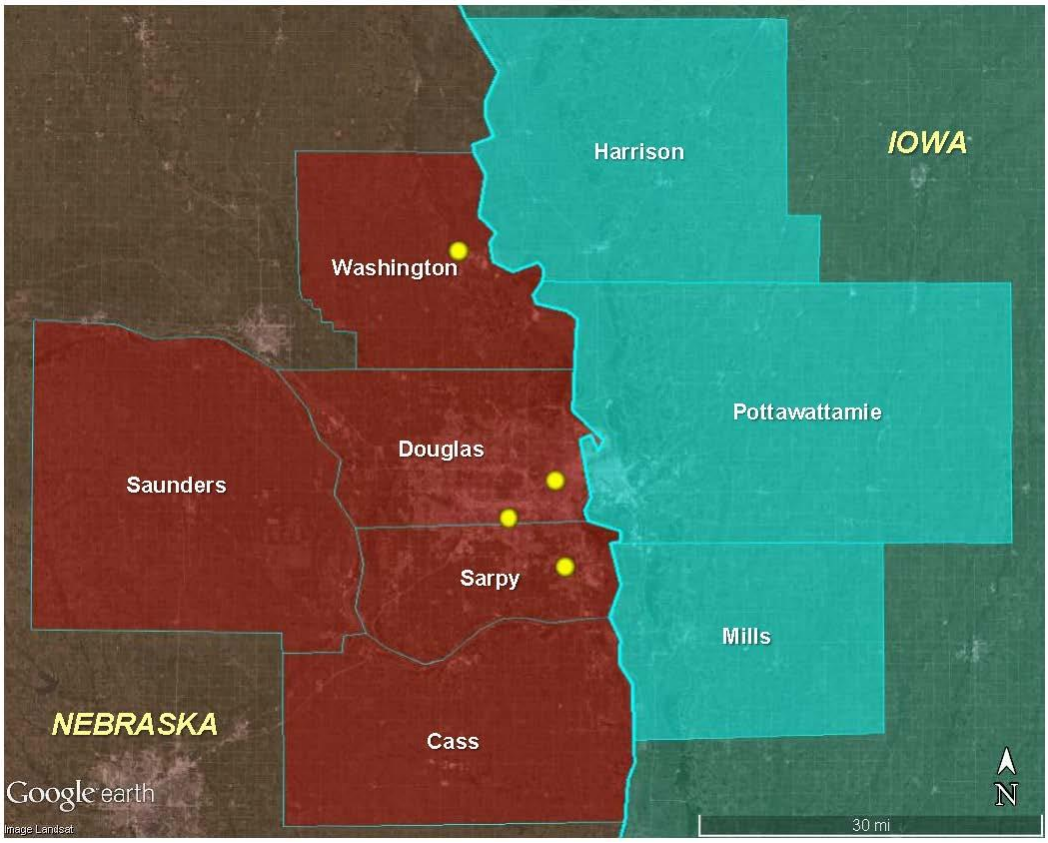
Appendix H: Maps of Monitoring Locations in MSAs on the State Border

Iowa includes portions of three MSAs that it shares with other states: Davenport-Moline-Rock Island, IA-IL; Omaha-Council Bluffs, NE-IA; and Sioux City, NE-IA-SD. To estimate the SLAMs monitors operating at the time of this review, Air Quality System (AQS) reports (AMP390 and AMP600) and Network Plans from adjacent states were reviewed. The following maps show the estimated number and locations for SLAMS monitors for ozone, $PM_{2.5}$, SO_2, and PM_{10} in these MSA's.

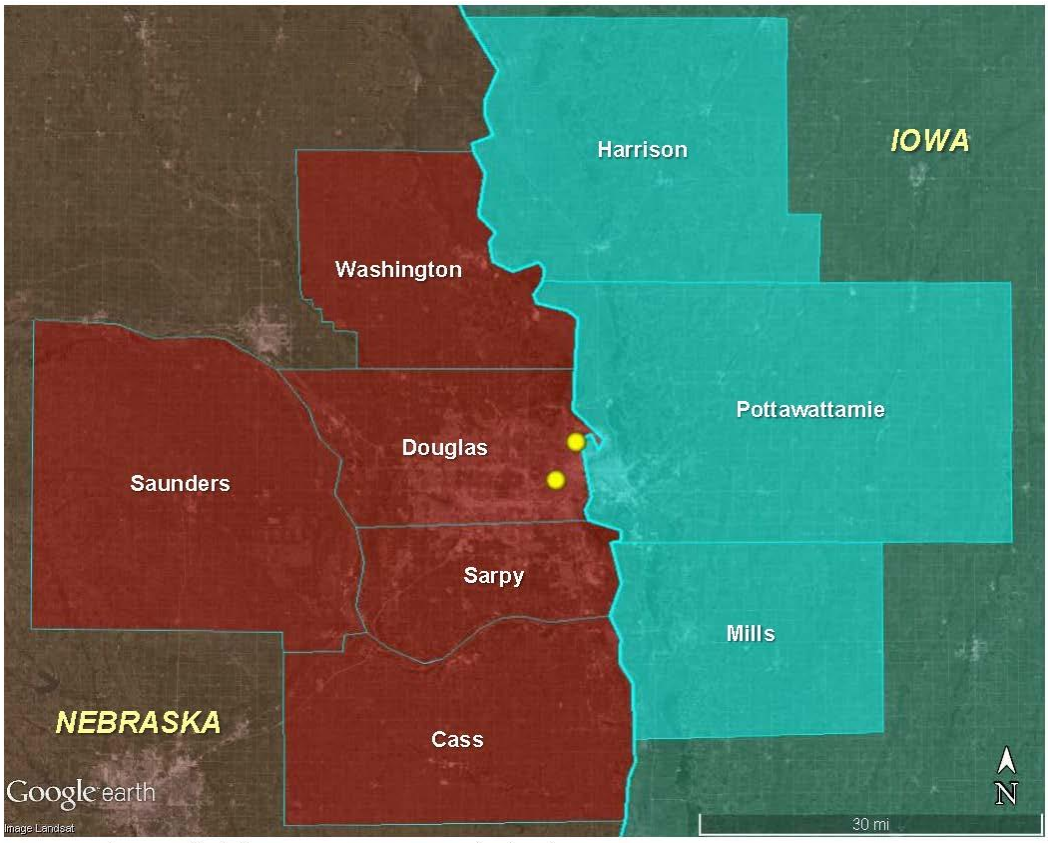




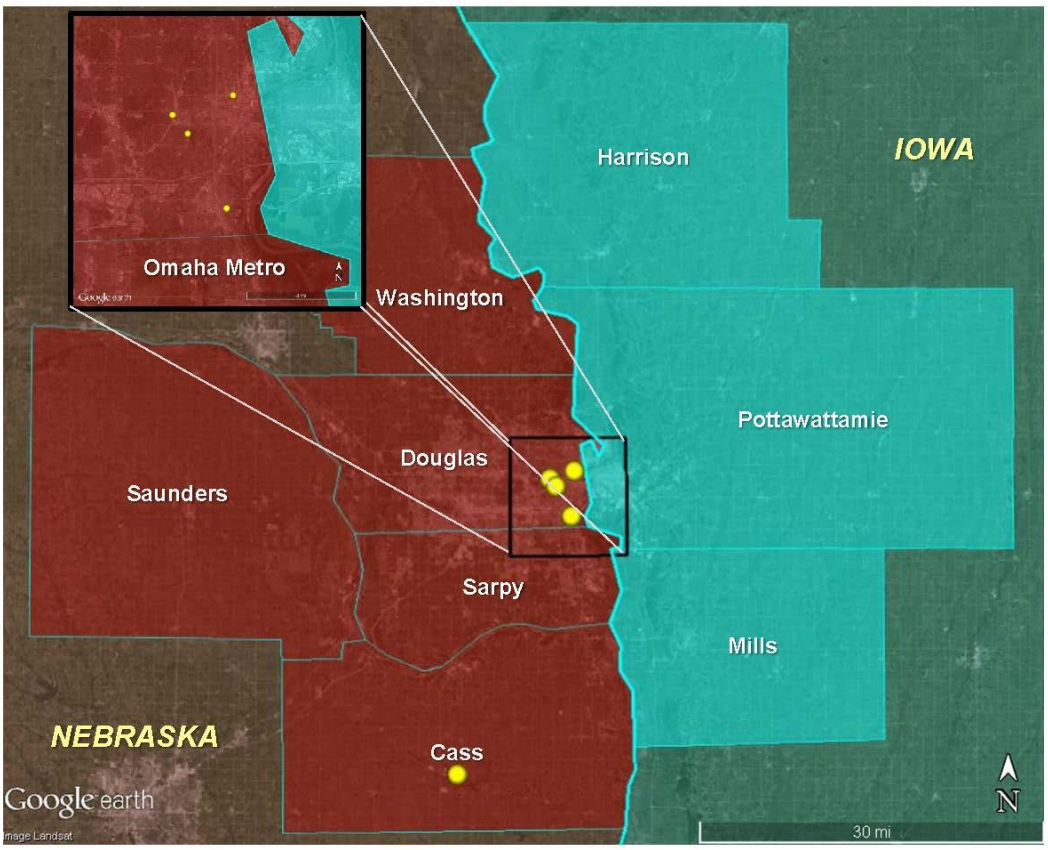
Omaha-Council Bluffs, NE-IA Ozone SLAMS Monitoring Sites



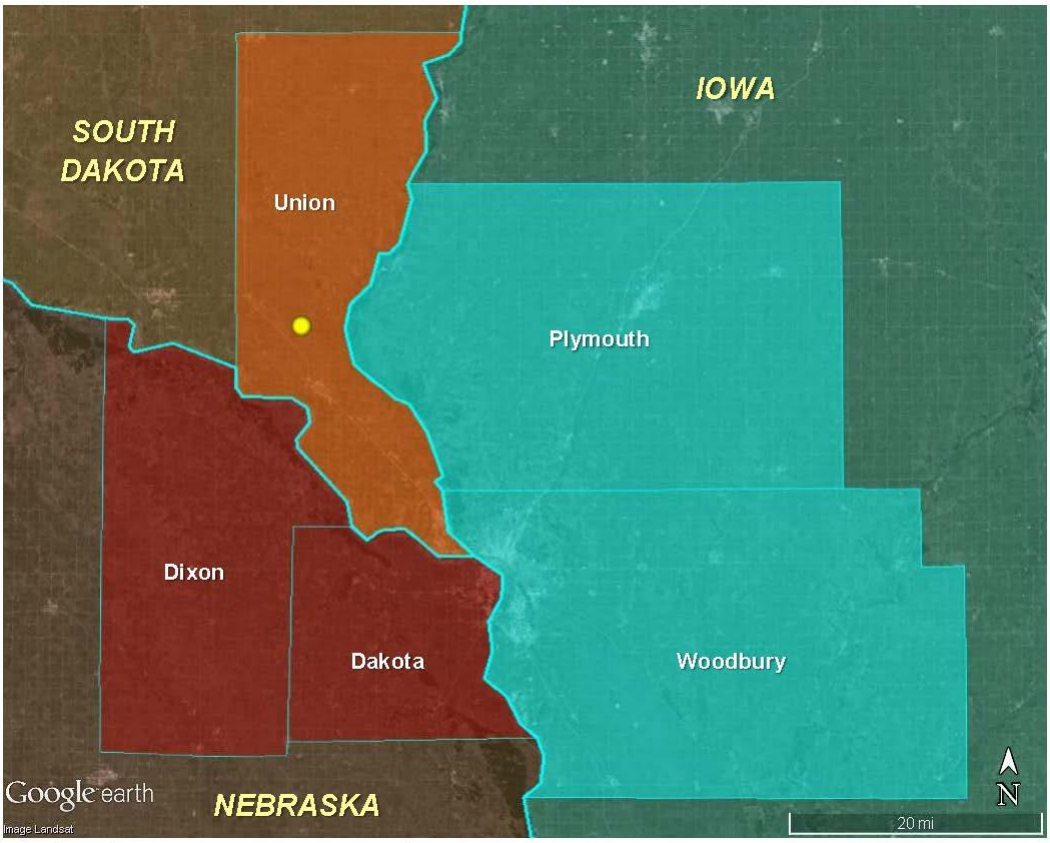
Omaha-Council Bluffs, NE-IA $PM_{2.5}$ SLAMS Monitoring Sites



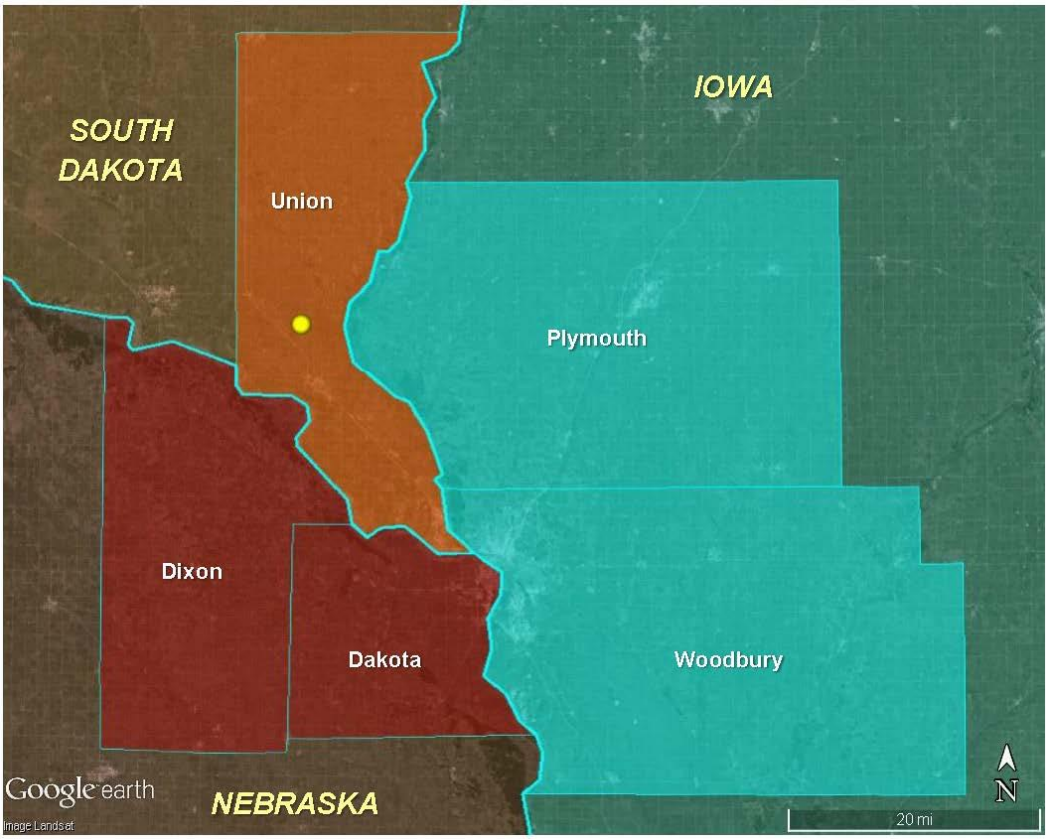
Omaha-Council Bluffs, NE-IA SO_2 SLAMS Monitoring Sites



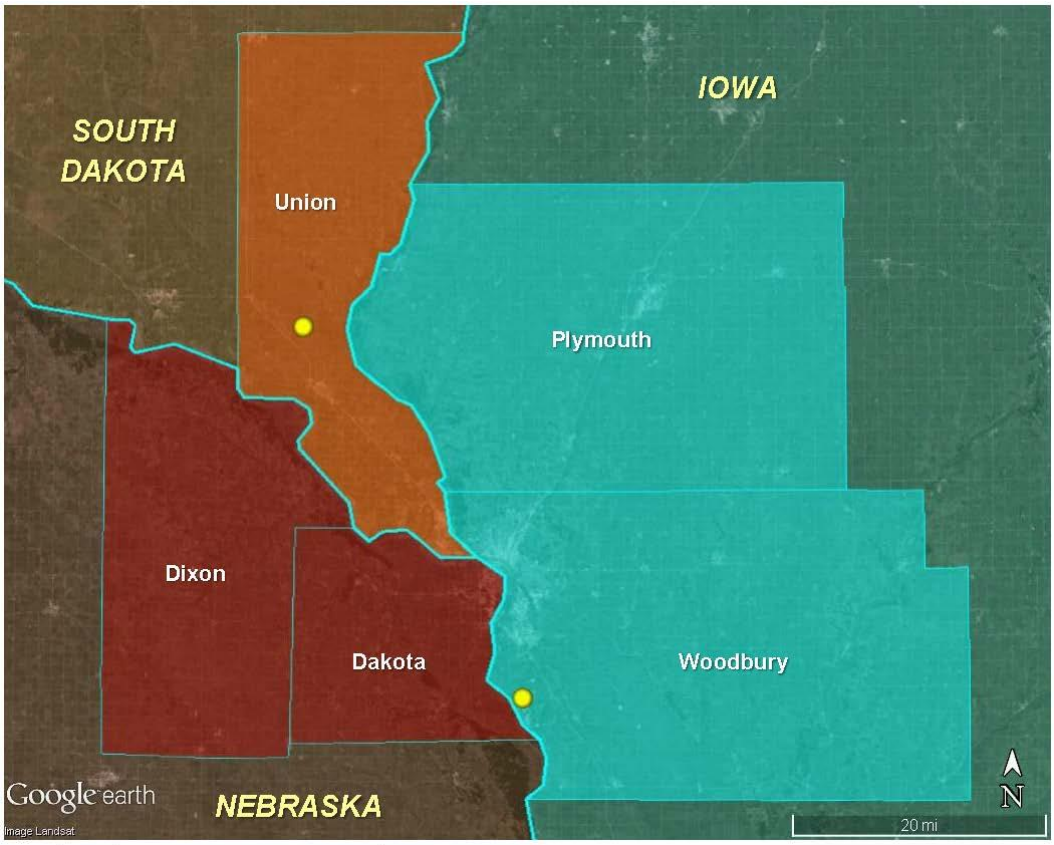
Omaha-Council Bluffs, NE-IA PM_{10} SLAMS Monitors



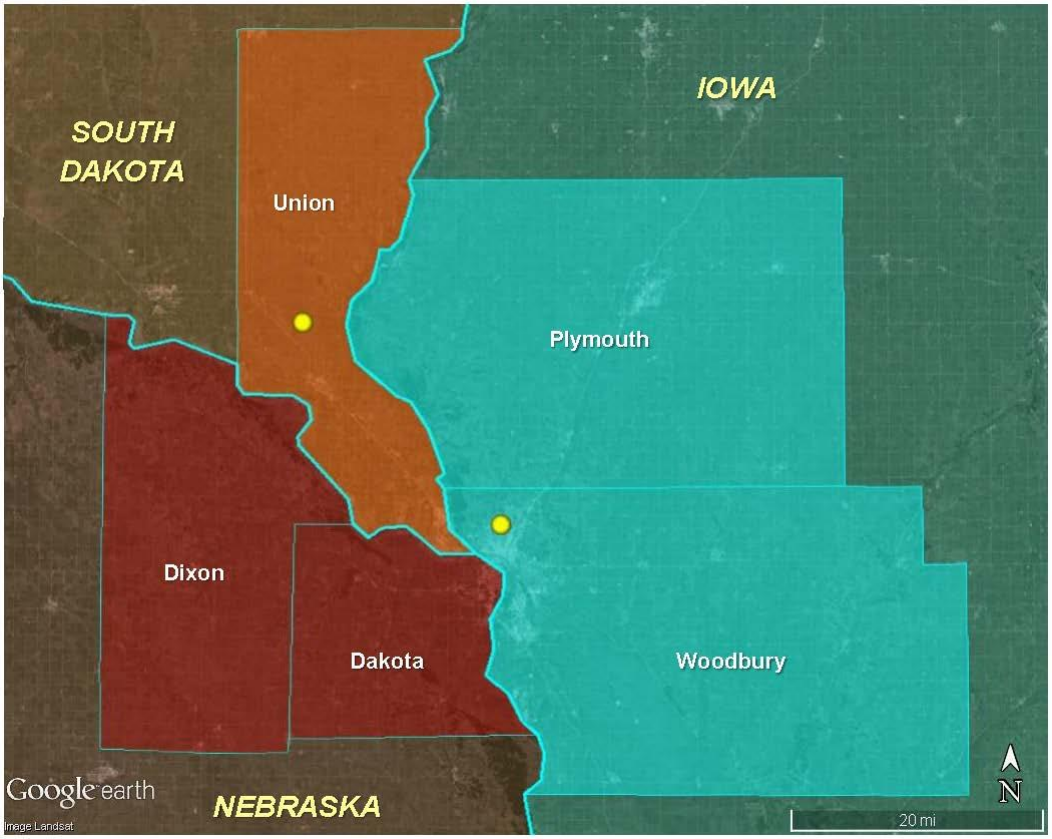
Sioux City, IA-NE-SD Ozone SLAMS Monitors



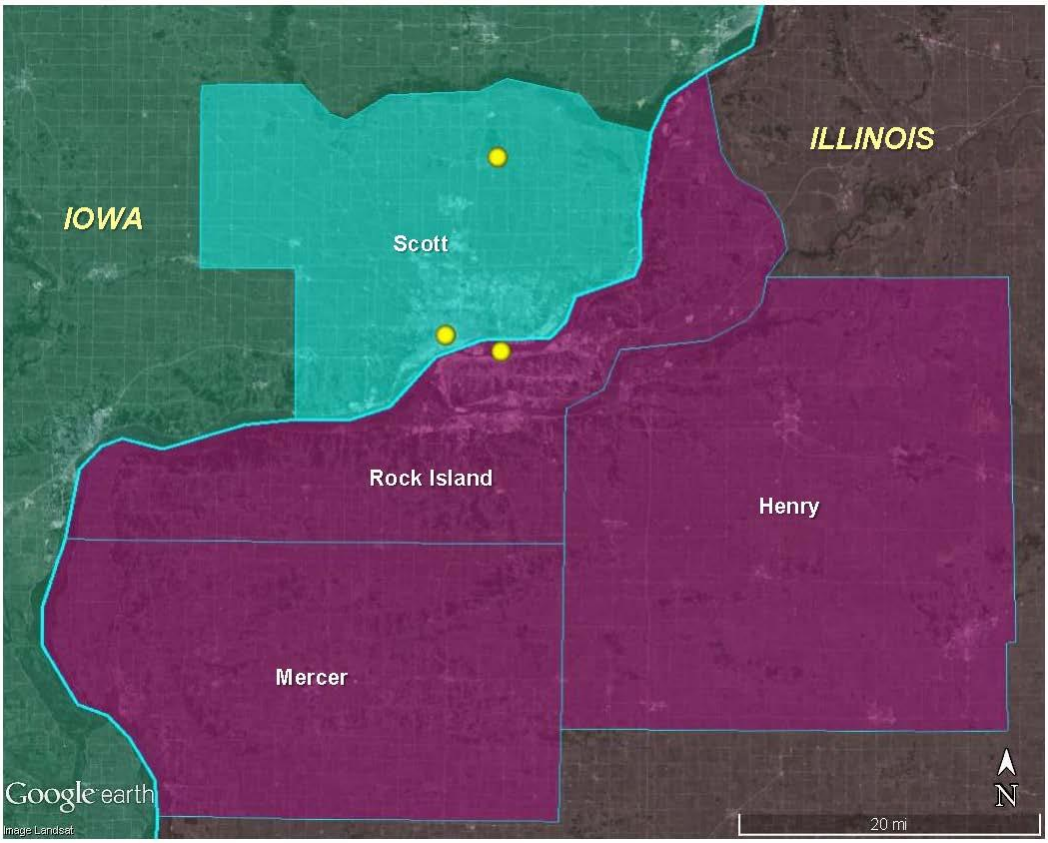
Sioux City, IA-NE-SD $PM_{2.5}$ SLAMS Monitors



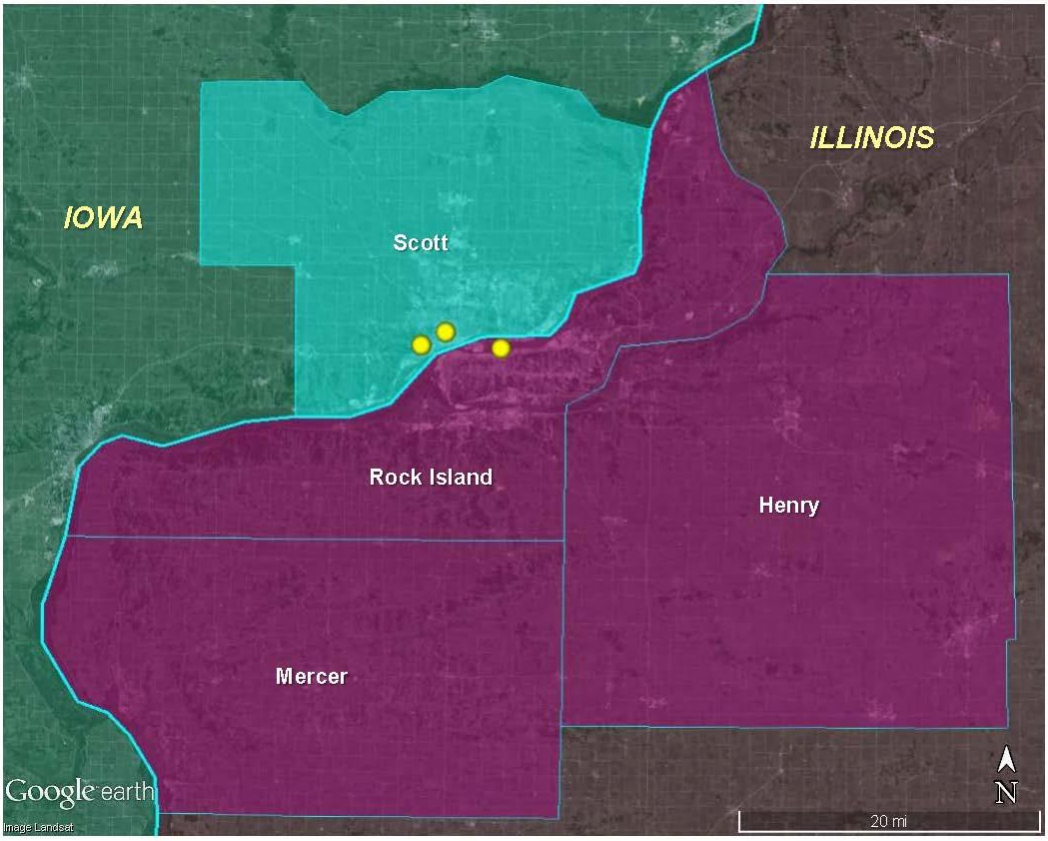
Sioux City, IA-NE-SD SO_2 SLAMS Monitors



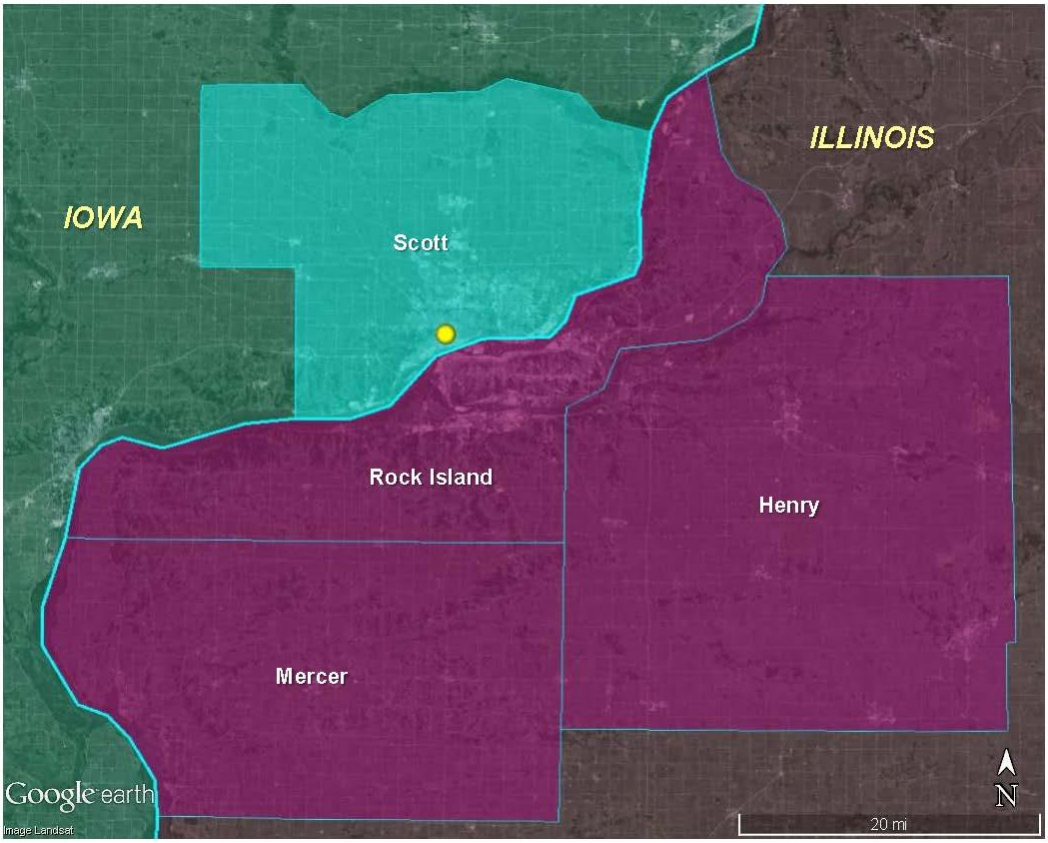
Sioux City, IA-NE-SD PM_{10} SLAMS Monitors



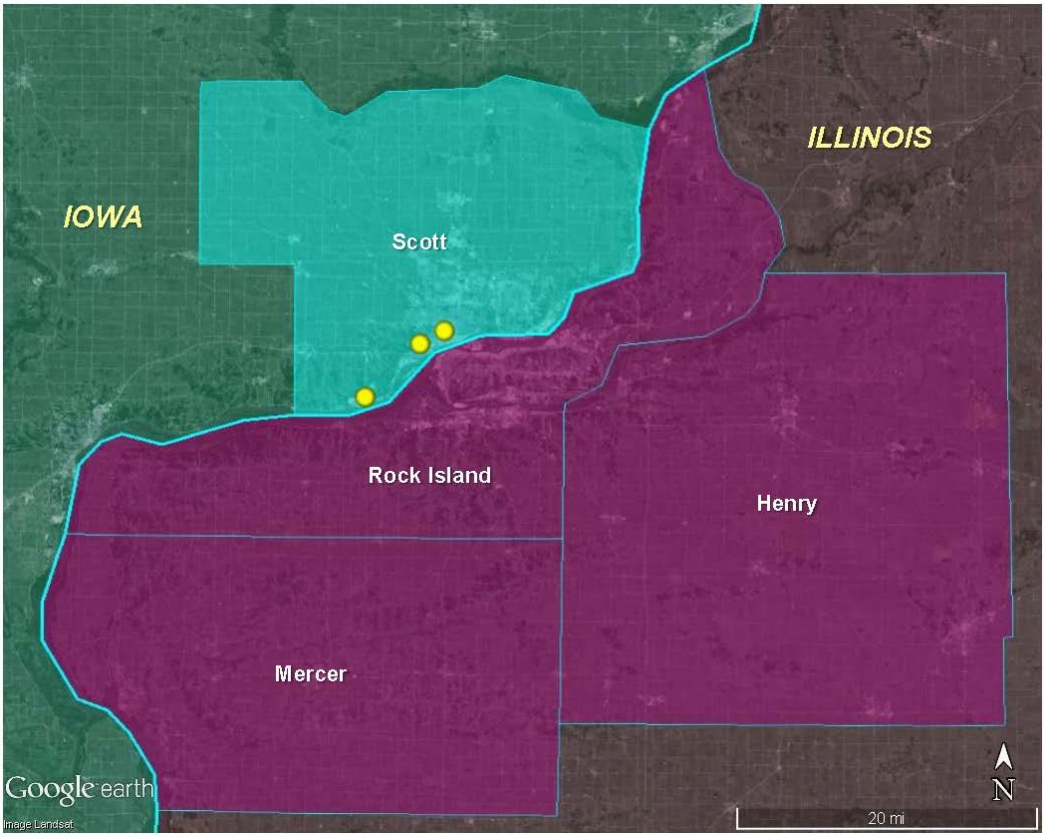
Davenport-Moline-Rock Island, IA-IL Ozone SLAMS Monitors



Davenport-Moline-Rock Island, IA-IL $PM_{2.5}$ SLAMS Monitors



Davenport-Moline-Rock Island, IA-IL SO_2 SLAMS Monitors



Davenport-Moline-Rock Island, IA-IL PM_{10} SLAMS Monitors

Appendix I: Uniform Air Quality Index (AQI) and Daily Reporting

Appendix G to Part 58—Uniform Air Quality Index (AQI) and Daily Reporting

General Requirements

1. What is the AQI?
2. Why report the AQI?
3. Must I report the AQI?
4. What goes into my AQI report?
5. Is my AQI report for my MSA only?
6. How do I get my AQI report to the public?
7. How often must I report the AQI?
8. May I make exceptions to these reporting requirements?

Calculation

9. How Does the AQI Relate to Air Pollution Levels?
10. What Monitors Should I Use To Get the Pollutant Concentrations for Calculating the AQI?
11. Do I have to forecast the AQI?
12. How Do I Calculate the AQI?

Background and Reference Materials

13. What Additional Information Should I Know?

General Requirements

1. What Is the AQI?
   The AQI is a tool that simplifies reporting air quality to the general public. The AQI incorporates into a single index concentrations of 5 criteria pollutants: ozone (O_3), particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). The scale of the index is divided into general categories that are associated with health messages.

2. Why Report the AQI?
   The AQI offers various advantages:
   a. It is simple to create and understand.
   b. It conveys the health implications of air quality.
   c. It promotes uniform use throughout the country.

3. Must I Report the AQI?
   You must report the AQI daily if yours is a metropolitan statistical area (MSA) with a population over 350,000.

4. What Goes Into My AQI Report?
   i. Your AQI report must contain the following:
      a. The reporting area(s) (the MSA or subdivision of the MSA).
      b. The reporting period (the day for which the AQI is reported).
      c. The critical pollutant (the pollutant with the highest index value).
      d. The AQI (the highest index value).
      e. The category descriptor and index value associated with the AQI and, if you choose to report in a color format, the associated color. Use only the following descriptors and colors for the six AQI categories:

Table 1—AQI Categories

For this AQI	Use this descriptor	And this color[1]
0 to 50	"Good"	Green
51 to 100	"Moderate"	Yellow
101 to 150	"Unhealthy for Sensitive Groups"	Orange
151 to 200	"Unhealthy"	Red
201 to 300	"Very Unhealthy"	Purple
301 and above	"Hazardous"	Maroon[1]

[1]Specific colors can be found in the most recent reporting guidance (Guideline for Public Reporting of Daily Air Quality—Air Quality Index (AQI)).

f. The pollutant specific sensitive groups for any reported index value greater than 100. Use the following sensitive groups for each pollutant:

When this pollutant has an index value above 100***	Report these sensitive groups***
Ozone	Children and people with asthma are the groups most at risk.
PM2.5	People with respiratory or heart disease, the elderly and children are the groups most at risk.
PM_{10}	People with respiratory disease are the group most at risk.
CO	People with heart disease are the group most at risk.
SO_2	People with asthma are the group most at risk.
NO_2	Children and people with respiratory disease are the groups most at risk.

ii. When appropriate, your AQI report may also contain the following:
   a. Appropriate health and cautionary statements.
   b. The name and index value for other pollutants, particularly those with an index value greater than 100.
   c. The index values for sub-areas of your MSA.
   d. Causes for unusual AQI values.
   e. Actual pollutant concentrations.

5. Is My AQI Report for My MSA Only?
   Generally, your AQI report applies to your MSA only. However, if a significant air quality problem exists (AQI greater than 100) in areas significantly impacted by your MSA but not in it (for example, O_3 concentrations are often highest downwind and outside an urban area), you should identify these areas and report the AQI for these areas as well.

6. How Do I Get My AQI Report to the Public?
   You must furnish the daily report to the appropriate news media (radio, television, and newspapers). You must make the daily report publicly available at one or more places of public access, or by any other means, including a recorded phone message, a public Internet site, or facsimile transmission. When the AQI value is greater than 100, it is particularly critical that the reporting to the various news media be as extensive as possible. At a minimum, it should include notification to the media with the largest market coverages for the area in question.

7. How Often Must I Report the AQI?
   You must report the AQI at least 5 days per week. Exceptions to this requirement are in section 8 of this appendix.

8. May I Make Exceptions to These Reporting Requirements?
   i. If the index value for a particular pollutant remains below 50 for a season or year, then you may exclude the pollutant from your calculation of the AQI in section 12.
   ii. If all index values remain below 50 for a year, then you may report the AQI at your discretion. In subsequent

years, if pollutant levels rise to where the AQI would be above 50, then the AQI must be reported as required in sections 3, 4, 6, and 7 of this appendix.

Calculation

9. How does the AQI relate to air pollution levels?
   For each pollutant, the AQI transforms ambient concentrations to a scale from 0 to 500. The AQI is keyed as appropriate to the national ambient air quality standards (NAAQS) for each pollutant. In most cases, the index value of 100 is associated with the numerical level of the short-term standard (i.e., averaging time of 24-hours or less) for each pollutant. The index value of 50 is associated with the numerical level of the annual standard for a pollutant, if there is one, at one-half the level of the short-term standard for the pollutant, or at the level at which it is appropriate to begin to provide guidance on cautionary language. Higher categories of the index are based on increasingly serious health effects and increasing proportions of the population that are likely to be affected. The index is related to other air pollution concentrations through linear interpolation based on these levels. The AQI is equal to the highest of the numbers corresponding to each pollutant. For the purposes of reporting the AQI, the sub-indexes for PM_{10} and $PM_{2.5}$ are to be considered separately. The pollutant responsible for the highest index value (the reported AQI) is called the "critical" pollutant.

10. What monitors should I use to get the pollutant concentrations for calculating the AQI?
    You must use concentration data from State/Local Air Monitoring Station (SLAMS) or parts of the SLAMS required by 40 CFR 58.10 for each pollutant except PM. For PM, calculate and report the AQI on days for which you have measured air quality data (e.g., from continuous $PM_{2.5}$ monitors required in Appendix D to this part). You may use PM measurements from monitors that are not reference or equivalent methods (for example, continuous PM_{10} or $PM_{2.5}$ monitors). Detailed guidance for relating non-approved measurements to approved methods by statistical linear regression is referenced in section 13 below.

11. Do I Have to Forecast the AQI?
    You should forecast the AQI to provide timely air quality information to the public, but this is not required. If you choose to forecast the AQI, then you may consider both long-term and short-term forecasts. You can forecast the AQI at least 24-hours in advance using the most accurate and reasonable procedures considering meteorology, topography, availability of data, and forecasting expertise. The document "Guideline for Developing an Ozone Forecasting Program" (the Forecasting Guidance) will help you start a forecasting program. You can also issue short-term forecasts by predicting 8-hour ozone values from 1-hour ozone values using methods suggested in the Reporting Guidance, "Guideline for Public Reporting of Daily Air Quality."

12. How do I calculate the AQI?
    i. The AQI is the highest value calculated for each pollutant as follows:
       a. Identify the highest concentration among all of the monitors within each reporting area and truncate as follows:
          (1) Ozone—truncate to 3 decimal places
              $PM_{2.5}$—truncate to 1 decimal place
              PM_{10}—truncate to integer
              CO—truncate to 1 decimal place
              SO_2—truncate to integer
              NO_2—truncate to integer

          (2) [Reserved]

       b. Using Table 2, find the two breakpoints that contain the concentration.
       c. Using Equation 1, calculate the index.
       d. Round the index to the nearest integer.

Table 2—Breakpoints for the AQI

These breakpoints							Equal these AQI's	
O_3 (ppm) 8-hour	O_3 (ppm) 1-hour[1]	$PM_{2.5}$ (µg/m³) 24-hour	PM_{10} (µg/m³) 24-hour	CO (ppm) 8-hour	SO_2 (ppb) 1-hour	NO_2 (ppb) 1-hour	AQI	Category
0.000- 0.059		0.0-12.0	0-54	0.0-4.4	0-35	0-53	0-50	Good.
0.060- 0.075		12.1-35.4	55-154	4.5-9.4	36-75	54-100	51- 100	Moderate.
0.076- 0.095	0.125- 0.164	35.5-55.4	155-254	9.5-12.4	76-185	101-360	101- 150	Unhealthy for Sensitive Groups.
0.096- 0.115	0.165- 0.204	355.5-150.4	255-354	12.5-15.4	4186-304	361-649	151- 200	Unhealthy.
0.116- 0.374	0.205- 0.404	3150.5-250.4	355-424	15.5-30.4	4305-604	650-1249	201- 300	Very Unhealthy.
([2])	0.405- 0.504	3250.5-350.4	425-504	30.5-40.4	4605-804	1250-1649	301- 400	Hazardous.
([2])	0.505- 0.604	3350.5-500.4	505-604	40.5-50.4	4805-1004	1650-2049	401- 500	

[1]Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone index value may be calculated, and the maximum of the two values reported.
[2]8-hour O^3 values do not define higher AQI values (≥301). AQI values of 301 or greater are calculated with 1-hour O_3 concentrations.
[3]If a different SHL for $PM_{2.5}$ is promulgated, these numbers will change accordingly.
[4]1-hr SO values do not define higher AQI values (≥200). AQI values of 200 or greater are calculated with 24-hour SO_2 concentrations.

ii. If the concentration is equal to a breakpoint, then the index is equal to the corresponding index value in Table 2. However, Equation 1 can still be used. The results will be equal. If the concentration is between two breakpoints, then calculate the index of that pollutant with Equation 1. You must also note that in some areas, the AQI based on 1-hour O_3 will be more precautionary than using 8-hour values (see footnote 1 to Table 2). In these cases, you may use 1-hour values as well as 8-hour values to calculate index values and then use the maximum index value as the AQI for O_3.

Equation 1

$$I_P = \frac{I_{Hi} - I_{Lo}}{BP_{Hi} - BP_{Lo}}(C_P - BP_{Lo}) + I_{Lo}$$

Where:
I_p = the index value for pollutant$_p$
C_p = the truncated concentration of pollutant$_p$
BP_{Hi} = the breakpoint that is greater than or equal to C_p
BP_{Lo} = the breakpoint that is less than or equal to C_p
I_{Hi} = the AQI value corresponding to
BP_{Hi} I_{lo} = the AQI value corresponding to BP_{Lo}.

iii. If the concentration is larger than the highest breakpoint in Table 2 then you may use the last two breakpoints in Table 2 when you apply Equation 1.

Example

iv. Using Table 2 and Equation 1, calculate the index value for each of the pollutants measured and select the one that produces the highest index value for the AQI. For example, if you observe a PM value of 210 µg/m³, a 1-hour O_3 value of 0.156 ppm, and an 8-hour O_3 value of 0.130 ppm, then do this:

a. Find the breakpoints for PM at 210 µg/m³ as 155 µg/m³ and 254 µg/m³, corresponding to index values 101

and 150;

b. Find the breakpoints for 1-hour O_3 at 0.156 ppm as 0.125 ppm and 0.164 ppm, corresponding to index values 101 and 150;

c. Find the breakpoints for 8-hour O_3 at 0.130 ppm as 0.116 ppm and 0.374 ppm, corresponding to index values 201 and 300;

d. Apply Equation 1 for 210 µg/m^3, PM :

$$\frac{150-101}{254-155}(210-155)+101=128$$

e. Apply Equation 1 for 0.156 ppm, 1-hour O_3:

$$\frac{150-101}{0.164-0.125}(0.156-0.125)+101=140$$

f. Apply Equation 1 for 0.130 ppm, 8-hour O_3:

$$\frac{300-201}{0.374-0.116}(0.130-0.116)+201=206$$

g. Find the maximum, 206. This is the AQI. The minimal AQI report would read:

v. Today, the AQI for my city is 206 which is Very Unhealthy, due to ozone. Children and people with asthma are the groups most at risk.

13. What additional information should I know?

The EPA has developed a computer program to calculate the AQI for you. The program prompts for inputs, and it displays all the pertinent information for the AQI (the index value, color, category, sensitive group, health effects, and cautionary language). The EPA has also prepared a brochure on the AQI that explains the index in detail (The Air Quality Index), Reporting Guidance (Technical Assistance Document for the Reporting of Daily Air Quality—the Air Quality Index (AQI)) that provides associated health effects and cautionary statements, and Forecasting Guidance (Guideline for Developing an Ozone Forecasting Program) that explains the steps necessary to start an air pollution forecasting program. You can download the program and the guidance documents at *www.airnow.gov.* Reference for relating non-approved PM measurements to approved methods (Eberly, S, T Fitz-Simons, T Hanley, L Weinstock., T Tamanini, G Denniston, B Lambeth, E Michel, S Bortnick. Data Quality Objectives (DQOs) For Relating Federal Reference Method (FRM) and Continuous $PM_{2.5}$ Measurements to Report an Air Quality Index (AQI). U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA-454/B-02-002, November 2002) can be found on the Ambient Monitoring Technology Information Center (AMTIC) Web site, http://www.epa.gov/ttnamti1/.

[64 FR 42547, Aug. 4, 1999, as amended at 73 FR 16513, Mar. 27, 2008; 75 FR 6537, Feb. 9, 2010; 75 FR 35602, June 22, 2010; 78 FR 3286, Jan. 15, 2013]

Appendix J: Federal Collocation Requirements

Unless otherwise indicated, all the following is quoted from Appendix A to 40 CFR Part 58.

Collocation Requirements for $PM_{2.5}$:

3.2.5 Collocated Sampling Procedures for $PM_{2.5}$. For each pair of collocated monitors, designate one sampler as the primary monitor whose concentrations will be used to report air quality for the site, and designate the other as the audit monitor.

3.2.5.1 Each EPA designated Federal reference method (FRM) or Federal equivalent method (FEM) within a primary quality assurance organization must:

(a) Have 15 percent of the monitors collocated (values of 0.5 and greater round up); and

(b) Have at least 1 collocated monitor (if the total number of monitors is less than 3). The first collocated monitor must be a designated FRM monitor.

3.2.5.2 In addition, monitors selected for collocation must also meet the following requirements:

(a) A primary monitor designated as an EPA FRM shall be collocated with an audit monitor having the same EPA FRM method designation.

(b) For each primary monitor model designated as an EPA FEM used by the PQAO, 50 percent of the monitors designated for collocation shall be collocated with an audit monitor having the same method designation and 50 percent of the monitors shall be collocated with an FRM audit monitor. If the primary quality assurance organization only has one FEM monitor it shall be collocated with an FRM audit monitor. If there are an odd number of collocated monitors required, the additional monitor shall be an FRM audit monitor. An example of this procedure is found in Table A-3 of this appendix.

3.2.5.3 The collocated monitors should be deployed according to the following protocol:

(a) 80 percent of the collocated audit monitors should be deployed at sites with annual average or daily concentrations estimated to be within ±20 percent of the applicable NAAQS and the remainder at what the monitoring organizations designate as high value sites;

(b) If an organization has no sites with annual average or daily concentrations within ±20 percent of the annual NAAQS (or 24-hour NAAQS if that is affecting the area), 60 percent of the collocated audit monitors should be deployed at those sites with the annual mean concentrations (or 24-hour NAAQS if that is affecting the area) among the highest 25 percent for all sites in the network.

3.2.5.4 In determining the number of collocated sites required for $PM_{2.5}$, monitoring networks for visibility assessments should not be treated independently from networks for particulate matter, as the separate networks may share one or more common samplers. However, for Class I visibility areas, EPA will accept visibility aerosol mass measurement instead of a $PM_{2.5}$ measurement if the latter measurement is unavailable. Any $PM_{2.5}$ monitoring site which does not have a monitor which is an EPA FRM, FEM or ARM is not required to be included in the number of sites which are used to determine the number of collocated monitors.

3.2.5.5 For each PSD monitoring network, one site must be collocated. A site with the predicted highest 24-hour pollutant concentration must be selected.

…

3.3.5 Collocated Sampling Procedures for $PM_{2.5}$. Follow the same procedure as described in section 3.2.5 of this appendix. $PM_{2.5}$ samplers used in the $PM_{10\text{-}2.5}$ network, may be counted along with the $PM_{2.5}$ samplers in the $PM_{2.5}$ network as long as the $PM_{2.5}$ samplers in both networks are the same method designation.

4.7.2 Requirement for Continuous $PM_{2.5}$ Monitoring. The State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional

Administrator for these required continuous analyzers. [This paragraph is from Appendix D to 40 CFR Part 58.]

Collocation Requirements for $PM_{10-2.5}$:

3.2.6 Collocated Sampling Procedures for $PM_{10-2.5}$. For the $PM_{10-2.5}$ network, all automated methods must be designated as Federal equivalent methods (FEMs). For each pair of collocated monitors, designate one sampler as the primary monitor whose concentrations will be used to report air quality for the site, and designate the other as the audit monitor.

…

3.3.6 Collocated Sampling Procedures for $PM_{10-2.5}$. All designated FRMs within the $PM_{10-2.5}$ monitoring network must have 15 percent of the monitors collocated (values of 0.5 and greater round up) at the $PM_{10-2.5}$ sites. All FRM method designations can be aggregated.

3.3.6.1 The EPA shall ensure that each designated FEM within the $PM_{10-2.5}$ monitoring network must:

(a) Have 15 percent of the monitors collocated (values of 0.5 and greater round up); and

(b) Have at least 2 collocated monitors (if the total number of monitors is less than 10). The first collocated monitor must be a designated FRM monitor and the second must be a monitor of the same method designation. Both collocated FRM and FEM monitors can be located at the same site.

3.3.6.2 The Regional Administrator for the EPA Region where the FRM or FEMs are implemented will select the sites for collocated monitoring. The collocation site selection process shall consider sites at primary quality assurance organizations or States with more than one $PM_{10-2.5}$ site; primary quality assurance organizations already monitoring for PM_{10} and $PM_{2.5}$ using FRMs or FEMs; and an appropriate distribution among rural and urban NCore sites. Monitoring organizations implementing PM_{10} samplers and $PM_{2.5}$ FRM samplers of the same method designation as the $PM_{10-2.5}$ FRM can include the $PM_{10-2.5}$ monitors in their respective PM_{10} and $PM_{2.5}$ count. Follow the same procedures as described in sections 3.2.6.2 and 3.2.6.3 of this appendix.

Collocation Requirements for PM_{10}:

3.3.1 Collocated Sampling Procedures for PM_{10}. For each network of manual PM_{10} methods, select 15 percent (or at least one) of the monitoring sites within the primary quality assurance organization for collocated sampling. For purposes of precision assessment, networks for measuring total suspended particulate (TSP) and PM_{10} shall be considered separately from one another. However, PM_{10} samplers used in the $PM_{10-2.5}$ network, may be counted along with the PM_{10} samplers in the PM_{10} network as long as the PM_{10} samplers in both networks are the same method designation. PM_{10} and TSP sites having annual mean particulate matter concentrations among the highest 25 percent of the annual mean concentrations for all the sites in the network must be selected or, if such sites are impractical, alternative sites approved by the EPA Regional Administrator may be selected.

3.3.1.1 In determining the number of collocated sites required for PM_{10}, monitoring networks for lead (Pb) should be treated independently from networks for particulate matter (PM), even though the separate networks may share one or more common samplers. However, a single pair of samplers collocated at a common-sampler monitoring site that meets the requirements for both a collocated Pb site and a collocated PM site may serve as a collocated site for both networks.

…

3.3.1.3 For each pair of collocated samplers, designate one sampler as the primary sampler whose samples will be used to report air quality for the site, and designate the other as the audit sampler.

Collocation Requirements for Lead:

3.3.4.3 Collocated Sampling. PQAO that have a combination of source and non-source-oriented sites (unless the only non-source-oriented site is an NCore site) will follow the procedures described in sections 3.3.1 of

this appendix with the exception that the first collocated Pb site selected must be the site measuring the highest Pb concentrations in the network. If the site is impractical, alternative sites, approved by the EPA Regional Administrator, may be selected. If additional collocated sites are necessary, collocated sites may be chosen that reflect average ambient air Pb concentrations in the network. The collocated sampling requirements for PQAO that only have Pb monitoring at a non-source-oriented NCore site for sampling required under 40 CFR 58, Appendix D, paragraph 4.5(b) shall be implemented as described in section 3.2.6 of this appendix with the exception that the collocated monitor will be the same method designation as the primary monitor.

Appendix K: Collocated Monitoring Network Analysis

For some criteria pollutants, EPA regulations require that multiple monitors are operated at the same site for the purpose of quality assurance Appendix J or public reporting Appendix I. This Appendix compares the Iowa network to these requirements.

Ozone Network Analysis

There are no federal requirements for collocated ozone monitoring. In the Iowa network, continuous ozone data is generated at fifteen sites. The data is used for real-time and AQI reporting and uploaded to the EPA's AirNow Real-Time Reporting System, where it is consolidated to produce the national ozone and AQI maps. At each of the fifteen sites, pairs of ozone monitors are operated to allow for a real-time check on the quality of the data. These are FEM monitors, and the data they produce is acceptable for NAAQS compliance and AQI reporting. When two FEM monitors are operated simultaneously at a monitoring site, in the absence of a definite set of rules for aggregating the monitor data to establish the site data, there is potential ambiguity in establishing the site's data capture and NAAQS attainment status at the site. EPA has not yet developed these rules for ozone, so the department will use the data in POC 1 for establishing the NAAQS attainment status of the site, and use the data in POC 2 for quality assurance of the AQI and real time data. In the event the data capture rate of the POC 1 monitor is too low to compute a design value of a monitoring site, the DNR will consult with EPA Region 7 on appropriate ways to consolidate the POC 1 and POC 2 datasets to establish the attainment status of the site. Creating a consolidated data set for the site by substitution of the POC 2 data for missing POC1 data would be the DNR's preferred method of addressing this situation.

$PM_{2.5}$ Network Analysis

To meet EPA QA requirements, the Iowa network contains pairs of $PM_{2.5}$ monitors (collocated monitors) at some sites. EPA regulations (Appendix J) require that 15 percent of the sites be collocated (values of 0.5 and greater round up), and a minimum of one collocated monitor within each monitoring group or primary quality assurance organization (PQAO). The Iowa network contains three PQAO's, corresponding to the Polk, Linn and SHL networks. Since the SHL network contains 19 FRM sites, 2.85 (rounding to 3) collocated sites are required. The Polk network (2 FRM sites) and Linn network (1 FRM site), each meet miniumum collocation requirements by operation of a single collocated FRM site.

Linn County operates a collocated monitor at its Public Health site. Polk County operates its collocated monitor at its Health Department site. SHL uses two groups of field operators to run its PM2.5 samplers. Members of the SHL staff collect filters in the eastern part of the state where levels are typically higher. Contract operators collect filters in the western half of the state where levels are typically lower. SHL operates a collocated pair of filter samplers at its NCORE site. SHL also operates a collocated pair of filter samplers at Muscatine High School (with highest annual and 24-Hour design values in the state). A contract operator collects filters at a collocated site at Franklin School in Council Bluffs.

EPA regulations require "80 percent of the collocated audit monitors should be deployed at sites with annual average or daily concentrations estimated to be within ±20 percent of the applicable NAAQS and the remainder at what the monitoring organizations designate as high value sites". The only site in Iowa that meets these concentration criteria is Muscatine High School, which was within ±20 percent of the 24 hour NAAQS in 2013, and is presently collocated. EPA also indicates that "If an organization has no sites with annual average or daily concentrations within ±20 percent of the annual NAAQS (or 24-hour NAAQS if that is affecting the area), 60 percent of the collocated audit monitors should be deployed at those sites with the annual mean concentrations (or 24-hour NAAQS if that is affecting the area) among the highest 25 percent for all sites in the network". This requirement is met automatically in the Linn PQAO since they have only one PM2.5 site. It is also met in the Polk PQAO.

In MSAs where a single $PM_{2.5}$ monitor is required, 40 CFR Part 58 requires that an additional continuous $PM_{2.5}$ monitor is operated at the same monitoring location. A continuous $PM_{2.5}$ monitor for the Omaha-Council Bluffs MSA is operated by a Nebraska agency. Continuous $PM_{2.5}$ monitors are currently operated in Des Moines, Davenport, Cedar Rapids, Waterloo, and Iowa City.

In the Iowa $PM_{2.5}$ network, continuous $PM_{2.5}$ data is generated at twelve sites. This data is used in for real-time AQI reporting and uploaded to the EPA's AirNow system where it is consolidated along with data from other States to

produce the national $PM_{2.5}$ and AQI maps. At each of the twelve sites, pairs of beta-attenuation monitors (BAMs) are operated to allow for a real-time check on the quality of the data. Owing to historical issues with comparability of $PM_{2.5}$ continuous and FRM filter sampler data, the continuous monitors are not operated in a FEM configuration. The data they produce is used for real-time AQI reporting, but not for establishing NAAQS compliance.

$PM_{10-2.5}$ Network Analysis

Iowa has only one reference method $PM_{10-2.5}$ site and meets CFR requirements with collocated monitors at this site.

PM_{10} Network Analysis

EPA regulations require collocation at 15 percent (or at least one) of the monitoring sites within a PQAO. The Iowa network contains three PQAO's, corresponding to the Polk, Linn and SHL networks. Since the SHL network contains 16 FRM sites, 2.4 (rounding to 2) collocated sites are required. For the Polk network (2 FRM sites) and Linn network (1 FRM site), one collocated site meets the requirement.

Linn County operates a collocated monitor at its Public Health site. Polk County operates its collocated monitor at its Health Department site. SHL uses two groups of field operators to run its PM10 samplers. SHL operates a collocated pair of filter samplers at its NCORE site. Contract operators collect filters at a collocated pair of filter samplers at Holcim Cement in Mason City and Bryant School in Sioux City.

According to EPA regulations "PM10 … sites having annual mean particulate matter concentrations among the highest 25 percent of the annual mean concentrations for all the sites in the network must be selected [for collocation] or, if such sites are impractical, alternative sites approved by the EPA Regional Administrator may be selected." In the SHL network, the site with the highest annual mean (Buffalo, Linwood Mining at 43.7 µg/m3 in 2013) is already collocated as indicated below. Although there are some sites that are among the highest 25 percent of the annual mean concentrations which are not collocated, the annual means at those sites do not differ significantly from collocated sites which fall below the highest 25 percent in their annual means. Collocation of the Mason City PM10 monitor is a more practical choice than collocating other monitors in the 4th quartile, because the site was the basis for a PM10 SIP action in Mason City, and was only 0.3 µg/m3 below of the 4th quartile for the SHL PM10 network (based on 2013 data).

When multiple FRM/FEM monitors are operated simultaneously at a monitoring site, in the absence of EPA rules describing the how the monitor data is to be aggregated to establish the site data, there is potential ambiguity in establishing the data capture and NAAQS attainment status at the site (Figure 1). Owing to comparability issues between filter-based and continuous methods, the department considers the FRM method (filter data) to be more suitable for making PM10 attainment decisions than continuous methods. At Linwood Mining near Buffalo, SHL collects filters from the primary filter sampler (POC 2) to establish NAAQS attainment, and operates a collocated beta-attenuation monitor (POC 3) for quality assurance purposes and an additional BAM (POC 5) for real-time AQI reporting.

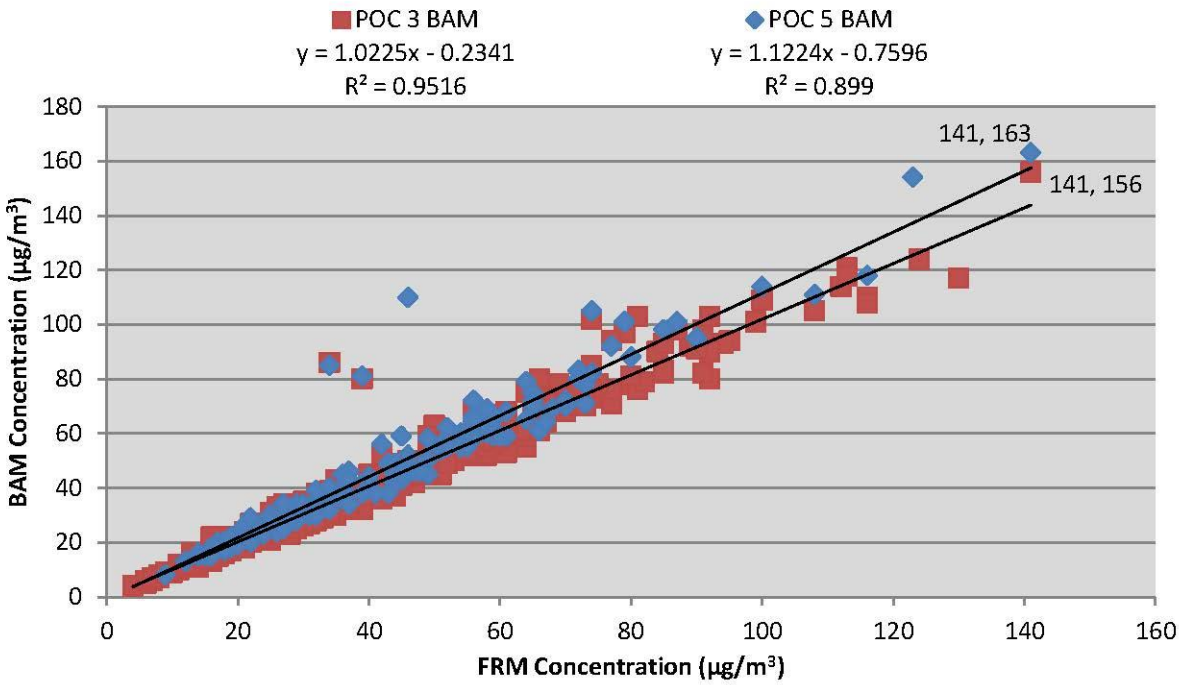


Figure 1. Buffalo, Linnwood Mining PM_{10} BAM vs FRM in 2013. For the two points indicated, each BAM records a NAAQS exceedance, while the FRM does not.

SO_2, NO_2, CO Network Analysis

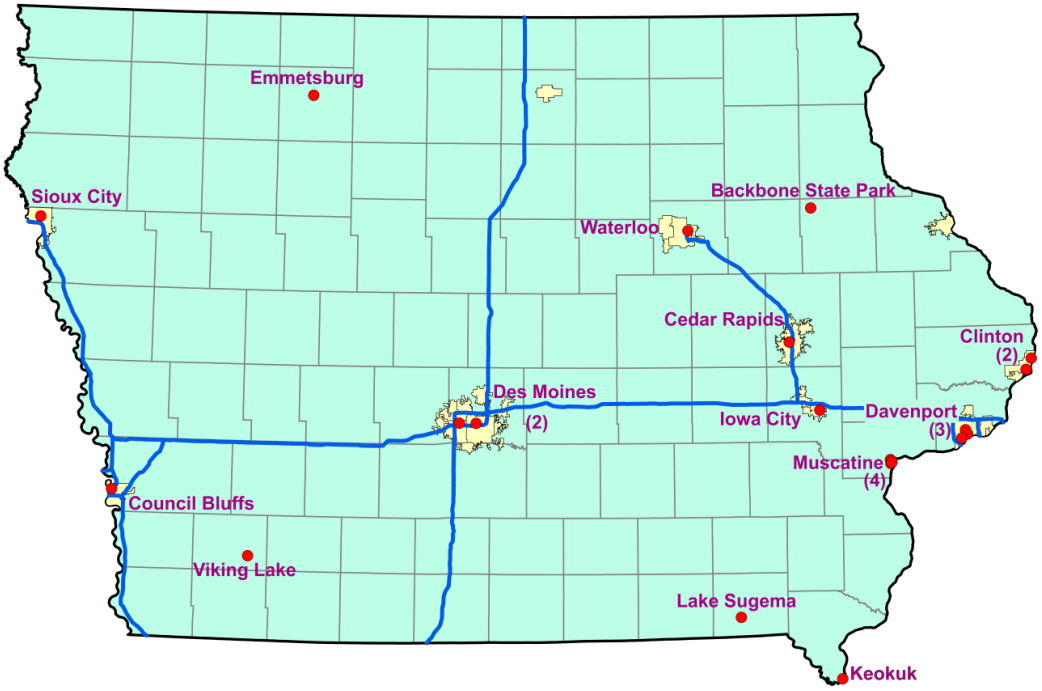
There are no federal requirements for collocated SO_2, NO_2 or CO monitoring, and there are no collocated monitors in the Iowa network for these criteria pollutants.

Lead Network Analysis

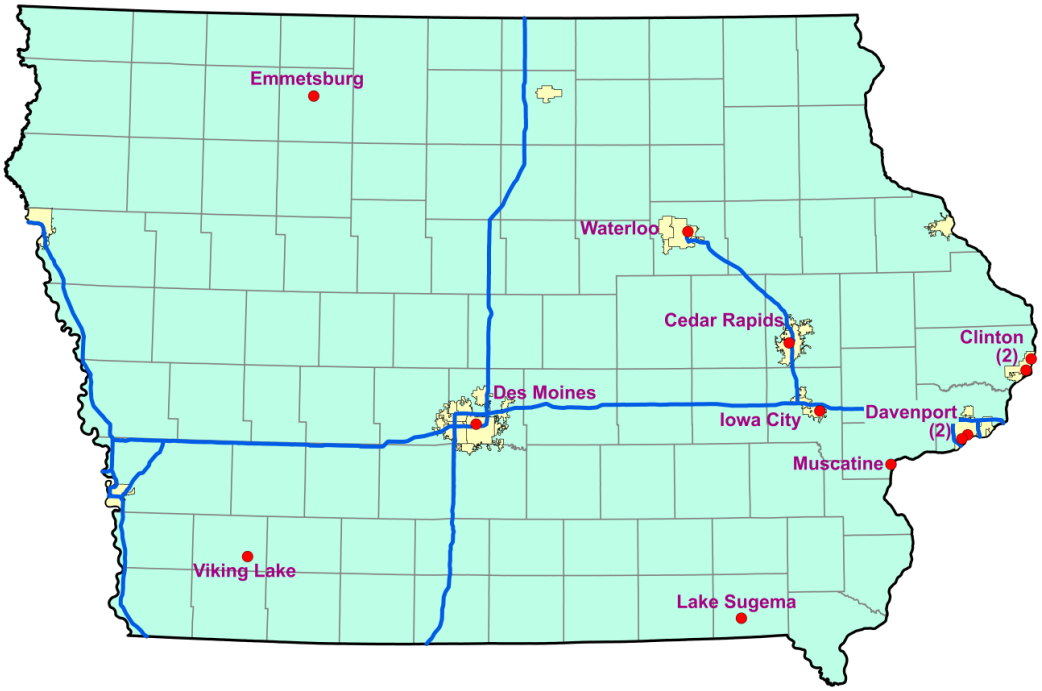
Iowa has only one Lead site and meets CFR requirements with collocated monitors at this site.

Appendix L: Iowa Ambient Air Monitoring Network Maps

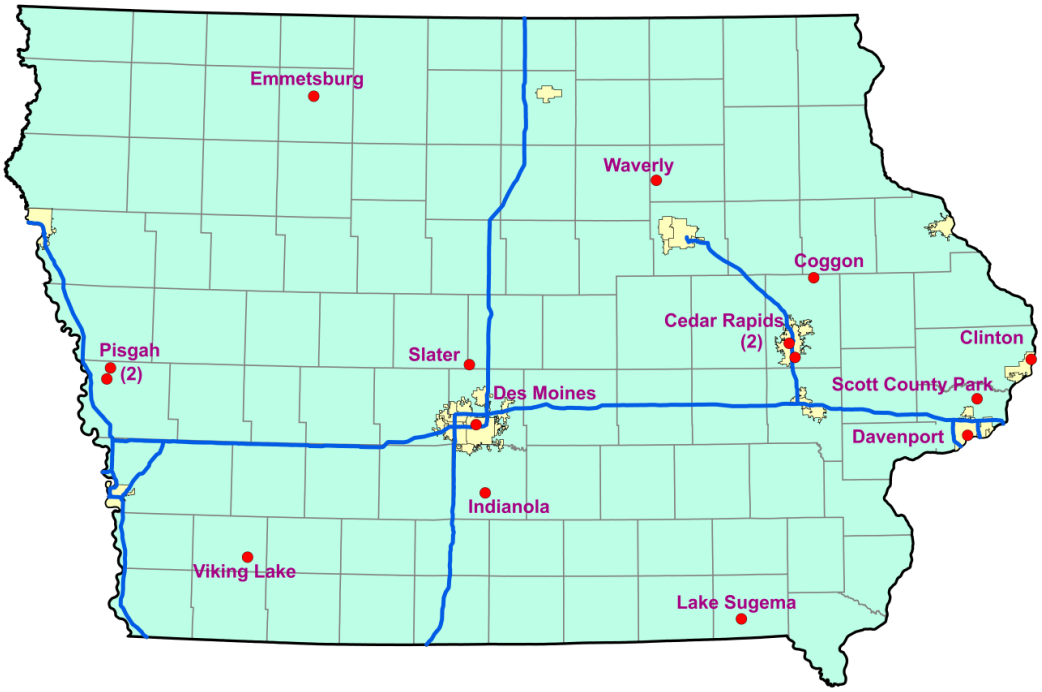
The following maps show the locations for the criteria pollutant monitors in the state of Iowa, which are current as of June 1, 2014. Non-criteria pollutant maps are also included for the continuous $PM_{2.5}$ monitoring network and the Toxics and Speciation monitoring networks.



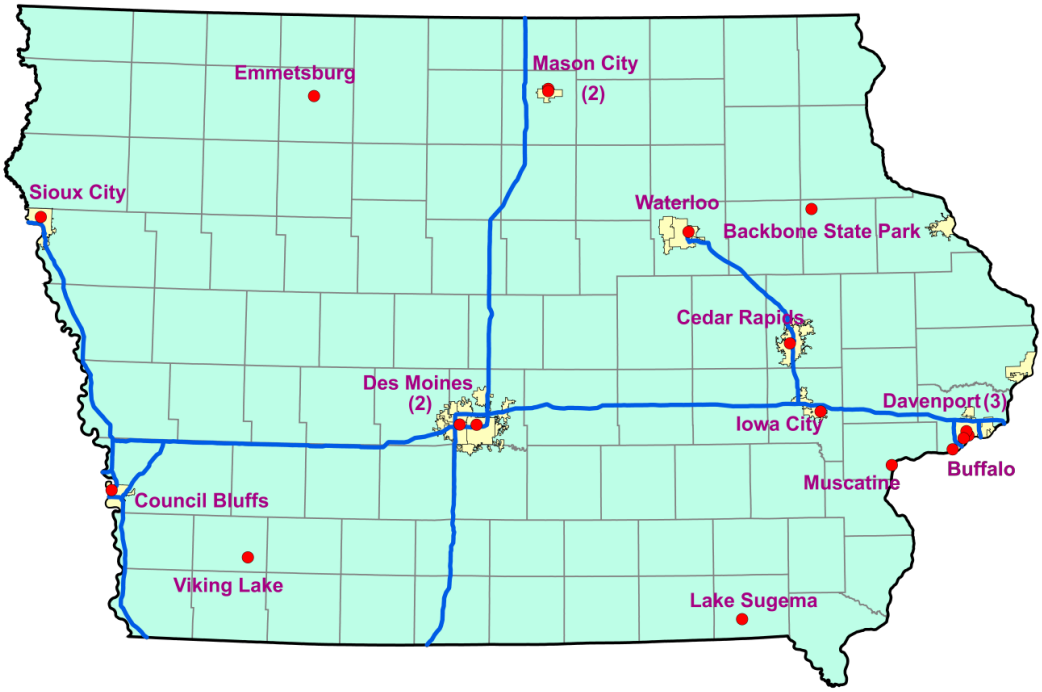
Manual $PM_{2.5}$ (FRM) Monitoring Sites



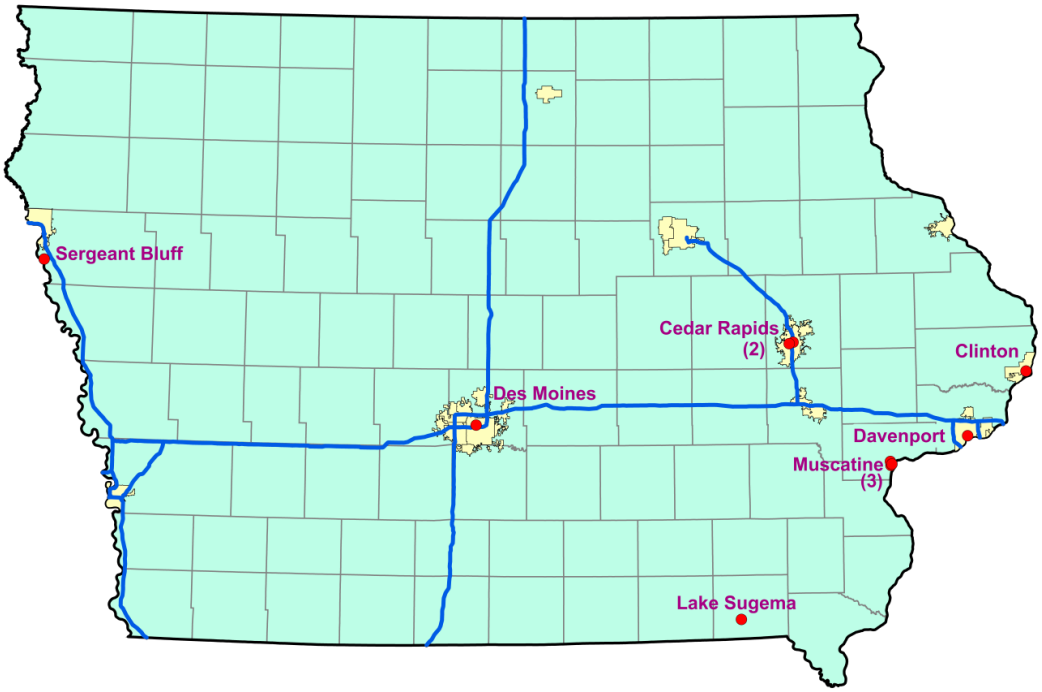
Continuous $PM_{2.5}$ (non-FRM) Monitoring Sites



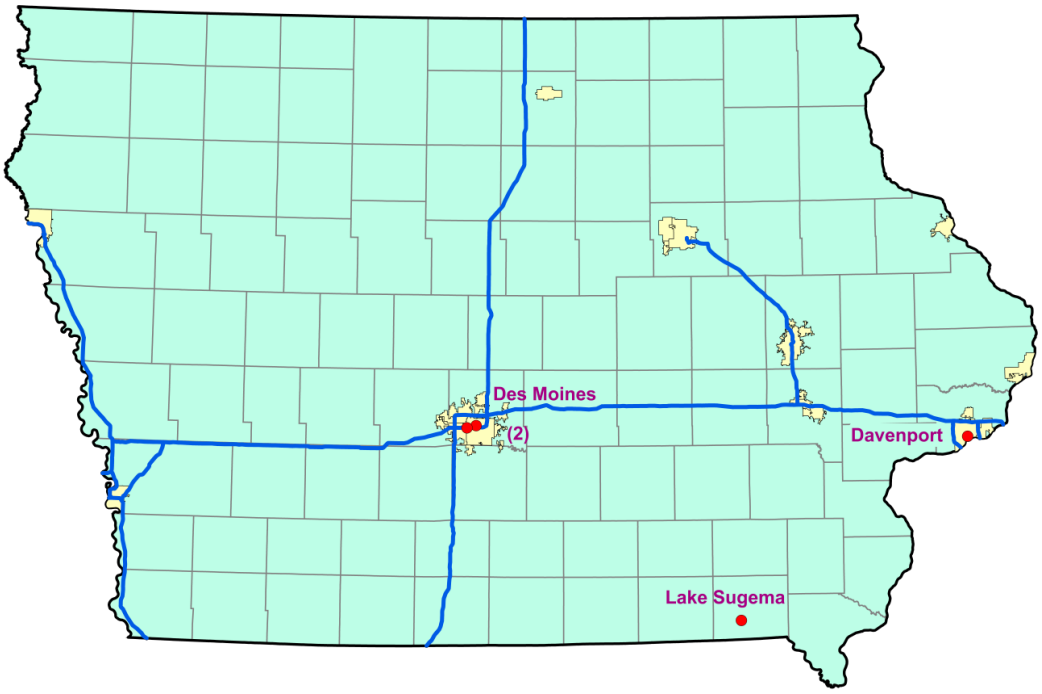
Ozone Monitoring Sites



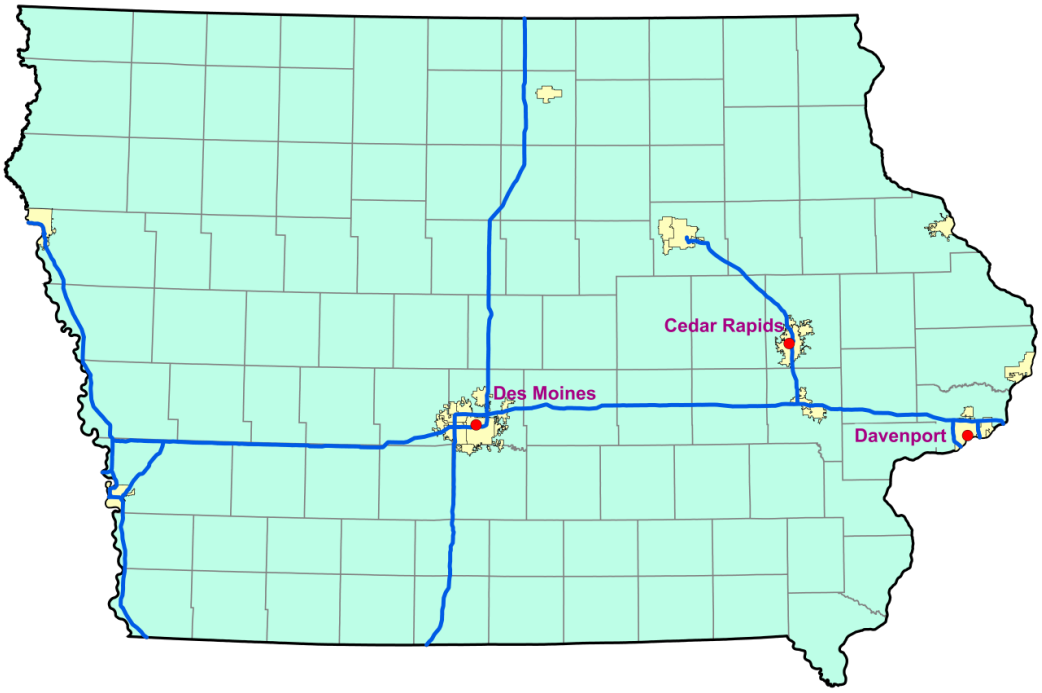
PM_{10} Monitoring Sites



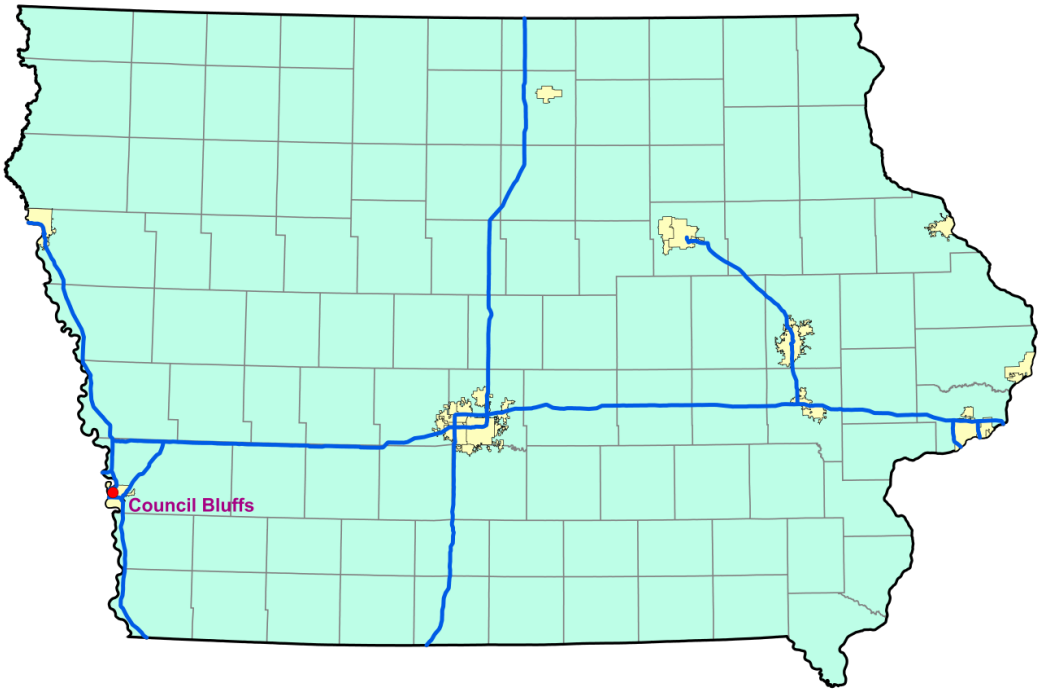
SO_2 Monitoring Sites



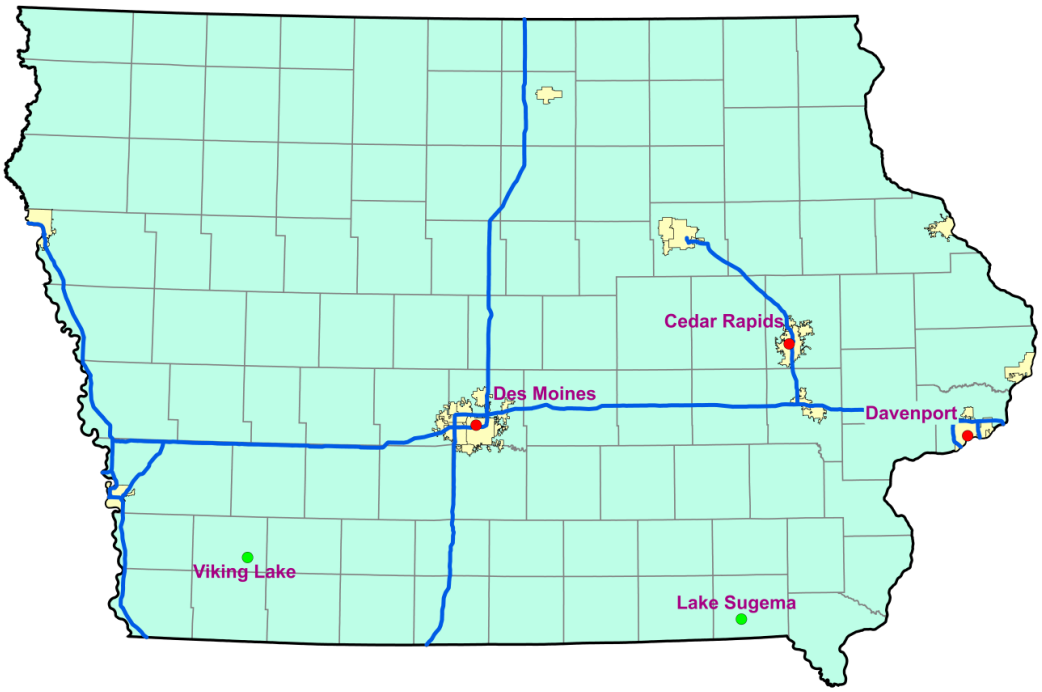
NO_2 Monitoring Sites



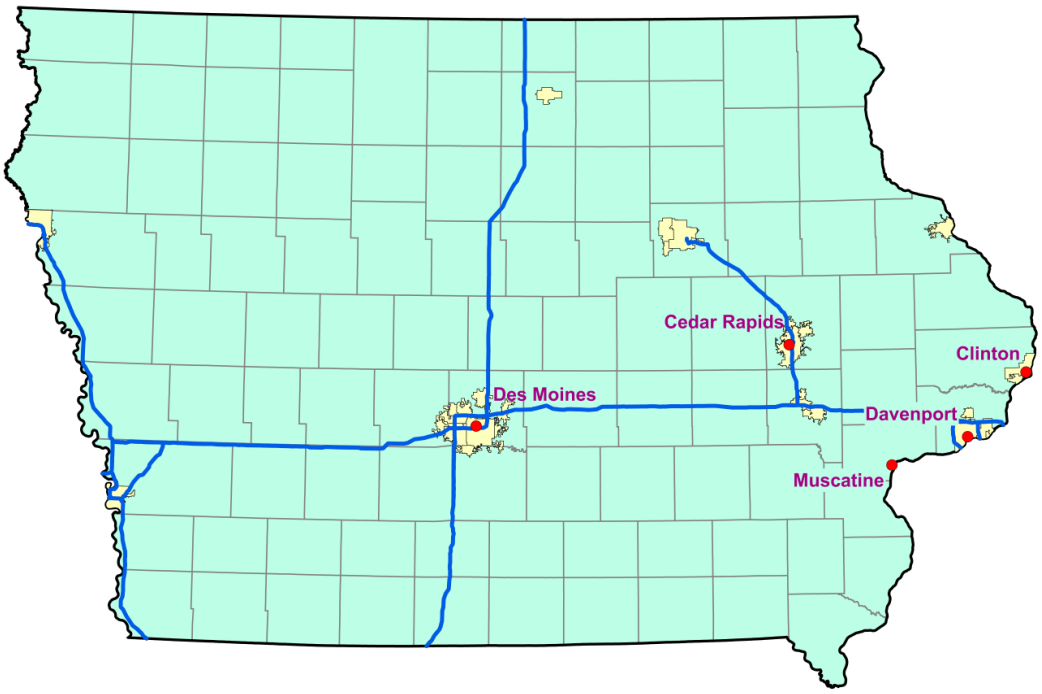
CO Monitoring Sites



Lead (Pb) Monitoring Sites



Speciation Monitors; CSN Speciation samplers are located at the red dots, IMPROVE speciation samplers are located at the green dots.



Toxics Monitoring Sites

Appendix M: Network Changes

Conversion of SPM SO_2 Cedar Rapids, Tait Cummins Site to SLAMS

Elevated levels have been observed at the Tait Cummins SO_2 monitor in 2014. The proposal is to designate the monitor as SLAMS beginning January 1, 2015.

Changes in $PM_{2.5}$ Speciation Sampling in Polk and Linn Counties

EPA funding of laboratory analysis supporting two supplemental $PM_{2.5}$ speciation monitors in Polk and Linn Counties will be discontinued at the end of 2014. EPA's evaluation of speciated $PM_{2.5}$ data from these sites has suggested that they are not critical to the national CSN network. Therefore the supplemental speciation data set from these sites will end on December 31, 2014.

$PM_{2.5}$ design values are higher in Linn County than in Polk County, and there are more SO_2 sources in Linn County. Collocated sulfate and nitrate $PM_{2.5}$ filter samples (analyzed by SHL) will be collected in Linn County after January 1, 2015. All sulfate and nitrate $PM_{2.5}$ filter sampling in Polk County will be discontinued.

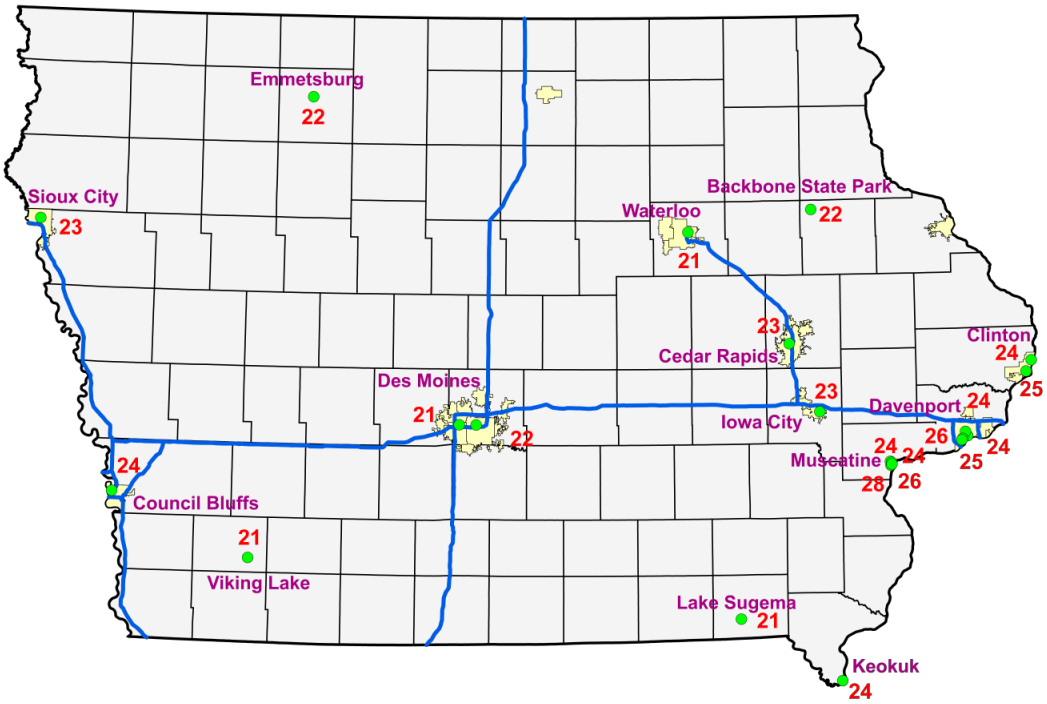
Network Change Tables

The changes proposed for the Iowa network are indicated in the table below:

Site Name	Pollutant	POC	Monitor Type	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?	Primary Purpose	FRM / FEM	Action
Cedar Rapids, Tait Cummins Park	SO2	1	SPM	UV Fluorescent		Continuous	Source Oriented	Middle Scale	Yes	NAAQS Compliance	Yes	Deletion
Cedar Rapids, Tait Cummins Park	SO2	1	SLAMS	UV Fluorescent		Continuous	Source Oriented	Middle Scale	Yes	NAAQS Compliance	Yes	Addition
Cedar Rapids, Public Health	PM2.5 Speciation	5	Supplemental Speciation	PM2.5 Speciation	CSN Protocol	1/6 Day	Population Exposure	Neighborhood	No			Deletion
Cedar Rapids, Public Health	SO4	3	SPM	Low Volume	Ion Chromatography	1/6 Day	Population Exposure	Neighborhood	No			Addition
Cedar Rapids, Public Health	NO3	3	SPM	Low Volume	Ion Chromatography	1/6 Day	Population Exposure	Neighborhood	No			Addition
Des Moines, Health Dept.	PM2.5 Speciation	5	Supplemental Speciation	PM2.5 Speciation	CSN Protocol	1/6 Day	Population Exposure	Neighborhood	No			Deletion
Des Moines, Health Dept.	SO4	2	SPM	Low Volume	Ion Chromatography	1/6 Day	Population Exposure	Neighborhood	No			Deletion
Des Moines, Health Dept.	NO3	2	SPM	Low Volume	Ion Chromatography	1/6 Day	Population Exposure	Neighborhood	No			Deletion

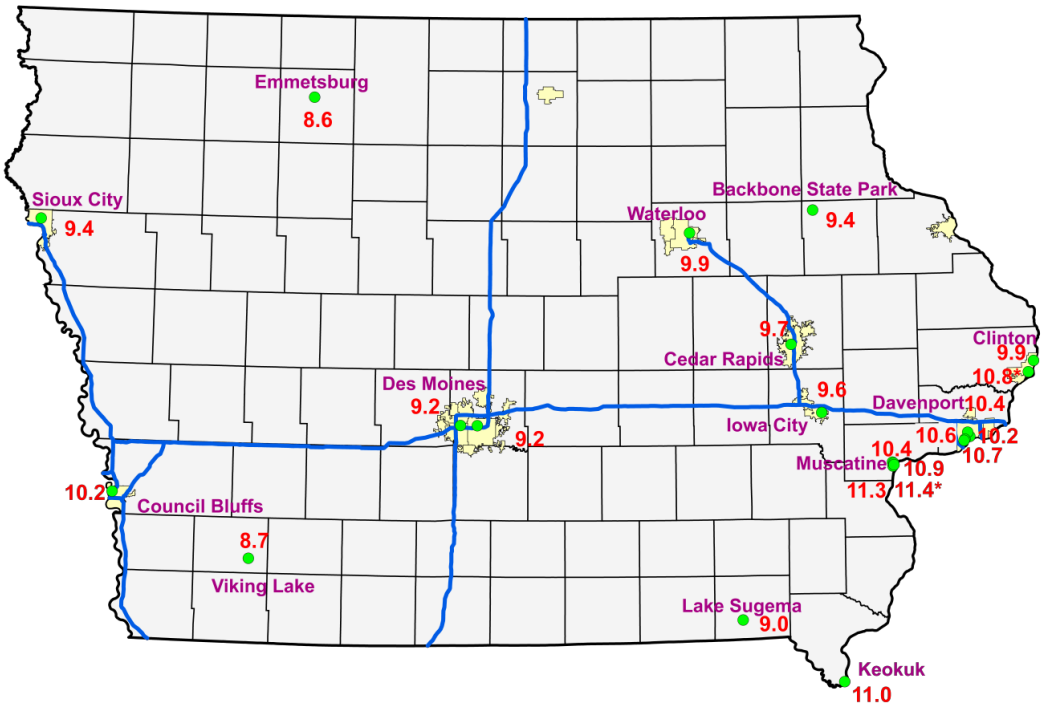
See Appendix D for definitions of the elements in this table.

Appendix N: Design Value Maps for $PM_{2.5}$



2011-2013 $PM_{2.5}$ 24-hr Design Values ($\mu g/m^3$)

* = Source Oriented Sampling (Annual Standard Does Not Apply)



2011-2013 $PM_{2.5}$ Annual Design Values ($\mu g/m^3$)

Appendix O: Federal Requirements for NCore Sites

40 CFR Part 58 Appendix D, Section 3: Design Criteria for NCore Sites.

(a) Each State (i.e. the fifty States, District of Columbia, Puerto Rico, and the Virgin Islands) is required to operate at least one NCore site. States may delegate this requirement to a local agency. States with many MSAs often also have multiple air sheds with unique characteristics and, often, elevated air pollution. These States include, at a minimum, California, Florida, Illinois, Michigan, New York, North Carolina, Ohio, Pennsylvania, and Texas. These States are required to identify one to two additional NCore sites in order to account for their unique situations. These additional sites shall be located to avoid proximity to large emission sources. Any State or local agency can propose additional candidate NCore sites or modifications to these requirements for approval by the Administrator. The NCore locations should be leveraged with other multipollutant air monitoring sites including PAMS sites, National Air Toxics Trends Stations (NATTS) sites, CASTNET sites, and STN sites. Site leveraging includes using the same monitoring platform and equipment to meet the objectives of the variety of programs where possible and advantageous.

(b) The NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$ particle mass, speciated $PM_{10-2.5}$, O_3, SO_2, CO, NO/NO_y, wind speed, wind direction, relative humidity, and ambient temperature. NCore sites in CBSA with a population of 500,000 people (as determined in the latest Census) or greater shall also measure Pb either as Pb-TSP or Pb-PM_{10}. The EPA Regional Administrator may approve an alternative location for the Pb measurement where the alternative location would be more appropriate for logistical reasons and the measurement would provide data on typical Pb concentrations in the CBSA.

  (1) Although the measurement of NO_y is required in support of a number of monitoring objectives, available commercial instruments may indicate little difference in their measurement of NO_y compared to the conventional measurement of NO_X, particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NO_y and NO_X measured concentrations, the Administrator may allow for waivers that permit NO_X monitoring to be substituted for the required NO_y monitoring at applicable NCore sites.

  (2) EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

(c) [Reserved]

(d) Siting criteria are provided for urban and rural locations. Sites with significant historical records that do not meet siting criteria may be approved as NCore by the Administrator. Sites with the suite of NCore measurements that are explicitly designed for other monitoring objectives are exempt from these siting criteria (e.g., a near- roadway site).

  (1) Urban NCore stations are to be generally located at urban or neighborhood scale to provide representative concentrations of exposure expected throughout the metropolitan area; however, a middle-scale site may be acceptable in cases where the site can represent many such locations throughout a metropolitan area.

  (2) Rural NCore stations are to be located to the maximum extent practicable at a regional or larger scale away from any large local emission source, so that they represent ambient concentrations over an extensive area.

Appendix P: Federal Requirements for Near-Road Sites

40 CFR Part 58 Appendix D—Network Design Criteria for Ambient Air Quality Monitoring

4.2 Carbon Monoxide (CO) Design Criteria

4.2.1 General Requirements.

(a) Except as provided in subsection (b), one CO monitor is required to operate collocated with one required near- road NO_2 monitor, as required in Section 4.3.2 of this part, in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO2 monitor, only one CO monitor is required to be collocated with a near-road NO_2 monitor within that CBSA.

(b) If a state provides quantitative evidence demonstrating that peak ambient CO concentrations would occur in a near-road location which meets microscale siting criteria in Appendix E of this part but is not a near-road NO_2 monitoring site, then the EPA Regional Administrator may approve a request by a state to use such an alternate near-road location for a CO monitor in place of collocating a monitor at near-road NO_2 monitoring site.

…

Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring

4.3 Nitrogen Dioxide (NO_2) Design Criteria

4.3.1 General Requirements

(a) State and, where appropriate, local agencies must operate a minimum number of required NO_2 monitoring sites as described below.

4.3.2 Requirement for Near-road NO_2 Monitors

(a) Within the NO_2 network, there must be one microscale near-road NO_2 monitoring station in each CBSA with a population of 500,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high AADT counts as specified in paragraph 4.3.2(a)(1) of this appendix. An additional near- road NO_2 monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations. CBSA populations shall be based on the latest available census figures.

(1) The near-road NO_2 monitoring stations shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO_2 concentrations are expected to occur and siting criteria can be met in accordance with appendix E of this part. Where a State or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO_2 concentrations are expected to occur, the monitoring agency shall consider the potential for population exposure in the criteria utilized to select the final site location. Where one CBSA is required to have two near-road NO_2 monitoring stations, the sites shall be differentiated from each other by one or more of the following factors: fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation.

(b) Measurements at required near-road NO2 monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO_2, and NO_X.

4.3.3 Requirement for Area-wide NO_2 Monitoring

(a) Within the NO_2 network, there must be one monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales. PAMS sites collecting NO2 data that are situated in an area of expected high NO2 concentrations at the neighborhood or larger spatial scale may be used to satisfy this minimum monitoring requirement when the NO_2 monitor is operated year round. Emission inventories and meteorological analysis should be used to identify the appropriate locations within a CBSA for locating required area-wide NO_2 monitoring stations. CBSA populations shall be based on the latest available census figures.

4.3.4 Regional Administrator Required Monitoring

(a) The Regional Administrators, in collaboration with States, must require a minimum of forty additional NO_2 monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations. The Regional Administrators, working with States, may also consider additional factors described in paragraph (b) below to require monitors beyond the minimum network requirement.

(b) The Regional Administrators may require monitors to be sited inside or outside of CBSAs in which:

(i) The required near-road monitors do not represent all locations of expected maximum hourly NO_2 concentrations in an area and NO_2 concentrations may be approaching or exceeding the NAAQS in that area;

(ii) Areas that are not required to have a monitor in accordance with the monitoring requirements and NO_2 concentrations may be approaching or exceeding the NAAQS; or

(iii) The minimum monitoring requirements for area-wide monitors are not sufficient to meet monitoring objectives.

(c) The Regional Administrator and the responsible State or local air monitoring agency should work together to design and/or maintain the most appropriate NO_2 network to address the data needs for an area, and include all monitors under this provision in the annual monitoring network plan.

4.3.5 NO_2 Monitoring Spatial Scales

(a) The most important spatial scale for near-road NO_2 monitoring stations to effectively characterize the maximum expected hourly NO_2 concentration due to mobile source emissions on major roadways is the microscale. The most important spatial scales for other monitoring stations characterizing maximum expected hourly NO_2 concentrations are the microscale and middle scale. The most important spatial scale for area-wide monitoring of high NO_2 concentrations is the neighborhood scale.

(1) *Microscale*—This scale represents areas in close proximity to major roadways or point and area sources. Emissions from roadways result in high ground level NO_2 concentrations at the microscale, where concentration gradients generally exhibit a marked decrease with increasing downwind distance from major roads. As noted in appendix E of this part, near-road NO_2 monitoring stations are required to be within 50 meters of target road segments in order to measure expected peak concentrations. Emissions from stationary point and area sources, and non-road sources may, under certain plume conditions, result in high ground level concentrations at the microscale. The microscale typically represents an area impacted by the plume with dimensions extending up to approximately 100 meters.

(2) *Middle scale*—This scale generally represents air quality levels in areas up to several city blocks in size with dimensions on the order of approximately 100 meters to 500 meters. The middle scale may include locations of expected maximum hourly concentrations due to proximity to major NO_2 point, area, and/or non-road sources.

(3) *Neighborhood scale*—The neighborhood scale represents air quality conditions throughout some relatively uniform land use areas with dimensions in the 0.5 to 4.0 kilometer range. Emissions from stationary point and area sources may, under certain plume conditions, result in high NO_2 concentrations at the neighborhood scale. Where a neighborhood site is located away from immediate NO_2 sources, the site may be useful in representing typical air quality values for a larger residential area, and therefore suitable for population exposure and trends analyses.

(4) *Urban scale*—Measurements in this scale would be used to estimate concentrations over large portions of an urban area with dimensions from 4 to 50 kilometers. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large scale air pollution control strategies. Urban scale sites may also support other monitoring objectives of the NO_2 monitoring network identified in paragraph 4.3.4 above.

4.3.6 NO_y Monitoring

(a) NO/NO_y measurements are included within the NCore multi-pollutant site requirements and the PAMS program. These NO/NO_y measurements will produce conservative estimates for NO_2 that can be used to ensure tracking continued compliance with the NO_2 NAAQS. NO/NO_y monitors are used at these sites because it is important to collect data on total reactive nitrogen species for understanding O_3 photochemistry.

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4.7 Fine Particulate Matter ($PM_{2.5}$) Design Criteria.

4.7.1 General Requirements.

…

(b) (2) For CBSAs with a population of 1,000,000 or more persons, at least one PM2.5 monitor is to be collocated at a near-road NO_2 station required in section 4.3.2(a) of this appendix.

…

Appendix Q: Highest PM_{10} Values in Iowa MSAs 2011-2013

The following table shows the highest values recorded by PM_{10} monitors in Iowa Metropolitan Statistical Areas, including those shared with Illinois, South Dakota and Nebraska.

Table D-4 of Appendix D to Part 58 of the Code of Federal Regulations, specifies different minimum monitoring requirements for PM_{10}, depending on whether the concentrations are high, medium, or low. High concentrations are defined as exceeding the PM_{10} NAAQS by 20% or more (186 µg/m^3 or greater). Medium levels are defined as concentrations exceeding 80% of the NAAQS (between 124 and 186 µg/m^3). If ambient concentrations are less than 80% of the PM_{10} NAAQS, the levels are characterized as low. These categories are reflected in the last column of the following table.

PM_{10} Values in MSAs (3 year maximum)

MSA	2011 Max (µg/m^3)	2012 Max (µg/m^3)	2013 Max (µg/m^3)	3 Year Max (µg/m^3)	High, Medium, Low Classification
Omaha-Council Bluffs, NE-IA	172	199	108	199	High
Des Moines-West Des Moines, IA	49	62	46	62	Low
Davenport-Moline-Rock Island, IA- IL	149	141	141*	149	Medium
Cedar Rapids, IA	48	55	57	57	Low
Sioux City, IA-NE-SD	74	101	103	103	Low
Waterloo-Cedar Falls, IA	60	68	58	68	Low
Iowa City, IA	52	83	43	83	Low

Source: http://www.epa.gov/airdata/ad_rep_mon.html

*Note: A collocated continuous FEM monitor recorded a value of 156 µg/m^3; this corresponds to the same "Medium" classification as the 141 µg/m^3 FRM value used for NAAQS attainment.

Appendix R: Federal Requirements for SO_2 Sites

40 CFR Part 58 Appendix D —Network Design Criteria for Ambient Air Quality Monitoring

4.4 Sulfur Dioxide (SO_2) Design Criteria.

4.4.1 General Requirements. (a) State and, where appropriate, local agencies must operate a minimum number of required SO2 monitoring sites as described below.

4.4.2 Requirement for Monitoring by the Population Weighted Emissions Index. (a) The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA) they contain or share with another State or States for use in the implementation of or adjustment to the SO_2 monitoring network. The PWEI shall be calculated by multiplying the population of each CBSA, using the most current census data or estimates, and the total amount of SO_2 in tons per year emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product shall be divided by one million, providing a PWEI value, the units of which are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required within that CBSA.

(1) The SO_2 monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of this appendix): population exposure, highest concentration, source impacts, general background, or regional transport. SO_2 monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors under this part. Any monitor that is sited outside of a CBSA with minimum monitoring requirements to assess the highest concentration resulting from the impact of significant sources or source categories existing within that CBSA shall be allowed to count towards minimum monitoring requirements for that CBSA.

4.4.3 Regional Administrator Required Monitoring. (a) The Regional Administrator may require additional SO_2 monitoring stations above the minimum number of monitors required in 4.4.2 of this part, where the minimum monitoring requirements are not sufficient to meet monitoring objectives. The Regional Administrator may require, at his/her discretion, additional monitors in situations where an area has the potential to have concentrations that may violate or contribute to the violation of the NAAQS, in areas impacted by sources which are not conducive to modeling, or in locations with susceptible and vulnerable populations, which are not monitored under the minimum monitoring provisions described above. The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and/or maintain the most appropriate SO_2 network to provide sufficient data to meet monitoring objectives.

4.4.4 SO_2 Monitoring Spatial Scales. (a) The appropriate spatial scales for SO_2 SLAMS monitors are the microscale, middle, neighborhood, and urban scales. Monitors sited at the microscale, middle, and neighborhood scales are suitable for determining maximum hourly concentrations for SO_2. Monitors sited at urban scales are useful for identifying SO_2 transport, trends, and, if sited upwind of local sources, background concentrations.

(1) *Microscale*—This scale would typify areas in close proximity to SO_2 point and area sources. Emissions from stationary point and area sources, and non-road sources may, under certain plume conditions, result in high ground level concentrations at the microscale. The microscale typically represents an area impacted by the plume with dimensions extending up to approximately 100 meters.

(2) *Middle scale*—This scale generally represents air quality levels in areas up to several city blocks in size with dimensions on the order of approximately 100 meters to 500 meters. The middle scale may include locations of expected maximum short-term concentrations due to proximity to major SO_2 point, area, and/or non-road sources.

(3) *Neighborhood scale*—The neighborhood scale would characterize air quality conditions throughout some relatively uniform land use areas with dimensions in the 0.5 to 4.0 kilometer range. Emissions from stationary point and area sources may, under certain plume conditions, result in high SO_2 concentrations at the neighborhood scale. Where a neighborhood site is located away from immediate SO_2 sources, the

site may be useful in representing typical air quality values for a larger residential area, and therefore suitable for population exposure and trends analyses.

(4) *Urban scale*—Measurements in this scale would be used to estimate concentrations over large portions of an urban area with dimensions from 4 to 50 kilometers. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large scale air pollution control strategies. Urban scale sites may also support other monitoring objectives of the SO_2 monitoring network such as identifying trends, and when monitors are sited upwind of local sources, background concentrations.

4.4.5 NCore Monitoring. (a) SO_2 measurements are included within the NCore multipollutant site requirements as described in paragraph (3)(b) of this appendix. NCore-based SO_2 measurements are primarily used to characterize SO2 trends and assist in understanding SO_2 transport across representative areas in urban or rural locations and are also used for comparison with the SO_2 NAAQS. SO_2 monitors at NCore sites that exist in CBSAs with minimum monitoring requirements per section 4.4.2 above shall be allowed to count towards those minimum monitoring requirements.

* * * * *

Appendix S: Sulfur Dioxide Population Weighted Emissions Index

This SO_2 rule requires monitoring in or near Core Based Statistical Areas (CBSA's) based on the population weighted emissions index (PWEI). The PWEI is calculated using the most recent census data or estimates, and the most recent county level emissions data available in the National Emissions Inventory.

The PWEI is calculated by multiplying the population of the CBSA by the total tons of SO_2 emissions inventories from counties that make up the CBSA and dividing by one million. The PWEI is expressed in units of million person-tons per year.

The final monitoring regulations require monitors to be placed in Core Based Statistical Areas (CBSA's) based on the PWEI for the area. The final rule requires:

- 3 monitors in CBSAs with index values of 1,000,000 or more;
- 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000; and
- 1 monitor in CBSAs with index values greater than 5,000 but less than 100,000.

Iowa has chosen to use the 2011 National Emissions Inventory (NEI) data[39] as the most complete and accessible data to use for SO_2 emissions information. U.S. Census Bureau population estimates from Appendix F have been used for population data. The PWEI for Iowa MSAs are listed in the table below.

US Census Geographic Area	US Census Population Estimate, July, 2012	SO_2 Emissions, tons per year	SO_2 Population Weighted Emissions Index	SO_2 Monitors Required
Omaha-Council Bluffs, NE-IA	895,151	30,785	27,557	1
Sioux City, IA-NE	168,714	29,943	5,052	1
Davenport-Moline-Rock Island, IA-IL	383,681	6,877	2,638	0
Cedar Rapids, IA	262,421	7,877	2,067	0
Iowa City, IA	161,170	2,537	409	0
Des Moines-West Des Moines, IA	599,789	551	330	0
Ames, IA	92,406	3,547	328	0
Dubuque, IA	95,697	1,083	104	0
Waterloo-Cedar Falls, IA	169,484	539	91	0

[39] http://www.epa.gov/ttn/chief/net/2011inventory.html

Appendix T: Federal Requirements for Lead Sites

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3. (b) The NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter- based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$ particle mass, speciated $PM_{10-2.5}$, O_3, SO_2, CO, NO/NO_y, wind speed, wind direction, relative humidity, and ambient temperature. NCore sites in CBSA with a population of 500,000 people (as determined in the latest Census) or greater shall also measure Pb either as Pb-TSP or Pb-PM_{10}. The EPA Regional Administrator may approve an alternative location for the Pb measurement where the alternative location would be more appropriate for logistical reasons and the measurement would provide data on typical Pb concentrations in the CBSA.

*****

(c) [Reserved.]

*****

4.5 Lead (Pb) Design Criteria. (a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (http://www.epa.gov/ttn/chief/eiinformation.html) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure.

(i) One monitor may be used to meet the requirement in paragraph 4.5(a) for all sources involved when the location of the maximum Pb concentration due to one Pb source is expected to also be impacted by Pb emissions from a nearby source (or multiple sources). This monitor must be sited, taking into account logistics and the potential for population exposure, where the Pb concentration from all sources combined is expected to be at its maximum.

(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under §58.10(d).

(iii) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near each of the airports listed in Table D-3A for a period of 12 consecutive months commencing no later than December 27, 2011. Monitors shall be sited to measure the maximum Pb concentration in ambient air, taking into account logistics and the potential for population exposure, and shall use an approved Pb-TSP Federal Reference Method or Federal Equivalent Method. Any monitor that exceeds 50 percent of the Pb NAAQS on a rolling 3-month average (as determined according to 40 CFR part 50, Appendix R) shall become a required monitor under paragraph 4.5(c) of this Appendix, and shall continue to monitor for Pb unless a waiver is granted allowing it to stop operating as allowed by the provisions in paragraph 4.5(a)(ii) of this appendix. Data collected shall be submitted to the Air Quality System database according to the requirements of 40 CFR part 58.16.

Table D-3A Airports to be Monitored for Lead

Airport	County	State
Merrill Field	Anchorage	AK
Pryor Field Regional	Limestone	AL
Palo Alto Airport of Santa Clara County	Santa Clara	CA
McClellan-Palomar	San Diego	CA
Reid-Hillview	Santa Clara	CA
Gillespie Field	San Diego	CA
San Carlos	San Mateo	CA
Nantucket Memorial	Nantucket	MA
Oakland County International	Oakland	MI
Republic	Suffolk	NY
Brookhaven	Suffolk	NY
Stinson Municipal	Bexar	TX
Northwest Regional	Denton	TX
Harvey Field	Snohomish	WA
Auburn Municipal	King	WA

(b) State and, where appropriate, local agencies are required to conduct non-source-oriented Pb monitoring at each NCore site required under paragraph 3 of this appendix in a CBSA with a population of 500,000 or more.

(c) The EPA Regional Administrator may require additional monitoring beyond the minimum monitoring requirements contained in paragraphs 4.5(a) and 4.5(b) where the likelihood of Pb air quality violations is significant or where the emissions density, topography, or population locations are complex and varied. EPA Regional Administrators may require additional monitoring at locations including, but not limited to, those near existing additional industrial sources of Pb, recently closed industrial sources of Pb, airports where piston-engine aircraft emit Pb, and other sources of re-entrained Pb dust.

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Appendix U: Lead (Pb) Emissions Estimates

Facilities with 2012 NEI lead emissions over 0.25 tons per year (tpy) are indicated below:

Facility Name	Lead Emissions (tpy)
Grain Processing Corporation – Muscatine	1.922
MidAmerican Energy (Walter Scott Jr. Energy Center) – Council Bluffs	0.451
MidAmerican Energy (Louisa Station) – Muscatine	0.290
Clow Valve Company Foundry – Oskaloosa	0.280
MidAmerican Energy (George Neal North) – Sergeant Bluff	0.254

Appendix V: Lead Modeling for Facilities in Iowa with Lead Emissions Over 0.5 Tons

IOWA DEPARTMENT OF NATURAL RESOURCES
Environmental Services Division
Air Quality Bureau Modeling Group

MEMORANDUM

DATE: 15-JAN-2014
TO: SEAN FITZSIMMONS
FROM: DON PETERSON, PETER ZAYUDIS
RE: LEAD MODELING FOR 2012 EMISSIONS
CC: BRIAN HUTCHINS, JIM MCGRAW, JASON MARCEL, BRAD ASHTON, NICK PAGE

INTRODUCTION

On January 12, 2009, the EPA's new and more stringent NAAQS standard for airborne lead (Pb) became effective. The primary standard for lead is 0.15 µg/m^3 based on the maximum (not to be exceeded) 3-month rolling average. On December 23, 2009 EPA proposed to decrease the emissions threshold for ambient monitoring to 0.5 tons/yr. Each year the Department will evaluate sources of lead emissions in the state to determine if any facilities meet or exceed this value.

During 2012, MidAmerican Energy's Walter Scott Jr. Energy Center (WSEC) and Grain Processing Corporation (GPC) in Muscatine had lead emissions that exceeded 0.45 tons/yr. In 2012, estimated actual lead emissions from Griffin Pipe Products Company located in Council Bluffs fell below 0.45 tons/yr due to the installation and operation of additional emission controls. However, the Department continues to gather information to develop an accurate lead emissions profile from Griffin Pipe Products Company and surrounding activities. Once completed, this lead emission data will be used to assist the Department in better characterizing lead ambient air impacts in the vicinity of Griffin Pipe Products Company.

Therefore the Department has decided to model the impacts from lead emissions from these facilities. Monitoring may, at the EPA Regional Administrator's discretion, be waived if modeled concentrations do not exceed 50% of the standard. The purposes of the current modeling are to evaluate ambient concentrations around these facilities for aid in determining if a monitoring waiver can be issued and, if necessary, where to site monitors.

ANALYSIS SUMMARY

Previous lead modeling for each facility was used as a base on which to build the current analysis. The analysis was evaluated using the newest version of AERMOD (version 13350). The sources at each facility were modeled using the stack parameters and emission rates listed in Table 1. Sources were modeled using the most recent actual emission rates approved by the construction permit engineering staff. No stack parameters or emission rates were changed from the previously modeled values.

Table 1: Modeled Emission Rates and Stack Parameters

Emission Point	PM_{10} (lb/hr)	Stack Height (ft)	Stack Gas Exit Temperature (°F)	Stack Tip Diameter (in)	Stack Gas Flow Rate (acfm)
MidAmerican Energy – Walter Scott Energy Center					
1 (Boiler 1)	1.17	250	287	144	220,270
2 (Boiler 2)	1.65	250	316	144	446,200
3 (Boiler 3)	0.14	550	180	300	2,619,890
4 (Boiler 4)	0.025	551	207	296	2,447,050

Emission Point	PM_{10} (lb/hr)	Stack Height (ft)	Stack Gas Exit Temperature (°F)	Stack Tip Diameter (in)	Stack Gas Flow Rate (acfm)
Grain Processing Corporation					
EP001 (GEP Boilers)	0.97	219	379	180	402,340

MODEL RESULTS

Since the dispersion model AERMOD does not provide the ability to directly compute the 3-month rolling averages, results must go through a post-processing procedure. EPA's "leadpost" tool was used to determine the highest 3- month rolling average lead concentration, the receptor location, and the period of time.

According to the results from the AMS/EPA Regulatory Model (AERMOD, dated 13350), as post-processed by leadpost (dated 13262), the Pb emissions from these facilities will cause predicted concentrations that are less than 50% of the Pb NAAQS. All sources were assumed to operate 24 hours/day, 8760 hours/year.

The Pb modeling result for the worst case calendar quarter and year is listed in Tables 2 and 3. Visual displays of isopleths are provided in Figures 1 and 2. The isopleths are based on the highest 3-month rolling average concentrations at each receptor. The coordinates for both facilities are based on UTM zone 15, NAD27. The location of the maximum concentration is marked with either a red dot or red contour line. This will facilitate a determination of where the highest predicted impacts are and where monitors may best be located, if monitoring will be required.

Table 2: Worst Case Modeling Results for Pb – MidAmerican – WSEC

Averaging Period	Year in which event occurred	Predicted Concentration * ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Rolling 3-month	2009 (May – July)	0.029	0	0.029	0.15

*The rolling 3-month concentration is the highest predicted value.

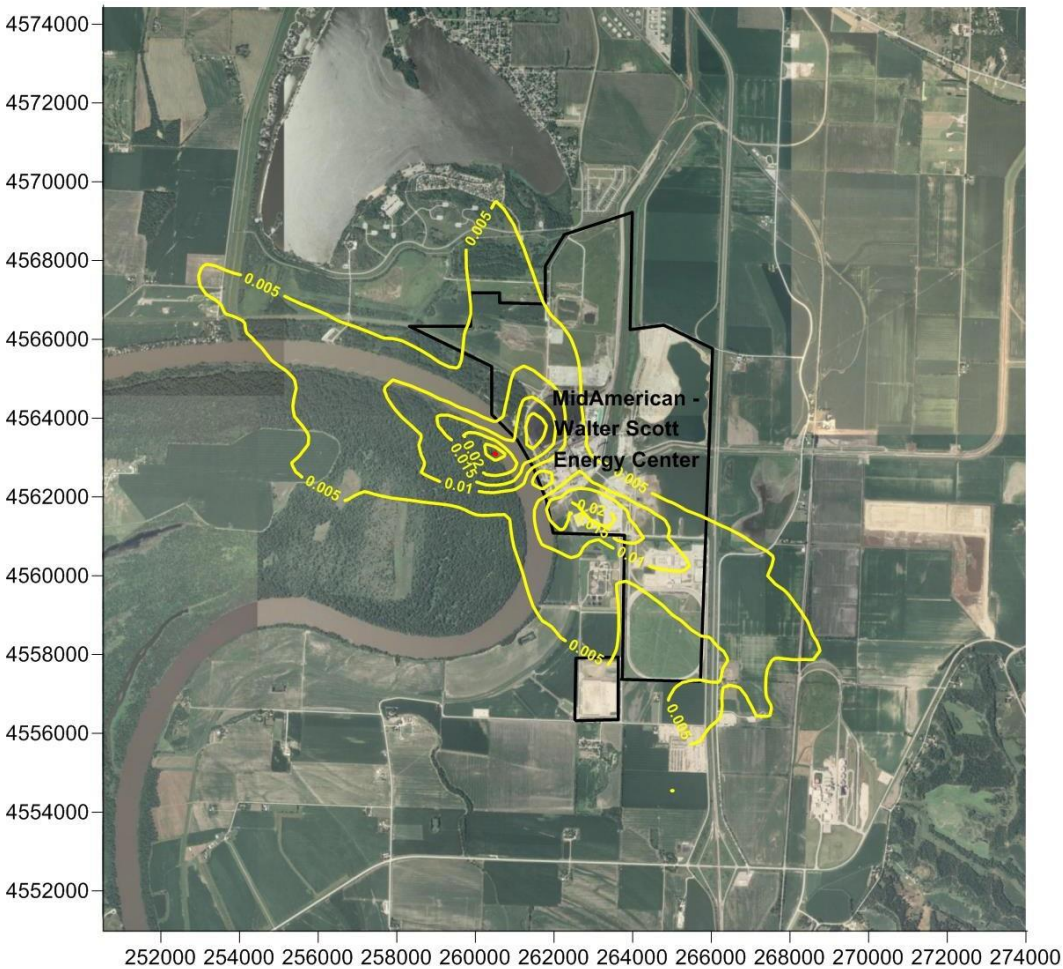

Figure 1: Concentration Profile – MidAmerican – WSEC

Table 3: Worst Case Modeling Results for Pb – GPC

Averaging Period	Year in which event occurred	Predicted Concentration * (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
Rolling 3-month	2005 (August-October)	0.0063	0	0.0063	0.15

*The rolling 3-month concentration is the highest predicted value.

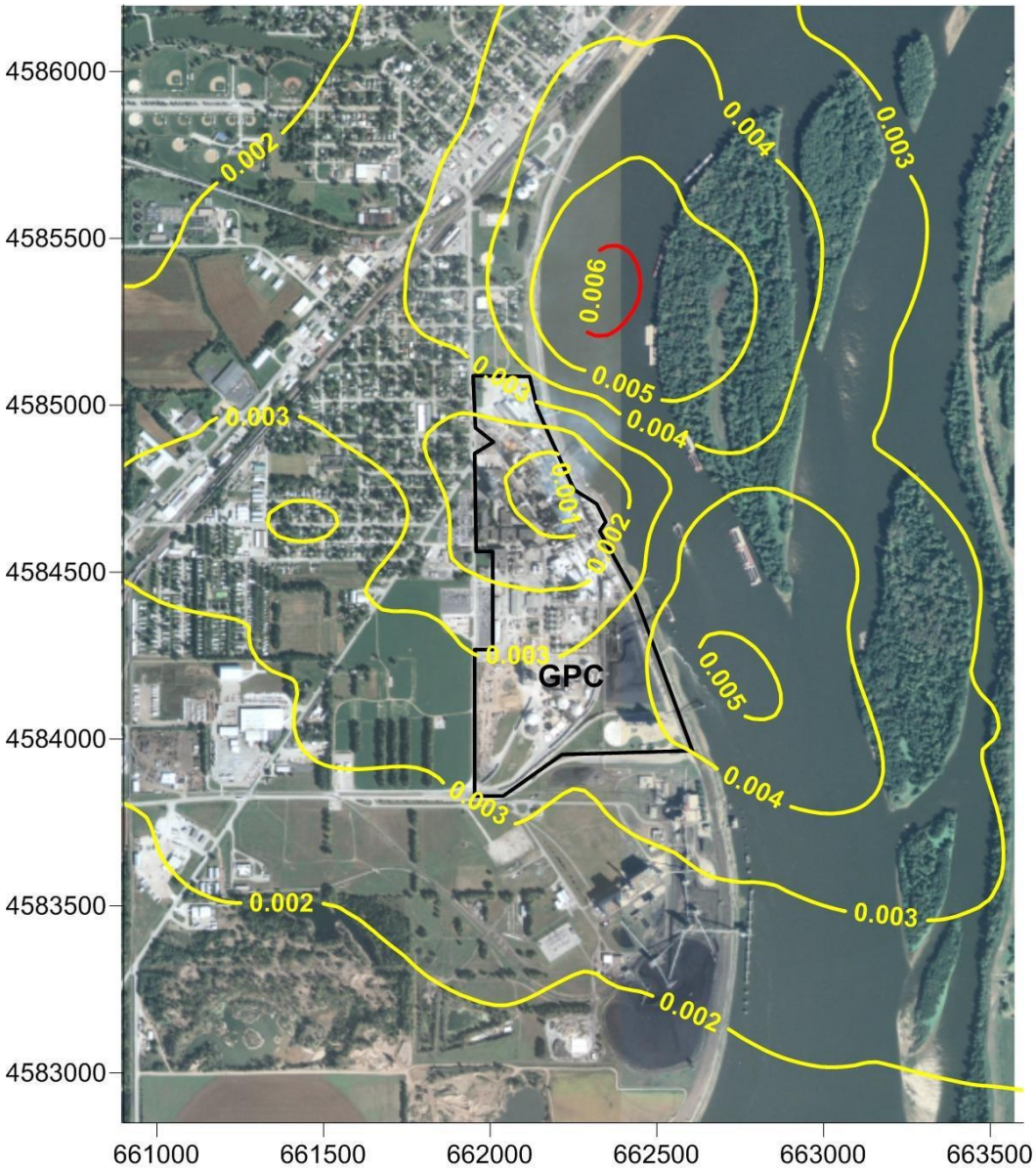

Figure 2: Concentration Profile – GPC