Iowa Ambient Air Monitoring
2009 Network Plan

Iowa Department of Natural Resources
Air Quality Bureau

Table of Contents

Introduction

States and other agencies delegated to perform air monitoring under the Clean Air Act are required to examine their networks annually to insure that they meet federal requirements (Appendix A). These requirements 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) generally represent long- term monitoring efforts, and discontinuing a SLAMS monitor requires concurrence from EPA. Special purpose monitors (SPM's) provide important additional air quality information, but these monitoring sites need not be permanent, and are highly dependent on available funding. 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 B and Appendix C.

Ozone Network Analysis

EPA's population-based monitoring requirements for ozone are reproduced in Appendix D. These requirements apply to metropolitan statistical areas (MSA's) and depend on the population of the MSA (Appendix E) and the ozone levels monitored in or downwind of the MSA over the past three years (Appendix F). Based on this information, the minimum number of population-based SLAMS ozone monitors 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
Waterloo-Cedar Falls, IA	1

In Iowa, there is one SLAMS monitor for the Omaha-Council Bluffs MSA, two SLAMS monitors for the Des Moines MSA, two SLAMS monitors for the Davenport-Moline-Rock Island MSA, one SLAMS monitor for the Cedar Rapids MSA, and one SLAMs monitor for the Waterloo-Cedar Falls MSA. The State of Iowa shares the responsibility for ozone monitoring in the Omaha-Council Bluffs MSA with Nebraska agencies, and in Davenport-Moline-Rock Island MSA with Illinois agencies (Appendix G). In 2008, three SLAMS ozone monitors were operated in Omaha, Nebraska, and one ozone monitor was operated in Rock Island, Illinois.

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 C. 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 H**.**

$PM_{2.5}$ Network Analysis

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

MSA	Number of Monitors Required
Omaha-Council Bluffs, NE-IA	1
Des Moines-West Des Moines, IA	1
Davenport-Moline-Rock Island, IA-IL	1

Iowa operates two SLAMS $PM_{2.5}$ monitors in Des Moines and two in Davenport. 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 G). In 2008, four SLAMS $PM_{2.5}$ monitoring sites were operated by Nebraska in the Omaha, Nebraska MSA; and one SLAMS $PM_{2.5}$ monitor was operated by Illinois in the Davenport-Moline-Rock Island MSA (Appendix G).

In addition to population-based minimum requirements, 40 CFR Pt 58 also specifies that each state operate at least one $PM_{2.5}$ monitor to measure background concentrations, and at least one site to measure regional transport of $PM_{2.5}$. A SLAMS background monitor is located at Emmetsburg in northwest Iowa, and SLAMS transport monitors are located at Lake Sugema in Southeast Iowa and Viking Lake in Southwest Iowa. In MSA's where a single $PM_{2.5}$ monitor is required, 40 CFR Pt 58 requires that an additional continuous $PM_{2.5}$ monitor is operated at 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 and Davenport.

40 CFR Pt 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. All $PM_{2.5}$ samplers recording design values in this range are currently operating on a daily sampling schedule.

None of the five $PM_{2.5}$ chemical speciation sites operated in Iowa have been designated as speciation trends network (STN) sites by EPA, and their continued operation is not required by 40 CFR Part 58.

$PM_{2.5}$ monitoring at sites near the Blackhawk Foundry in Davenport and at Chancy Park in Clinton have recorded elevated $PM_{2.5}$ values relative to other $PM_{2.5}$ monitors in Eastern Iowa. 40 CFR Part 58 indicates these 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.

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 C and displayed in Appendix J**.** There are no anticipated reductions to the SLAMS $PM_{2.5}$ monitoring network prior to the submission of the next network plan. 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 H**.**

PM_{10} Network Analysis

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

MSA	Number of Monitors Required
Omaha-Council Bluffs, NE-IA	2-4
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} monitors in the Des Moines-West Des Moines MSA, two 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 G). In 2008, eight SLAMS PM_{10} sites were operated by Nebraska in the Omaha MSA; and no SLAMS PM_{10} monitors were operated by Illinois in the Davenport-Moline-Rock Island MSA.

Iowa's PM_{10} monitoring network meets the minimum federal requirements. Additional PM_{10} monitors are operated in order to support compliance activities and to compute background levels for air dispersion modeling. Iowa's complete PM_{10} monitoring network is listed in Appendix C and displayed in Appendix J. There are no anticipated reductions to the SLAMS PM_{10} monitoring network prior to the submission of the next network plan. Changes to monitors in the SPM PM_{10} network that are expected to occur before the submission of the next network plan are detailed in Appendix H.

Sulfur Dioxide, Nitrogen Dioxide, and Carbon Monoxide Network Analysis

There are currently no minimum requirements for the number of Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2), and Carbon Monoxide (CO) monitors contained in 40 CFR Part 58. Iowa's SO_2, NO_2 and CO monitors are listed in Appendix C and displayed at the locations indicated in Appendix J. EPA has encouraged states to use trace- level monitors at sites that have recorded pollutant levels that are much less than the NAAQS, and Iowa has deployed some trace level SO_2 and CO monitors in its network. There are no planned reductions to the SLAMS monitoring network for these pollutants scheduled before submission of the next network plan. Changes to SPM monitors in the SO_2, NO_2 and CO network that are anticipated before the submission of the next network plan are indicated in Appendix H.

Toxics Monitoring Network Analysis

Iowa currently operates three air toxics sites. There are no minimum requirements for the number of toxics sites contained in 40 CFR Part 58. Details concerning Iowa's air toxics network are contained in Appendix C and displayed in Appendix J. No modifications to the air toxics network are anticipated before the submission of the next network plan.

Lead Network Analysis

EPA made final revisions to the lead NAAQS in November, 2008. The revised lead NAAQS contains provisions for population-oriented monitoring in large urban areas and source-oriented monitoring near lead emitters. The schedule for deployment of the new lead monitoring network is contained in the preamble of the final rule.[1]

We are allowing monitoring agencies to stagger installation of any newly required monitors over a two-year period. Each monitoring agency is required to install and operate the required source-oriented monitors by January 1, 2010. The non-source-oriented monitors are required to be installed and operated by January 1, 2011. The annual monitoring plan due July 1, 2009 must describe the planned monitoring that will begin by January 1, 2010, and the plan due July 1, 2010 must describe the planned monitoring that will begin by January 1, 2011.

Federal monitoring requirements for lead are reproduced in Appendix L. With regards to the proposal for source-oriented lead monitoring sites required in this (2009) network plan, there must be a minimum of one source-oriented SLAMS site located to measure the maximum lead concentration in ambient air resulting from each lead source which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (NEI), or other scientifically justifiable methods and data (such as improved emissions factors or site- specific data), unless the requirement for monitoring is waived by EPA.

After the new lead NAAQS was finalized, the department reviewed the latest emissions data for facilities with emissions near the 1 ton per year threshold. For this analysis, the 2007 facility-generated emissions estimates were reviewed by emissions inventory and engineering staff. In some cases, facilities were asked to perform stack tests to improve the quality of the lead emissions estimates. A comparison of department's 2007 lead emissions estimates to the 2005 NEI estimates is contained Appendix M. A discussion of the differences between the two estimates is provided in Appendix N. Two facilities, Grain Processing Corporation (GPC) in Muscatine and Griffin Pipe in Council Bluffs, exceed the one ton per year emissions threshold specified in the rule using the department's 2007 emissions estimates.

EPA may waive the requirement for monitoring near lead sources if the department can demonstrate the lead source will not contribute to a maximum lead concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). Results of air dispersion modeling of the lead emissions from GPC in Muscatine are presented in Appendix O. The modeled maximum lead concentration was 4% of the NAAQS. The

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[1] See page 67029 of the Federal Register Vol. 73, No. 219 , Wednesday, November 12, 2008, available at: http://www.epa.gov/fedrgstr/EPA-AIR/2008/November/Day-12/a25654.pdf

department requests a waiver of the requirement to conduct lead monitoring in Muscatine.

Results of air dispersion modeling of the lead emissions from Griffin Pipe in Council Bluffs are presented in Appendix P. The modeling shows ambient levels exceeding the lead NAAQS. The department intends to establish a monitoring location in the populated high impact area in the area north of the facility by January 2010.

Proposal for an NCore Monitoring Station

In October 2006, the United States Environmental Protection Agency (EPA) revised federal rules regarding minimum requirements for State ambient air monitoring networks. Included in the revision was the requirement that each state propose at least one multi-pollutant "NCore" site for development in its 2009 network plan. This NCore site must be operational by January 1, 2011. Federal monitoring requirements for NCore sites are contained in Appendix Q.

The department proposes to upgrade an existing monitoring site located at Jefferson School in Davenport (AQS ID 191630015) to an NCore site. This site was established to assess population exposure to air pollution and it has been in operation since 1982. Ambient air monitoring data from this location, along with meteorological data from the KDVN National Weather Service at the Davenport Airport, have recently played an important role in assessing the causes of elevated fine particle levels in the Quad Cities area.[2] Photographs of this site are contained in Appendix R. Most of the required NCore parameters are already being monitored at this location (see Appendix S).

In order to collect wind speed and wind direction that meets NCore requirements, EPA requires that a circle of 100 meters in radius around the met tower contain no obstructions to air flow. Trees and houses near the site prevent it from meeting this requirement. Federal rules allow for a waiver of the NCore meteorological monitoring requirements, and the department formally requests a waiver of the requirement to collect wind speed and wind direction data at this location.

If EPA accepts the department's proposal to complete development of this monitoring location as an NCore site, then an additional NOy monitor will need to be added at the site, along with additional calibration equipment. Incorporation of these new elements will require installation of a new, larger, monitoring trailer, which will require approval of a building permit by the City of Davenport.

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[2] See http://www.iowadnr.gov/air/prof/progdev/files/NA_Response_TJD.pdf and http://www.iowadnr.gov/air/prof/monitor/files/Fireworks_7_4_08.pdf

Appendix A: 40 CFR Part 58 Requiring Annual Network Plans

§ 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 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.

(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.

(c) The annual monitoring network plan must document how States and local agencies provide for the review of changes to a $PM_{2.5}$ monitoring network that impact the location of a violating $PM_{2.5}$ monitor or the creation/change to a community monitoring zone, including a description of the proposed use of spatial averaging for purposes of making comparisons to the annual $PM_{2.5}$ NAAQS as set forth in appendix N to part 50 of this chapter. 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. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites. 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 first assessment is due 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.

Appendix B: Iowa Ambient Air Monitoring Locations

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	41.91040	-91.65146	191130028	Linn Local Prog.
	Scottish Rite Temple	616 A Ave.	Linn	CDR	41.98300	-91.66479	191130031	Linn Local Prog.
	Army Reserve Center	1599 Wenig Rd. NE	Linn	CDR	42.00506	-91.67924	191130037	Linn Local Prog.
	Public Health	500 11th St NW	Linn	CDR	41.97677	-91.68766	191130040	Linn Local Prog.
Clarion	Jannsen Farm	2446 Quincy Ave.	Wright	-	42.69539	-93.65598	191970004	DNR
Clinton	Chancy Park	23rd & Camanche	Clinton	-	41.82328	-90.21198	190450019	DNR
	Rainbow Park	2600 Roosevelt	Clinton	-	41.87500	-90.17757	190450021	DNR
Clive	Indian Hills Jr. High Sch.	9401 Indian Hills	Polk	DSM	41.60348	-93.74782	191532510	Polk Local Prog.
Coggon	Coggon Elementary Sch.	408 E Linn	Linn	CDR	42.28062	-91.52740	191130033	Linn Local Prog.
Council Bluffs	Franklin Sch.	3130 C Ave.	Pottowatamie	OMC	41.26417	-95.89612	191550009	DNR
Davenport	Jefferson Sch.	10th & Vine	Scott	DMR	41.53001	-90.58761	191630015	DNR
	Adams Sch.	3029 N Division	Scott	DMR	41.55001	-90.60012	191630018	DNR
	Black Hawk Foundry	300 Wellman	Scott	DMR	41.51777	-90.61876	191630019	DNR
Des Moines	Health Dept.	1907 Carpenter	Polk	DSM	41.60313	-93.64323	191530030	Polk Local Prog.
Emmetsburg	Iowa Lakes Coll.	Iowa Lakes College	Palo Alto	-	43.12370	-94.69352	191471002	DNR
Indianola	Lake Ahquabi	1650 118th Ave.	Warren	DSM	41.28543	-93.58401	191810022	Polk Local Prog.
Iowa City	Hoover Sch.	2200 East Court	Johnson	IAC	41.65723	-91.50348	191032001	DNR
Keokuk	Fire Station	111 S 13th	Lee	-	40.40096	-91.39101	191110008	DNR
Mason City	Holcim	17th & Washington	Cerro Gordo	-	43.16944	-93.20243	190330018	DNR
	Washington Sch.	700 N Washington	Cerro Gordo	-	43.15856	-93.20301	190330020	DNR
Muscatine	Garfield Sch.	1409 Wisconsin	Muscatine	-	41.40095	-91.06781	191390015	DNR
	Greenwood Cemetery	Fletcher & Kimble	Muscatine	-	41.41943	-91.07098	191390016	DNR
	Franklin Sch.	210 Taylor	Muscatine	-	41.41439	-91.06261	191390018	DNR
	Musser Park	Oregon & Earl Ave.	Muscatine	-	41.40780	-91.06265	191390020	DNR
Pisgah	Forestry Office	206 Polk	Harrison	OMC	41.83226	-95.92800	190851102	DNR
	Highway Maintenance	1575 Hwy 183	Harrison	OMC	41.78026	-95.94844	190851101	DNR
Sioux City	Bryant Sch.	821 30th	Woodbury	SXC	42.52236	-96.40021	191930019	DNR
Slater	City Hall	105 Greene	Story	DSM	41.88294	-93.68793	191690011	Polk Local Prog.
Waterloo	Grout Museum	West Park & South	Black Hawk	WTL	42.49255	-92.34383	190130008	DNR
	Water Tower	Vine & Steely	Black Hawk	DNR	42.50154	-92.31602	190130009	DNR
Waverly	Airport	Waverly Airport	Bremer	WTL	42.74119	-92.51284	190170011	Linn Local Prog.
-	Backbone State Park	Backbone State Park	Delaware	-	42.60082	-91.53849	190550001	DNR
-	Viking Lake State Park	2780 Viking Lake Road	Montgomery	-	40.96911	-95.04495	191370002	DNR
-	Scott County Park	Scott County Park	Scott	DMR	41.69917	-90.52194	191630014	DNR
-	Lake Sugema State Park	24430 Lacey Trail	Van Buren	-	40.69311	-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 (MSA's) according to July, 2007 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
Waterloo-Cedar Falls, IA	WTL
Sioux City, IA-NE-SD	SXC
Iowa City, IA	IAC
Dubuque, IA	-
Ames, IA	-

From: http://www.census.gov/popest/metro/CBSA-est2008-annual.html Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2008 (CBSA-EST2008-01). Source: Population Division, U.S. Census Bureau, Release Date: March 19, 2009

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 University of Iowa Hygienic Lab (UHL) to operate monitoring sites not operated by the Polk or Linn County Local Programs.

Appendix C: Iowa Ambient Air Monitors

Site Name	Pollutants Measured	Monitor Type	Design Value 06-08	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?
Backbone State Park	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	General/Background	Regional	Yes
Buffalo, Linwood Mining	PM10	SLAMS			Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	Yes
Cedar Rapids, Army Reserve Center	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Cedar Rapids, Army Reserve Center	PM2.5	SLAMS	25	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Cedar Rapids, Army Reserve Center	PM2.5 Speciation	Supplemental Speciation			PM 2.5 Speciation	STN Protocol	1/6 Day	Population Exposure	Neighborhood	No
Cedar Rapids, Kirkwood College	Ozone	SPM	68	Yes	UV Absorbtion		Continuous	Transport	Urban	Yes
Cedar Rapids, Public Health	CO	SPM			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	No
Cedar Rapids, Public Health	Filter SO4	SPM			Low Volume	Ion Chromatography	1/3 Day	Population Exposure	Neighborhood	No
Cedar Rapids, Public Health	Ozone	SPM			UV Absorbtion		Continuous	Population Exposure	Urban	Yes
Cedar Rapids, Public Health	PM2.5	SPM			Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes
Cedar Rapids, Public Health	PM2.5 Continuous	SLAMS			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	No
Cedar Rapids, Public Health	SO2	SPM			UV Fluorescent		Continuous	Population Exposure	Neighborhood	Yes
Cedar Rapids, Public Health	SO4	SPM			UV Fluorescent		Continuous	Population Exposure	Neighborhood	No
Cedar Rapids, Public Health	Toxics	SPM			Cannister	TO-15, GC-FID	1/12 Day	Population Exposure	Neighborhood	No
Cedar Rapids, Public Health	Toxics	SPM			Cartridge	TO-11A	1/12 Day	Population Exposure	Neighborhood	No
Cedar Rapids, Scottish Rite Temple	SO2	SPM			UV Fluorescent		Continuous	Source Oriented	Middle	Yes
Clarion, Jannsen Farm	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Source Oriented	Neighborhood	Yes
Clinton, Chancy Park	PM2.5	SPM	34	Yes	Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	24 Hour Only
Clinton, Chancy Park	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Source Oriented	Middle	No
Clinton, Chancy Park	SO2	SPM			UV Fluorescent		Continuous	Source Oriented	Middle	Yes
Clinton, Rainbow Park	Ozone	SLAMS	67	Yes	UV Absorbtion		Continuous	Population Exposure	Urban	Yes
Clinton, Rainbow Park	PM2.5	SPM	28	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes
Clinton, Rainbow Park	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	No
Clive, Indian Hills Jr. High Sch.	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Clive, Indian Hills Jr. High Sch.	PM2.5	SLAMS	23	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Coggon, Coggon Elementary Sch.	Ozone	SLAMS	67	Yes	UV Absorbtion		Continuous	Max Ozone Conc.	Urban	Yes
Council Bluffs, Franklin Sch.	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Council Bluffs, Franklin Sch.	PM2.5	SPM	25	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Davenport, Adams Sch.	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Davenport, Adams Sch.	PM2.5	SPM	29	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Davenport, Blackhawk Foundry	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Source Oriented	Middle	Yes
Davenport, Blackhawk Foundry	PM2.5	SLAMS	34	Yes	Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	24 Hour Only
Davenport, Blackhawk Foundry	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Source Oriented	Middle	No
Davenport, Jefferson Sch.	CO	Proposed NCORE			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	NH3	SPM			Photoacoustic		Continuous	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	NO2	Proposed NCORE			Chemiluminescence		Continuous	Population Exposure	Neighborhood	Yes
Davenport, Jefferson Sch.	NO3	SPM			Chemiluminescence		Continuous	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	Ozone	Proposed NCORE	63	No	UV Absorbtion		Continuous	Population Exposure	Urban	Yes
Davenport, Jefferson Sch.	PM10	Proposed NCORE			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Davenport, Jefferson Sch.	PM2.5	SLAMS	28	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes
Davenport, Jefferson Sch.	PM2.5 Continuous	SLAMS			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	PM2.5 Speciation	Supplemental Speciation			PM 2.5 Speciation	STN Protocol	1/3 Day	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	SO2	Proposed NCORE			UV Fluorescent		Continuous	Population Exposure	Urban	Yes
Davenport, Jefferson Sch.	SO4	SPM			UV Fluorescent		Continuous	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	Toxics	SPM			Cannister	TO-15, GC-FID	1/12 Day	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	Toxics	SPM			Cartridge	TO-11A	1/12 Day	Population Exposure	Neighborhood	No

Site Name	Pollutants Measured	Monitor Type	Design Value 0 6-08	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?
Des Moines, Health Dept.	co	SPM			Non-Dispersive Infra-red		Continuous	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	NO2	SPM			Chemi-luminescence		Continuous	Population Exposure	Neighborhood	Yes
Des Moines, Health Dept.	Ozone	SLAMS			UV Absorption		Continuous	Population Exposure	Urban	Yes
Des Moines, Health Dept.	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Des Moines Health Dept.	PM2.5	SLAMS	25	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes
Des Moines, Health Dept.	PM2.5 Continuous	SLAMS			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	PM2.5 Speciation	Supplemental Speciation			PM 2.5 Speciation	STN Protocol	1/6 Day	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	SO2	SPM			UV Fluorescent		Continuous	Population Exposure	Urban	Yes
Des Moines, Health Dept.	Toxics	SPM			Canister	TO-15, GC-FID	1/12 Day	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	Toxics	SPM			Cartridge	TO-11A	1/12 Day	Population Exposure	Neighborhood	No
Emmetsburg, Iowa Lakes Coll.	Ozone	SLAMS	58	No	UV Absorption		Continuous	Regional Transport	Regional	Yes
Emmetsburg, Iowa Lakes Coll.	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	General/ Background	Regional	Yes
Emmetsburg, Iowa Lakes Coll.	PM2.5	SLAMS	24	No	Low Volume FRM	Gravimetric	1/3 Day	General/ Background	Regional	Yes
Emmetsburg, Iowa Lakes Coll.	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	General/ Background	Regional	No
Indianola, Lake Ahquabi	Ozone	SPM	64	Yes	UV Absorption		Continuous	Upwind Background	Regional	Yes
Iowa City, Hoover Sch.	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Iowa City, Hoover Sch.	PM2.5	SLAMS	29	No	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes
Iowa City, Hoover Sch.	PM2.5 Continuous	SLAMS			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	Neighborhood
Keokuk, Fire Station	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Neighborhood
Lake Sugema State Park	IMPROVE Speciation	IMPROVE			IMPROVE Sampler	IMPROVE Protocol	1/3 Day	Regional Transport	Regional	No
Lake Sugema State Park	Ozone	SLAMS	66	Yes	UV Absorption		Continuous	Regional Transport	Regional	Yes
Lake Sugema State Park	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	General/ Background	Regional	Yes

Site Name	Pollutants Measured	Monitor Type	Design Value 0 6-08	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?
Lake Sugema State Park	PM2.5	SLAMS	26	No	Low Volume FRM	Gravimetric	1/3 Day	Regional Transport	Regional	Yes
Lake Sugema State Park	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Regional Transport	Regional	No
Lake Sugema State Park	SO2	SPM			UV Fluorescent		Continuous	General/ Background	Regional	Yes
Mason City, Holcim	PM10	SLAMS			Low Volume FRM	Gravimetric	Daily	Source Oriented	Middle	Yes
Mason City, Washington Sch.	PM10	SPM			Low Volume FRM	Gravimetric	1/2 Day	Population Exposure	Neighborhood	Yes
Muscatine, Franklin Sch.	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Muscatine Garfield Sch.	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Muscatine, Garfield Sch.	PM2.5	SLAMS	35	Yes	Low Volume FRM	Gravimetric	Daily	Population Exposure	Neighborhood	Yes
Muscatine Garfield Sch.	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	No
Muscatine, Greenwood Cemetery	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Muscatine Musser Park	SO2	SLAMS			UV Fluorescent		Continuous	Source Oriented	Middle	Yes
Pisgah, Highway Maintenance	Ozone	SLAMS	67	Yes	UV Absorption		Continuous	Max Ozone Cone.	Urban	Yes
Pisgah, Forestry Office	Ozone	SPM			UV Absorption		Continuous	Max Ozone Cone.	Urban	Yes
Scott County Park	Ozone	SLAMS	65	Yes	UV Absorption		Continuous	Max Ozone Cone.	Urban	Yes
Sioux City, Bryant Sch.	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Sioux City, Bryant Sch.	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Slater, City Hall	Ozone	SLAMS	64	Yes	UV Absorption		Continuous	Max Ozone Cone.	Urban	Yes
Viking Lake State Park	IMPROVE Speciation	IMPROVE			IMPROVE Sampler	IMPROVE Protocol	1/3 Day	Regional Transport	Regional	No
Viking Lake State Park	Ozone	SLAMS	66	Yes	UV Absorption		Continuous	Regional Transport	Regional	Yes
Viking Lake State Park	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	General/ Background	Regional	Yes
Viking Lake State Park	PM2.5	SLAMS	23	No	Low Volume FRM	Gravimetric	1/3 Day	Regional Transport	Regional	Yes
Viking Lake State Park	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Regional Transport	Regional	No

Site Name	Pollutants Measured	Monitor Type	Design Value 0 6-08	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?
Waterloo , Grout Museum	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Waterloo Grout Museum	PM2.5	SLAMS	28	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Waterloo, Water Tower	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Waterloo, Water Tower	PM2.5 Continuous	SLAMS			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Neighborhood	No
Waverly, Airport	Ozone	SLAMS	65	Yes	UV Absorption		Continuous	Max Ozone Cone.	Urban	Yes

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 $PM_{2.5}$
- NH_3 – ammonia
- 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) + 2 $N2O_5+HNO_4$ + PAN + other organic nitrates
- Ozone – an unstable molecule consisting of three oxygen atoms
- PAN- peroxyacyl nitrates
- 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 $PM_{2.5}$
- PMcoarse-coarse particles, defined by the expression PMcoarse=PM_{10}-$PM_{2.5}$, where PM_{10} and $PM_{2.5}$ are determined by low volume FRM methods
- 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

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 $PM_{2.5}$.
- Proposed NCore – monitors operated at a site which has been proposed for inclusion in EPA's national network of long term multi-pollutant sites (NCore).
- 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 STN protocols, but not contained in the STN Network.

Design Value – A design value is a number computed from monitoring data (see 40 CFR Part 50, Appendix N) that is used to compare air quality at the site to the National Ambient Air Quality Standards (NAAQS).

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). EPA lowered the ozone NAAQS from 84 to 75 ppb. 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 two types of continuous $PM_{2.5}$ monitors currently used in the Iowa Network are the $PM_{2.5}$ FDMS TEOM (FDMS=Filter Dynamic Measurement System, TEOM= Tapered Element Oscillating Microbalance) and the $PM_{2.5}$ BAM (BAM=Beta Attenuation Monitor).
  - $PM_{2.5}$ FDMS – a continuous fine particle monitor that that uses a heater and dehumidifier to condition fine particles and a TEOM microbalance to weigh the fine particles. This type of monitor corrects for volatization losses during sampling by measuring the change in the mass of the fine particles collected on the sampling filter after the fine particle flow is switched off.
  - $PM_{2.5}$ BAM- A continuous fine particle monitor that 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. This property is the basis of the analytical method used to quantify NO. To measure NO_2, the NO_2 must first be converted to NO using a heated molybdenum converter. To measure Nitrate, the collected particulate is heated rapidly, and the vaporization/decomposition process converts the particulate nitrate contained in the collected sample to nitrogen oxides, which are quantified by the chemiluminescence method.
- 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.
- Photoacoustic-a monitoring method that uses a sensitive microphone to pick up sound waves produced by absorption of light of by the analyte. The wavelength of light used must correspond to a to a strong absorption resonance of the gas being measured.
- $PM_{2.5}$ 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 both continuous SO_2 gas analyzers, as well as continuous particulate sulfate monitors. In the latter case, sulfate particles are first converted to SO_2 gas.

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.
- STN Protocol – refers to the EPA's speciation trends 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. 1/3, 1/6, and 1/12) schedule for a manual samplers refers to collecting a sample every third, sixth, and twelfth day, respectively. Ozone monitors in Iowa 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. The model of TEOM operated in the Iowa network has not yet been approved by EPA as an FEM, and Iowa does not anticipate operating any TEOM's as FEMs in the coming year.

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:

$PM_{2.5}$ data that are representative, not of areawide but rather, of relatively unique population-oriented microscale, or localized hot spot, or unique population-oriented middle-scale impact sites are only eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS. For example, if the $PM_{2.5}$ monitoring site is adjacent to a unique dominating local $PM_{2.5}$ source or can be shown to have average 24-hour concentrations representative of a smaller than neighborhood spatial scale, then data from a monitor at the site would only be eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS.

Appendix D: 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 PM2.5 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 (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 within the ranges shown in this table will be jointly determined by EPA and the State Agency.
[2] High concentration areas are those for which ambient PM10 data show ambient concentrations exceeding the PM10

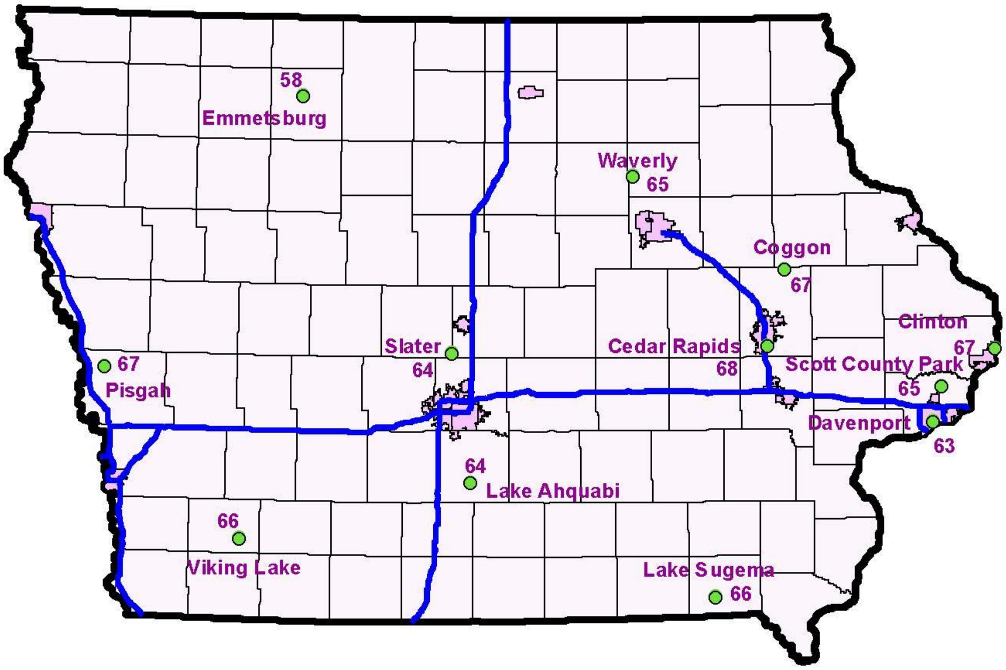
NAAQS by 20 percent or more.
[3] Medium concentration areas are those for which ambient PM10 data show ambient concentrations exceeding 80 percent of the PM10 NAAQS.
[4] Low concentration areas are those for which ambient PM10 data show ambient concentrations less than 80 percent of the PM10 NAAQS.
[5] These minimum monitoring requirements apply in the absence of a design value.

Appendix E: Census Bureau estimates for Iowa MSA's:

US Census Geographic Area	US Census Population Estimate, July 1, 2008
Omaha-Council Bluffs, NE-IA	837,925
Des Moines-West Des Moines, IA	556,230
Davenport-Moline-Rock Island, IA-IL	377,626
Cedar Rapids, IA	255,452
Waterloo-Cedar Falls, IA	164,220
Iowa City, IA	149,437
Sioux City, IA-NE-SD	143,157
Dubuque, IA	92,724
Ames, IA	86,754

From: http://www.census.gov/popest/metro/CBSA-est2008-annual.html Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2008 (CBSA-EST2008-01)
Source: Population Division, U.S. Census Bureau, Release Date: March 19, 2009

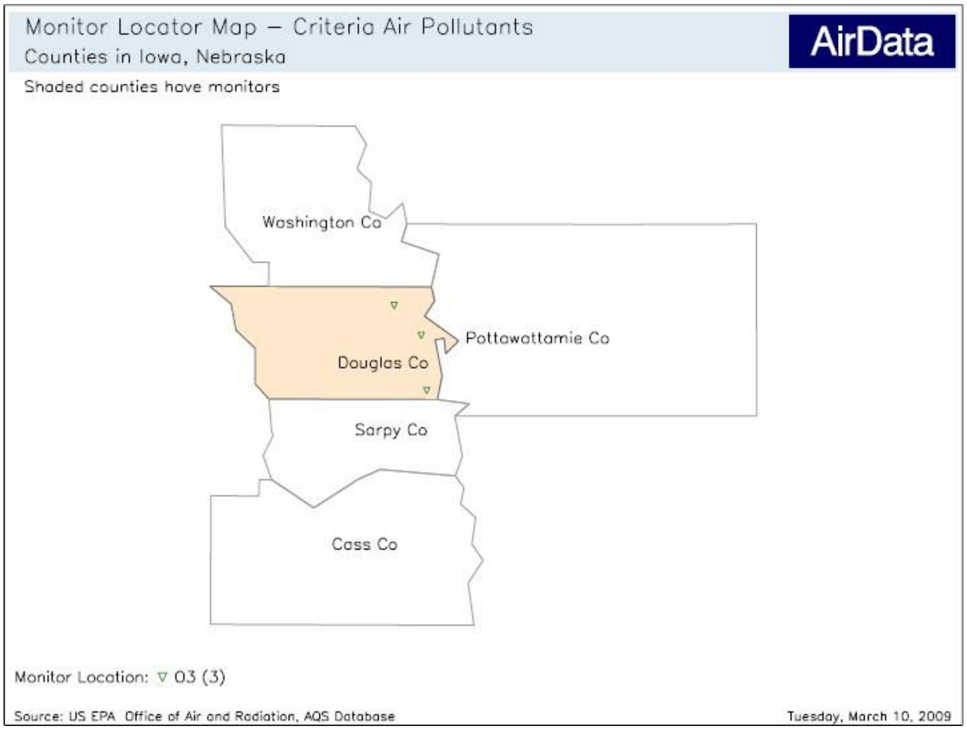
Appendix F: Design Value Map for Ozone



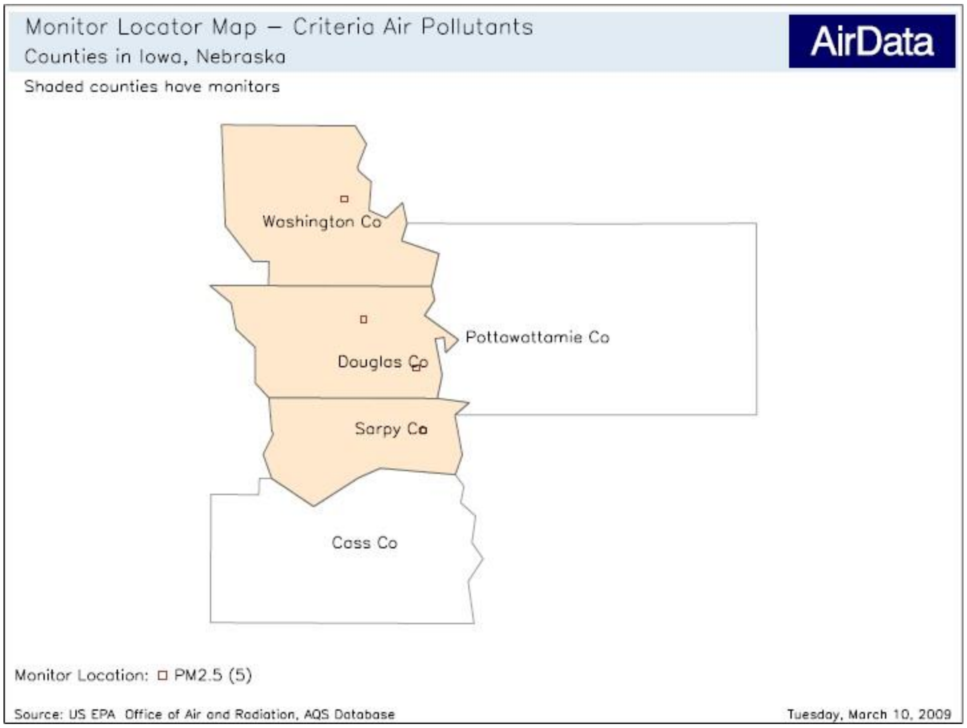
2006-2008 Ozone Design Values (ppb)

Appendix G: Maps of Monitoring Locations in MSA's on the State Border

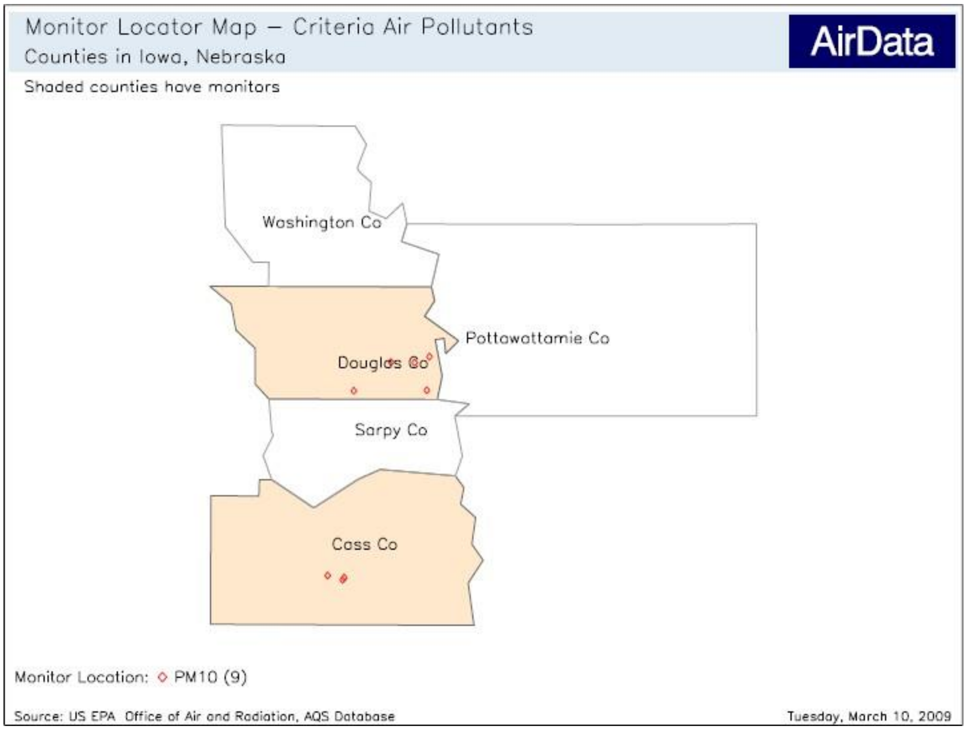
The two largest MSA's that span both sides of the Iowa border are Davenport-Moline-Rock Island, IA-IL; and Omaha-Council Bluffs, NE-IA. The following maps show all the locations for SLAMS monitors that were operated in 2008 for Ozone, $PM_{2.5}$, and PM_{10} in these metro areas, including those operated by Illinois and Nebraska.



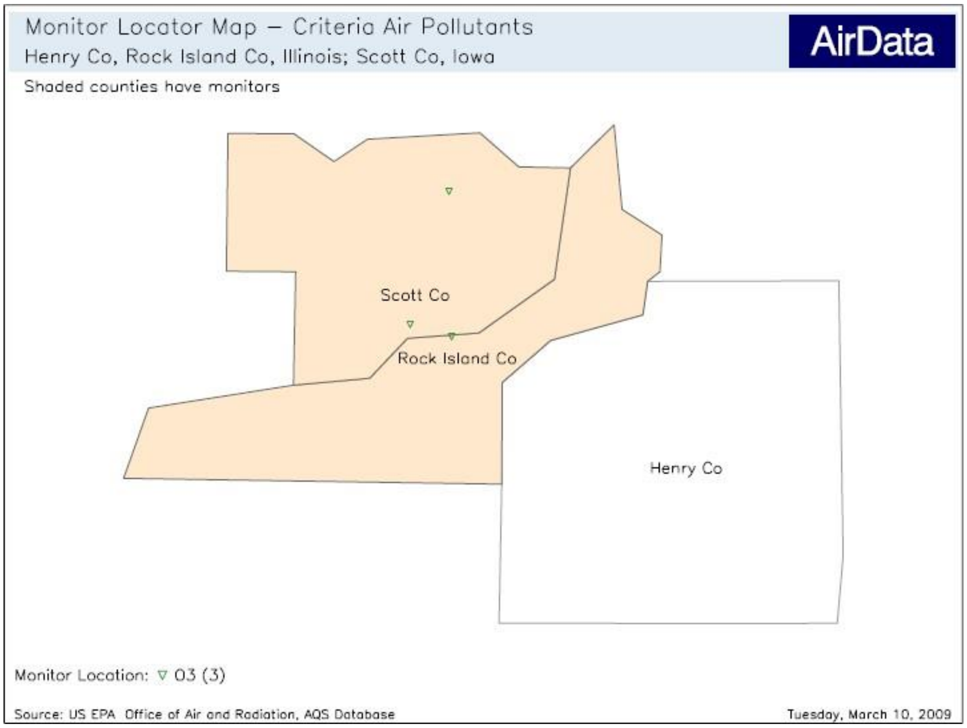
Omaha-Council Bluffs, NE-IA Ozone Monitors



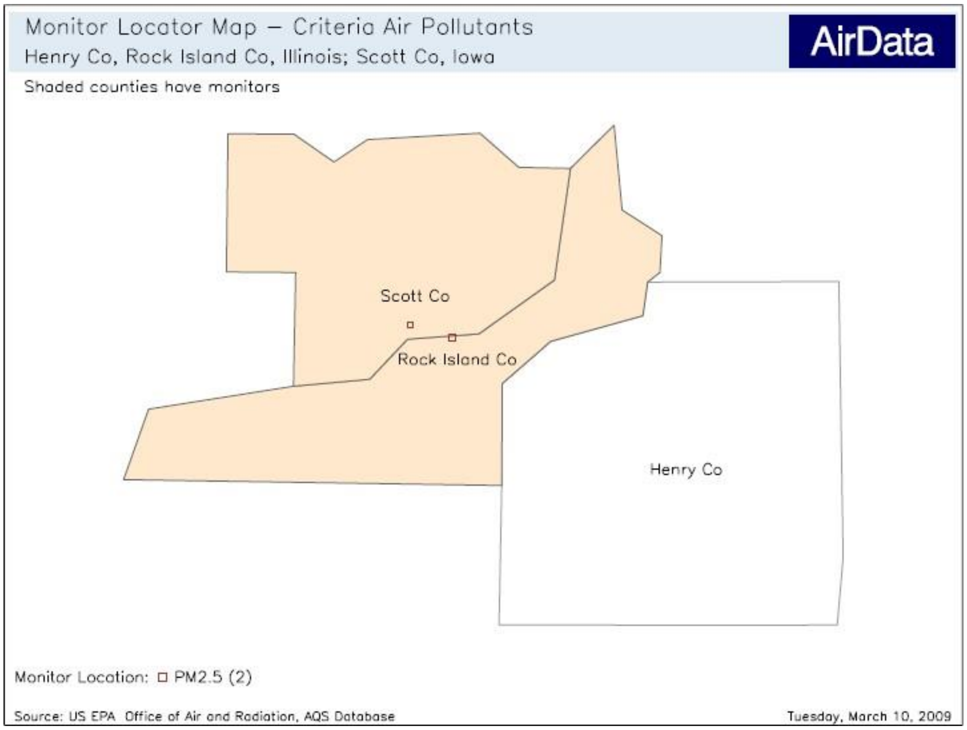
Omaha-Council Bluffs, NE-IA PM2.5 SLAMS Monitors



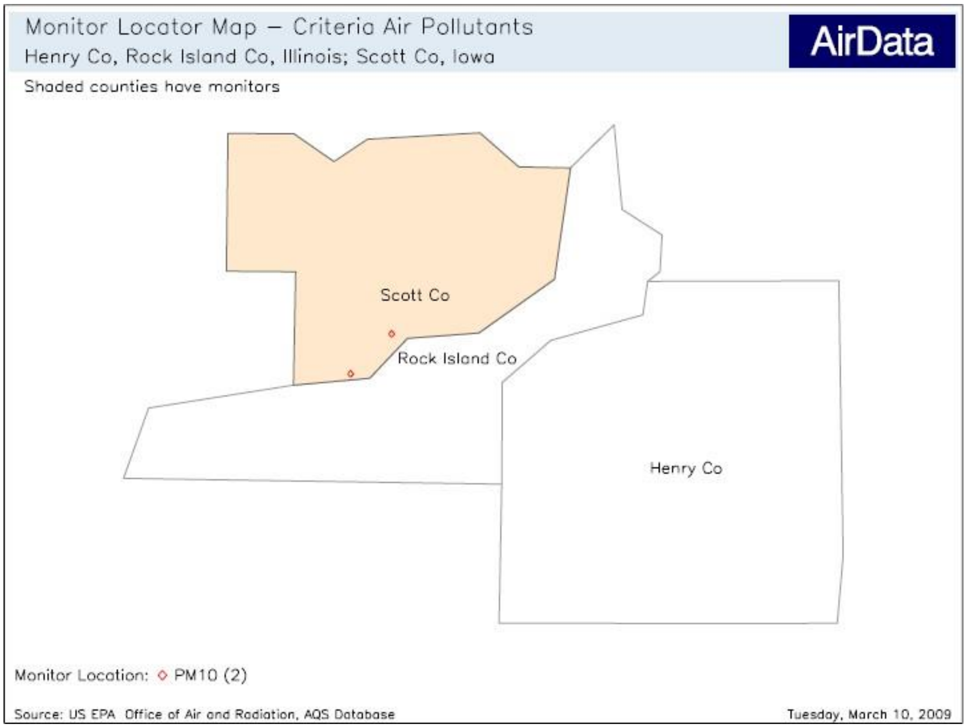
Omaha-Council Bluffs, NE-IA PM10 SLAMS Monitors



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



Davenport-Moline-Rock Island, IA-IL PM2.5 Monitors



Davenport-Moline-Rock Island, IA-IL PM10 SLAMS Monitors

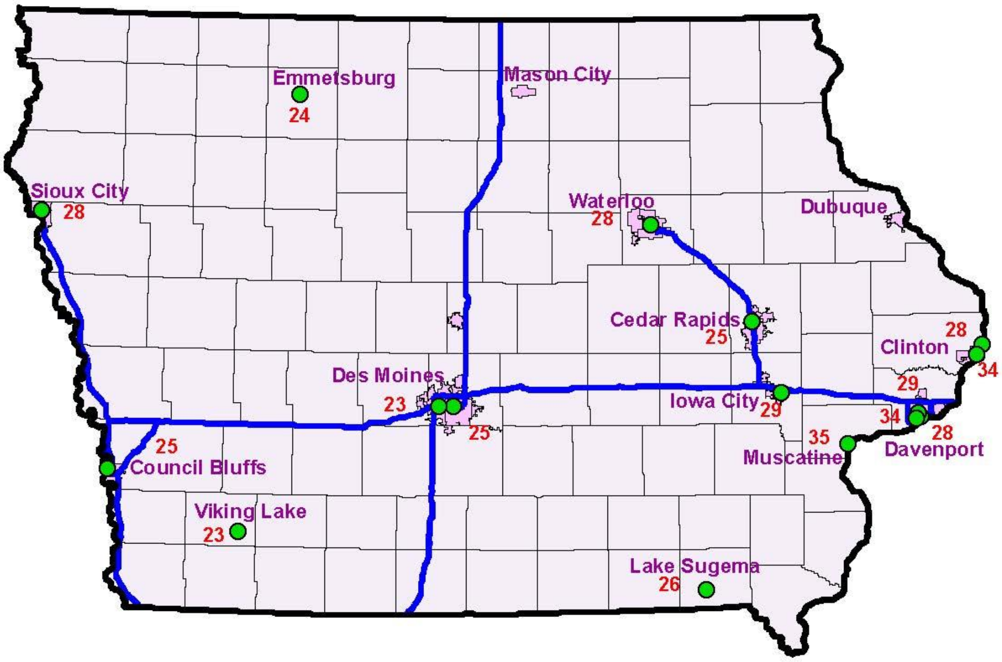
Appendix H: Network Change Table

Site Name	Pollutant	Monitor Type	Sampling Method	Analysis	NAAQS Comparable?	Operating Schedule	Action
Davenport, Hayes School	$PM_{2.5}$	SPM	Low Volume FRM	Gravimetric	Yes	1/3 day	Addition
Davenport, Hayes School	$PM_{2.5}$	SPM	$PM_{2.5}$ Continuous	BAM or TEOM	No	Continuous	Addition
Lake Macbride	Ozone	SPM	UV Absorption		Yes	Seasonal Continuous	Addition
Davenport, Jefferson School	NOy	NCore	Chemiluminescense		No	Continuous	Addition
Council Bluffs	Lead	SLAMS*	High Volume	GFAAS or ICP-MS	No	1/3 day	Addition
Clarion	$PM_{2.5}$	SPM	Low Volume FRM	Gravimetric	Yes	1/3 day	Deletion

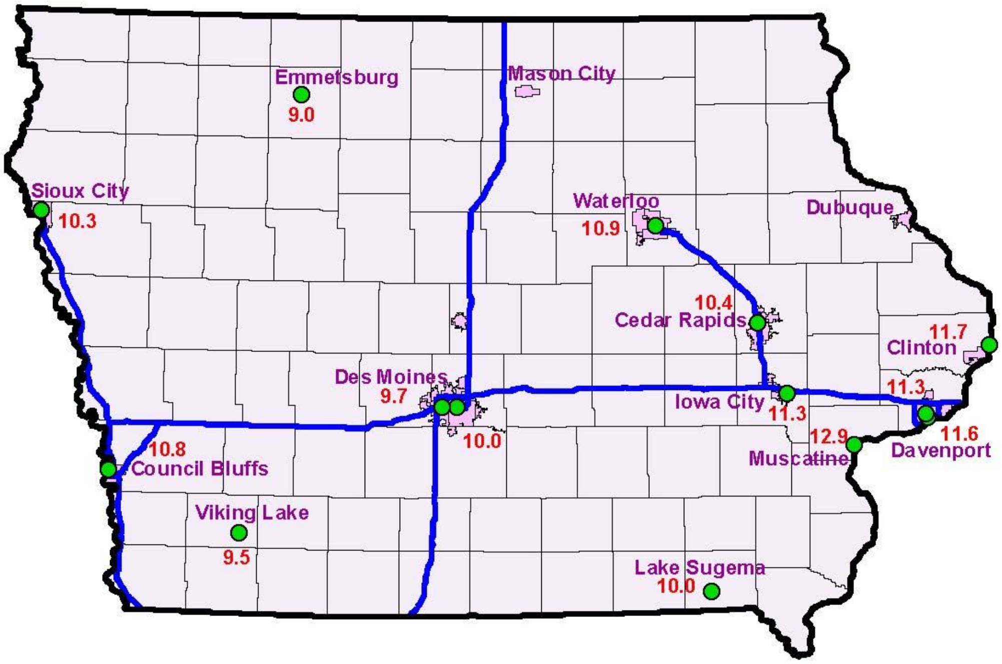
See Appendix C for definitions of the elements in this table.

*Note: This monitor type was inadvertently indicated as "SPM" in the Network Plan posted for public inspection during June 2009.

Appendix I: Design Value Maps for PM$_{2.5}$



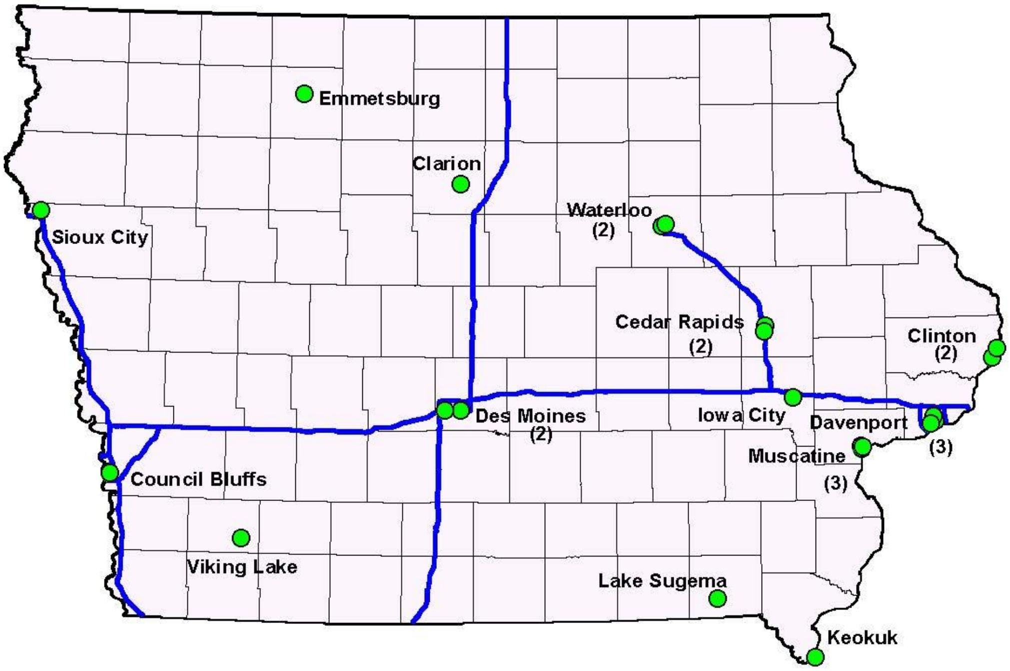
2006-2008 PM2.5 24-hr Design Values (µg/m3)



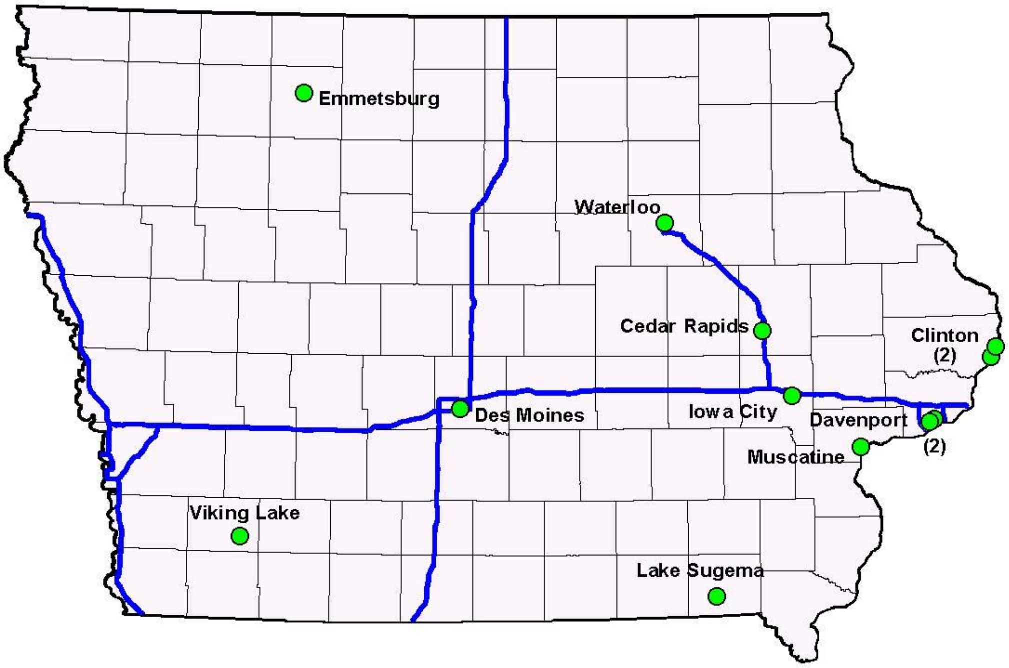
2006-2008 PM2.5 Annual Design Values (µg/m3)

Appendix J: Iowa Ambient Air Monitoring Network Maps

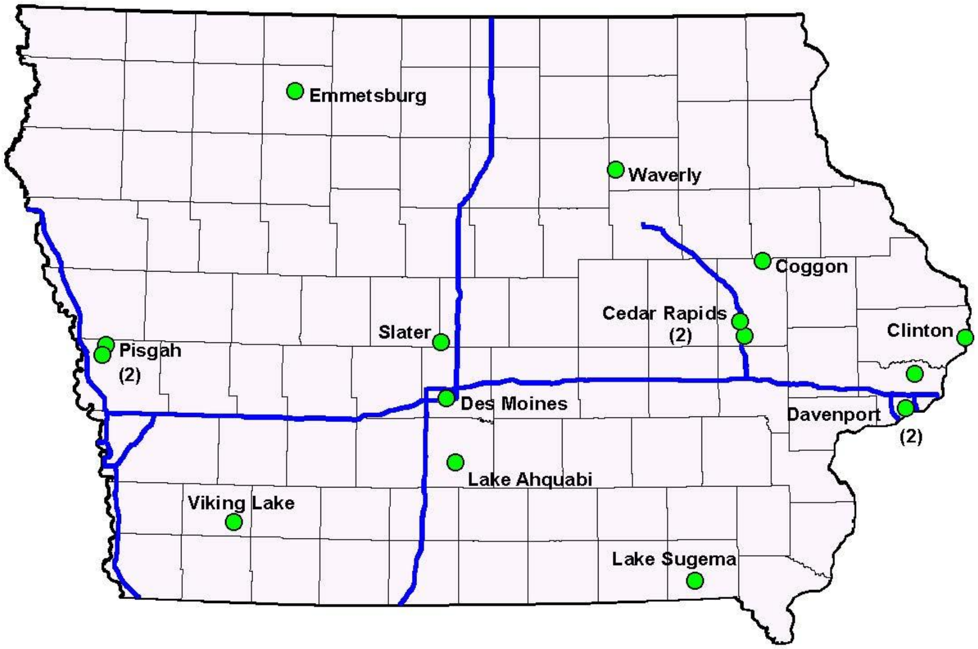
The following maps show the locations for the criteria pollutant monitors in the state of Iowa, which are current as of June 30th, 2008. Non-criteria pollutant maps are also included for the continuous $PM_{2.5}$ monitoring network and the Toxics and Speciation monitoring networks.



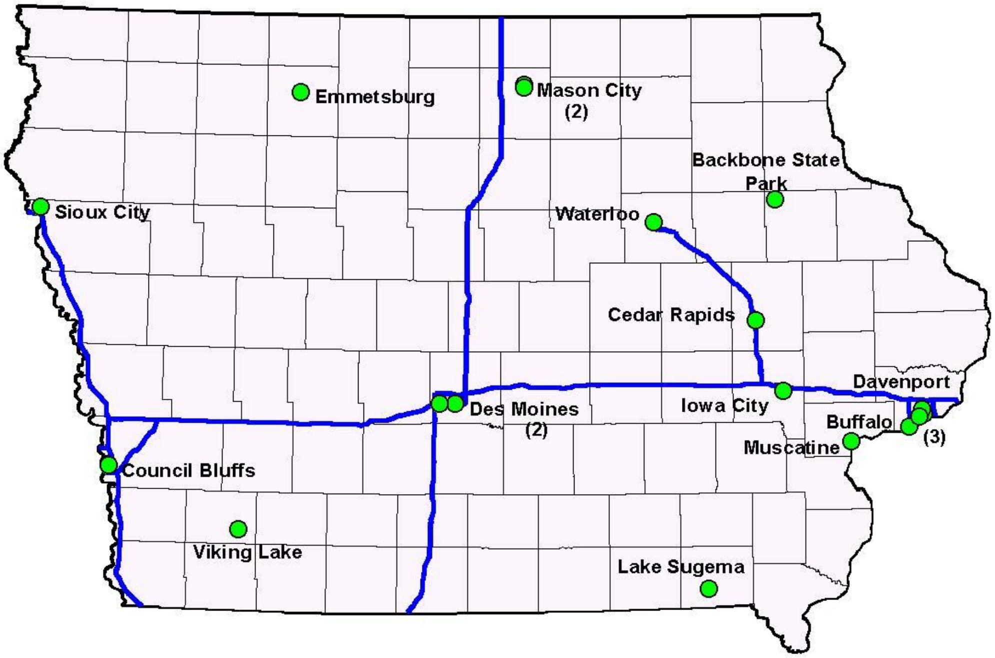
Manual PM2.5 (FRM) Monitoring Sites



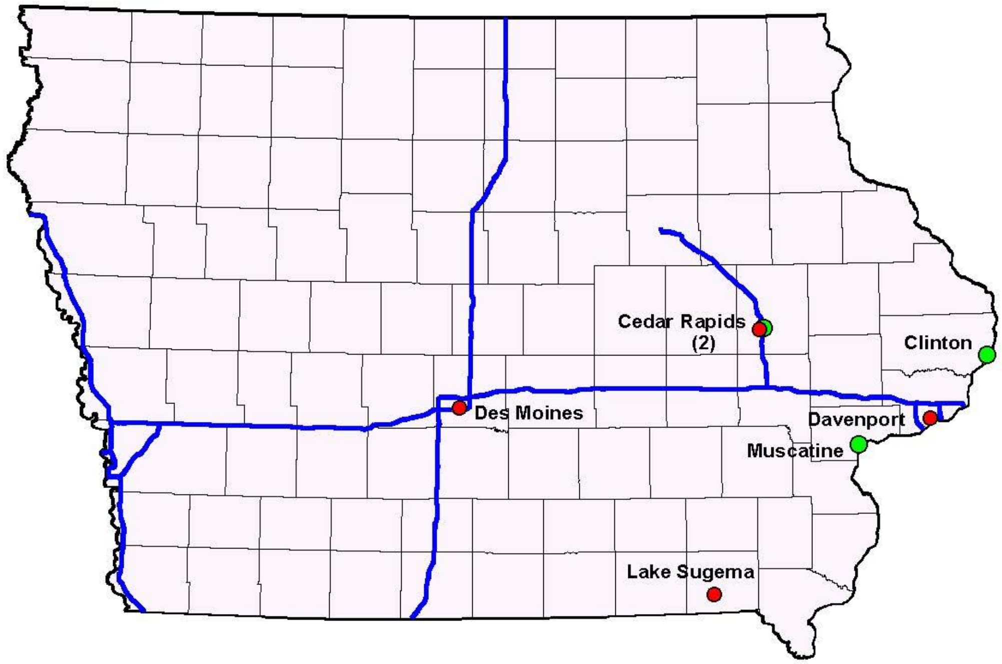
Continuous PM2.5 (non-FRM) Monitoring Sites



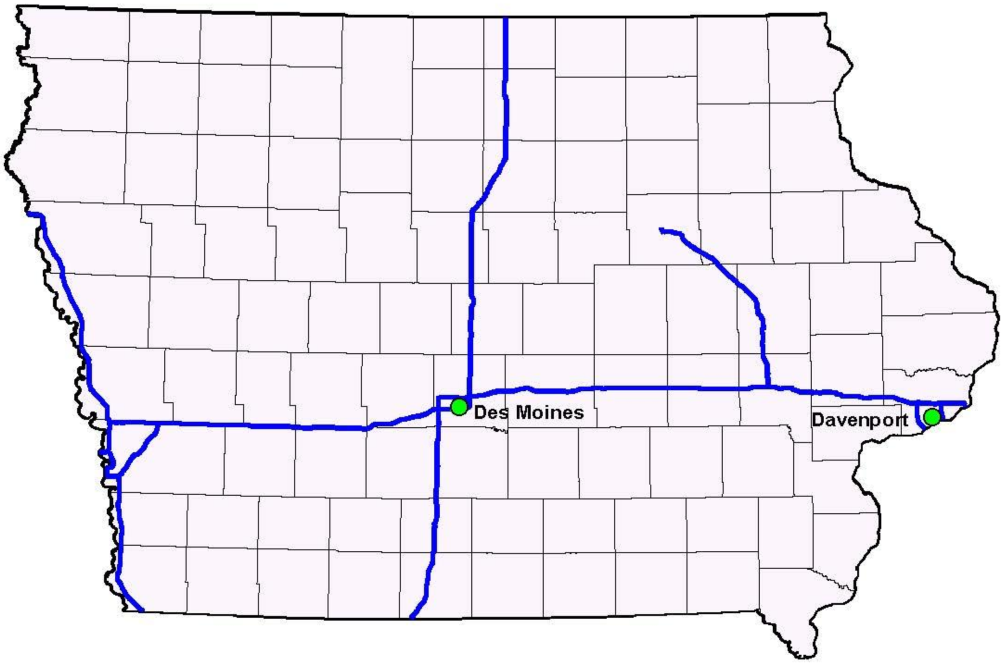
Ozone Monitoring Sites



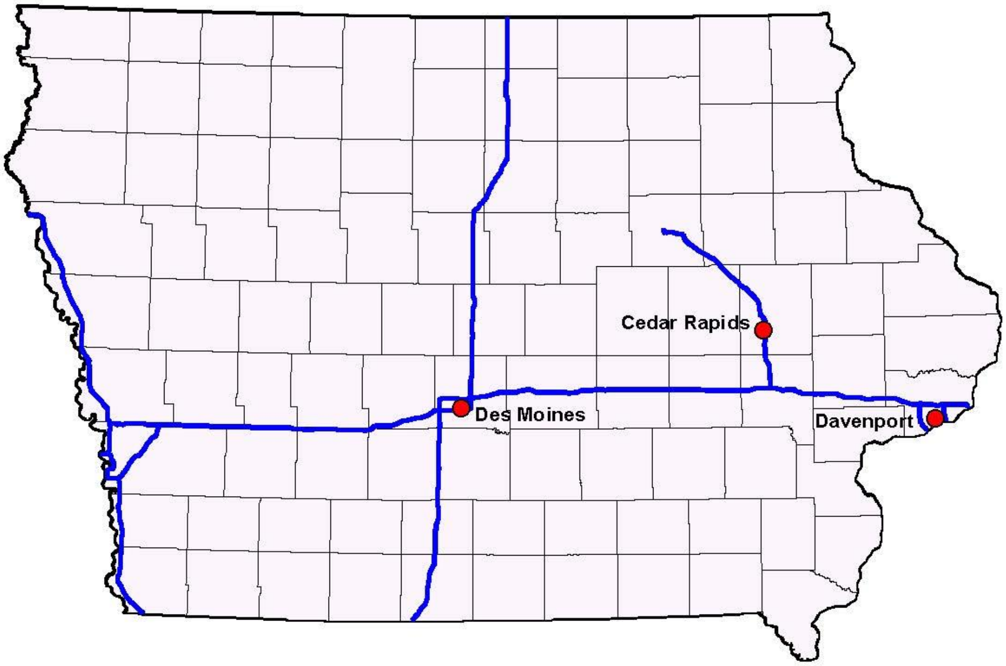
PM10 Monitoring Sites



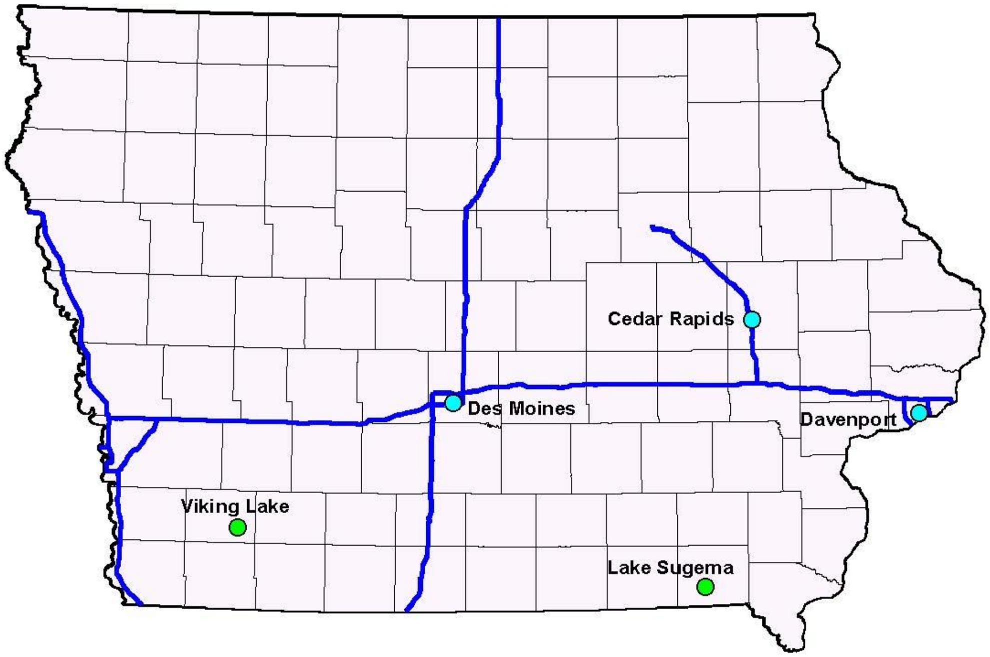
SO2 Monitoring Sites; trace-level monitors are shown in red, ordinary SO2 monitors are shown in green.



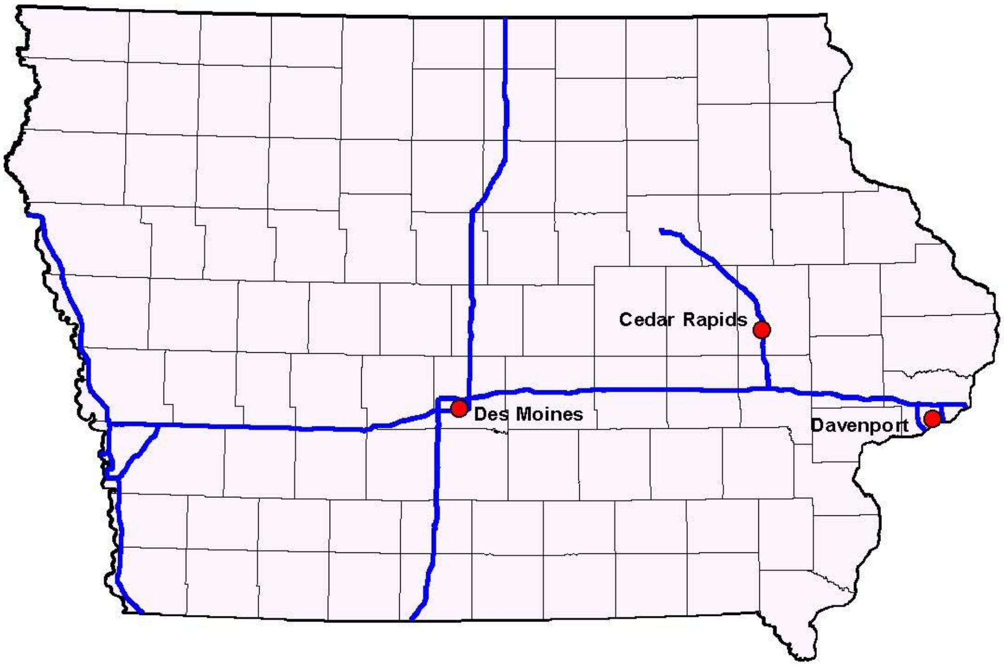
NO2 Monitoring Sites



CO Monitoring Sites (Trace Level)



Speciation Monitors; STN Speciation samplers are located at the blue dots, IMPROVE speciation samplers are located at the green dots.



Toxics Monitoring Sites

Appendix K: Highest PM_{10} values in Iowa MSA's 2006-2008

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

AAQS, the levels are characterized as low. These categories are reflected in the last column of the following table.

Maximum PM_{10} Values in MSA's (µg/m^3)

MSA	2005	2006	2007	3 Year Maximum	High, Medium, Low Classification
Omaha-Council Bluffs, NE-IA	141	167	143	167	Medium
Des Moines-West Des Moines, IA	64	63	46	64	Low
Davenport-Moline-Rock Island, IA-IL	161	119	116	161	Medium
Cedar Rapids, IA	64	53	50	64	Low
Iowa City, IA	-	-	53	53	Low
Waterloo-Cedar Falls, IA	58	62	57	62	Low
Sioux City, IA-NE-SD	100	85	96	100	Low

Appendix L: Federal Requirements for Lead Sites

40 CFR Part 58 Appendix D, Section 4.5: Design Criteria for Lead.

4.5 Lead (Pb) Design Criteria.

(a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring taking into account 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, the potential for population exposure, and logistics. At a minimum, there must be one source- oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each Pb source 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% 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).

(b) State and, where appropriate, local agencies are required to conduct Pb monitoring in each CBSA with a population equal to or greater than 500,000 people as determined by the latest available census figures. At a minimum, there must be one non-source-oriented SLAMS site located to measure neighborhood scale Pb concentrations in urban areas impacted by re-entrained dust from roadways, closed industrial sources which previously were significant sources of Pb, hazardous waste sites, construction and demolition projects, or other fugitive dust sources of Pb.

(c) The EPA Regional Administrator may require additional monitoring beyond the minimum monitoring requirements contained in 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.

(d) The most important spatial scales for source-oriented sites to effectively characterize the emissions from point sources are microscale and middle scale. The most important spatial scale for non-source-oriented sites to characterize typical lead concentrations in urban areas is the neighborhood scale. Monitor siting should be conducted in accordance with 4.5(a)(i) with respect to source-oriented sites.

  (1) Microscale—This scale would typify areas in close proximity to lead point sources. Emissions from point sources such as primary and secondary lead smelters, and primary copper smelters may under fumigation conditions likewise result in high ground level concentrations at the microscale. In the latter case, the microscale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Pb monitors in areas where the public has access, and particularly children have access, are desirable because of the higher sensitivity of children to exposures of elevated Pb concentrations.

  (2) Middle scale—This scale generally represents Pb 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 for example, include schools and playgrounds in center city areas which are close to major Pb point sources. Pb monitors in such areas are desirable because of the higher sensitivity of children to exposures of elevated Pb concentrations (reference 3 of this appendix). Emissions from point sources frequently impact on areas at which single sites may be located to measure concentrations representing middle spatial scales.

  (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. Sites of this scale would provide monitoring data in areas representing conditions where children live and play. Monitoring in such areas

is important since this segment of the population is more susceptible to the effects of Pb. Where a neighborhood site is located away from immediate Pb sources, the site may be very useful in representing typical air quality values for a larger residential area, and therefore suitable for population exposure and trends analyses.

Appendix M: 2005 NEI and 2007 Iowa DNR Lead Emissions Estimates*

Facility Name	2005 NEI Estimate (tons)	2007 DNR Estimate (tons)
Grain Processing Corporation	1.64	4.23
Bloomfield Foundry Inc.	1.19	0.54
Winegard Company	0.83	0.00
MidAmerican Energy Co. - George Neal North	0.82	0.48
Walter Scott Jr. Energy Center	0.77	0.78
Griffin Pipe Products Company	0.69	3.41
Nichols Aluminum – Casting	0.61	0.13
IPL – Prairie Creek Generating Station	0.56	0.32
MidAmerican Energy Co. - George Neal South	0.51	0.59

*Facilities emitting over half a ton of lead per year in the 2005 NEI are indicated in this table. The table includes all facilities with lead emissions one ton per year or greater according to 2007 DNR estimates.

Appendix N: Explanation of Changes from 2005 NEI to 2007 Iowa DNR Estimates

Grain Processing Corporation
The facility estimated actual lead emissions in 2005 to be 1.64 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 4.23 tons. Grain Processing Corporation has six coal- fired boilers that vent emissions through one emission point (EP1) as specified in air construction permit 95-A- 374-S3.

The facility estimated lead emissions from all coal-fired boilers in 2005 using an emission factor of 0.013 lbs/ton. This value was derived using the actual throughput in tons, a heating value of 13,000 Btu/lb for coal, and the uncontrolled emission factor for the coal fired boilers in AP-42[3], Table 1.1-17. The DNR estimated lead emissions from the coal-fired boilers in 2007 using 8,760 hours of operation for the stack (as reported by the facility in the 2007 emissions inventory) along with stack test data which occurred March 4th, 2004. The facility also tested the coal-fired boilers stack for lead on December 1st, 2004 but the operating capacity and lead emission rate from these units were higher during the March test (operating at 95% capacity) as compared to the December test (operating at 91% capacity). In addition, the facility conducted lead performance testing on March 4th, 2004 and December 1st, 2004 for their own purposes and was not observed by the DNR. The coal- fired boilers have not been tested for lead since these dates.

Facility 2005 Estimate

- Boiler #1
  - Actual throughput = 32,250 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers = 0.000507 lbs of lead/MMBtu of heat input

$$\begin{aligned} Lead\ Emissions \\ &= (32{,}250\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \\ &\times (1 MMBtu/1{,}000{,}000 Btu) \times 0.000507\ lbs\ lead/MMBtu) \times (1\ ton/2{,}000\ lbs) \\ &= 0.21\ tons\ of\ lead \end{aligned}$$

- Boiler #2
  - Actual throughput = 32,250 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers = 0.000507 lbs of lead/MMBtu of heat input

$$\begin{aligned} Lead\ Emissions \\ &= (32{,}250\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \\ &\times (1 MMBtu/1{,}000{,}000 Btu) \times 0.000507\ lbs\ lead/MMBtu) \times (1\ ton/2{,}000\ lbs) \\ &= 0.21\ tons\ of\ lead \end{aligned}$$

- Boiler #3
  - Actual throughput = 29,670 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers =0 .000507 lbs of lead/MMBtu of heat input

$$\begin{aligned} Lead\ Emissions \\ &= (29{,}670\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \\ &\times (1 MMBtu/1{,}000{,}000 Btu) \times 0.000507\ lbs\ lead/MMBtu) \times (1\ ton/2{,}000\ lbs) \\ &= 0.19\ tons\ of\ lead \end{aligned}$$

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[3] AP-42: http://www.epa.gov/ttn/chief/ap42/index.html

- Boiler #4
  - Actual throughput = 29,670 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers =0 .000507 lbs of lead/MMBtu of heat input

$$\begin{aligned} Lead\ Emissions &= (29{,}670\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \\ &\times (1 MMBtu/1{,}000{,}000 Btu) \times 0.000507\ lbs\ lead/MMBtu) \times (1\ ton/2{,}000\ lbs) \\ &= 0.19\ tons\ of\ lead \end{aligned}$$

- Boiler #6
  - Actual throughput = 64,500 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers = 0.000507 lbs of lead/MMBtu of heat input

$$\begin{aligned} Lead\ Emissions &= (64{,}500\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \\ &\times (1 MMBtu/1{,}000{,}000 Btu) \times 0.000507\ lbs\ lead/MMBtu) \times (1\ ton/2{,}000\ lbs) \\ &= 0.42\ tons\ of\ lead \end{aligned}$$

- Boiler #7
  - Actual throughput = 64,500 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers = 0.000507 lbs of lead/MMBtu of heat input

$$\begin{aligned} Lead\ Emissions &= (64{,}500\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \\ &\times (1 MMBtu/1{,}000{,}000 Btu) \times 0.000507\ lbs\ lead/MMBtu) \times (1\ ton/2{,}000\ lbs) \\ &= 0.42\ tons\ of\ lead \end{aligned}$$

2005 Facility Total = 1.64 tons of lead

DNR 2007 Estimate

- Boilers #1, #2, #3, #4, #6, and #7
  - Hours of operation of the stack = 8,760 hours
  - March 4th, 2004 stack test result for lead = 0.966 lbs of lead/hour

$$Lead\ Emissions = (8{,}760\ hours) \times (0.966\ \ lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 4.23\ tons\ of\ lead$$

2007 DNR Total = 4.23 tons of lead

Bloomfield Foundry Inc.

The facility estimated actual lead emissions in 2005 to be 1.19 tons. When this value was checked against Iowa's 2005 NEI submittal it matched. However, EPA's 2005 NEI version 2 indicates that the facility-wide lead emissions are 0.83 tons. The original NEI submittal by Iowa showed 1.19 tons of lead emissions from the cupola (cupola baghouse stack and cupola bypass stack) whereas EPA's 2005 NEI version 2 shows 0.83 tons of lead emissions from the cupola (cupola baghouse stack and cupola bypass stack). The DNR estimated actual lead emissions from Bloomfield Foundry's most recent emissions inventory (2007) to be 0.541 tons. Bloomfield Foundry has consistently reported lead emissions from their cupola but has not been reporting lead emissions from the castings cooling process. Lead emissions from the castings cooling process were accounted for in the DNR estimate for emission year 2007.

The facility estimated lead emissions from the cupola in 2005 using the actual amount of melted metal, an emission factor obtained from FIRE[4], and control efficiency for the baghouse. Using this methodology, the calculations are not accurate for the cupola and the cupola bypass stack. The DNR estimated lead emissions from the cupola in 2007 using the actual amount of melted metal, the uncontrolled cupola emission factor in AP- 42, Table 12.10-5, a combination of the PM emission factor for pouring and cooling in AP-42, Table 12.10-7 and Iron Foundry MACT guidance, and control efficiency for the baghouse.

Facility 2005 Estimate

- Cupola (Baghouse)
  - Actual throughput = 4,740 tons of metal
  - FIRE emission factor = .51 lbs of lead/ton of metal
  - Water Spray Tower and Baghouse Control Efficiency = 73.24%

$$\begin{aligned} Lead\ Emissions &= (4{,}740\ tons\ of\ metal) \times (0.51\ lbs\ of\ lead/ton\ of\ metal) \times (1 - 0.7324) \times (1\ ton/2{,}000\ lbs) \\ &= 0.38\ tons\ of\ lead\ (inaccurate\ calculation\ by\ facility) \end{aligned}$$

- Cupola (Cap and Bypass—No Controls)
  - Actual throughput = 4,740 tons of metal
  - FIRE emission factor = 0.51 lbs of lead/ton of metal
  - Water Spray Tower and Baghouse Control Efficiency = 73.24%

$$\begin{aligned} Lead\ Emissions &= (4{,}740\ tons\ of\ metal) \times (0.51\ lbs\ of\ lead/ton\ of\ metal) \times (1 - 0.7324) \times (1\ ton/2{,}000\ lbs) \\ &= 0.38\ tons\ of\ lead\ (inaccurate\ calculation\ by\ facility) \end{aligned}$$

- Castings Cooling
  The facility did not estimate lead emissions for this process in 2005

2005 Facility Total = 1.19 tons of lead

DNR 2007 Estimate

- Cupola (Baghouse)
  - Actual throughput = 4,740 tons of gray iron produced
  - AP-42 Table 12.10-5 lead emission factor for an uncontrolled cupola = 1.1 lbs of lead/ton of gray iron produced
  - Baghouse Control Efficiency = 80%

$$\begin{aligned} &Lead\ Emissions \\ &\quad = (4{,}740\ tons\ of\ metal) \times (1.1\ lbs\ of\ lead/ton\ of\ gray\ iron\ produced) \times (1 - 0.80) \\ &\quad \times (1\ ton/2{,}000\ lbs) = 0.52\ tons\ of\ lead \end{aligned}$$

- Cupola (Cap and Bypass—No Controls)
  - Actual throughput = 4,740 tons of gray iron produced
  - DNR Air Construction Permit 04-A-307-S1 limits operation of the bypass stack to only the pre- heating and cool-down part of the process therefore all melting emissions are controlled by the baghouse and attributed as such
  - AP-42 Table 12.10-7 total PM emission factor for the pouring and cooling process = 4.2 lbs of PM/ton of gray iron produced
  - Iron Foundry MACT guidance for lead concentration in PM for the cooling process = 0.2%

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[4] WebFIRE: http://cfpub.epa.gov/oarweb/index.cfm?action=fire.main

$$\begin{aligned} \mathit{Lead\ Emissions} \\ &= (4{,}740\ \mathit{tons\ of\ metal}) \times (4.2\ \mathit{lbs\ of\ PM/ton\ of\ gray\ iron\ produced}) \times (0.002\ \mathit{lbs\ lead/lb\ PM}) \\ &\times (1\ \mathit{ton}/2{,}000\ \mathit{lbs}) = 0.02\ \mathit{tons\ of\ lead} \end{aligned}$$

- Castings Cooling
  - Actual throughput = 4,740 tons of metal poured
  - NESHAP Background Document for Iron and Steel Foundries (EPA 453/R-02-013—December 2002) lead emission factor for pouring/cooling/shakeout processes = 0.000474 lbs of lead/ton of metal poured

$$\begin{aligned} \mathit{Lead\ Emissions} &= (4{,}740\ \mathit{tons\ of\ metal}) \times (.000474\ \mathit{lbs\ lead/ton\ of\ metal\ poured}) \times (1\ \mathit{ton}/2{,}000\ \mathit{lbs}) \\ &= 0.001\ \mathit{tons\ of\ lead} \end{aligned}$$

2007 DNR Total = 0.541 tons of lead

Winegard Company

The facility estimated actual lead compound emissions in 2005 to be 0.83 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 0.00033 tons. Winegard has consistently reported lead compound emissions from two processes at their facility. The two processes are soldering and a reflow oven.

The facility estimated lead compound emissions from both the soldering process and reflow oven in 2005 using the actual amount of solder processed and a mass balance calculation which was based on the lead contained in the solder. The facility assumed that 100% of the lead contained in the solder is emitted to the atmosphere. The DNR estimated lead emissions from the soldering process and reflow oven in 2007 using a combination of engineering estimates and the emission factor for lead in AP-42 Table 12.17-2 for type metal production.

Facility 2005 Estimate

- Soldering Process
  - Actual throughput = 7,600 lbs of solder
  - Percent by weight of lead in the solder = 18.15%
  - Assumption of 100% of lead emitted

$$\begin{aligned} \mathit{Lead\ Emissions} &= (7{,}600\ \mathit{lbs\ solder}) \times (0.1815\ \mathit{lbs\ lead/lb\ solder}) \times (1\ \mathit{ton}/2{,}000\ \mathit{lbs}) \\ &= 0.69\ \mathit{tons\ lead\ compounds} \end{aligned}$$

- Reflow Oven
  - Actual throughput = 554.45 lbs of solder
  - Percent by weight of lead in the solder = 50%
  - Assumption of 100% of lead emitted

$$\begin{aligned} \mathit{Lead\ Emissions} &= (554.45\ \mathit{lbs\ solder}) \times (0.50\ \mathit{lbs\ lead/lb\ solder}) \times (1\ \mathit{ton}/2{,}000\ \mathit{lbs}) \\ &= 0.14\ \mathit{tons\ lead\ compounds} \end{aligned}$$

2005 Facility Total = 0.83 tons of lead

DNR 2007 Estimate

- Soldering Process
  - Actual throughput = 9,203 lbs of solder
  - Percent by weight of lead in the solder = 40%
  - AP-42 Table 12.17-2 lead emission factor for type metal production = 0.25 lbs of lead/ton of lead processed

$$\begin{aligned} \mathit{Lead\ Emissions} \\ &= (9{,}203\ \mathit{lbs\ solder}) \times (0.4\ \mathit{lbs\ lead/lb\ solder}) \times (1\ \mathit{ton}/2{,}000\ \mathit{lbs}) \\ &\times (0.25\ \mathit{lbs\ lead/ton\ lead\ processed}) \times (1\ \mathit{ton}/2{,}000\ \mathit{lbs}) = 0.0003\ \mathit{tons\ lead} \end{aligned}$$

- Reflow Oven
  - Actual throughput = 849.2 lbs of solder
  - Percent by weight of lead in the solder = 40%
  - AP-42 Table 12.17-2 lead emission factor for type metal production = 0.25 lbs of lead/ton of lead processed

$$\begin{aligned}Lead\ Emissions \\ &= (849.2\ lbs\ solder) \times (0.4\ lbs\ lead/lb\ solder) \times (1\ ton/2{,}000\ lbs) \\ &\times (0.25\ lbs\ lead/ton\ lead\ processed) \times (1\ ton/2{,}000\ lbs) = 0.00003\ tons\ lead\end{aligned}$$

2007 DNR Total = 0.00033 tons of lead

MidAmerican Energy Co – George Neal North

The facility estimated actual lead emissions in 2005 to be 0.82 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 0.48 tons. MidAmerican Energy Co. – George Neal North has three coal-fired boilers. It should be noted that the emission factors in AP-42, Table 1.1-17 and 1.1- 18 rely on test methods that measure only lead emissions, not lead compounds as reported by MidAmerican Energy Co – George Neal North in their emissions inventory.

The facility estimated lead emissions from the three coal-fired boilers in 2005 using actual throughputs and the emission factor for pulverized coal-fired dry bottom boilers and cyclone boilers from AP-42, Table 1.1-18. The DNR estimated lead emissions from boiler #1 in 2007 using the actual throughput in 2007 and the emission factor in AP-42, Table 1.1-18. The DNR estimated lead emissions from boilers #2 and #3 in 2007 using actual hours of operation and stack test data which was conducted January 8th and January 19th, 2009. Boiler #2 was only operating at 72.9% capacity during the stack test so DNR extrapolated the tested value (0.0236 lbs Pb/hr) to estimate lead emissions from Boiler #2 operating at the rated capacity (0.0324 lbs Pb/hr) to ensure lead emissions from the facility are less than 1 ton per year.

Facility 2005 Estimate

- Boiler #1
  - Actual throughput = 577,458 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (577{,}458\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.12\ tons\ lead$$

- Boiler #2
  - Actual throughput = 1,111,230 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (1{,}111{,}230\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.23\ tons\ lead$$

- Boiler #3
  - Actual throughput = 2,259,441 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (2{,}259{,}441\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.47\ tons\ lead$$

2005 Facility Total = 0.82 tons of lead

DNR 2007 Estimate

- Boiler #1
  - Actual throughput = 577,001 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (577{,}001\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.12\ tons\ lead$$

- Boiler #2
  - Hours of operation of the stack = 8,760 hours
  - January 8th, 2009 stack test result for lead = 0.0236 lbs of lead/hour
  - Extrapolated lead value to rated capacity based on steam production = 0.0324 lbs of lead/hr

$$Lead\ Emissions = (8{,}760\ hours) \times (0.0324\ lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 0.14\ tons\ lead$$

- Boiler #3
  - Hours of operation of the stack = 7,392 hours
  - January 19th, 2009 stack test result for lead = 0.06 lbs of lead/hour

$$Lead\ Emissions = (7{,}392\ hours) \times (0.06\ lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 0.22\ tons\ lead$$

2007 DNR Total = 0.48 tons of lead

Walter Scott Jr. Energy Center

The facility estimated actual lead emissions in 2005 to be 0.77 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 0.78 tons. Walter Scott Jr. Energy Center had three coal-fired boilers in 2005 but currently has four coal-fired boilers. It should be noted that the emission factors in AP-42, Table 1.1-17 and 1.1-18 rely on test methods that measure only lead emissions, not lead compounds as reported by MidAmerican Energy Co – Walter Scott Jr. Energy Center in their emissions inventory.

The facility estimated lead emissions from the three coal-fired boilers in 2005 using actual throughputs and the emission factor for pulverized coal-fired dry bottom boilers and tangentially-fired boilers from AP-42, Table 1.1-18. In November of 2008, the DNR requested Walter Scott Jr. Energy Center to conduct lead testing for boiler #3 but the facility indicated that a baghouse will be installed in May of 2009. The DNR estimated lead emissions from boiler #3 after the baghouse installation to be 0.009 tons based on 2007 operating data. In addition, the estimated lead emissions from the Walter Scott Jr. Energy Center after the baghouse installation on boiler #3 are 0.14 tons based on 2007 operating data.

The DNR estimated lead emissions from boilers #1, #2, and #3 in 2007 using the actual throughput in 2007 and the emission factor in AP-42, Table 1.1-18. The DNR estimated lead emissions from boiler #4 in 2007 using actual hours of operation and stack test data which was conducted September 27th, 2008.

Facility 2005 Estimate

- Boiler #1
  - Actual throughput = 215,918 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/tangentially- fired boilers .00042 lbs of lead/ton of coal

$$Lead\ Emissions = (215{,}918\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.04\ tons\ lead$$

- Boiler #2
  - Actual throughput = 391,247 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/ tangentially-fired boilers =0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (391{,}247\ tons\ coal) \times (0.00042\, lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.08\ tons\ lead$$

- Boiler #3
  - Actual throughput = 3,074,505 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/ tangentially-fired boilers =0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (3{,}077{,}505\ tons\ coal) \times (0.00042\, lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.65\ tons\ lead$$

2005 Facility Total = 0.77 tons of lead

DNR 2007 Estimate

- Boiler #1
  - Actual throughput = 223,931 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers =0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (223{,}931\ tons\ coal) \times (0.00042\, lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.05\ tons\ lead$$

- Boiler #2
  - Actual throughput = 365,041 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (365{,}041\ tons\ coal) \times (0.00042\, lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.08\ tons\ lead$$

- Boiler #3
  - Actual throughput = 3,049,530 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers/cyclone boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (3{,}049{,}530\ tons\ coal) \times (0.00042\, lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.64\ tons\ lead$$

- Boiler #4
  - Hours of operation of the stack = 8,760 hours
  - September 27th, 2008 stack test result for lead =0.002 lbs of lead/hour

$$Lead\ Emissions = (8{,}760\ tons\ coal) \times (0.002\, lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.01\ tons\ lead$$

2007 DNR Total = 0.78 tons of lead

Griffin Pipe Products

The facility estimated actual lead emissions in 2005 to be 0.69 tons. Griffin Pipe Products has a cupola and a desulfurization of hot iron process for which they reported lead emissions in 2007. The facility has been consistent with reporting lead emissions from the cupola but inconsistent when reporting lead emissions from the desulfurization of hot iron process.

The facility estimated lead emissions from the cupola in 2005 using total hours of operation from the cupola stack and a stack test value. The stack test value was dated April 9th, 2002. The facility did not include an actual lead emissions estimate for the desulfurization of hot iron process for 2005. Lead testing on the cupola stack conducted on March 4th, 2009 showed a result of 1.333 lbs of lead/hr. The facility indicated unusual gaps in the mesh bed may have decreased particulate removal, and a new test was conducted on May 13th and 14th, 2009. DNR will be updating the lead emission rate for the cupola once the results are received from this new testing. The DNR estimated 2007 lead emissions from the desulfurization of hot iron process using stack test data conducted on March 3rd, 2009. The lead result from the roof vent in the closest proximity to the desulfurization process showed an emission rate of 0.153 lbs of lead/hr. It is possible that the DNR has underestimated emissions from the desulfurization process and from the cupola due to operational uncertainties at the facility. The DNR is continuing to investigate these concerns. For both the cupola and the desulfurization of hot iron, DNR estimated actual lead emissions using the hours of operation in 2007.

Facility 2005 Estimate

- Cupola
  - Actual throughput = 191,100 tons of coke
  - April 9th, 2002 stack test value for lead = 0.0072 lbs of lead/ton of coke

$$Lead\ Emissions = (191{,}100\ tons\ coke) \times (0.0072\, lbs\ lead/ton\ coke) \times (1\ ton/2{,}000\ lbs) = 0.69\ tons\ lead$$

- Desulfurization of Hot Iron Process
  - The facility did not estimate lead emissions for this process in 2005

2005 Facility Total = 0.69 tons of lead

DNR 2007 Estimate using March 4th, 2009 stack test

- Cupola
  - Hours of operation of the stack = 4,589 hours
  - March 4, 2009 lead stack test value = 1.333 lbs lead/hour

$$Lead\ Emissions = (4{,}589\ hours) \times (1.333\, lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 3.06\ tons\ lead$$

- Desulfurization of Hot Iron Process
  - Hours of operation of the process = 4,589 hours
  - March 3, 2009 lead stack test value = 0.153 lbs lead/hour

$$Lead\ Emissions = (4{,}589\ hours) \times (0.153\, lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 0.35\ tons\ lead$$

2007 DNR Total = 3.41 tons of lead

The emission rate for the cupola does not meet its permitted emissions rate, based on the March 4, 2009 stack test data. If the cupola emitted lead at its permitted rate, the facility would still exceed the one ton per year threshold for monitoring, as shown below:

DNR 2007 Estimate using permitted allowable emission rate

- Cupola
  - Hours of operation of the stack = 4,589 hours
  - Permitted lb/hr lead emission rate per Iowa DNR Air Construction Permit 71-A-009-S8 = 0.78 lbs lead/hour

$$Lead\ Emissions = (4{,}589\ hours) \times (0.78\, lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 1.79\ tons\ lead$$

- Desulfurization of Hot Iron Process
  - Hours of operation of the process = 4,589 hours
  - March 3, 2009 lead stack test value = 0.153 lbs lead/hour

$$Lead\ Emissions = (4{,}589\ hours) \times (0.153\, lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 0.35\ tons\ lead$$

2007 DNR Total = 2.14 tons of lead

Nichols Aluminum – Casting

The facility estimated actual lead compound emissions in 2005 to be 0.61 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 0.127 tons. Nichols Aluminum – Casting has an aluminum shredder and five furnaces for which they reported lead compound emissions in 2005. The facility mistakenly reported lead emissions from the rotary barrel furnaces in 2007. The 2005, 2006, and 2008 emission inventories make no mention of lead emissions from the rotary barrel furnaces therefore DNR excluded this equipment from the lead estimate for 2007.

The facility estimated lead compound emissions from the aluminum shredder, melting furnaces, and holding furnaces in 2005 using the actual amount of metal melted, a developed emission factor based on a mass balance or engineering estimate, and control efficiency. The facility did not submit documentation showing how the emission factors were calculated.

The DNR estimated lead emissions from the aluminum shredder, melting furnaces, and holding furnaces in 2007 using PM test data for each emission point referenced in the inventory along with the lead content of the scrap metal processed as indicated in the Material Safety Data Sheet (MSDS) provided by Nichols Aluminum. Using this calculation, the facility-wide lead emissions are 0.127 tons for 2007.

Facility 2005 Estimate

- Aluminum Shredder
  - Actual throughput = 111,590 tons of metal
  - Emission factor based on mass balance = 0.0384 lbs of lead compounds/ton of metal
  - Bag filter control efficiency = 99%

$$Lead\ Emissions = (111{,}590\ tons\ metal) \times (0.0384\ lbs\ lead\ compounds/ton\ metal) \times (1 - .99) \times (1\ ton/2{,}000\ lbs) = 0.02\ tons\ lead\ compounds$$

- Melting Furnace #1
  - Actual throughput = 66,834 tons of metal
  - Emission factor based on mass balance = 0.0031 lbs of lead compounds/ton of metal

$$Lead\ Emissions = (66{,}834\ tons\ metal) \times (0.0031\ lbs\ lead\ compounds/ton\ metal) \times (1\ ton/2{,}000\ lbs) = 0.10\ tons\ lead\ compounds$$

- Melting Furnace #2
  - Actual throughput = 73,793 tons of metal
  - Emission factor based on stack test = 0.0031 lbs of lead compounds/ton of metal (stack test not found)

$$Lead\ Emissions = (73{,}793\ tons\ metal) \times (0.0031\ lbs\ lead\ compounds/ton\ metal) \times (1\ ton/2{,}000\ lbs) = 0.12\ tons\ lead\ compounds\ (inaccurate\ calculation)$$

- Holding Furnace #1
  - Actual throughput = 109,361 tons of metal
  - Engineering estimate emission factor = 0.0031 lbs of lead compounds/ton of metal

$$Lead\ Emissions = (109{,}361\ tons\ metal) \times (0.0031\ lbs\ lead\ compounds/ton\ metal) \times (1\ ton/2{,}000\ lbs) = 0.17\ tons\ lead\ compounds$$

- Holding Furnace #2
  - Actual throughput = 123,050 tons of metal
  - Engineering estimate emission factor = 0.0031 lbs of lead compounds/ton of metal

$$Lead\ Emissions = (123{,}050\ tons\ metal) \times (0.0031\ lbs\ lead\ compounds/ton\ metal) \times (1\ ton/2{,}000\ lbs)$$
$$= 0.19\ tons\ lead\ compounds$$

- Melting Furnace #3
  - Actual throughput = 61,146 tons of metal
  - Emission factor based on stack test =0.0051 lbs of lead compounds/ton of metal (stack test not found)
  - Bag filter control efficiency = 95% (should be left blank if emission factor is a stack test value)

$$Lead\ Emissions = (61{,}146\ tons\ metal) \times (0.0051\ lbs\ lead\ compounds/ton\ metal) \times (1 - .95) \times (1\ ton/2{,}000\ lbs) = 0.01\ tons\ lead\ compounds\ (inaccurate\ calculation)$$

2005 Facility Total = 0.61 tons of lead

DNR 2007 Estimate

- Aluminum Shredder
  - Hours of operation of the stack = 8,760 hours
  - November 14, 2007 PM stack test value = 2.13 lbs PM/hour
  - Scrap metal lead content = 0.5%

$$Lead\ Emissions = (8{,}760\ hours) \times (2.13\ lbs\ PM/hour) \times (0.005) \times (1\ ton/2{,}000\ lbs) = 0.47\ tons\ lead$$

- Melting Furnaces #1 & #2/Holding Furnaces #1 & #2
  - Hours of operation of the stack = 8,760 hours
  - July 2, 2008 PM stack test value = 3.23 lbs PM/hour
  - Scrap metal lead content = 0.5%

$$Lead\ Emissions = (8{,}760\ hours) \times (3.23\ lbs\ PM/hour) \times (0.005) \times (1\ ton/2{,}000\ lbs) = 0.07\ tons\ lead$$

- Melting Furnace #3/Delacquering System
  - Hours of operation of the stack = 8,760 hours
  - November 14, 2007 PM stack test value =0.65 lbs PM/hour
  - Scrap metal lead content = 0.5%

$$Lead\ Emissions = (8{,}760\ hours) \times (0.65\ lbs\ PM/hour) \times (0.005) \times (1\ ton/2{,}000\ lbs) = 0.01\ tons\ lead$$

2007 DNR Total = 0.127 tons of lead

IPL – Prairie Creek Generating Station

The facility estimated actual lead emissions in 2005 to be 0.56 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 0.32 tons. IPL – Prairie Creek Generating Station has four coal-fired boilers. The facility has been consistent with reporting lead emissions only from the coal-fired boilers' stacks.

It was unclear how the facility estimated lead emissions from their four coal-fired boilers in 2005. The facility submitted actual throughputs in tons of coal and actual emissions values for each coal-fired boiler but the emission factors were left blank. No supporting documentation could be found relating to how the actual emissions were calculated. The DNR estimated lead emissions from boiler #3 in 2007 using the actual throughput in 2007, a heating value of 13,000 Btu/lb for the coal, and the emission factor in AP-42, Table 1.1-17. The DNR estimated lead emissions from boilers #1, #2, and #4 in 2007 using actual hours of operation and stack test data which was conducted in April of 2005 and August of 2006. In addition, the facility conducted lead performance testing on April of 2005 and August of 2006 for their own purposes and was not observed by the DNR.

Facility 2005 Estimate

- Boiler #1
  - Actual throughput = 97,135 tons of coal Actual lead emissions = 0.42 tons of lead
- Boiler #2
  - Actual throughput = 106,447 tons of coal Actual lead emissions = 0.00 tons of lead
- Boiler #3
  - Actual throughput = 157,700 tons of coal Actual lead emissions =0.03 tons of lead
- Boiler #4
  - Actual throughput = 543,933 tons of coal Actual lead emissions = 0.11 tons of lead

2005 Facility Total = 0.56 tons of lead

DNR 2007 Estimate

- Boiler #1
  - Hours of operation of the stack = 7,956 hours
  - April 2005 stack test result for lead = 0.0017 lbs of lead/hour

Lead Emissions = (7,956 hours)*(.0017 lbs of lead/hour)*(1 ton/2,000 lbs)
= 0.01 tons of lead

- Boiler #2
  - Hours of operation of the stack = 8,268 hours
  - April 2005 stack test result for lead = 0.0033 lbs of lead/hour

Lead Emissions = (8,268 hours)*(.0033 lbs of lead/hour)*(1 ton/2,000 lbs)
= 0.01 tons of lead

- Boiler #3
  - Actual throughput = 147,317.03 tons of coal
  - Heating value of coal = 13,000 Btu/lb
  - AP-42 Table 1.1-17 lead emission factor for spreader stoker/overfeed stoker, traveling grate coal- fired boilers = 0.000507 lbs of lead/MMBtu of heat input (uncontrolled)
  - Control efficiency for electro-static precipitator = 75%

$$\begin{aligned} Lead\ Emissions \\ &= (147{,}317.03\ tons\ coal) \times (2{,}000\ lbs/ton) \times (13{,}000\ Btu/lb) \times (1MMBtu/1{,}000{,}000Btu) \\ &\times (0.000507\ lbs\ lead/MMBtu) \times (1 - 0.75) \times (1\ ton/2{,}000\ lbs) = 0.24\ tons\ lead \end{aligned}$$

- Boiler #4
  - Hours of operation of the stack = 6,568 hours
  - August 2006 stack test result for lead =0.0181 lbs of lead/hour

$$Lead\ Emissions = (6{,}568\ hours) \times (0.0181\ lbs\ lead/hour) \times (1\ ton/2{,}000\ lbs) = 0.06\ tons\ lead$$

2007 DNR Total = 0.32 tons of lead

MidAmerican Energy Co – George Neal South

The facility estimated actual lead emissions in 2005 to be .51 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2007) to be 0.59 tons. MidAmerican Energy Co. – George Neal South has one coal-fired boiler. It should be noted that the emission factors in AP-42, Table 1.1-17 and 1.1-18 rely on test methods that measure only lead emissions, not lead compounds as reported by MidAmerican Energy Co – George Neal South in their emissions inventory.

The facility estimated lead emissions from the coal-fired boiler in 2005 using the actual throughput and the emission factor for pulverized coal-fired dry bottom boilers from AP-42, Table 1.1-18. The DNR estimated lead emissions from the coal-fired boiler using the actual throughput in 2007 and the emission factor in AP-42, Table 1.1-18.

Facility 2005 Estimate

- Boiler #1
  - Actual throughput = 2,447,045 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (2{,}447{,}045\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.51\ tons\ lead$$

2005 Facility Total = 0.51 tons of lead

DNR 2007 Estimate

- Boiler #1
  - Actual throughput = 2,815,405 tons of coal
  - AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of coal

$$Lead\ Emissions = (2{,}815{,}405\ tons\ coal) \times (0.00042\ lbs\ lead/ton\ coal) \times (1\ ton/2{,}000\ lbs) = 0.59\ tons\ lead$$

2007 DNR Total = 0.59 tons of lead

Appendix O: Lead Modeling Analysis for Muscatine

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

MEMORANDUM

DATE: 4/06/09
TO: CATHARINE FITZSIMMONS, DAVE PHELPS, BRIAN HUTCHINS, SEAN FITZSIMMONS, LORI HANSON
FROM: DON PETERSON
RE: GRAIN PROCESSING CORPORATION (GPC) (70-01-004), MUSCATINE, LEAD EMISSIONS MODELING
CC: JIM MCGRAW, JASON MARCEL, PETER ZAYUDIS, NICK PAGE

INTRODUCTION

On January 12, 2009, the EPA's new and more stringent NAAQS standard for airborne lead (Pb) became effective. The new primary standard for lead is 0.15 µg/m^3 based on the maximum (not to be exceeded) 3-month rolling average. Facilities that emit over 1 ton/year of lead are required to monitor for attainment with the standard. 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 the facility for aid in siting monitors and in determining if a monitoring waiver can be issued.

REVIEW SUMMARY

A facility-wide lead NAAQS dispersion modeling review and analysis was conducted for Grain Processing Corporation (GPC) located in Muscatine, Iowa. A lead dispersion model, previously submitted by GPC on November 18, 2008, was reviewed and used as the starting point for this analysis. An adjacent facility, Muscatine Power & Water (MPW), was added to the model. These facilities, for the sake of modeling lead impacts, are considered as one facility.

MODEL CHANGES

The following substantive changes were made to the submitted model:

1. Post files were added to the output options to enable post-processing of the model results.
2. Concatenated meteorological data, rather than individual year data, was used to facilitate post-processing.
3. The MPW model was incorporated, including the latest lead emission rates.
4. The new NED seamless elevation data was imported, replacing the older DEM elevation data.[5]

RESULTS

According to the results from the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD, dated 07026), the Pb emissions from this facility (which includes Muscatine Power & Water) will cause predicted concentrations that are less than 50% of the lead NAAQS.

The emission sources for this project were evaluated using the emission rates and stack parameters listed in Table 1. The Pb modeling result for the worst case calendar quarter and year is listed in Table 2. All emission sources for this project are assumed to operate 24 hours/day, 8760 hours/year.

POST-PROCESSING 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 draft "leadpost" tool was used to determine the highest 3-month rolling average lead concentration, the receptor location, and the period of time (see Table 2 below). A visual display of isopleths is provided in Figure 1. The isopleths are based on the highest 3-month rolling average concentrations at each of the 3561 receptors in the model. This will facilitate a determination of where the highest

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[5] A building downwash (BPIP) analysis was subsequently performed.

predicted impacts are and where monitors may best be located, if monitoring will be required.

The correctness of the parameters used in the modeling, including emission rates, was verified by the Construction Permits Section staff.

Table 1. Modeled Emission Rates and Stack Parameters

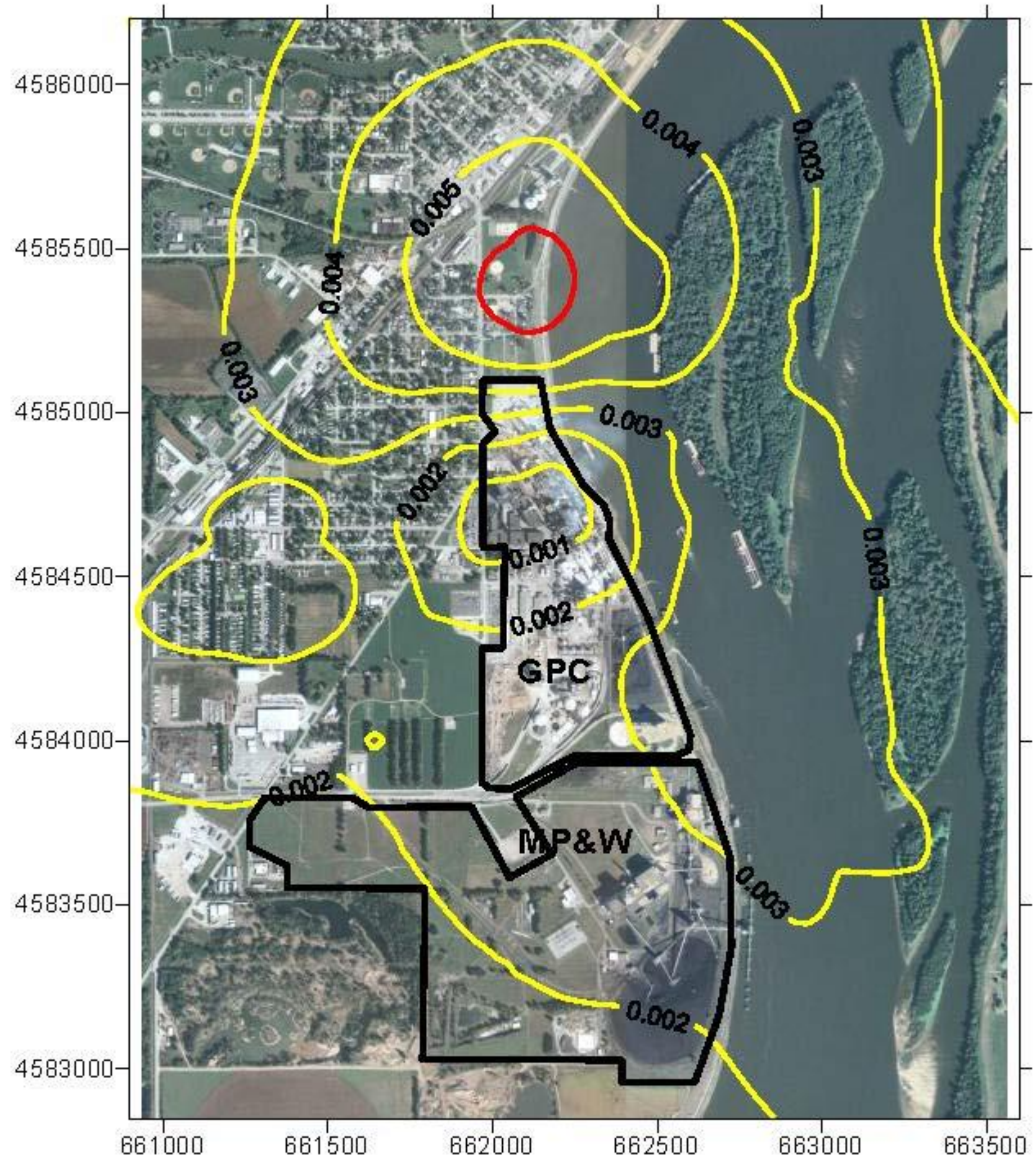
Emission Points		Emission Rates (lb/hr)					Stack Parameters			
ID	Description	PM_{10}	SO_2	NO_X	CO	Pb	Stack height (ft)	Stack gas exit temp (°F)	Stack gas flow rate (acfm)*	Stack tip diameter (ft)
EP001	GPC: boilers 1-4,6,7	--	--	--	--	0.966	219	379	417,070	15.0
EP70	MPW boiler	--	--	--	--	0.023	220	350	99,340	8.86
EP80	MPW boiler	--	--	--	--	0.019	225	350	350,000	8.53
EP90	MPW boiler	--	--	--	--	0.038	300	180	520,000	10.5

*Discharge type vertical/unrestricted.

Table 2. Worst Case Modeling Result for Pb for the 2003 – 2007 Meteorological Data Set

Averaging Period	Months/Year in which result 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	July-Sept / 2004	0.006	0	0.006	0.15

*The rolling 3-month concentration is the highest predicted value. The location of the highest predicted lead concentration is at UTM coordinates 662100 m (easting) and 4585400 m (northing), NAD27.



Contour interval = 0.001 micrograms/m^3
Red contour indicates high concentration of 0.006 micrograms/m^3

Figure 1. Modeled concentrations due to lead emissions from GPC and Muscatine Power & Water. The location of the highest predicted lead concentration is at UTM coordinates 662100 m (easting) and 4585400 m (northing), NAD27. This is in the Earl St. / Musser Park area along the Mississippi River.

Appendix P: Lead Modeling Analysis for Council Bluffs

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

MEMORANDUM

DATE: 5/20/09
TO: CATHARINE FITZSIMMONS, DAVE PHELPS, BRIAN HUTCHINS, SEAN FITZXIMMONS, LORI HANSON
FROM: DON PETERSON
RE: GRIFFIN PIPE PRODUCTS COMPANY (78-01-012), COUNCIL BLUFFS, LEAD EMISSIONS MODELING
CC: JIM MCGRAW, JASON MARCEL, PETER ZAYUDIS, NICK PAGE

INTRODUCTION

On January 12, 2009, the EPA's new and more stringent NAAQS standard for airborne lead (Pb) became effective. The new primary standard for lead is 0.15 µg/m^3 based on the maximum (not to be exceeded) 3-month rolling average. Facilities that emit over 1 ton/year of lead are required to monitor for attainment with the standard. Monitoring may, at the EPA Regional Administrator's discretion, be waived if modeled lead concentrations do not exceed 50% of the standard. The purpose of the current modeling is to evaluate ambient lead concentrations around the facility for aid in siting monitors, if that is required.

CURRENT MODELING STATUS AND REMAINING ISSUES

The lead modeling results presented herein for Griffin Pipe Products Company are considered preliminary results. This is not only because the results predict exceedances of the lead NAAQS, but also because there are uncertainties, as of this writing, about how the lead emissions from Griffin Pipe should be characterized. It is possible that the current lead modeling has underestimated emissions from the desulfurization process and from a cupola bypass stack due to questions regarding the stack test methodology and operational uncertainty at the facility. Additionally, there have been problems with the cupola stack scrubber, and thus uncertainty in the actual lead emission rate. Griffin Pipe has installed a temporary, horizontal stack extension used for testing of pollutant emissions from the desulfurization process (EPFG2). The horizontal discharge may result in prolonged periods and increased average ground-level pollutant concentrations. Extended use of this temporary stack extension will not be allowed without a new construction permit for this grandfathered source. The DNR is continuing to investigate these concerns. This modeling analysis uses the best currently available information provided to DNR.[6]

These issues notwithstanding, DNR recognizes that plant process design and/or operational procedures will be required to be modified should the current controls, in particular the cupola scrubber (EP2), not achieve the required reduction in lead emissions to facilitate compliance with the lead NAAQS.

MODELING SUMMARY

A facility-wide lead NAAQS dispersion modeling review and analysis was conducted for Griffin Pipe Products Company located in Council Bluffs, Iowa. A PM_{10} dispersion model, submitted by Griffin Pipe in August, 2008, and subsequently reviewed and revised by DNR in October, 2008 (project 08-405), was used as the template for this analysis. No nearby facilities were added to this model. The plot plan submitted for that project was deemed current. The DNR evaluated two sources of airborne lead emissions: EP2 (cupola and magnesium inoculation process) and EPFG2 (desulfurization process). EP1 (cupola bypass stack) was not evaluated.

Two scenarios were modeled, differentiated only by the rate of lead emissions from EP2: scenario 1: emission rate = 0.78 lb/hr (permit limit); scenario 2: emission rate = 1.33 lb/hr (average tested rate).

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[6] Modeling cannot be delayed until these issues are resolved because of a statutory deadline to submit the results of all lead modeling to the EPA.

This report additionally provides an aerial view of the facility with an overlay of concentration isopleths that allow for a visual representation of the maximum predicted concentrations of airborne lead averaged over time. Also, some sensitive locations, such as schools and residences, in the predominant downwind areas north of Griffin Pipe are identified for possible monitoring locations.

MODEL CHANGES

The following substantive changes were made to the project 08-405 model:

1. Based on new information received, lead emissions from the desulfurization process are treated as a point source rather than a volume source.
2. Post files were added to the output options to enable post-processing of the model results.
3. Concatenated meteorological data, rather than individual year data, was used to facilitate post-processing.
4. The new NED seamless elevation data was imported, replacing the older DEM elevation data.[7]

Several important assumptions of the model should be noted:

1. The sources of lead emissions at this facility have a history of a wide variance in the number of operating hours over a 3-month period, with operations from about 4 to 23 hrs/day. This model assumes constant operations 24 hrs/day, 8760 hrs/year.
2. Both stacks were evaluated with discharge in the vertical direction. Stack testing conducted at the facility has necessitated the use of a temporary horizontal stack extension for the desulfurization process. This scenario was not modeled as it is temporary and not part of normal operating procedures.
3. For the desulfurization process, all emissions are assumed to occur through one stack (EPFG2). As noted above, there is currently some question on the validity of this assumption.
4. For the cupola and magnesium inoculation process, all emissions are assumed to occur through one stack (EP2). As noted above, there is currently some question on the validity of this assumption.

MODEL RESULTS

According to the results from the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD, dated 07026), the lead (Pb) emissions from Griffin Pipe Products Company will cause predicted concentrations that are greater than the lead NAAQS for both scenarios 1 and 2.

The emission sources for this project were evaluated using the emission rates and stack parameters listed in Table 1 for scenarios 1 and 2. The lead modeling results for the worst case calendar quarter and year are listed in Table 2 for scenarios 1 and 2.

Results for the identified sensitive areas near the facility are shown in Tables 3 and 4 for scenarios 1 and 2, respectively. Results for all sensitive locations other than the south fence line near the cupola indicate that, for both scenarios, the controlling stack is EP2.

POST-PROCESSING 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 draft "leadpost" tool was used to determine the highest 3-month rolling average lead concentration, the receptor location, and the period of time (see Table 2 below).
In addition, surface mapping software was used to provide visual displays of the results. Figure 1 shows an aerial view of the Griffin Pipe facility. A visual display of lead concentration isopleths is provided for scenario 1 in Figures 2 and 3, and for scenario 2 in Figures 4 and 5.[8] The isopleths are based on the highest 3-month rolling average concentrations at each of the 2913 receptors in the model. Figures 3 and 5 provide a detail of the predominant downwind area just north of the plant for scenarios 1 and 2, respectively. They show some of the identified sensitive areas, such as schools and residences. These figures will facilitate a determination of where the highest predicted impacts are and where a monitor may best be located.

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[7] A building downwash (BPIP) analysis was subsequently performed.

[8] Aerial photos for Figures 2 – 5 were taken from Google Earth.

The correctness of the parameters used in the modeling, including emission rates, was verified by the Construction Permits Section staff.

Table 1. Modeled Emission Rates and Stack Parameters

Emission Points		Pb Emission Rates (lb/hr)		Stack Parameters			
ID	Description	Scenario 1	Scenario 2	Stack height (ft)	Stack gas exit temp (°F)	Stack gas flow rate (acfm)*	Stack tip Diameter (ft)
EP2	cupola	0.78	1.33	125	145	58,900	7.0
EPFG2	desulfurization	0.153	0.153	40	95	122,350	9.15

*Discharge type vertical/unrestricted.

Table 2. Worst Case Modeling Result for Pb for the 2000 – 2004 Meteorological Data Set

Scenario	Rolling 3-month period for which result occurred	Predicted Concentration* ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Scenario 1	July – Sept / 2003	0.47	0	0.47	0.15
Scenario 2	July – Sept / 2004	0.60	0	0.60	0.15

*The rolling 3-month concentration is the highest predicted value. Scenario 1: The location of the highest predicted lead concentration is at UTM coordinates 258202 m (easting) and 4570568 m (northing), NAD27. This is on the south fenceline near stack EP2. Scenario 2: The location of the highest predicted lead concentration is at UTM coordinates 258080 m (easting) and 4570886 m (northing), NAD27. This is several meters NW of residence 1.

Table 3: Scenario 1: ambient contributions of lead based on highest predicted values.

Location	Easting (NAD 27)	Northing (NAD 27)	EP2 Predicted Concentration ($\mu g/m^3$)	EPFG2 Predicted Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)*
Rue Elementary School	257182	4571104	0.02	0.01	0.03
St. Albert Elementary School	257748	4570778	0.05	0.03	0.09
Residence 1	258086	4570875	0.25	0.19	0.43
South fence line near stack EP2	258202	4570568	0.02	0.46	0.47
Residence 2	258259	4570850	0.11	0.07	0.18
Thomas Jefferson HS	258380	4571514	0.04	0.01	0.05
Timothy Lutheran Pre-School	257503	4571689	0.04	0.02	0.07
Little Hands at Work & Play (Day Care Center)	258158	4571372	0.08	0.03	0.11
Edison Elementary School	258928	4571326	0.01	0.00	0.01

*The total may be slightly different from the sum of the individual contributions, because the highest predicted values do not necessarily occur at the same location and time.

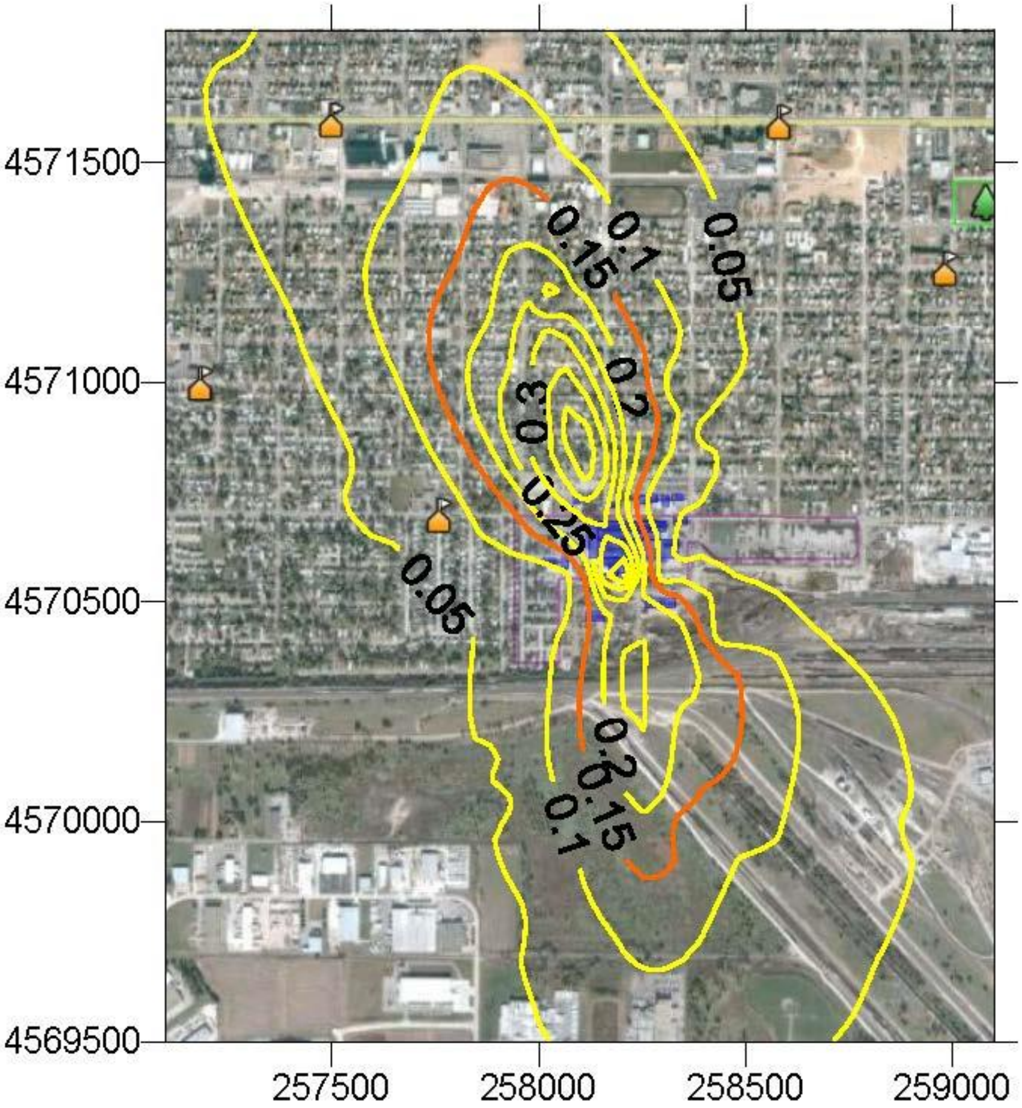
Table 4: Scenario 2: ambient contributions of lead based on highest predicted values.

Location	Easting (NAD 27)	Northing (NAD 27)	EP2 Predicted Concentration ($\mu g/m^3$)	EPFG2 Predicted Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)*
Rue Elementary School	257182	4571104	0.03	0.01	0.04
St. Albert Elementary School	257748	4570778	0.09	0.03	0.12
Residence 1	258086	4570875	0.42	0.19	0.61

Location	Easting (NAD 27)	Northing (NAD 27)	EP2 Predicted Concentration (µg/m³)	EPFG2 Predicted Concentration (µg/m³)	Total Predicted Concentration (µg/m³)*
South fence line near stack EP2	258202	4570568	0.03	0.46	0.47
Residence 2	258259	4570850	0.18	0.07	0.25
Thomas Jefferson HS	258380	4571514	0.06	0.01	0.07
Timothy Lutheran Pre-School	257503	4571689	0.07	0.02	0.09
Little Hands at Work & Play (Day Care Center)	258158	4571372	0.13	0.03	0.17
Edison Elementary School	258928	4571326	0.02	0.00	0.02

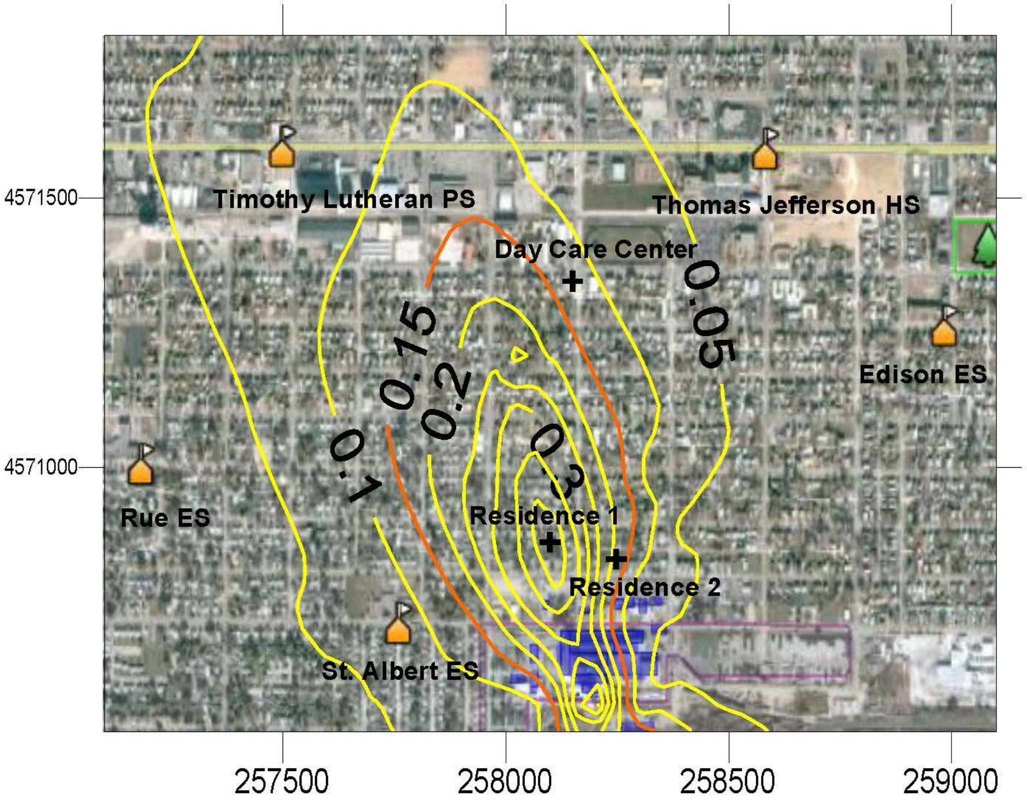
*The total may be slightly different from the sum of the individual contributions, because the highest predicted values do not necessarily occur at the same location and time.

Figure 1. Aerial view of Griffin Pipe Products Company and some of the adjacent properties (mostly residential) to the north. (Picture taken from Microsoft Virtual Earth and horizontally compressed to fit on page.)



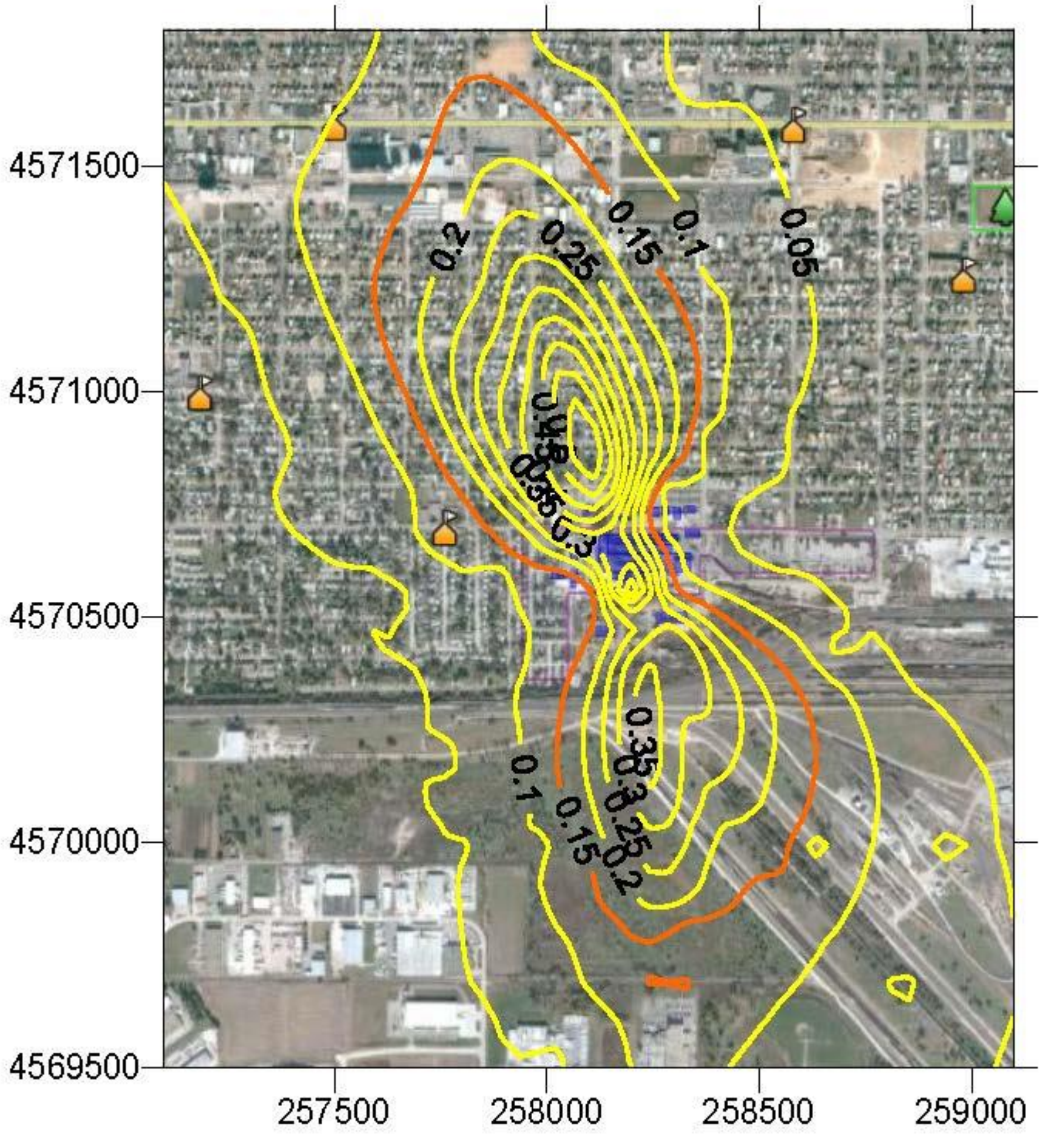
Contour interval = 0.05 micrograms/cubic meter
Orange contour line represents the NAAQS standard for lead of 0.15 micrograms/cubic meter

Figure 2. Scenario 1: Modeled concentrations due to lead emissions from Griffin Pipe. The location of the highest predicted lead concentration is at UTM coordinates 258202 m (easting) and 4570568 m (northing), NAD27. This is along the south fence line near stack EP2.



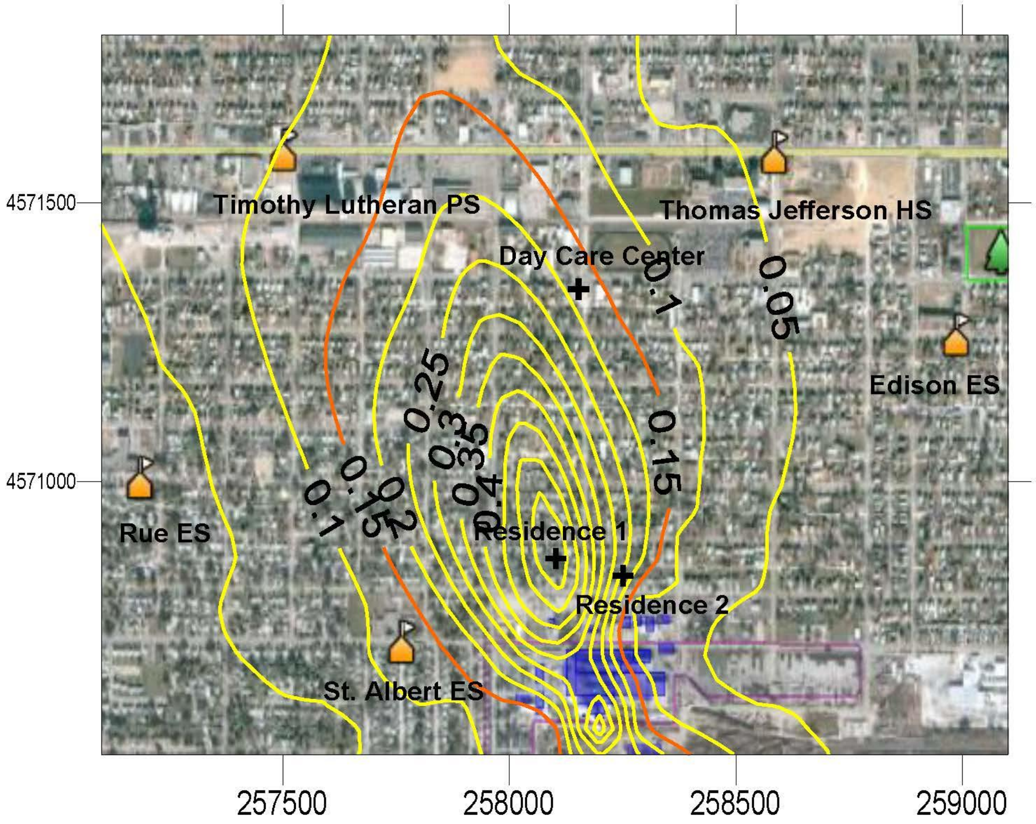
Some identified sensitive areas
Orange contour line represents the NAAQS standard for lead of 0.15 micrograms/cubic meter

Figure 3. Scenario 1: Detail of the sensitive areas identified north of Griffin Pipe.



Contour interval = 0.05 micrograms/cubic meter
Orange contour line represents the NAAQS standard for lead of 0.15 micrograms/cubic meter

Figure 4. Scenario 2: Modeled concentrations due to lead emissions from Griffin Pipe. The location of the highest predicted lead concentration is at UTM coordinates 2570886 m (easting) and 4570568 m (northing), NAD27. This is near residence 1.



Some identified sensitive areas
Orange contour line represents the NAAQS standard for lead of 0.15 micrograms/cubic meter

Figure 5. Scenario 2: Detail of the sensitive areas identified north of Griffin Pipe.

Appendix Q: 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 multi-pollutant 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/NOy, wind speed, wind direction, relative humidity, and ambient temperature.

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

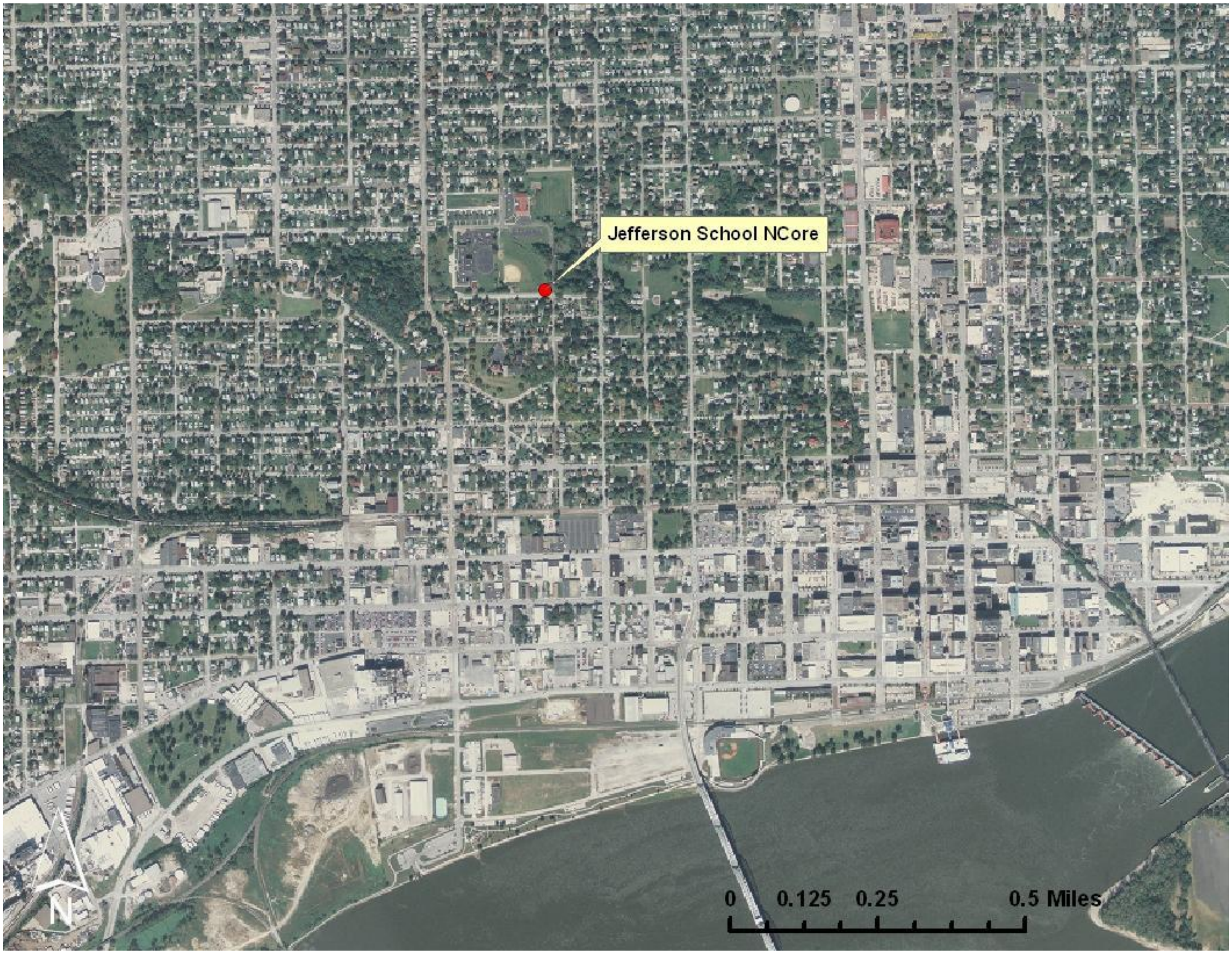
(c) In addition to the continuous measurements listed above, 10 of the NCore locations must also measure lead (Pb) either at the same sites or elsewhere within the MSA/CSA boundary. These ten Pb sites are included within the NCore networks because they are intended to be long-term in operation, and not impacted directly from a single Pb source. These locations for Pb monitoring must be located in the most populated MSA/CSA in each of the 10 EPA Regions. Alternatively, it is also acceptable to use the Pb concentration data provided at urban air toxics sites. In approving any substitutions, the Administrator must consider whether these alternative sites are suitable for collecting long-term lead trends data for the broader area.

(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).

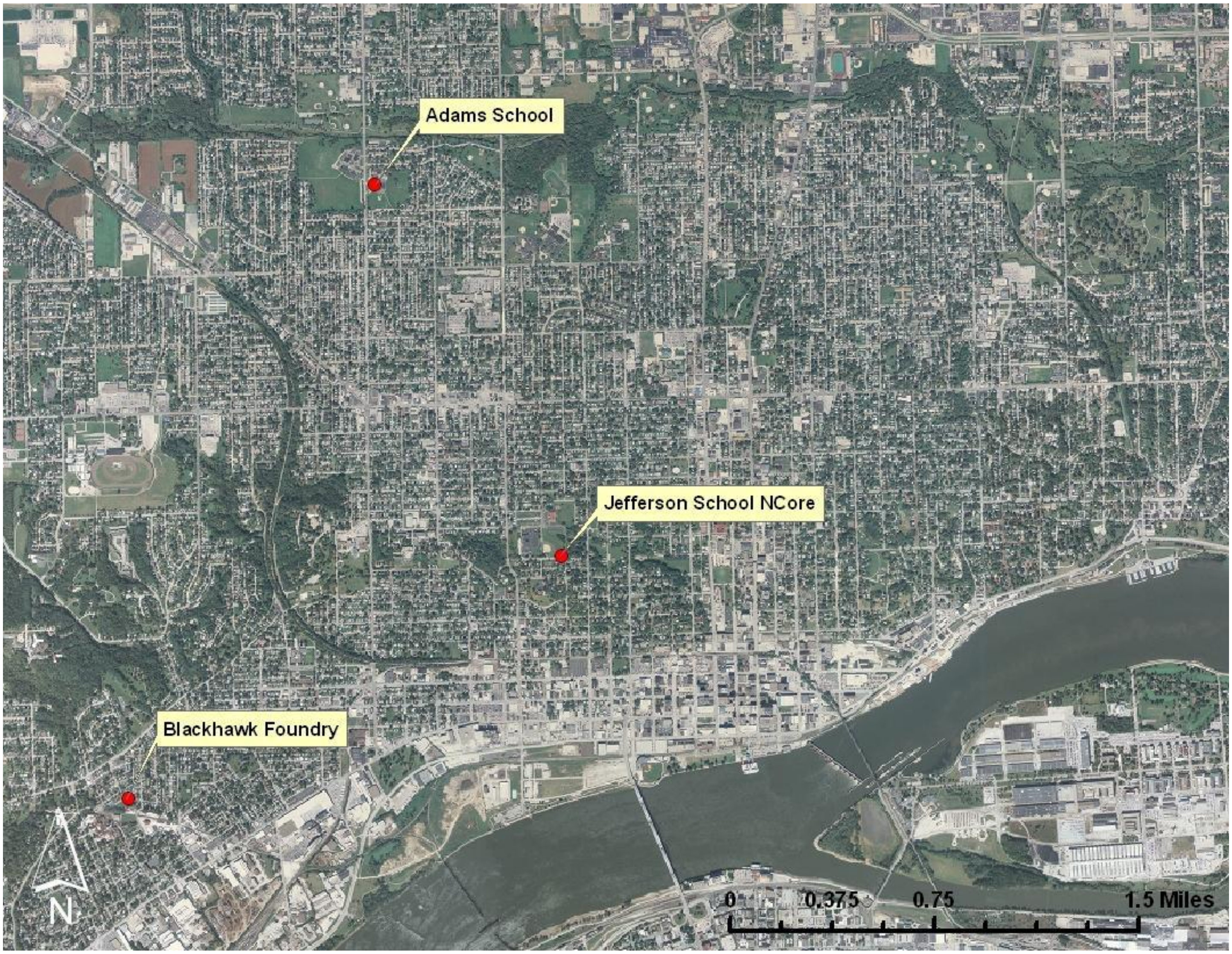
   (1) Urban NCore stations are to be generally located at urban or neighborhood scale to provide representative concentrations of exposure expected throughout the metropolitan area; however, a middle-scale site may be acceptable in cases where the site can represent many such locations throughout a metropolitan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



Davenport, Jefferson School Monitoring Site Location



Location of Jefferson School Monitoring Site and Nearby Sites at Blackhawk Foundry and Adams School

The center picture is of the monitoring site and is looking toward the WNW. The surrounding pictures were taken from the monitoring site looking toward the indicated direction.

Appendix S: Parameters Currently Measured at the Proposed NCore Monitoring Site

Pollutants Measured	Monitor Type	Sampling Method	Analysis	Operating Schedule	Spatial Scale	NAAQS Comparable?	Established
CO-Trace Level	Proposed NCORE	Non-Dispersive Infrared		Continuous	Neighborhood	No	2006
Filter NO3	SPM	Low Volume	Ion Chromatography	1/3 Day	Neighborhood	No	2007
Filter SO4	SPM	Low Volume	Ion Chromatography	1/3 Day	Neighborhood	No	2005
NO2	Proposed NCORE	Chemiluminescence		Continuous	Neighborhood	Yes	2006
NO3	SPM	Chemiluminescence		Continuous	Neighborhood	No	2006
Ozone	Proposed NCORE	UV Absorption		Continuous	Urban	Yes	2006
PM10	Proposed NCORE	Low Volume FRM	Gravimetric	1/3 Day	Neighborhood	Yes	1999
PM2.5	SLAMS	Low Volume FRM	Gravimetric	Daily	Neighborhood	Yes	1999
PM2.5 Continuous	SLAMS	PM2.5 Continuous	BAM or TEOM	Continuous	Neighborhood	No	1999
PM2.5 Speciation	Supplemental Speciation	PM 2.5 Speciation	STN Protocol	1/3 Day	Neighborhood	No	2001
SO2*	Proposed NCORE	UV Fluorescent		Continuous	Urban	Yes	1982
SO4	SPM	UV Fluorescent		Continuous	Neighborhood	No	2005
Toxics	SPM	Canister	TO-15, GC-FID	1/12 Day	Neighborhood	No	2000
Toxics	SPM	Cartridge	TO-11A	1/12 Day	Neighborhood	No	2000
Temperature	N/A	2 meters		Continuous	Micro	No	2006
Relative Humidity	N/A	2 meters		Continuous	Micro	No	2006
Wind Speed	N/A	~7 meters		Continuous	Micro	No	1992
Wind Direction	N/A	~7 meters		Continuous	Micro	No	1992
PM Coarse	Proposed NCORE	Low Volume FRM	Gravimetric	1/3 Day	Neighborhood	No	2007
NH3-Trace Level	SPM	Photoacoustic		Continuous	Neighborhood	No	2007

*Trace level monitoring began 2006

See Appendix C for definitions of the terms in this table.