Iowa Ambient Air Monitoring
2010 Network Plan

Air Quality Bureau
Iowa Department of Natural Resources

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Introduction

States and other agencies delegated to perform air monitoring under the Clean Air Act are required to examine their networks annually to 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 Monitoring 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	1
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 the Davenport-Moline-Rock Island MSA with Illinois agencies (Appendix G). In 2009, three SLAMS ozone monitors were operated in Omaha, Nebraska, and one SLAMS 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 and displayed in Appendix J. 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.

$PM_{2.5}$ Monitoring Network Analysis

EPA's population-based monitoring requirements for $PM_{2.5}$ are contained in 40 CFR Part 58, Appendix D (reproduced in Appendix 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 number of required 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 2009, four SLAMS $PM_{2.5}$ monitoring sites (5 monitors) 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 Part 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 Part 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 Part 58 specifies that the minimum frequency for manual $PM_{2.5}$ sampling at required SLAMS sites is one sample every three days. Required SLAMS sites with a 24-hour design value within 5% of the 24-hour $PM_{2.5}$ NAAQS (34 $\mu g/m^3$ to 36 $\mu g/m^3$) must assume a daily sampling schedule. 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} Monitoring 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	0-1
Cedar Rapids, IA	0-1

Iowa operates two SLAMS PM_{10} monitors in the Des Moines-West Des Moines MSA, three in the Davenport-Moline-Rock Island MSA, and one in the Cedar Rapids MSA. Iowa shares the responsibility for PM_{10} monitoring in the Omaha-Council Bluffs MSA with Nebraska agencies, and in the Davenport-Moline-Rock Island MSA with Illinois agencies (Appendix G). In 2009, 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 Monitoring Network Analysis

There are currently no minimum requirements for the number of Sulfur Dioxide (SO_2) and Carbon Monoxide (CO) monitors contained in 40 CFR Part 58. The Nitrogen Dioxide (NO_2) rule was finalized on January 22, 2010. This established minimum requirements for the number of NO_2 monitors. Sites established to meet these requirements must be included in the 2012 network plan, and must be operational by January 1, 2013. Iowa's SO_2, NO_2 and CO monitors are listed in Appendix C and displayed in Appendix J. 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.

NCore Monitoring Network Analysis

Requirements for a multi-pollutant "NCore" site are contained in 40 CFR Part 58, and reproduced in Appendix L. Each state must operate at least one NCore site by January 1, 2011. The department intends to upgrade an existing monitoring site located at Jefferson School in Davenport (AQS ID 191630015) to an NCore site to meet this requirement.

Lead Monitoring Network Analysis

Current federal lead monitoring rules are reproduced in Appendix M. Proposed rules are reproduced in Appendix N.

To satisfy the population-oriented lead monitoring requirements of the current rule, States are required to establish SLAMs lead monitoring sites in core-based statistical areas (CBSA's) with populations over 500,000 people. The proposed rule requires SLAMs lead monitoring at a State's NCORE monitoring sites. Both the current and proposed rules require monitor installation by January 1, 2011. Due to the conflict in the population-oriented monitoring requirements in the current and proposed rules, EPA has advised States to follow the requirements of the proposed rule. Iowa intends to operate a lead monitor at its NCORE site in Davenport by January 1 to meet this requirement.

Source-oriented lead monitoring requirements in the current lead rule require SLAMs lead monitoring near facilities that emit over one ton per year (tpy) of lead beginning in January 2010. In the proposed rule, the emissions threshold requiring monitoring was reduced to one-half ton per year. Monitoring sites near sources with emissions between 0.5 tpy and 1.0 tpy are required to operational by January 2011. Both rules require use of the most recent National Emission Inventory (NEI), or other scientifically justifiable methods and data for emissions estimates. Both rules allow for a waiver of monitoring requirements if air dispersion modeling predicts ambient air concentrations less than half the NAAQS. To address the requirements of the current and proposed rules, the department has adopted the proposed 0.5 tpy threshold for this lead network analysis.

The department has screened its emissions data to identify any facilities with lead emissions greater than 0.25 tpy in the 2005 facility estimate, the 2005 NEI, or 2008 DNR estimate. Appendix O contains a table of these three emissions estimates. A detailed discussion comparing the 2005 facility estimates to the 2008 departmental estimates is contained in Appendix P. The 2008 emissions estimates were reviewed by emissions inventory and engineering staff and incorporate the latest stack test data and most up to date emissions information. The department believes that the 2008 emissions estimates are the most accurate and scientifically defensible estimates for the each facility, and has used these estimates to establish source-oriented lead monitoring requirements.

Three facilities exceeded the 0.5 tpy emissions estimates threshold in the proposed lead rule according to the department's 2008 emissions estimates. Grain Processing Corporation (GPC) in Muscatine had 3.81 tpy of lead emissions, Mid American Energy Company – Walter Scott Jr. Energy Center in Council Bluffs had emissions of 0.62 tpy, and Griffin Pipe in Council Bluffs had emissions of 0.58 tpy.

Results of air dispersion modeling of the lead emissions from GPC in Muscatine are presented in Appendix Q. The modeled maximum lead concentration was 5% of the NAAQS. The department requests a waiver of the requirement to conduct lead monitoring near GPC.

Results of dispersion modeling for Mid American Energy Company – Walter Scott Jr. Energy Center in Council Bluffs are presented in Appendix R. Emissions for this facility were estimated at 0.62 tpy, and dispersion modeling was used to evaluate ambient impacts. The modeled maximum lead concentration was 19% of the NAAQS. The department requests a waiver of the requirement to conduct lead monitoring near this facility.

Results of air dispersion modeling of the lead emissions from Griffin Pipe in Council Bluffs are presented Appendix S. The modeling shows ambient levels exceeding the lead NAAQS in areas to the north and south of the facility. The department established a monitor in the populated high impact area north of the facility in accordance with the 2009 network plan. The department intends to continue monitoring at this location to meet the lead monitoring requirements for this facility.

Griffin Pipe has recently submitted a federal *prevention of significant deterioration* (PSD) permit application to the department. In this application, Griffin Pipe has indicated that it intends to install bag houses to reduce its lead emissions. These modifications should result in modeled ambient air concentrations below the NAAQS before the 2011 network plan.

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.

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Appendix B: Iowa Ambient Air Monitoring Sites

City	Site	Address	County	MSA	Latitude	Longitude	AQS Site ID	Responsible Agency
Buffalo	Linwood Mining	11100 110th Ave.	Scott	DMR	41.46724	-90.68845	191630017	DNR
Cedar Rapids	Kirkwood College	6301 Kirkwood Blvd SW	Linn	CDR	41.91056	-91.65194	191130028	Linn Local Prog.
	Scottish Rite Temple	616 A Ave.	Linn	CDR	41.98333	-91.66278	191130031	Linn Local Prog.
	Army Reserve Center	1599 Wenig Rd. NE	Linn	CDR	42.00833	-91.67861	191130037	Linn Local Prog.
	Public Health	500 11th St. NW	Linn	CDR	41.97677	-91.68766	191130040	Linn Local Prog.
Clinton	Chancy Park	23rd & Camanche	Clinton	-	41.82328	-90.21198	190450019	DNR
	Rainbow Park	Roosevelt St.	Clinton	-	41.87500	-90.17757	190450021	DNR
Clive	Indian Hills Jr. High School	9401 Indian Hills	Polk	DSM	41.60352	-93.74790	191532510	Polk Local Prog.
Coggon	Coggon Elementary School	408 E Linn St.	Linn	CDR	42.28056	-91.52694	191130033	Linn Local Prog.
Council Bluffs	Franklin School	3130 C Ave.	Pottawattamie	OMC	41.26417	-95.89612	191550009	DNR
	Griffin Pipe	8th Avenue and 27th St	Pottawattamie	OMC	41.25425	-95.88725	191550011	DNR
Davenport	Jefferson School	10th St. & Vine St.	Scott	DMR	41.53001	-90.58761	191630015	DNR
	Adams School	3029 N Division St.	Scott	DMR	41.55001	-90.60012	191630018	DNR
	Blackhawk Foundry	300 Wellman St.	Scott	DMR	41.51777	-90.61876	191630019	DNR
	Hayes School	622 South Concord St	Scott	DMR	41.51208	-90.62404	191630020	DNR
Des Moines	Health Dept.	1907 Carpenter	Polk	DSM	41.60318	-93.64330	191530030	Polk Local Prog.
Emmetsburg	Iowa Lakes College	Iowa Lakes Community College	Palo Alto	-	43.12370	-94.69352	191471002	DNR
Indianola	Lake Ahquabi State Park	1650 118th Ave.	Warren	DSM	41.28553	-93.58398	191810022	Polk Local Prog.
Iowa City	Hoover School	2200 East Court	Johnson	IAC	41.65723	-91.50348	191032001	DNR
Keokuk	Fire Station	111S. 13th St.	Lee	-	40.40096	-91.39101	191110008	DNR
Mason City	Holnam Cement	17th St. & Washington St.	Cerro Gordo	-	43.16944	-93.20243	190330018	DNR
	Washington School	700 N. Washington Avenue	Cerro Gordo	-	43.15856	-93.20301	190330020	DNR
Muscatine	Garfield School	1409 Wisconsin	Muscatine	-	41.40095	-91.06781	191390015	DNR
	Greenwood Cemetary	Fletcher St. & Kimble St.	Muscatine	-	41.41943	-91.07098	191390016	DNR
	Franklin School	210 Taylor St.	Muscatine	-	41.41439	-91.06261	191390018	DNR
	Musser Park	Oregon St. & Earl Ave.	Muscatine	-	41.40780	-91.06265	191390020	DNR
Pisgah	Forestry Office	206 Polk St.	Harrison	OMC	41.83226	-95.92819	190850007	DNR
	Highway Maintenance Shed	1575 Hwy 183	Harrison	OMC	41.78026	-95.94844	190851101	DNR
Sioux City	Bryant School	821 30th St.	Woodbury	SXC	42.52236	-96.40021	191930019	DNR
Slater	City Hall	105 Greene	Story	DSM	41.88287	-93.68780	191690011	Polk Local Prog.
Tama	Meskwaki Tribal Center	349 Meskwaki Road	Tama		41.98730	-92.65230	191710007	DNR
Waterloo	Grout Museum	West Park St. & South St.	Black Hawk	WTL	42.49306	-92.34389	190130008	DNR
	Water Tower	Vine St. & Steely	Black Hawk	WTL	42.50154	-92.31602	190130009	DNR
Waverly	Waverly Airport	Waverly Airport	Bremer	WTL	42.74306	-92.51306	190170011	Linn Local Prog.
-	Scott County Park	Scott County Park	Scott	DMR	41.69917	-90.52194	191630014	DNR
-	Backbone State Park	Backbone State Park	Delaware	-	42.60083	-91.53833	190550001	DNR
-	Viking Lake State Park	2780 Viking Lake Road	Montgomery	-	40.96911	-95.04495	191370002	DNR
-	Lake Sugema	24430 Lacey Trl, Keosauqua	Van Buren	-	40.69508	-92.00632	191770006	DNR

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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, 2009 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-est2009-annual.html Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2009 (CBSA-EST2009-01). Source: Population Division, U.S. Census Bureau, Release Date: March 2010

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 07-09	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	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Cedar Rapids, Army Reserve	PM2.5	SLAMS	28	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Cedar Rapids, Army Reserve	PM2.5 Speciation	Supplemental Speciation			PM2.5 Speciation	CSN Protocol	1/6 Day	Population Exposure	Neighborhood	No
Cedar Rapids, Army Reserve	Filter NO3	SPM			Low Volume	Ion Chromatography	1/6 Day	Population Exposure	Neighborhood	No
Cedar Rapids, Kirkwood College	Ozone	SPM	66	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	Neighborhood	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			Canister	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
Clinton, Chancy Park	PM2.5	SPM	32	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	Population Exposure	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	25	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Coggon, Coggon Sch.	Ozone	SLAMS	66	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
Council Bluffs, Griffin Pipe	Pb	SLAMS			High Volume FRM	GFAA or ICP-MS	1/3 Day	Source Oriented	Middle	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	33	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, Hayes Sch.	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Urban	Yes
Davenport, Hayes Sch.	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Population Exposure	Urban	No
Davenport, Jefferson Sch.	CO	Proposed NCORE			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	Filter NO3	SPM			Low Volume	Ion Chromatography	1/3 Day	Population Exposure	Neighborhood	No
Davenport, Jefferson Sch.	Filter SO4	SPM			Low Volume	Ion Chromatography	1/3 Day	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			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			PM2.5 Speciation	CSN 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			Canister	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

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Site Name	Pollutants Measured	Monitor Type	Design Value 07-09	High Design Value?	Sampling Method	Analysis	Operating Schedule	Primary Monitoring Objective	Spatial Scale	NAAQS Comparable?
Des Moines, Health Dept.	CO	SPM			Non-Dispersive Infrared		Continuous	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	NO2	SPM			Chemiluminescence		Continuous	Population Exposure	Neighborhood	Yes
Des Moines, Health Dept.	Ozone	SLAMS	61	No	UV Absorbtion		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			PM2.5 Speciation	CSN Protocol	1/6 Day	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	Filter NO3	SPM			Low Volume	Ion Chromatography	1/6 Day	Population Exposure	Neighborhood	No
Des Moines, Health Dept.	Filter SO4	SPM			Low Volume	Ion Chromatography	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 Absorbtion		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	Regional Transport	Regional	No
Indianola, Lake Ahquabi	Ozone	SPM	63	No	UV Absorbtion		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	No
Keokuk, Fire Station	PM2.5	SPM	26	No	Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Keosauqua, Lake Sugema	IMPROVE Speciation	IMPROVE			IMPROVE Sampler	IMPROVE Protocol	1/3 Day	Visibility/Regional Haze	Regional	No
Keosauqua, Lake Sugema	Ozone	SLAMS	64	Yes	UV Absorbtion		Continuous	Regional Transport	Regional	Yes
Keosauqua, Lake Sugema	PM10	SPM			Low Volume FRM	Gravimetric	1/3 Day	General/Background	Regional	Yes
Keosauqua, Lake Sugema	PM2.5	SLAMS	25	No	Low Volume FRM	Gravimetric	1/3 Day	Regional Transport	Regional	Yes
Keosauqua, Lake Sugema	PM2.5 Continuous	SPM			PM2.5 Continuous	BAM or TEOM	Continuous	Regional Transport	Regional	No
Keosauqua, Lake Sugema	SO2	SPM			UV Fluorescent		Continuous	General/Background	Regional	Yes
Mason City, Holcim Cement	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	38	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 Cemetary	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, Forestry Office	Ozone	SPM			UV Absorbtion		Continuous	Max Ozone Conc.	Urban	Yes
Pisgah, Highway Maintenance	Ozone	SLAMS	64	Yes	UV Absorbtion		Continuous	Max Ozone Conc.	Urban	Yes
Scott County Park	Ozone	SLAMS	66	Yes	UV Absorbtion		Continuous	Max Ozone Conc.	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	62	No	UV Absorbtion		Continuous	Max Ozone Conc.	Urban	Yes
Tama, Meskwaki Tribal Center	PM2.5	SPM			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Viking Lake State Park	IMPROVE Speciation	IMPROVE			IMPROVE Sampler	IMPROVE Protocol	1/3 Day	Visibility/Regional Haze	Regional	No
Viking Lake State Park	Ozone	SLAMS	63	No	UV Absorbtion		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	21	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
Waterloo, Grout Museum	PM10	SLAMS			Low Volume FRM	Gravimetric	1/3 Day	Population Exposure	Neighborhood	Yes
Waterloo, Grout Museum	PM2.5	SLAMS	29	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	64	Yes	UV Absorbtion		Continuous	Max Ozone Conc.	Urban	Yes

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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
- Pb - lead
- PM_{10} – particles with a diameter of 10 micrometers or less
- $PM_{2.5}$ – particles with a diameter of 2.5 micrometers or less, also known as “fine particles”.
- $PM_{2.5}$ speciation – a speciation monitor and suite of lab analysis procedures developed by EPA for their national speciation trends network (STN), to identify and quantify the chemical components of $PM_{2.5}$
- 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 CSN protocols, but not contained in the STN Network.

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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 $\mu g/m^3$ or greater are considered greater than or equal to 85% of the 24-hour NAAQS (35 $\mu g/m^3$). For ozone, 8-hour design values of 64 ppb or greater are considered greater than or equal to 85% of the 8-hour NAAQS (75 ppb).

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

- Continuous $PM_{2.5}$- a monitor that reports $PM_{2.5}$ levels in real time. Continuous $PM_{2.5}$ monitors typically have three components: a size selective inlet (cyclone) that knocks out all but the fine particles, a conditioning system that rapidly dries the fine particles, and a mass measurement system that determines the mass of the conditioned sample. The 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.
- CSN Protocol – refers to EPA's chemical speciation network protocol. This protocol utilizes X-Ray Fluorescence, Ion Chromatography, and Thermal Optical Reflectance to identify and quantify the components of $PM_{2.5}$.
- Thermal Optical Reflectance- a carbon containing sample is subjected to a programmed, progressive heating in a controlled atmosphere, and the evolved carbon at each step is quantified by a flame ionization detector. Organic carbon (OC) evolves from the sample without an oxygen atmosphere for combustion, Elemental Carbon (EC) does not. A laser is used to detect charring in the sample, so that the charring of the high temperature OC component does not result in an over estimation of the EC in the sample.
- TO-11A – an EPA protocol in which carbonyl cartridge extracts are analyzed using High Performance Liquid Chromatography and an ultraviolet detector.
- TO-15, GC-FID – These analysis methods are used for air samples collected in specially treated stainless steel canisters. EPA protocol TO-15 is used for UATMP (Urban Air Toxics Monitoring Program) compounds. According to method TO-15, toxic gases are separated with a gas chromatograph, and quantified by a mass spectrometer (GCMS). The SNMOC (Speciated Non-Methane Organic Carbon) pollutants are also separated by a gas chromatograph, but are quantified by a flame ionization detector (GC-FID).
- X-Ray Fluorescence-when illuminated with x-rays, metallic atoms emit characteristic fluorescent radiation, which may be quantified with a semiconductor detector or gas proportional counter to obtain metallic concentrations in a filter sample.

Operating Schedule – Continuous monitors run constantly and measure hourly average concentrations in real time. Manual samplers, such as PM filter samplers or toxics samplers, collect a single 24 hour sample from midnight to midnight on a particular day, which is quantified later in an analytical laboratory. A fractional (e.g. 1/3, 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.

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

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

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

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

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

$PM_{2.5}$ 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.

$PM_{2.5}$

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.

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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, 2009
Omaha-Council Bluffs, NE-IA	849,517
Des Moines-West Des Moines, IA	562,906
Davenport-Moline-Rock Island, IA-IL	379,066
Cedar Rapids, IA	256,324
Waterloo-Cedar Falls, IA	164,913
Iowa City, IA	152,263
Sioux City, IA-NE	144,360
Dubuque, IA	93,072
Ames, IA	87,214

From: http://www.census.gov/popest/metro/CBSA-est2009-annual.html *Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2009 (CBSA-EST2009-01)*
Source: Population Division, U.S. Census Bureau, Release Date: March 2010

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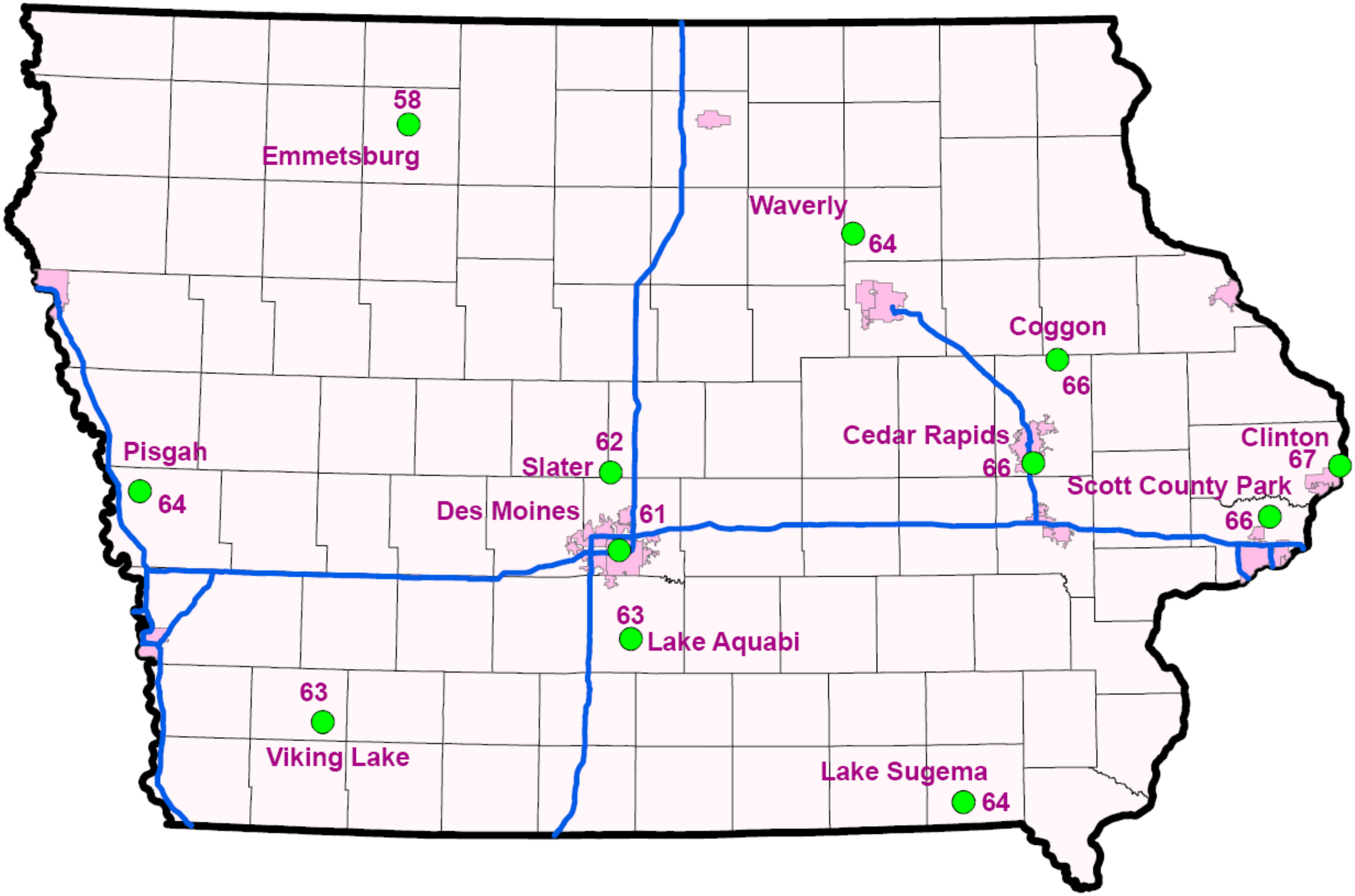
Appendix F: Design Value Map for Ozone



2007-2009 Ozone Design Values (ppb)

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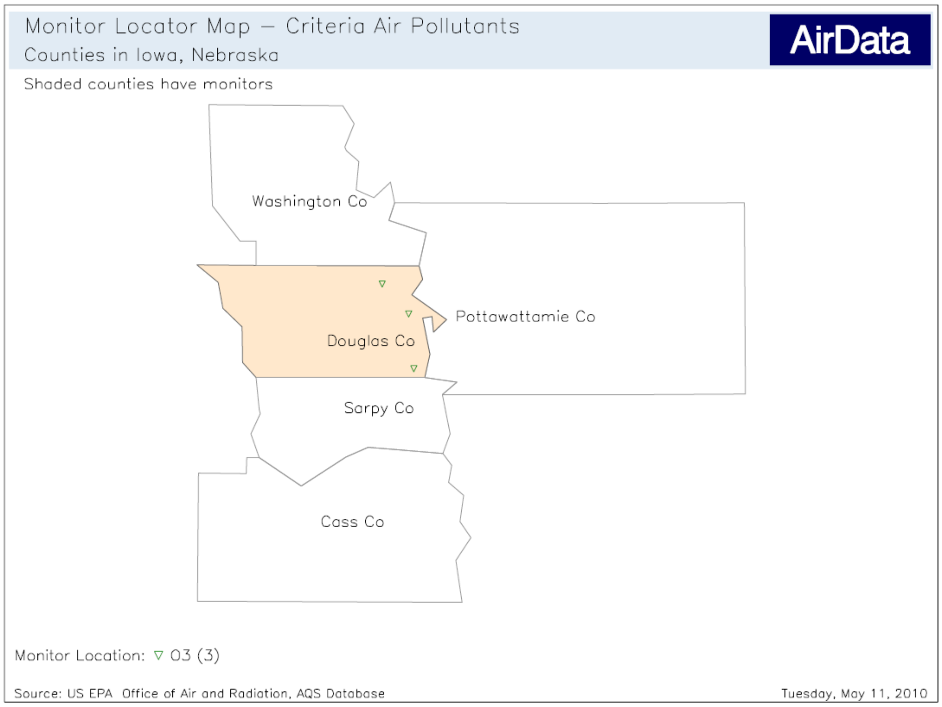
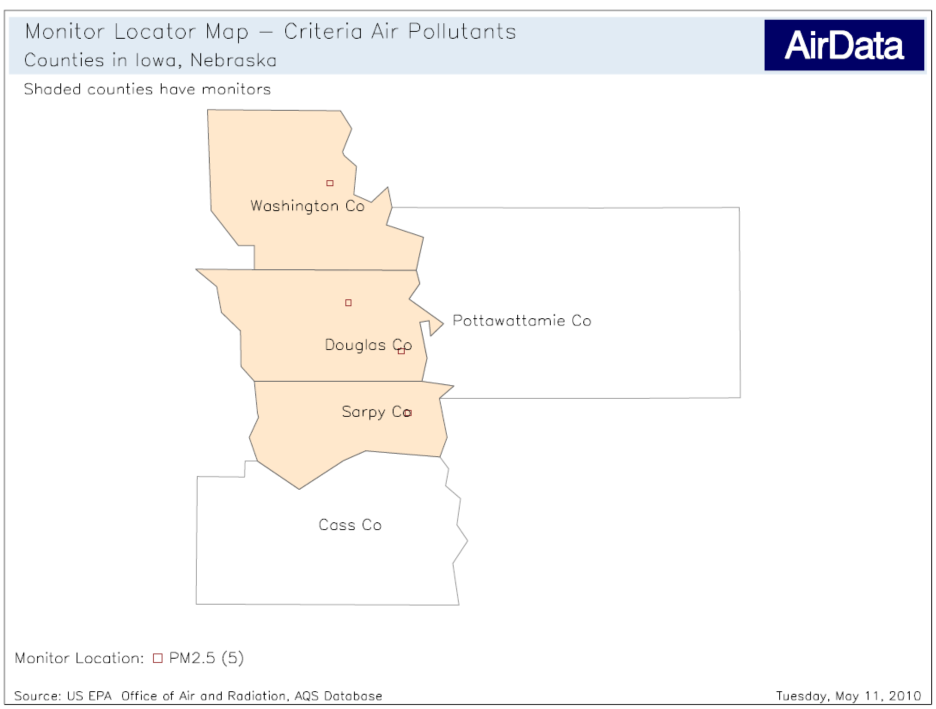
Appendix G: Maps of Monitoring Locations in MSA's on the State Border

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 2009 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 SLAMS Monitors



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

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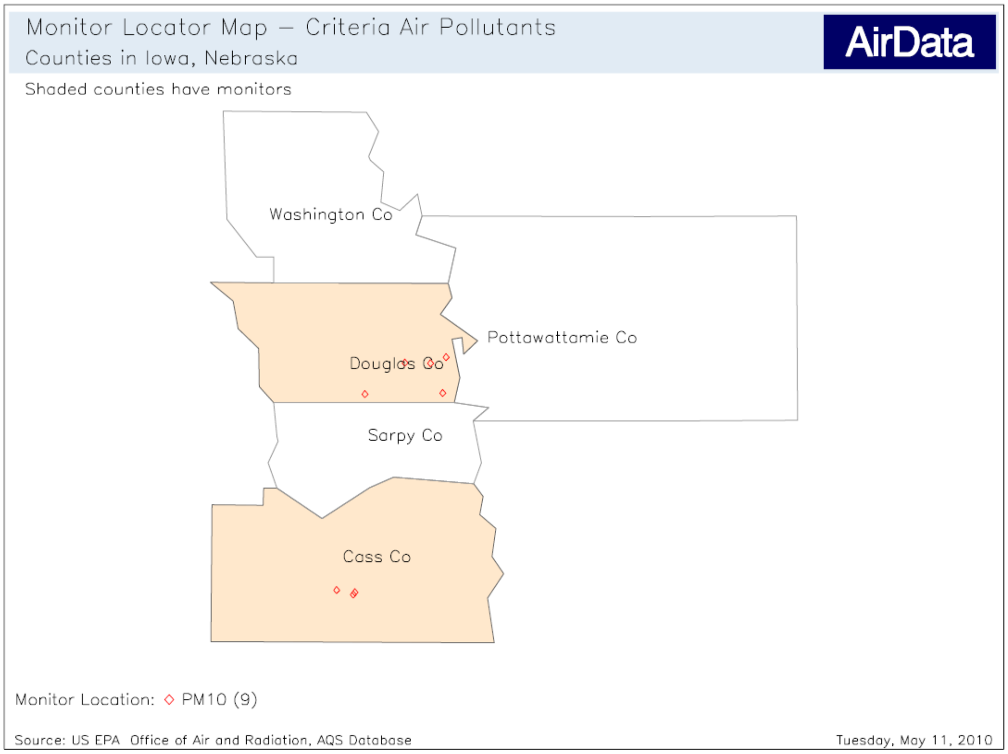
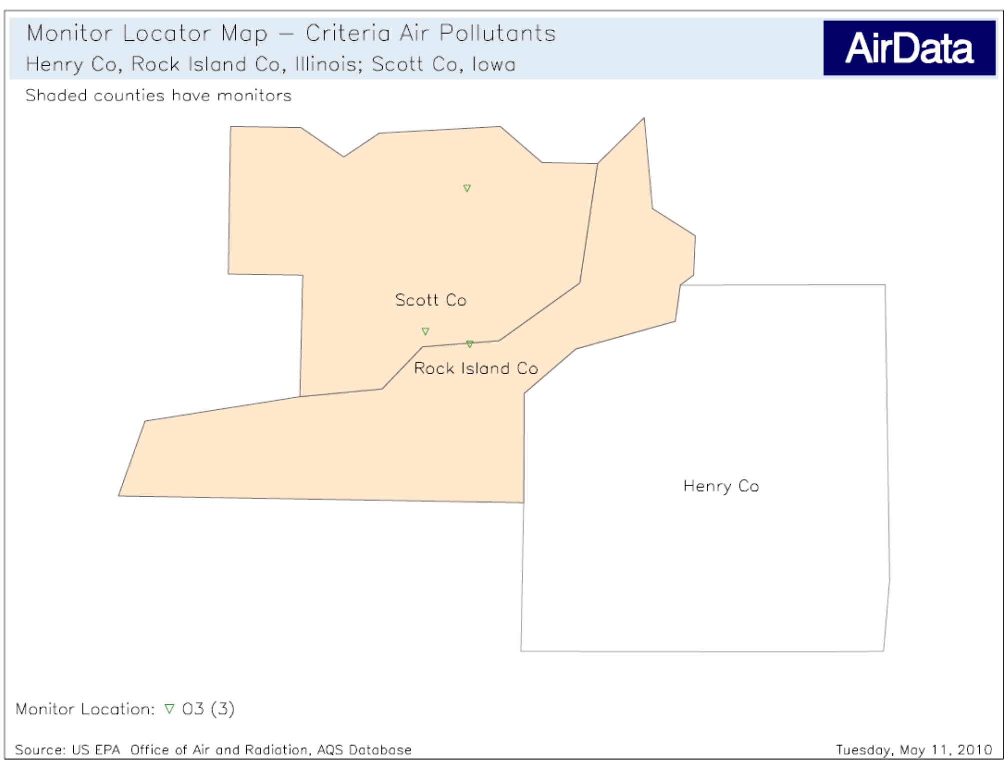


Omaha-Council Bluffs, NE-IA PM_{10} SLAMS Monitors



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

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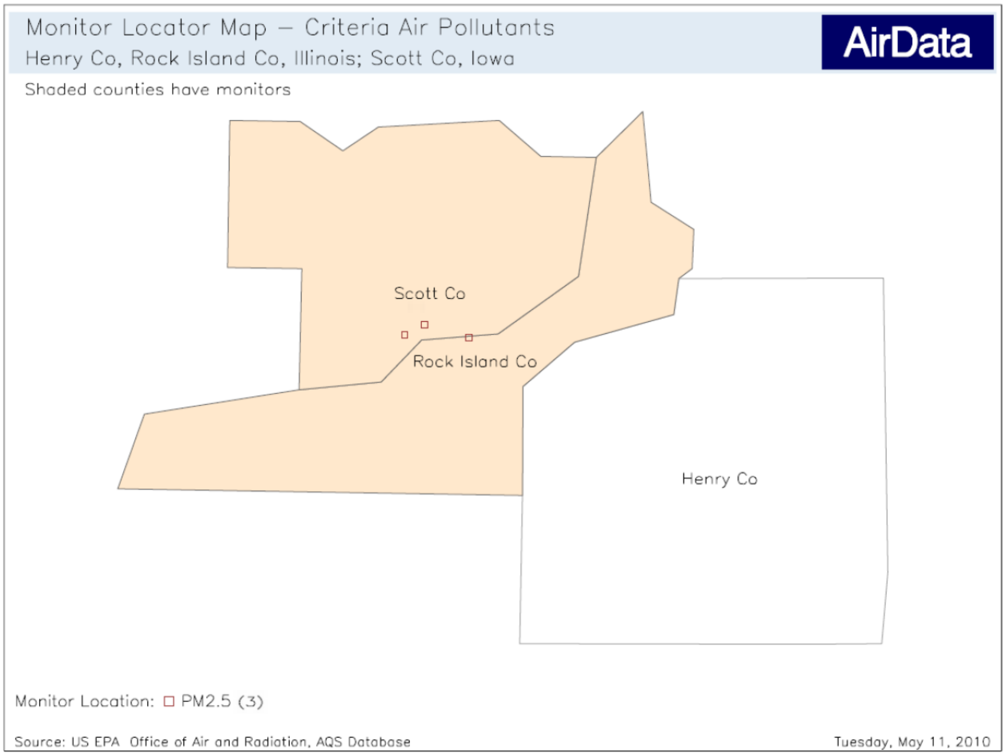
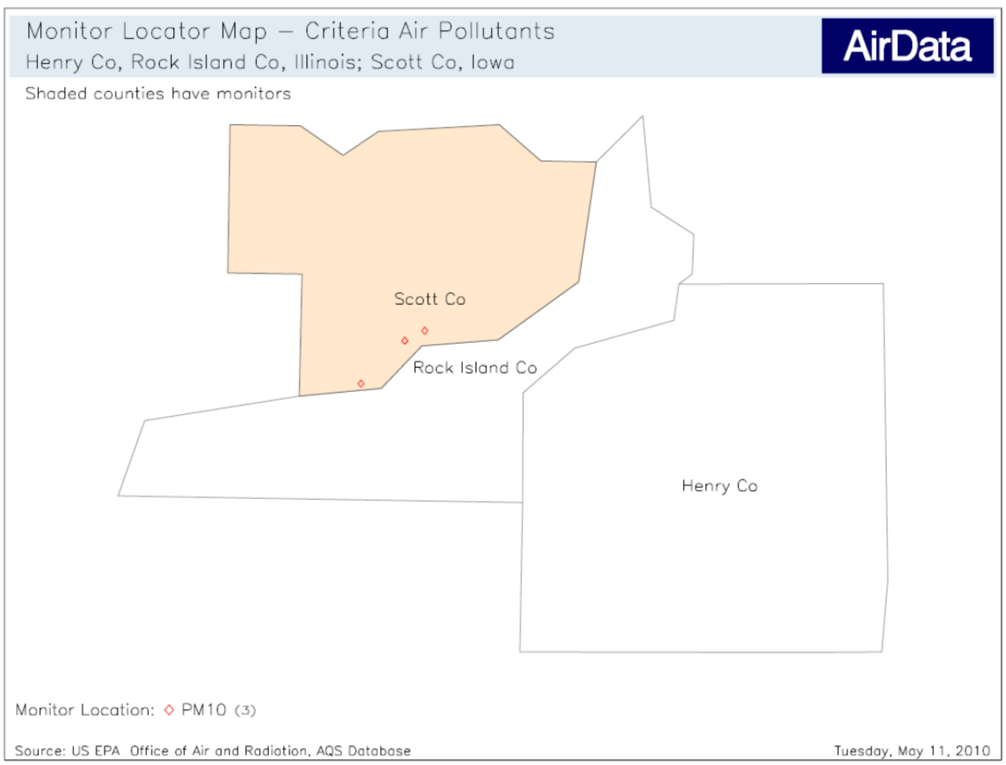


Davenport-Moline-Rock Island, IA-IL $PM_{2.5}$ SLAMS Monitors



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

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Appendix H: Network Change Table

Site Name	Pollutant	Monitor Type	Sampling Method	Analysis	NAAQS Comparable?	Operating Schedule	Action
Davenport, Jefferson School	Pb	NCore	High Volume FRM	GFAA or ICP-MS	Yes	1/6 day	Addition
Davenport, Jefferson School	NOy	NCore	Continuous	Chemiluminescence	No	Continuous	Addition
Muscatine, Musser Park	PM2.5	SPM	Low Volume FRM	Gravimetric	Yes	1/3 day	Addition
Backbone State Park	PM10	SPM	Low Volume FRM	Gravimetric	Yes	1/3 day	Deletion
Backbone State Park	PM2.5	SPM	Low Volume FRM	Gravimetric	Yes	1/3 day	Addition
Davenport, Jefferson School	Particulate Nitrate	SPM	Continuous	Chemiluminescence	No	Continuous Seasonal	Deletion

See Appendix C for definitions of the elements in this table. All changes are at existing sites; see Appendix B for additional site information.

Note: The existing $PM_{2.5}$ FRM, $PM_{2.5}$ Continuous, Speciated $PM_{2.5}$, PM_{Coarse}, Ozone, SO_2, CO, Wind Speed, Wind Direction, Relative Humidity, and Temperature sensors at the Davenport Jefferson School site will be designated as NCore monitors on January 1, 2011.

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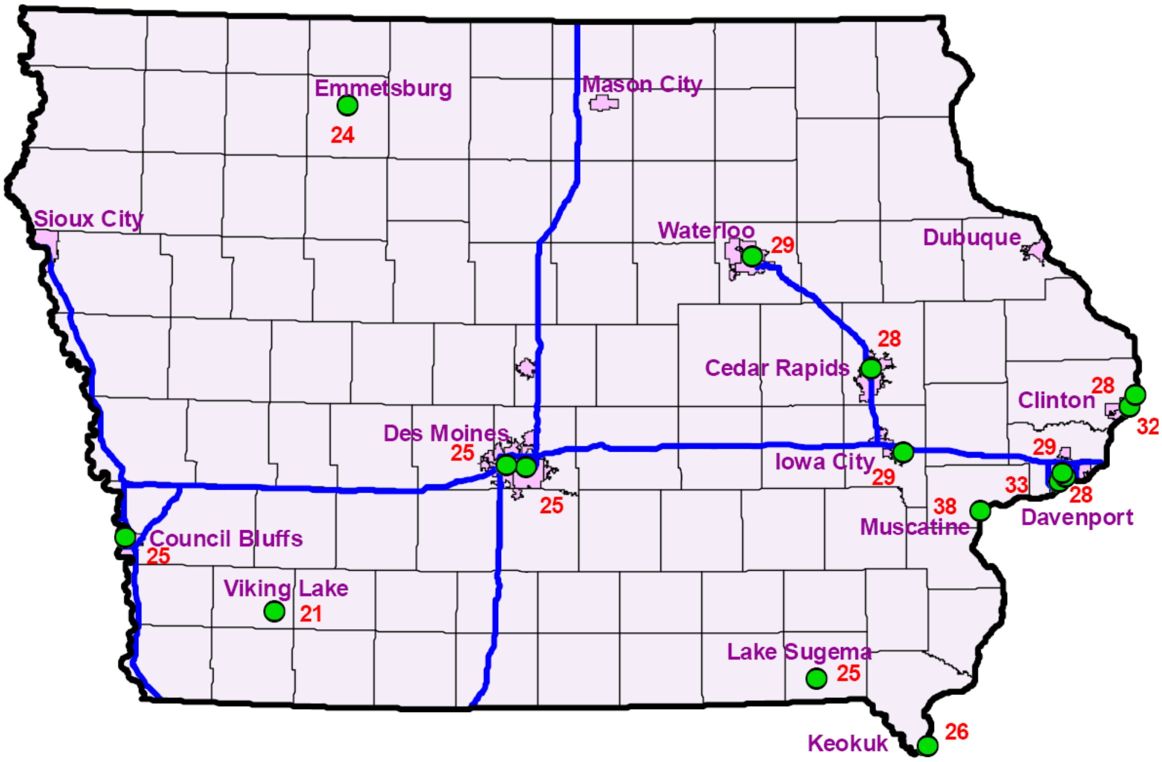
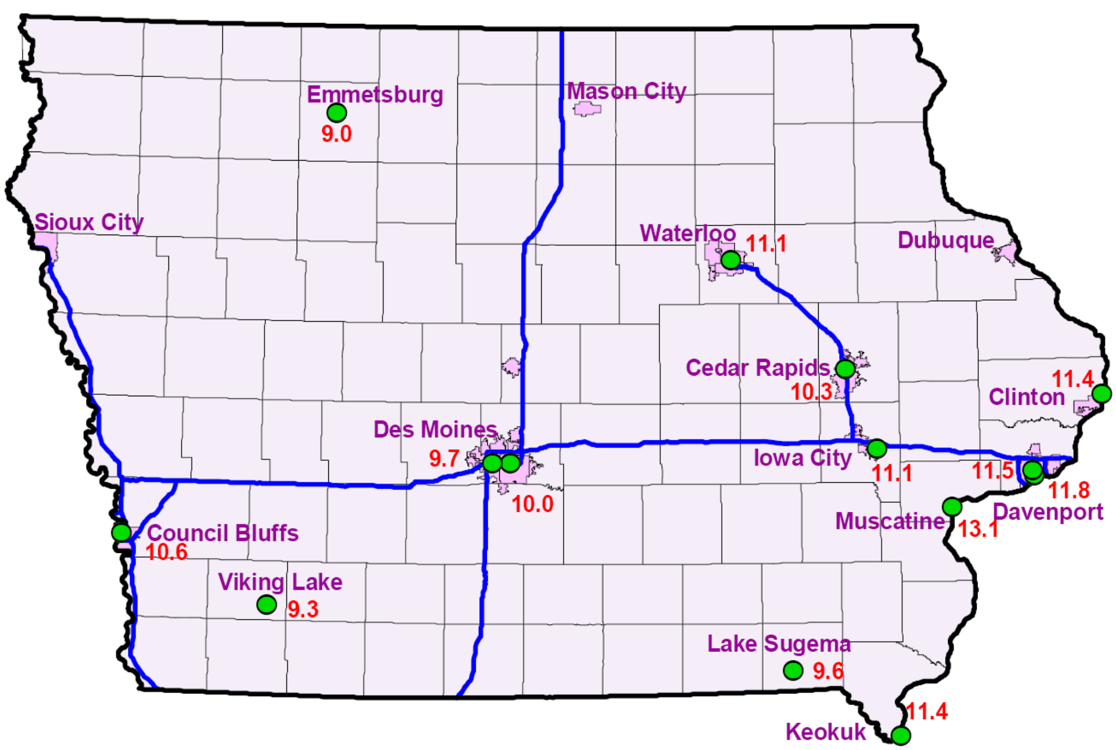
Appendix I: Design Value Maps for $PM_{2.5}$



2007-2009 $PM_{2.5}$ 24-hr Design Values ($\mu g/m^3$)



2007-2009 $PM_{2.5}$ Annual Design Values ($\mu g/m^3$)

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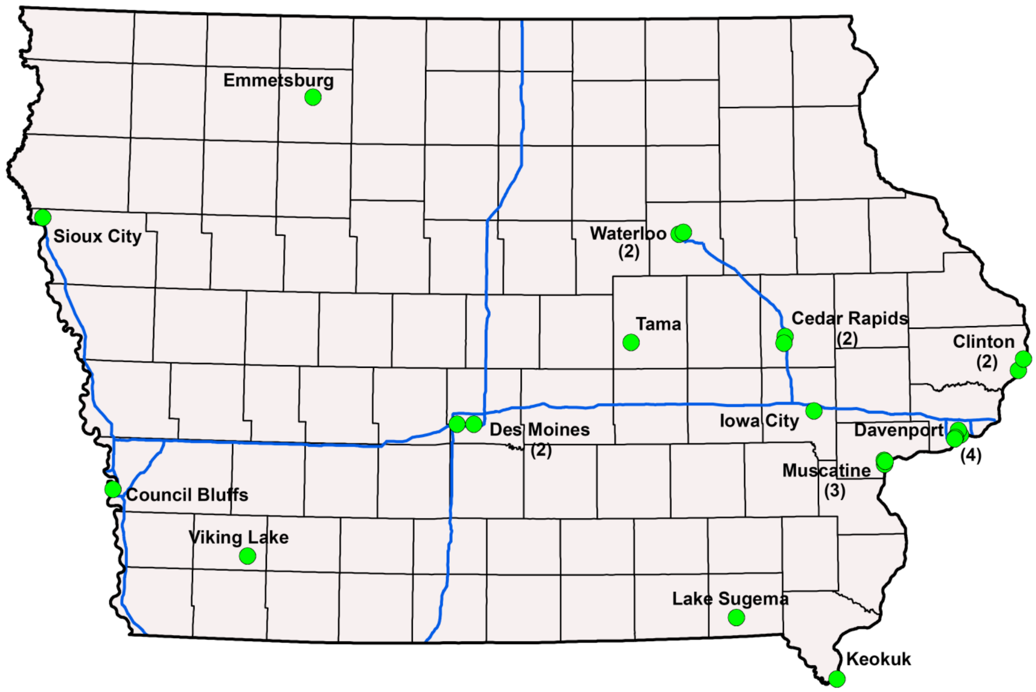
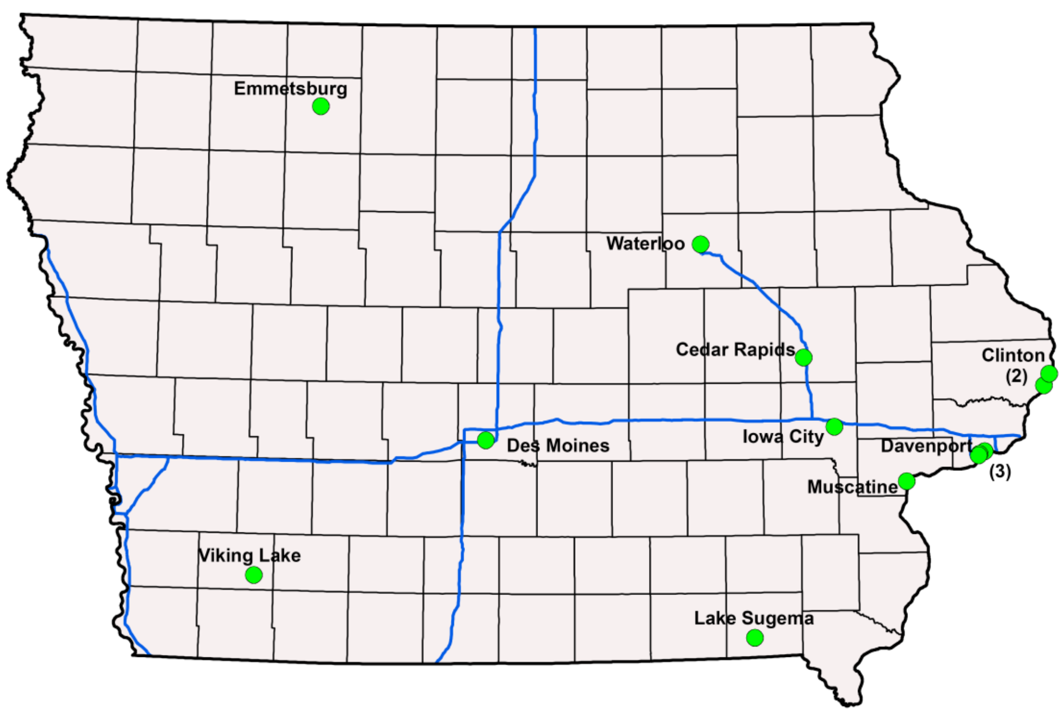
Appendix J: Iowa Ambient Air Monitoring Network Maps

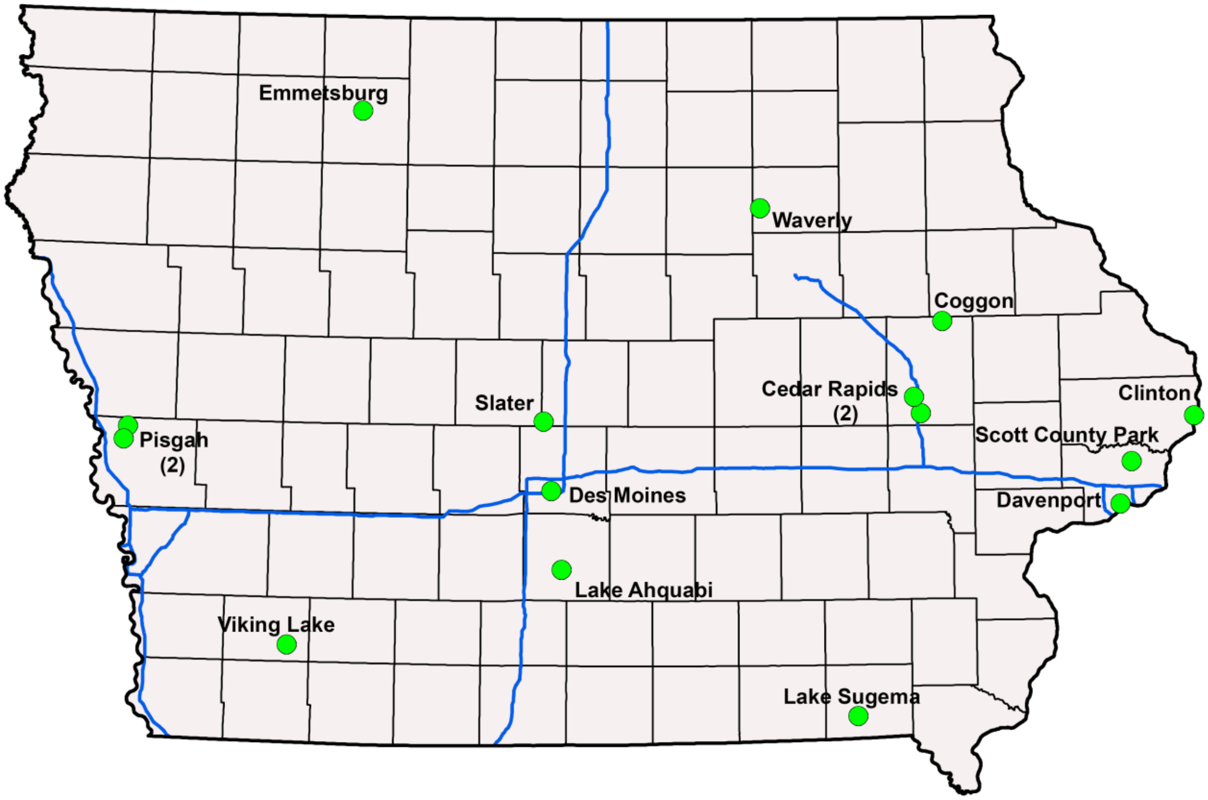
The following maps show the locations for the criteria pollutant monitors in the state of Iowa, which are current as of June 1, 2010. Non-criteria pollutant maps are also included for the continuous $PM_{2.5}$ monitoring network and the Toxics and Speciation monitoring networks.



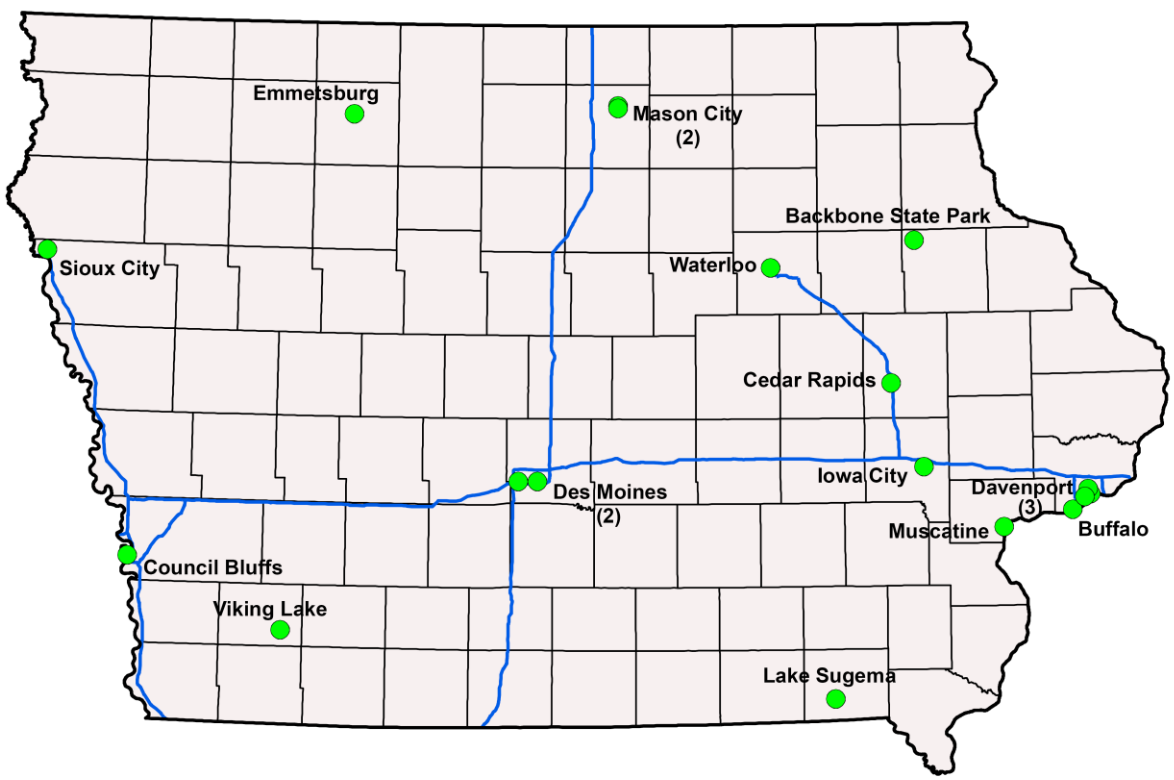
Manual $PM_{2.5}$ (FRM) Monitoring Sites



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



Ozone Monitoring Sites



PM_{10} Monitoring Sites

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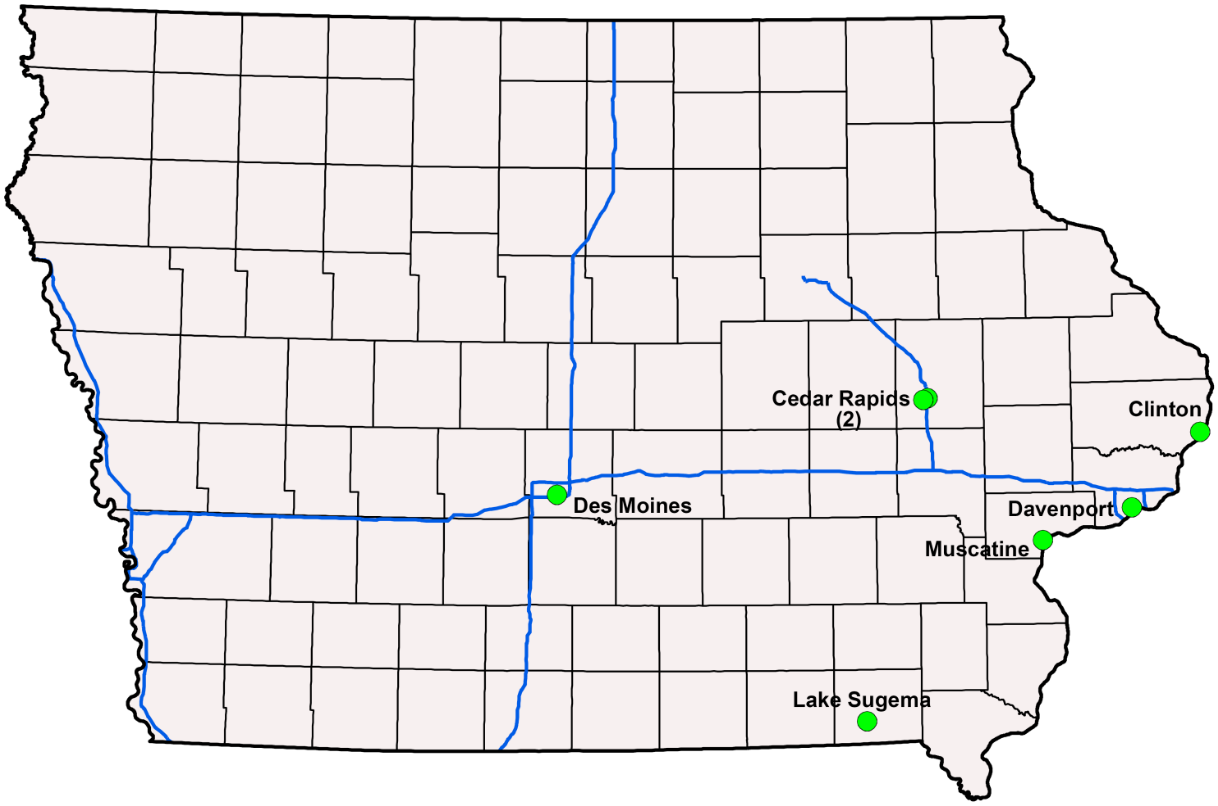
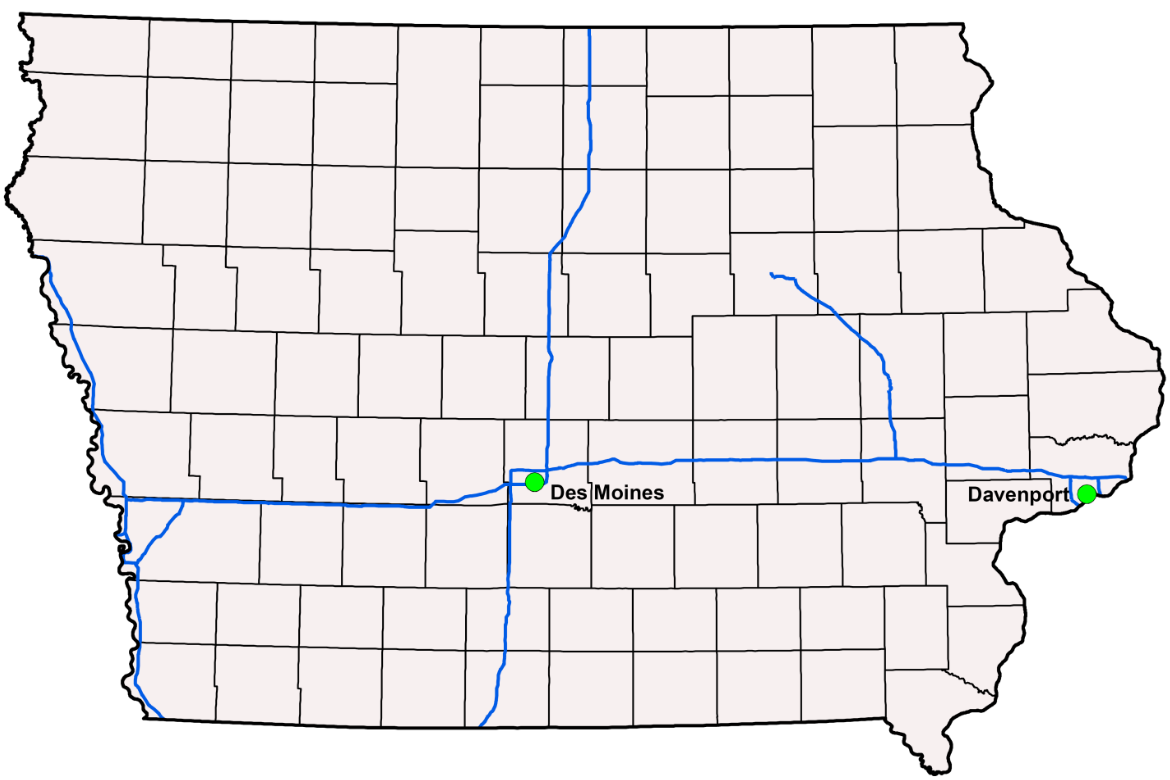


SO_2 Monitoring Sites



NO_2 Monitoring Sites

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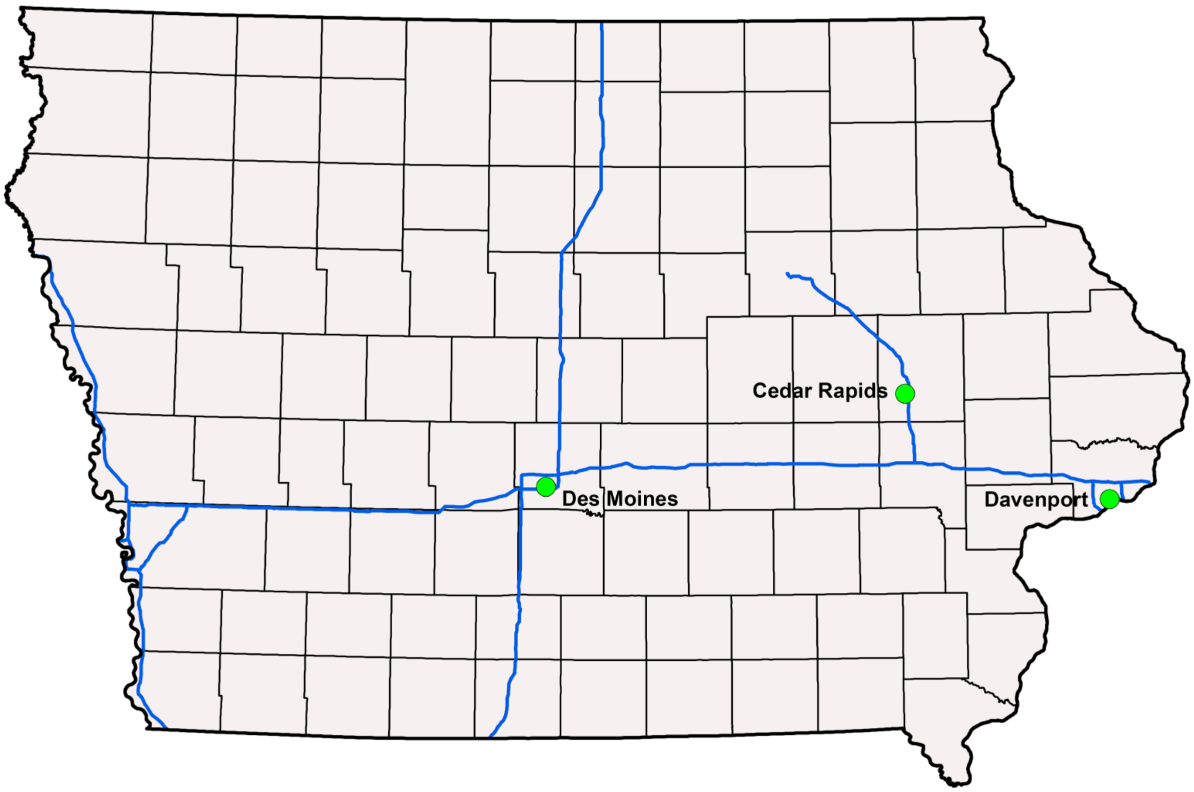
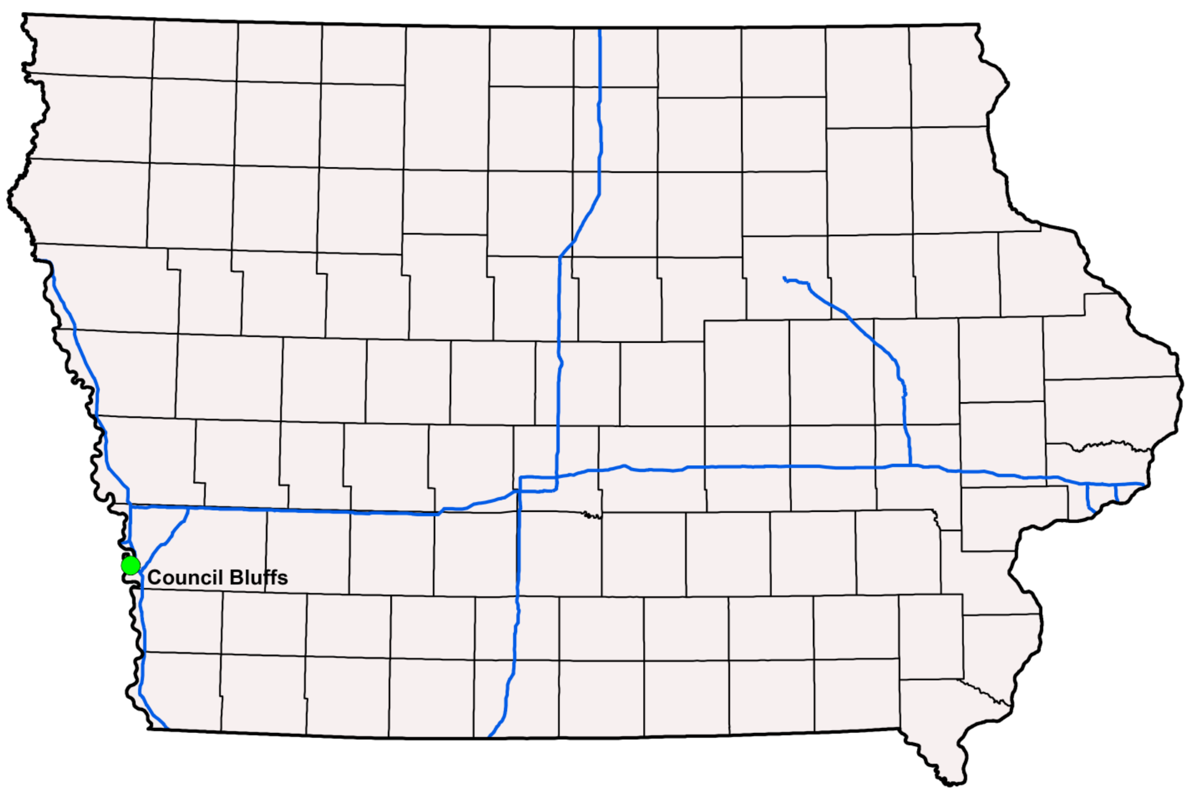


CO Monitoring Sites



Lead (Pb) Monitoring Sites

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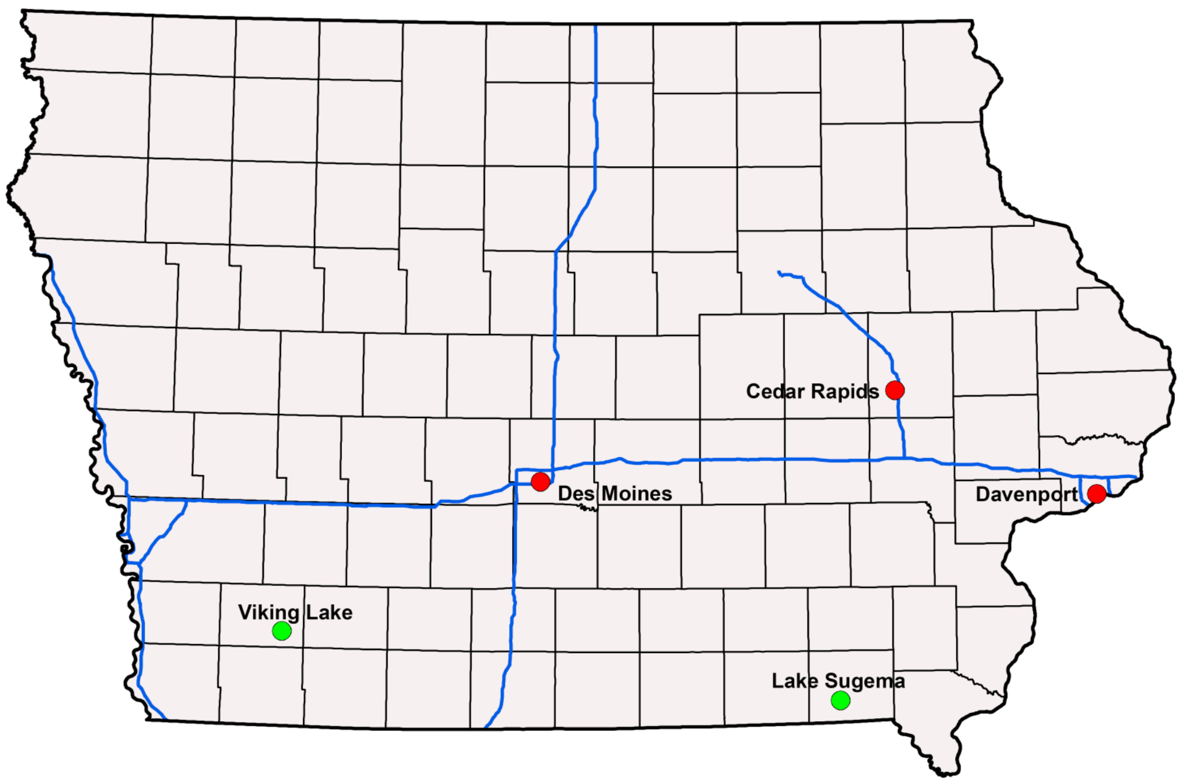
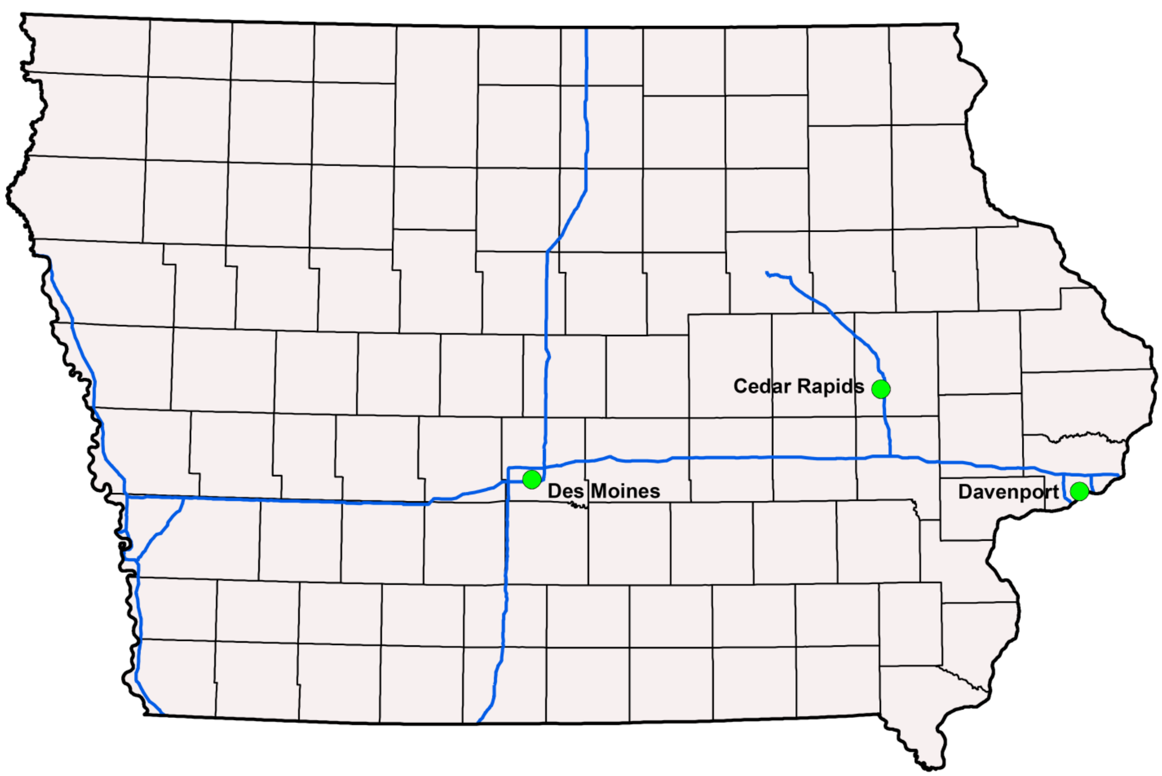


Speciation Monitors; CSN Speciation samplers are located at the red dots, IMPROVE speciation samplers are located at the green dots.



Toxics Monitoring Sites

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Appendix K: Highest PM_{10} Values in Iowa MSA's 2007-2009

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

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

MSA	2007 Max ($\mu g/m^3$)	2008 Max ($\mu g/m^3$)	2009 Max ($\mu g/m^3$)	3 Year Max ($\mu g/m^3$)	High, Medium, Low Classification
Omaha-Council Bluffs, NE-IA	167	143	140	167	Medium
Des Moines-West Des Moines, IA	63	46	53	63	Low
Davenport-Moline-Rock Island, IA-IL	119	116	119	119	Low
Cedar Rapids, IA	53	50	54	54	Low
Waterloo-Cedar Falls, IA	62	57	54	62	Low
Sioux City, IA-NE-SD	85	96	82	96	Low

PM_{10} Values in MSA's (3 year maximum)

Appendix L: 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 M: Federal Requirements for Lead Sites (Current)

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 N: Federal Requirements for Lead Sites (Proposed)

Proposed Revisions to 40 CFR Part 58*:

Section 58.10 is amended by revising paragraph (a)(4) to read as follows:

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a) * * *

(4) A plan for establishing source oriented lead monitoring sites in accordance with the requirements of appendix D to this part for lead sources emitting 1.0 tpy or greater shall be submitted to the EPA Regional Administrator no later than July 1, 2009, as part of the annual network plan required in paragraph (a)(1) of this section. The plan shall provide for the required source-oriented lead monitoring sites for lead sources emitting 1.0 tpy or greater to be operational by January 1, 2010. A plan for establishing source-oriented lead monitoring sites in accordance with the requirements of appendix D to this part for lead sources emitting greater than 0.50 tpy but less than 1.0 tpy shall be submitted to the EPA Regional Administrator no later than June 30, 2010. The plan shall provide for the required source-oriented lead monitoring sites for lead sources emitting greater than 0.50 tpy but less than 1.0 tpy to be operational by December 30, 2010.

* * * * *

3. Appendix D to Part 58 is amended as follows: a. By revising paragraph 3.(b), b. By removing and reserving paragraph 3.(c), c. By revising 4.5.(a), and d. By revising paragraph 4.5.(b).

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

3. * * *

(b) The NCore sites must measure, at a minimum, PM2.5 particle mass using continuous and integrated/filter-based samplers, speciated PM2.5, PM10–2.5 particle mass, speciated PM10–2.5, O3, SO2, CO, NO/ NOy, lead, wind speed, wind direction, relative humidity, and ambient temperature.

(c) [Reserved.]

* * * * *

4.5 * * * (a) State and, where appropriate, local agencies are required to conduct ambient air lead monitoring near lead sources which are expected to or have been shown to contribute to a maximum lead concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum lead concentration in ambient air resulting from each lead source which emits 0.50 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 lead concentration due to one lead source is expected to also be impacted by lead 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 lead 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 lead sources if the state or, where appropriate, local agency can demonstrate the lead source will not contribute to a maximum lead concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under § 58.10(d). (b) State and, where appropriate, local agencies are required to conduct non-source oriented lead monitoring at each NCore site required under paragraph 3 of this appendix.

* * * * *

*See page 69059 of the Federal Register Vol. 74, No. 249, Wednesday, December 30, 2009, available at: http://www.epa.gov/airquality/lead/fr/20091230.pdf

Appendix O: Summary of 2005 and 2008 Emissions Estimates

A list of facilities that emitted over 0.25 tpy of lead in the 2005 facility emissions estimate submitted by DNR for the 2005 NEI, EPA's 2005 NEI[1] estimate, or the 2008 DNR estimate[2] was compiled, and the table indicated below compares emissions estimates for these facilities.

Facility Name - City	2008 DNR Estimate (tons)	2005 Facility Estimate (tons)	2005 NEI EPA Estimate (tons)	2005 NEI EPA Estimate (data source)
Grain Processing Corporation - Muscatine	3.81	1.64[3]	0.19	2005 State Agency
MidAmerican - Walter Scott Jr. Energy Center - Council Bluffs	0.62	0.77	0.06	2005 EIAG EGU
Griffin Pipe Products Co. - Council Bluffs	0.58	0.69	0.69	2005 State Agency
MidAmerican - George Neal North - Sergeant Bluff	0.37	0.82	0.06	2005 EIAG EGU
MidAmerican - Louisa Station - Muscatine	0.28	0.49	0.02	2005 EIAG EGU
IPL - Lansing Generating Station - Lansing	0.26	0.21	0.04	2005 EIAG EGU
IPL - Prairie Creek Generating Station - Cedar Rapids	0.25	0.56	0.04	2005 EIAG EGU
A.Y. McDonald Manufacturing Co. Inc. - Dubuque	0.24[4]	N/A[5]	0.14	2005 TRI
Muscatine Power and Water - Muscatine	0.21	0.29	0.04	2005 EIAG EGU
Amsted Rail Co. Inc. (Griffin Wheel Co.) - Keokuk	0.18	0.48	0.48	2005 State Agency
Bloomfield Foundry, Inc. - Bloomfield	0.17	1.19[6]	0.83	2005 State Agency
Exide Technologies - Manchester	0.13[7]	N/A[8]	0.58	2005 TRI
MidAmerican - George Neal South - Sergeant Bluff	0.12	0.51	0.02	2005 EIAG EGU
IPL - Ottumwa Generating Station - Ottumwa	0.10[9]	0.47	0.02	2005 EIAG EGU
Nichols Aluminum Casting - Davenport	0.05	0.61	0.98	Risk & Tech. Rev.
Gerdau Ameristeel US Inc. - Wilton	0.02	0.39	0.39	2005 State Agency
Alcoa, Inc. - Riverdale	0.02	0.32	0.28	Risk & Tech. Rev.
Lehigh Cement Co. - Mason City	0.01	0.27	0.21	Risk & Tech. Rev.
Winegard Co. - Burlington	0.00	0.83	0.83	2005 State Agency
Crane Valve - Washington	0.00	0.00[10]	0.73	2002 NEI

[1] Available online at: http://www.epa.gov/ttn/chief/net/2005inventory.html
[2] Note: 2008 estimates may incorporate emissions from stack tests performed after 2008.
[3] DNR estimates submitted to EPA does not match EPA's emission estimate attributed to DNR.
[4] Lead emissions estimated using 2009 data.
[5] A. Y. McDonald is a Title V minor source and no facility emissions estimate was available for 2005.
[6] DNR estimates submitted to EPA does not match EPA's emission estimate attributed to DNR.
[7] Lead emissions were estimated for 2009 using stack test values and gr/dscf standards of performance for lead-acid battery manufacturing plants from 40 CFR 60.370, subpart KK.
[8] Exide Technologies is a Title V minor source and no facility emissions estimate was available for 2005.
[9] Lead emissions estimated using stack tests conducted June 2006.
[10] DNR records show Crane Valve took foundry equipment out of operation in September 2003, DNR estimates zero lead emissions since this action.

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Appendix P: Comparison of 2005 and 2008 Lead Emissions Estimates

The calculations below compare the 2005 facility estimates submitted by DNR for the 2005 NEI to 2008 Iowa DNR estimates.

<u>Grain Processing Corporation</u>
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 (2008) to be 3.81 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, Table 1.1-17. The DNR estimated lead emissions from the coal-fired boilers in 2008 using the actual coal throughput for each boiler (as reported by the facility in the 2008 emissions inventory), the heat content of the coal (as reported by the facility in an e-mail on 5/14/09), and stack test data conducted on 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.

<u>Facility 2005 Estimate</u>

- ***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*

  Lead Emissions = (32,250 tons coal)(2,000 lbs/ton)*(13,000 Btu/lb)*
  (1 MMBtu/1,000,000 Btu)(0.000507 lbs lead/MMBtu)* (1 ton/2,000 lbs)*
  = 0.21 tons of lead

- ***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*

  Lead Emissions = (32,250 tons coal)(2,000 lbs/ton)*(13,000 Btu/lb)*
  (1 MMBtu/1,000,000 Btu)(0.000507 lbs lead/MMBtu)*(1 ton/2,000 lbs)*
  = 0.21 tons of lead

- ***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*

  Lead Emissions = (29,670 tons coal)(2,000 lbs/ton)*(13,000 Btu/lb)*
  (1 MMBtu/1,000,000 Btu)(0.000507 lbs lead/MMBtu)*(1 ton/2,000 lbs)*

= 0.19 tons of lead

- ***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*

Lead Emissions = (29,670 tons coal)(2,000 lbs/ton)*(13,000 Btu/lb)**
(1 MMBtu/1,000,000 Btu)(0.000507 lbs lead/MMBtu)*(1 ton/2,000 lbs)*
= 0.19 tons of lead

- ***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*

Lead Emissions = (64,500 tons coal)(2,000 lbs/ton)*(13,000 Btu/lb)**
(1 MMBtu/1,000,000 Btu)(0.000507 lbs lead/MMBtu)*(1 ton/2,000 lbs)*
= 0.42 tons of lead

- ***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*

Lead Emissions = (64,500 tons coal)(2,000 lbs/ton)*(13,000 Btu/lb)**
(1 MMBtu/1,000,000 Btu)(0.000507 lbs lead/MMBtu)*(1 ton/2,000 lbs)*
= 0.42 tons of lead

2005 Facility Total = 1.64 tons of lead

<u>*DNR 2008 Estimate*</u>

- ***Boilers #1, #2, #3, #4, #6, and #7***
  - *Total coal throughput for the boilers venting through the stack = 273,392 tons*
  - *Heat content of the coal = 13,484 Btu heat input/lb of coal*
  - *March 4th, 2004 stack test result for lead = 0.001033 lbs of Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*

Lead Emissions = (273,392 tons of coal)(2000 lbs/ton)*(13,484 Btu heat input/lb of coal)*(MMBtu/1,000,000 Btu)*(0.001033 lbs lead/MMBtu heat input)*(1 ton/2,000 lbs)*
= 3.81 tons of lead

2008 DNR Total = 3.81 tons of lead

<u>***Walter Scott Jr. Energy Center***</u>

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 (2008) to be 0.62 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 previously reported by MidAmerican –Walter Scott Jr. Energy Center. MidAmerican – Walter Scott Jr. Energy

Center began reporting lead emissions, rather than lead compound emissions in their 2008 emissions inventory submittal.

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. The DNR estimated lead emissions from boilers #1 and #2 in 2008 using the actual throughput in 2008 and the emission factor in AP-42, Table 1.1-18. The DNR estimated lead emissions from boiler #3 in 2008 using the actual coal throughput from 2008 (as reported by the facility in the 2008 emissions inventory) and the approved stack test result conducted on June 24th, 2009. The DNR estimated lead emissions from boiler #4 in 2008 using the actual coal throughput from 2008 (as reported by the facility in the 2008 emissions inventory), the heat content of the coal (as indicated in the stack test report for boiler #4), and the approved stack test result conducted on May 9th, 2007.

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 0.00042 lbs of lead/ton of coal*

Lead Emissions = (215,918 tons coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs) = 0.04 tons of 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)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs) = 0.08 tons of 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)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs) = 0.65 tons of lead*

2005 Facility Total = 0.77 tons of lead

DNR 2008 Estimate

- ***Boiler #1***
  - *Actual throughput = 184,953 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*
  - *1 ton = 2,000 lbs*

Lead Emissions = (184,953 tons coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs) = 0.04 tons of lead*

- ***Boiler #2***
  - *Actual throughput = 299,690 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*
- *1 ton = 2,000 lbs*

Lead Emissions = (299,690 tons coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.06 tons of lead

- ***Boiler #3***
  - *Actual throughput = 3,104,163 tons of coal*
  - *June 24th, 2009 stack test result for lead = 0.0002841 lbs Pb/ton of coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (3,104,163 tons of coal)(0.0002841 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.44 tons of lead

- ***Boiler #4***
  - *Actual throughput = 3,108,251 tons of coal*
  - *Heat content of the coal = 8,503 Btu/lb of coal*
  - *May 9th, 2007 stack test result for lead = 0.000003033 lbs Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*
  - *MMBtu = 1,000000 Btu*

Lead Emissions = (3,108,251 tons coal)(2000 lbs/ton)*(8,503 Btu heat input/lb coal)*(1 MMBtu/1,000,000 Btu)*(0.000003033 lbs Pb/MMBtu heat input)*(1 ton/2,000 lbs)*
= 0.08 tons of lead

2008 DNR Total = 0.62 tons of lead

Griffin Pipe Products

The facility estimated actual lead emissions in 2005 to be 0.69 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.58 tons. Griffin Pipe Products has a cupola and a desulfurization of hot iron process for which they reported lead emissions in 2008. 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 the actual throughput from the cupola 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. The DNR estimated lead emissions from the cupola in 2008 using the actual throughput from 2008 (as reported by the facility in the 2008 emissions inventory) and the approved stack test result which was conducted March 2nd, 2010. The most recent lead performance testing results reflect the modification to the cupola off-take system from a side off-take to a 360-degree off-take system. Griffin Pipe conducted the cupola off-take system modification during the period December, 2009 to January, 2010. The DNR estimated lead emissions from the desulfurization of hot iron process in 2008 using the actual throughput from 2008 (as reported by the facility in the 2008 emissions inventory) and the stack test data conducted on March 5th, 2009. The lead result from the roof vent in the closest proximity to the desulfurization process showed an emission rate of 0.00317 lbs of lead/ton of metal. In the future, Griffin Pipe Products is proposing to install baghouse control on the cupola (EP2) and the desulfurization process (EPFG2A and EPFG2B). The addition of baghouse control to these lead emission sources will change the lead emissions characteristics from Griffin Pipe Products.

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)(0.0072 lbs lead/ton of coke)*(1 ton/2,000 lbs) = 0.69 tons of 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 2008 Estimate

- ***Cupola***
  - *Actual throughput = 84,325 tons of metal*
  - *March 2nd, 2010 lead stack test value = 0.011 lbs lead/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (84,325 tons of metal)(0.011 lbs of lead/ton of metal)*(1 ton/2,000 lbs) = 0.46 tons of lead*

- ***Desulfurization of Hot Iron Process***
  - *Actual throughput = 61,311 tons of metal*
  - *March 5th, 2009 lead stack test value = 0.003968 lbs lead/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (61,311 tons of metal)(0.0040 lbs of lead/ton of metal)*(1 ton/2,000 lbs) = 0.12 tons of lead*

2008 DNR Total = 0.58 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 (2008) to be 0.37 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 previously reported by MidAmerican Energy Co – George Neal North. MidAmerican Energy Co – George Neal North began reporting lead emissions, rather than lead compound emissions in their 2008 emissions inventory submittal.

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 boilers #1, #2, and #3 in 2008 using the actual coal throughput from 2008 (as reported by the facility in the 2008 emissions inventory), the heat content of the coal (as indicated in the stack test reports for each boiler stack), and the approved stack test results which were conducted in December 2008, January 2009, and January 2010.

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)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.12 tons of 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)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.23 tons of 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)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.47 tons of lead

2005 Facility Total = 0.82 tons of lead

DNR 2008 Estimate

- ***Boiler #1***
  - *Actual throughput = 565,793 tons of coal*
  - *Heat content of the coal = 8,603 Btu/lb of coal*
  - *January 13th, 2010 stack test result for lead = 0.00001877 lbs Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*
  - *MMBtu = 1,000000 Btu*

Lead Emissions = (565,793 tons coal)(2,000 lbs/ton)*(8,603 Btu heat input/lb coal)*(MMBtu/1,000,000 Btu)*(0.00001877 lbs Pb/MMBtu heat input)*(1 ton/2,000 lbs)*
= 0.09 tons of lead

- ***Boiler #2***
  - *Actual throughput = 1,116,058 tons of coal*
  - *Heat content of the coal = 8,608 Btu/lb of coal*
  - *December 4th & 5th, 2008 stack test result for lead = 0.000008806 lbs Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*
  - *MMBtu = 1,000000 Btu*

Lead Emissions = (1,116,058 tons coal)(2,000 lbs/ton)*(8,608 Btu heat input/lb coal)*(MMBtu/1,000,000 Btu)*(0.000008806 lbs Pb/MMBtu heat input)*(1 ton/2,000 lbs)*
= 0.08 tons of lead

- ***Boiler #3***
  - *Actual throughput = 2,000,196 tons of coal*
  - *Heat content of the coal = 8,586 Btu/lb of coal*
  - *January 19th, 2009 stack test result for lead = 0.00001169 lbs Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*
  - *MMBtu = 1,000000 Btu*

Lead Emissions = (2,000,196 tons coal)(2,000 lbs/ton)*(8,586 Btu heat input/lb coal)*(MMBtu/1,000,000 Btu)*(0.00001169 lbs Pb/MMBtu heat input)*(1 ton/2,000 lbs)*

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= 0.20 tons of lead

2008 DNR Total = 0.37 tons of lead

<u>MidAmerican Energy Co – Louisa Station</u>

The facility estimated actual lead emissions in 2005 to be 0.49 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.28 tons. MidAmerican Energy Co. – Louisa 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 previously reported by MidAmerican Energy Co – Louisa. MidAmerican Energy Co – Louisa began reporting lead emissions, rather than lead compound emissions in their 2008 emissions inventory submittal.

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 boiler #1 in 2008 using the actual coal throughput from 2008 (as reported by the facility in the 2008 emissions inventory), the heat content of the coal (as indicated in the stack test report for the utility boiler), and the approved stack test result which was conducted January 19th, 2010.

<u>*Facility 2005 Estimate*</u>

- ***Boiler #1***
  - *Actual throughput = 2,343,667 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*
  - *1 ton = 2,000 lbs*

Lead Emissions = (2,343,667 tons coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.49 tons of lead

2005 Facility Total = 0.49 tons of lead

<u>*DNR 2008 Estimate*</u>

- ***Boiler #1***
  - *Actual throughput = 3,053,469 tons of coal*
  - *Heat content of the coal = 8,400 Btu/lb of coal*
  - *January 19th, 2010 stack test result for lead = 0.00001075 lbs Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*
  - *MMBtu = 1,000000 Btu*

Lead Emissions = (3,053,469 tons coal)(2000 lbs/ton)*(8,400 Btu heat input/lb coal)*(1 MMBtu/1,000,000 Btu)*(0.00001075 lbs Pb/MMBtu heat input)*(1 ton/2,000 lbs)*
= 0.28 tons of lead

2008 DNR Total = 0.28 tons of lead

<u>IPL – Lansing Generating Station</u>

The facility estimated actual lead emissions in 2005 to be 0.21 tons. The DNR estimated actual lead emissions for purposes of the site specific source monitoring threshold from their most recent emissions inventory (2008) to be 0.26 tons. It should be noted that IPL – Lansing Generating Station estimated 2008 lead emissions from boiler #4 using a stack test conducted on May of 2006. When the stack test on boiler #4 occurred in May 2006, an electro-static precipitator was controlling emissions. Since that time, the electro-static precipitator has been removed and replaced by activated carbon injection with a baghouse. While it is DNR's belief that the emissions from the stack test performed in 2006 should be comparable to emissions from the newly configured boiler, DNR conservatively estimated lead emissions using the lead emission factor from AP-42, Table 1.1-18 for pulverized coal dry bottom boilers. IPL – Lansing Generating Station has four coal-fired boilers that may also operate on fuel-oil. The facility has been consistent with reporting lead emissions only from the coal-fired boilers' stacks.

The facility estimated lead emissions from their four coal-fired boilers in 2005 using actual throughput information and emission factors from AP-42, Table 1.1-18 for pulverized coal dry bottom boilers. The DNR estimated lead emissions from the four coal-fired boilers in 2008 using the actual throughput in 2008 and the emission factors from AP-42, Table 1.1-18 for pulverized coal dry bottom boilers and AP-42, Table 1.3-10 for distillate fuel oil combustion.

<u>*Facility 2005 Estimate*</u>

- ***Boiler #1 (Bituminous Coal Combustion)***
    - *Actual throughput = 365.70 tons of bituminous coal*
    - *FIRE lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of bituminous coal*
    - *1 ton = 2,000 lbs*

  Lead Emissions = (365.70 tons of bituminous coal)(0.00042 lbs lead/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
  = 0.00 tons of lead

- ***Boiler #2 (Coal Combustion)***
    - *Actual throughput = 3,607.30 tons of coal*
    - *FIRE lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of coal*
    - *1 ton = 2,000 lbs*

  Lead Emissions = (3,607.30 tons of coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
  = 0.00 tons of lead

- ***Boiler #3 (Coal Combustion)***
    - *Actual throughput = 86,096.40 tons of coal*
    - *FIRE lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of coal*
    - *1 ton = 2,000 lbs*

  Lead Emissions = (86,096.40 tons of coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
  = 0.02 tons of lead

- ***Boiler #4 (Sub bituminous Coal Combustion)***
    - *Actual throughput = 908,064.41 tons of sub bituminous coal*
    - *FIRE lead emission factor for sub bituminous coal combustion = 0.00042 lbs of lead/ton of sub bituminous coal*
    - *1 ton = 2,000 lbs*

  Lead Emissions = (928,064.41 tons of sub bituminous coal)(0.00042 lbs lead/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
  = 0.19 tons of lead

2005 Facility Total = 0.21 tons of lead

<u>*DNR 2008 Estimate*</u>

- ***Boiler #1 (Bituminous Coal Combustion)***

- *Actual throughput = 332 tons of bituminous coal*
- *AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of bituminous coal*
- *1 ton = 2,000 lbs*

Lead Emissions = (332 tons of bituminous coal)(0.00042 lbs Pb/ton of bituminous coal)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #1 (Fuel Oil #2 Combustion)***
  - *Actual throughput = 5.47 1,000gal of fuel oil #2*
  - *Heat content of fuel oil #2 = 0.00014 Trillion Btu/1,000gal*
  - *AP-42 Table 1.3-10 lead emission factor for distillate fuel oil combustion = 9 lbs of lead/trillion Btu heat input*
  - *1 ton = 2,000 lbs*

Lead Emissions = (5.47 1,000gal of fuel oil #2)(0.00014 Trillion Btu/1,000gal)*(9 lbs lead/Trillion Btu)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #2 (Coal Combustion)***
  - *Actual throughput = 656 tons of bituminous coal*
  - *AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (656 tons of coal)(0.00042 lbs Pb/ton of coal)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #2 (Fuel Oil #2 Combustion)***
  - *Actual throughput = 8.16 1,000gal of fuel oil #2*
  - *Heat content of fuel oil #2 = 0.00014 Trillion Btu/1,000gal*
  - *AP-42 Table 1.3-10 lead emission factor for distillate fuel oil combustion = 9 lbs of lead/trillion Btu heat input*
  - *1 ton = 2,000 lbs*

Lead Emissions = (8.16 1,000gal of fuel oil #2)(0.00014 Trillion Btu/1,000gal)*(9 lbs lead/Trillion Btu)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #3 (Coal Combustion)***
  - *Actual throughput = 96,207.10 tons of bituminous coal*
  - *AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (96,207.10 tons of coal)(0.00042 lbs Pb/ton of coal)*(1 ton/2,000 lbs)*
= 0.02 tons of lead

- ***Boiler #3 (Fuel Oil #2 Combustion)***
  - *Actual throughput = 72.81 1,000gal of fuel oil #2*
  - *Heat content of fuel oil #2 = 0.00014 Trillion Btu/1,000gal*

- *AP-42 Table 1.3-10 lead emission factor for distillate fuel oil combustion = 9 lbs of lead/trillion Btu heat input*
- *1 ton = 2,000 lbs*

Lead Emissions = (72.81 1,000gal of fuel oil #2)(0.00014 Trillion Btu/1,000gal)*(9 lbs lead/Trillion Btu)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #4 (Sub Bituminous Coal Combustion)***
  - *Actual throughput = 1,151,381..45 tons of sub bituminous coal*
  - *AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom boilers = 0.00042 lbs of lead/ton of bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (1,151,381.45 tons of sub bituminous coal)(0.00042 lbs Pb/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
= 0.24 tons of lead

- ***Boiler #4 (Fuel Oil #2 Combustion)***
  - *Actual throughput = 85.57 1,000gal of fuel oil #2*
  - *Heat content of fuel oil #2 = 0.00014 Trillion Btu/1,000gal*
  - *AP-42 Table 1.3-10 lead emission factor for distillate fuel oil combustion = 9 lbs of lead/trillion Btu heat input*
  - *1 ton = 2,000 lbs*

Lead Emissions = (85.57 1,000gal of fuel oil #2)(0.00014 Trillion Btu/1,000gal)*(9 lbs lead/Trillion Btu)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

2008 DNR Total = 0.26 tons of lead

<u>IPL – Prairie Creek Generating Station</u>

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 (2008) to be 0.25 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. Due to flooding in the Cedar Rapids area during 2008, the facility shut down operation of the coal-fired boilers after June 11th, 2008. The coal-fired boilers did not start back up until February 2009.

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 2008 using the actual throughput in 2008, a heating value of 11,500 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 2008 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 in April of 2005 and August of 2006 for their own purposes, which was not observed by the DNR.

<u>Facility 2005 Estimate</u>

- ***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

<u>*DNR 2008 Estimate*</u>

- ***Boiler #1***
    - *Hours of operation of the stack = 3,276 hours*
    - *April 26th, 2005 stack test result for lead = 0.0017 lbs of lead/hour*
    - *1 ton = 2,000 lbs*

  Lead Emissions = (3,276 hours)(0.0017 lbs of lead/hour)*(1 ton/2,000 lbs)*
  = 0.003 tons of lead

- ***Boiler #2***
    - *Hours of operation of the stack = 3,619 hours*
    - *April 27th & 28th, 2005 stack test result for lead = 0.0033 lbs of lead/hour*
    - *1 ton = 2,000 lbs*

  Lead Emissions = (3,619 hours)(0.0033 lbs of lead/hour)*(1 ton/2,000 lbs)*
  = 0.006 tons of lead

- ***Boiler #3***
    - *Actual throughput = 61,181 tons of coal*
    - *Heating value of coal = 11,500 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%*
    - *1 ton = 2,000 lbs*
    - *1 MMBtu = 1,000,000 Btu*

  Lead Emissions = (61,181 tons of coal)(2,000 lbs/ton)*(11,500 Btu/lb)*(1 MMBtu/1,000,000 Btu)*(0.000507 lbs lead/MMBtu)*(1-0.75)*(1 ton/2,000 lbs)*
  = 0.090 tons of lead

- ***Boiler #4***
    - *Hours of operation of the stack = 1,620 hours*
    - *August 22nd, 2006 stack test result for lead =0.1815 lbs of lead/hour*
    - *1 ton = 2,000 lbs*

Lead Emissions = (1,620 hours)(0.1815 lbs of lead/hour)*(1 ton/2,000 lbs)*
= 0.150 tons of lead

2008 DNR Total = 0.25 tons of lead

<u>A.Y. McDonald Manufacturing Company</u>
The DNR estimated actual lead emissions in 2006 to be 0.42 tons. The 2005 NEI version 2, prepared by EPA, estimated actual lead emissions in 2005 to be 0.14 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2009) to be 0.24 tons. A.Y. McDonald Manufacturing in Dubuque is a manufacturer of waterworks brass, plumbing valves, pumps and water systems and high pressure gas valves and meter bars. The facility has a brass foundry and a machine shop. The brass foundry melts and pours castings for the various products and has multiple stacks venting lead emissions from electric arc furnaces, casting, cooling, grinding, cleaning, shakeout, and general foundry processes.

The DNR estimated lead emissions at the facility in 2006 using a variety of emission factors including PM stack test values with corresponding dust analyses for lead, emission factors from the Iron and Steel Foundry NESHAP background document, and personal air monitoring data. These emission factors were used in conjunction with the 2006 actual throughput data to estimate lead emissions from 2006. The DNR estimated lead emissions in 2009 using a variety of emission factors including PM stack test values with corresponding dust analyses for lead, emission factors from the Iron and Steel Foundry NESHAP background document, and personal air monitoring data. These emission factors were used in conjunction with the 2009 actual throughput data to estimate lead emissions from 2009.

<u>DNR 2006 Estimate</u>

- ***Casting, Grinding, and Cleaning***
  - *Actual throughput = 4,160 hours of operation*
  - *December 5th, 1995 stack test value for PM = 1.42 lbs of PM/hr*
  - *December 2008 dust analysis lead content percent by weight = 0.03096 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

Lead Emissions = (4,160 hrs)(1.42 lbs PM/hr)*(0.03096 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.09 tons of lead

- ***Castings Cooling (Turntables 1-3)***
  - *Actual throughput = 13,944.93 tons of metal*
  - *Iron and Steel Foundry NESHAP background document value for PM = 0.29 lbs of PM/ton of metal*
  - *Lead content percent by weight = 0.07 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

Lead Emissions = (13,944.93 tons metal)(0.29 lbs PM/ton of metal)*(0.07 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.14 tons of lead

- ***General Foundry Exhaust***
  - *Actual throughput = 27,830.40 MMcf of foundry exhaust*
  - *Personal air monitoring data for lead = 0.0046 lbs of lead/MMcf of foundry exhaust*
  - *1 ton = 2,000 lbs*

Lead Emissions = (27,830.40 MMcf of foundry exhaust)(0.0046 lbs of lead/MMcf of foundry exhaust)*(1 ton/2,000 lbs)*
= 0.06 tons of lead

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- ***General Machining Exhaust***
    - *Actual throughput = 80,496 MMcf of machining exhaust*
    - *Personal air monitoring data for lead = 0.000687 lbs of lead/MMcf of machining exhaust*
    - *1 ton = 2,000 lbs*

Lead Emissions = (80,496 MMcf of machining exhaust)(0.000687 lbs of lead/MMcf of foundry exhaust)*(1 ton/2,000 lbs)*
= 0.03 tons of lead

- ***All Shakeout & Castings Cooling (Turntable 4)***
    - *Actual throughput = 4,160 hours of operation*
    - *December 3rd, 1998 stack test value for PM = 0.678 lbs of PM/hr*
    - *December 2008 dust analysis lead content percent by weight = 0.00776 lbs Pb/lb PM*
    - *1 ton = 2,000 lbs*

Lead Emissions = (4,160 hrs)(0.678 lbs PM/hr)*(0.00776 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

- ***Melting Brass Ingot and Mold Pouring***
    - *Actual throughput = 4,068 hours of operation*
    - *December 3rd, 1998 stack test value for PM = 0.725 lbs of PM/hr*
    - *December 2008 dust analysis lead content percent by weight = 0.05971 lbs Pb/lb PM*
    - *1 ton = 2,000 lbs*

Lead Emissions = (4,068 hrs)(0.725 lbs PM/hr)*(0.05971 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.09 tons of lead

DNR 2006 Total = 0.42 tons of lead

<u>*DNR 2009 Estimate*</u>

- ***Casting, Grinding, and Cleaning***
    - *Actual throughput = 3,593 hours of operation*
    - *December 5th, 1995 stack test value for PM = 1.42 lbs of PM/hr*
    - *April 2009 dust analysis lead content percent by weight = 0.03781 lbs Pb/lb PM*
    - *1 ton = 2,000 lbs*

Lead Emissions = (3,593 hours of operation)(1.42 lbs PM/hr)*(0.03781 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.10 tons of lead

- ***Castings Cooling (Turntables 1-3)***
    - *Actual throughput = 3,791.63 tons of castings*
    - *Iron and Steel Foundry NESHAP background document value for PM = 0.29 lbs of PM/ton of metal*
    - *DNR estimated the lead content in the casting cooling process to be the same as the lead content indicated in the dust analysis for the induction furnaces baghouse*
    - *April 2009 dust analysis lead content percent by weight = 0.06442 lbs Pb/lb PM*
    - *1 ton = 2,000 lbs*

Lead Emissions = (3,791.63 tons of castings)(0.29 lbs PM/ton of castings)*(0.06442 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.04 tons of lead

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- ***General Foundry Exhaust***
  - *Actual throughput = 9,408 MMcf of foundry exhaust*
  - *Personal air monitoring data for lead = 0.0046 lbs of lead/MMcf of foundry exhaust*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (9,408 MMcf of foundry exhaust)(0.0046 lbs of lead/MMcf of foundry exhaust)*(1 ton/2,000 lbs)*
  = 0.02 tons of lead

- ***General Machining Exhaust***
  - *Actual throughput = 40,454 MMcf of machining exhaust*
  - *Personal air monitoring data for lead = 0.000687 lbs of lead/MMcf of machining exhaust*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (40,454 MMcf of machining exhaust)(0.000687 lbs of lead/MMcf of foundry exhaust)*(1 ton/2,000 lbs)*
  = 0.01 tons of lead

- ***All Shakeout & Castings Cooling (Turntable 4)***
  - *Actual throughput = 5,055.5 tons of castings*
  - *Adjustment (to account for total particulate (front half)) to December 3rd, 1998 stack test value for PM10 = 0.0371 lbs of PM/ton of castings*
  - *April 2009 dust analysis lead content percent by weight = 0.00858 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (5,055.5 tons of castings)(0.0371 lbs PM/ton of castings)*(0.00858 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
  = 0.00 tons of lead

- ***Melting Brass Ingot and Mold Pouring***
  - *Actual throughput = 3,136 hours of operation*
  - *December 3rd, 1998 stack test value for PM = 0.725 lbs of PM/hr*
  - *April 2009 dust analysis lead content percent by weight = 0.06442 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (3,136 hours of operation)(0.725 lbs PM/hr)*(0.06442 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
  = 0.07 tons of lead

2009 DNR Total = 0.24 tons of lead

Muscatine Power & Water

The facility estimated actual lead emissions in 2005 to be 0.29 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.21 tons. Muscatine Power & Water has three coal-fired boilers. The facility has been consistent with reporting lead emissions only from the coal-fired boilers' stacks. The Unit 7 boiler has the ability to burn bituminous coal, sub bituminous coal, and natural gas. The Unit 8 boiler has the ability to burn bituminous coal, sub bituminous coal, natural gas, and waste solvents. The Unit 9 boiler has the ability to burn bituminous coal, sub bituminous coal, and fuel oil.

The facility estimated lead emissions from their three coal-fired boilers in 2005 using actual throughput information and emission factors from FIRE. The DNR estimated lead emissions from the three coal-fired boilers in 2008 using the actual throughputs in 2008 (as reported by the facility in the 2008 emissions inventory), emission factors from AP-42, Tables 1.3-10, 1.1-17, and 1.1-18, a heating value of 13,000 Btu/lb for the coal for the Unit 7 boiler, and the December 21st, 2009 stack test for the Unit 9 boiler.

<u>*Facility 2005 Estimate*</u>

- ***Unit 7 Boiler (Sub bituminous Coal Combustion)***
  - *Actual throughput = 82,138.05 tons of sub bituminous coal*
  - *FIRE lead emission factor for sub bituminous coal combustion = 0.000507 lbs of lead/ton of sub bituminous coal*
  - *Approximate heat content of sub bituminous coal = 9,600 Btu/lb*
  - *Control efficiency of electro-static precipitator = 85%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (82,138.05 tons of sub bituminous coal)(2,000 lbs/ton)*(9,600 Btu heat input/lb sub bituminous coal)*(1 MMBtu/1,000000 Btu)*(0.000507 lbs Pb/MMBtu heat input)*(1-0.85)*(1 ton/2,000 lbs)*
= 0.06 tons of lead

- ***Unit 8 Boiler (Sub bituminous Coal Combustion)***
  - *Actual throughput = 363,574.71 tons of sub bituminous coal*
  - *FIRE lead emission factor for sub bituminous coal combustion = 0.00042 lbs of lead/ton of sub bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (363,574.71 tons of sub bituminous coal)(0.00042 lbs lead/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
= 0.08 tons of lead

- ***Unit 8 Boiler (Bituminous Coal Combustion)***
  - *Actual throughput = 25.95 tons of bituminous coal*
  - *FIRE lead emission factor for bituminous coal combustion = 0.00042 lbs of lead/ton of bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (25.95 tons of bituminous coal)(0.00042 lbs lead/ton of bituminous coal)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Unit 8 Boiler (Natural Gas Combustion)***
  - *Actual throughput = 13.08 MMcf of natural gas*
  - *FIRE lead emission factor for natural gas combustion = 0.0005 lbs of lead/MMcf of natural gas*
  - *1 ton = 2,000 lbs*

Lead Emissions = (13.08 MMcf of natural gas)(0.0005 lbs lead/MMcf of natural gas)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Unit 9 Boiler (Sub bituminous Coal Combustion)***
  - *Actual throughput = 695,061 tons of sub bituminous coal*
  - *FIRE lead emission factor for sub bituminous coal combustion = 0.00042 lbs of lead/ton of sub bituminous coal*
  - *1 ton = 2,000 lbs*

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Lead Emissions = (695,061 tons of sub bituminous coal)(0.00042 lbs lead/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
= 0.15 tons of lead

- ***Unit 9 Boiler (Fuel Oil Combustion)***
  - *Actual throughput = 48.43 1,000gal of fuel oil*
  - *FIRE lead emission factor for fuel oil combustion = 0.000009 lbs of lead/MMBtu heat input*
  - *Heat content of fuel oil = 140 MMBtu/1,000gal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (48.43 1,000gal of fuel oil)(140 MMBtu/1,000gal)*(0.000009 lbs of lead/MMBtu heat input)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

2005 Facility Total = 0.29 tons of lead

<u>DNR 2008 Estimate</u>

- ***Unit 7 Boiler (Sub bituminous Coal Combustion)***
  - *Actual throughput = 90,630.51 tons of sub bituminous coal*
  - *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 = 85%*
  - *Approximate heat content of sub bituminous coal = 13,000 Btu/lb*
  - *1 ton = 2,000 lbs*

Lead Emissions = (90,630.51 tons of sub bituminous coal)(2,000 lbs/ton)*(13,000 Btu heat input/lb sub bituminous coal)*(1 MMBtu/1,000000 Btu)*(0.000507 lbs Pb/MMBtu heat input)*(1-0.85)*(1 ton/2,000 lbs)*
= 0.09 tons of lead

- ***Unit 8 Boiler (Sub bituminous Coal Combustion)***
  - *Actual throughput = 341,891.64 tons of sub bituminous coal*
  - *AP-42 Table 1.1-18 lead emission factor for coal-fired cyclone boilers = 0.00042 lbs of lead/ton of sub bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (341,891.641 tons of sub bituminous coal)(0.00042 lbs lead/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
= 0.07 tons of lead

- ***Unit 8 Boiler (Bituminous Coal Combustion)***
  - *Actual throughput = 5,729.11 tons of bituminous coal*
  - *AP-42 Table 1.1-18 lead emission factor for coal-fired cyclone boilers = 0.00042 lbs of lead/ton of bituminous coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (5729.11 tons of bituminous coal)(0.00042 lbs lead/ton of bituminous coal)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Unit 8 Boiler (Natural Gas Combustion)***
  - *Actual throughput = 44.72 MMcf of natural gas*

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- *AP-42 Table 1.4-2 lead emission factor for natural gas combustion = 0.0005 lbs of lead/MMcf of natural gas*
- *1 ton = 2,000 lbs*

Lead Emissions = (44.72 MMcf of natural gas)(0.0005 lbs lead/MMcf of natural gas)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Unit 9 Boiler (Sub bituminous Coal Combustion)***
  - *Actual throughput = 709,640 tons of sub bituminous coal*
  - *December 21st, 2009 stack test result for lead = 0.0001106 lbs Pb/ton of coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (709,640 tons sub bituminous coal)(0.0001106 lbs Pb/ton of sub bituminous coal)*(1 ton/2,000 lbs)*
= 0.04 tons of lead

- ***Unit 9 Boiler (Fuel Oil Combustion)***
  - *Actual throughput = 54.88 1,000gal of fuel oil*
  - *AP-42 Table 1.3-10 lead emission factor for fuel oil combustion = 9 lbs of lead/Trillion Btu heat input*
  - *Heat content of fuel oil = .00014 Trillion Btu/1,000gal*
  - *1 ton = 2,000 lbs*
  - *Control efficiency for electro-static precipitator = 85%*

Lead Emissions = (54.88 1,000gal of fuel oil)(.00014 Trillion Btu/1,000gal)*(9 lbs of lead/Trillion Btu heat input)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

2008 DNR Total = 0.21 tons of lead

<u>Amsted Rail Company, Inc. (Formerly Griffin Wheel Company)</u>
The facility estimated actual lead emissions in 2005 to be 0.48 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.18 tons. Amsted Rail Company has three electric arc furnaces, along with pouring and cooling processes. The emissions from the three electric arc furnaces are routed through a controlled (baghouse) emission point. In addition, some of the emissions from the three electric arc furnaces escape the building through a series of roof vents. Historically, the facility has been consistent with reporting lead emissions from the three electric arc furnaces but has not reported lead emissions from the pouring and cooling processes.

The facility estimated lead emissions from the controlled (baghouse) electric arc furnaces stack in 2005 using the actual throughput, a stack test value from 2005 for PM, and a dust analysis from 2005 which included lead content by weight. The un-captured (escaping through roof vents) electric arc furnaces emissions were calculated by the facility using the actual throughput, the PM emission factor in AP-42, Table 12.13-2 for an electric arc furnace, and a dust analysis which included lead content by weight. The facility estimated that 5% of the emissions being created are emitted through the roof vents. The facility did not include an actual lead emissions estimate for the pouring and cooling processes in 2005. The DNR estimated lead emissions from the three electric arc furnaces in 2008 using the actual throughput, a stack test value from 2008 for PM, and the average of two dust analysis conducted in 2008 for lead. The DNR estimated the un-captured (escaping through roof vents) electric arc furnaces emissions in 2008 by using the actual throughput, the PM emission factor in AP-42, Table 12.5-1 for charging, tapping, and slagging uncontrolled emissions escaping the roof monitor, and the average of two dust analysis conducted in 2008 for lead. The DNR estimated un-captured electric arc furnaces emissions (back charging, etc.) for lead assuming that these un-captured episodes occur for 7 minutes of every hour based on estimates provided by the facility. The DNR estimated lead emissions from the pouring and cooling processes using actual throughput data along with lead emission factors found in the Iron and Steel NESHAP background document, CERP Study.

<u>*Facility 2005 Estimate*</u>

- ***Electric Arc Furnaces (Baghouse Stack)***
  - *Actual throughput = 218,457 tons of metal melted*
  - *July 14th, 2005 stack test value for PM = 0.11 lbs of PM/ton of metal melted*
  - *Lead content percent by weight = 0.00572 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (218,457 tons metal melted)(0.11 lbs PM/ton of metal melted)*(0.00572 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
  = 0.07 tons of lead

- ***Electric Arc Furnaces (Roof Vents)***
  - *Actual throughput = 218,457 tons of metal melted*
  - *AP-42 Table 12.13-2 PM emission factor for an electric arc furnace at a steel foundry = 13 lbs of PM/ton of metal melted*
  - *Percent of un-captured emissions from electric arc furnaces being emitted through the roof vents = 5%*
  - *Lead content percent by weight = 0.00572 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (218,457 tons metal melted)(13 lbs PM/ton of metal melted)*(0.05)*(0.00572 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
  = 0.41 tons of lead

- ***Pouring (Un-captured) Process***
  - *The facility did not estimate lead emissions for this process in 2005*

- ***Cooling (Un-captured) Process***
  - *The facility did not estimate lead emissions for this process in 2005*

- ***Pressurized Pouring Process***
  - *The facility did not estimate lead emissions for this process in 2005*

2005 Facility Total = 0.48 tons of lead

<u>*DNR 2008 Estimate*</u>

- ***Electric Arc Furnaces (Baghouse Stack)***
  - *Actual throughput = 201,908 tons of metal melted*
  - *January 3rd, 2008 stack test value for PM = 0.0902 lbs of PM/ton of metal melted*
  - *Avg. Lead content percent by weight = 0.00556 lbs Pb/lb PM*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (201,908 tons metal melted)(0.0902 lbs PM/ton of metal melted)*(0.00556 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
  = 0.051 tons of lead

- ***Electric Arc Furnaces (Roof Vents)***
  - *Actual throughput = 201,908 tons of steel*

- *AP-42, Table 12.5-1 (charging, tapping, and slagging uncontrolled emissions escaping monitor) = 1.4 lbs PM/ton of steel*
- *Lead content percent by weight = 0.00556 lbs Pb/lb PM*
- *Frequency of un-captured EAF emissions episodes = (7 minutes/hour)*
- *1 ton = 2,000 lbs*

Lead Emissions = (201,908 tons of steel)(1.4 lbs PM/ton of steel)*(0.00556 lbs Pb/lb PM)*(7 minutes/60 minutes)*(1 ton/2,000 lbs)*
= 0.092 tons of lead

- ***Pouring (Un-captured) Process***
  - *Actual throughput = 100,954 tons of steel*
  - *Iron and Steel NESHAP background document, CERP Study = 0.000179 lbs Pb/ton of steel*

Lead Emissions = (100,954 tons of steel)(0.000179 lbs Pb/ton of steel)*(1 ton/2,000 lbs)*
= 0.009 tons of lead

- ***Cooling (Un-captured) Process***
  - *Actual throughput = 201,908 tons of steel*
  - *Iron and Steel NESHAP background document, CERP Study = 0.000222 lbs Pb/ton of steel*

Lead Emissions = (201,908 tons of steel)(0.000222 lbs Pb/ton of steel)*(1 ton/2,000 lbs)*
= 0.022 tons of lead

- ***Pressurized Pouring Process***
  - *Actual throughput = 100,954 tons of steel*
  - *Iron and Steel NESHAP background document, CERP Study = 0.000179 lbs Pb/ton of steel*

Lead Emissions = (100,954 tons of steel)(0.000179 lbs Pb/ton of steel)*(1 ton/2,000 lbs)*
= 0.009 tons of lead

2008 DNR Total = 0.18 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 (2008) to be 0.17 tons. Bloomfield Foundry has consistently reported lead emissions from their cupola but has not been reporting lead emissions from the castings cooling process or the machining and grinding baghouse. Lead emissions from the castings cooling process and the machining and grinding baghouse were accounted for in the DNR estimate for emission year 2008.

The facility estimated lead emissions from the cupola in 2005 using the actual amount of gray iron produced, an emission factor obtained from FIRE, and control efficiency for the baghouse. Using this methodology, the calculations are an over estimate of lead emissions during start-up, shutdown and normal operation. In the facilities' estimate for normal operation (baghouse controlled), a baghouse control efficiency of 80 percent was assumed for lead. Based on test data provided within the Iron and Steel Foundry NESHAP Background document, cupolas controlled by a baghouse achieved approximately 99 percent control for lead. The DNR estimated lead emissions from the cupola in 2008 using the actual amount of iron processed, a PM test conducted on July of 2004, and the average lead content of the PM as provided in the Iron and Steel Foundry

NESHAP background document. The DNR estimated lead emissions from the cupola bypass in 2008 using the number hours the cupola vented emissions uncontrolled though the bypass stack, PM emission factor for uncontrolled cupola operation as provided in the Iron and Steel Foundry NESHAP and the average lead content of the PM as provided in the Iron and Steel Foundry NESHAP. The DNR estimated lead emissions from the castings cooling process in 2008 using the actual amount of metal poured and the average lead emission factor for the pouring/cooling/shakeout processes from the Iron and Steel Foundry NESHAP background document.

Facility 2005 Estimate

- ***Cupola (Baghouse)***
  - *Actual throughput = 4,740 tons of iron processed*
  - *FIRE emission factor = .51 lbs of lead/ton of iron processed*
  - *Water Spray Tower and Baghouse Control Efficiency = 73.24%*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (4,740 tons of iron processed)(0.51 lbs of lead /ton of iron processed)*(1-0.7324)*(1 ton/2,000 lbs)*
  = 0.38 tons of lead (inaccurate calculation by facility)

- ***Cupola (Cap and Bypass—No Controls)***
  - *Actual throughput = 4,740 tons of iron processed*
  - *FIRE emission factor = 0.51 lbs of lead/ton of iron processed*
  - *Water Spray Tower and Baghouse Control Efficiency = 73.24%*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (4,740 tons of iron processed)(0.51 lbs of lead /ton of iron processed)*(1-0.7324)*(1 ton/2,000 lbs)*
  = 0.81 tons of lead (inaccurate calculation by facility)

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

- ***Machining and Grinding Baghouse***
  The facility did not estimate lead emissions for this process in 2005

2005 Facility Total = 1.19 tons of lead

DNR 2008 Estimate

- ***Cupola (Baghouse)***
  - *Actual throughput = 5,169 tons of iron processed*
  - *July 28th, 2004 stack test result for PM = 0.386 lbs PM/ton iron processed*
  - *Iron and Steel Foundry NESHAP background document average % of PM which are metal HAPs = 4.1%*
  - *Iron and Steel Foundry NESHAP background document average % of lead in metal HAPs = 47%*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (5,169 tons of iron processed)(0.386 lbs of PM /ton of iron processed)*(0.041)*(0.47)*(1 ton/2,000 lbs)*
  = 0.019 tons of lead

- ***Cupola (Cap and Bypass—No Controls)***
  - *Actual throughput = 2,125 tons of iron processed*
  - *Iron and Steel Foundry NESHAP background document average PM emission factor for an uncontrolled cupola = 7.26 lbs of PM/ton of gray iron produced*

- *Iron and Steel Foundry NESHAP background document average metal HAPs content in PM = 4.1%*
- *Iron and Steel Foundry NESHAP background document average lead content in metal HAPs = 47%*
- *1 ton = 2,000 lbs*

Lead Emissions = (2,125 tons of iron processed)(7.26 lbs of PM /ton of iron processed)*(0.041 lbs metal HAPs/lb PM)*(0.47 lbs lead/lb metal HAPs)*(1 ton/2,000 lbs)*
= 0.149 tons of lead

- ***Castings Cooling***
  - *Actual throughput = 5,169 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*
  - *1 ton = 2,000 lbs*

Lead Emissions = (5,169 tons metal poured)(.000474 lbs lead/ton of metal poured)*(1 ton/2,000 lbs)*
= 0.0012 tons

- ***Machining and Grinding Baghouse***
  - *Actual throughput = 2,000 hours of operation*
  - *October 20th, 2000 stack test result for PM = 0.359 lbs of PM/hr*
  - *April 12th, 2010 baghouse dust analysis lead content = 0.000522 lbs of lead/lb of PM*
  - *1 ton = 2,000 lbs*

Lead Emissions = (2,000 hours)(0.359 lbs PM/hour)*(0.000522 lbs lead/lb PM)*(1 ton/2,000 lbs)*
= 0.0002 tons

2008 DNR Total = 0.17 tons of lead

<u>Exide Technologies</u>

Exide Technologies in Manchester manufactures lead acid batteries for commercial use and has multiple stacks venting lead emissions from lead oxide mills, grid cast operations, paste mix operations, and strip casting.

The facility estimated actual lead emissions in 2006 to be 0.60 tons. DNR re-estimated the 2006 emissions for the facility by including 2006 actual throughput data and stack test data not incorporated in the facility's original estimate. DNR's estimate for 2006 lead emissions at Exide is 0.26 tons.

The DNR estimated lead emissions in 2009 using stack test values and gr/dscf standards of performance for lead-acid battery manufacturing plants from 40 CFR 60.370, subpart KK. There were two emission points which the gr/dscf standard was applied to in order to calculate actual emissions. These standards were applied because of a lack of documented emission factors available for the processes occurring at these two stacks. The DNR estimated actual lead emissions from their most recent emissions inventory (2009) to be 0.13 tons.

<u>Facility 2006 Estimate</u>

- ***Vacuum System Overall Process (EP30)***
  - *Actual throughput = 150,000 lbs of lead*
  - *NSPS Subpart KK standard for lead-acid battery manufacturing plants = 0.00044 gr/dscf*
  - *Baghouse Control Efficiency = 99%*

Lead emissions = (no calculations provided by the facility)
= 0.00 tons of lead

- ***Overall Process (EP32)***
  - *Actual throughput = 150,000 lbs of lead*
  - *NSPS Subpart KK standard for lead-acid battery manufacturing plants = 0.00044 gr/dscf*
  - *Baghouse Control Efficiency = 99%*

Lead emissions = (no calculations provided by the facility)
= 0.00 tons of lead

- ***Paste Mix Operation (EP33)***
  - *Actual throughput = 5,234 hours*
  - *Stack test result for lead = 0.029 lbs of lead/hr*

Lead emissions = (5,234 hours)(0.029 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.08 tons of lead

- ***Lead Oxide Mill (EP37)***
  - *Actual throughput = 335.2 1,000 batteries*
  - *AP-42 Table 12.15-2 lead emission factor for lead oxide mills at storage battery production facilities = 0.12 lbs of lead/1,000 batteries*

Lead emissions = (335.2 1,000 batteries)(0.12 lbs of lead/1,000 batteries)*(1 ton/2,000 lbs)*
= 0.02 tons of lead

- ***Lead Oxide Mill (EP38)***
  - *Actual throughput = 335.2 1,000 batteries*
  - *AP-42 Table 12.15-2 lead emission factor for lead oxide mills at storage battery production facilities = 0.12 lbs of lead/1,000 batteries*

Lead emissions = (335.2 ,1000 batteries)(0.12 lbs of lead/1,000 batteries)*(1 ton/2,000 lbs)*
= 0.02 tons of lead

- ***Lead Oxide Mill (EP39)***
  - *Actual throughput = 755.7 1,000 batteries*
  - *AP-42 Table 12.15-2 lead emission factor for lead oxide mills at storage battery production facilities = 0.12 lbs of lead/1,000 batteries*

Lead emissions = (755.7 1,000 batteries)(0.12 lbs of lead/1,000 batteries)*(1 ton/2,000 lbs)*
= 0.05 tons of lead

- ***3 Process Operation (EP44)***
  - *Actual throughput = 3,620 hours*
  - *Stack test result for lead = 0.007 lbs of lead/hr*

Lead emissions = (3,620 hours)(0.007 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

- ***Grid Cast Operations (EP45)***
  - *Actual throughput = 4,545 hours*
  - *Stack test result for lead = 0.02 lbs of lead/hr*

Lead emissions = (4,545 hours)(0.02 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.05 tons of lead

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- ***3 Process Operation (EP46)***
  - *Actual throughput = 2,376 hours*
  - *Stack test result for lead = 0.002 lbs of lead/hr*

Lead emissions = (2,376 hours)(0.002 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Splitter (EP47)***
  - *Actual throughput = 6,213 hours*
  - *Stack test result for lead = 0.008 lbs of lead/hr*

Lead emissions = (6,213 hours)(0.008 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.02 tons of lead

- ***Paste Unload (EP47)***
  - *Actual throughput = 4,970 hours*
  - *Stack test result for lead = 0.008 lbs of lead/hr*

Lead emissions = (4,970 hours)(0.008 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.02 tons of lead

- ***Grid Casting (EP50)***
  - *Actual throughput = 3,916 hours*
  - *Stack test result for lead = 0.0051 lbs of lead/hr*

Lead emissions = (3,916 hours)(0.0051 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

- ***3 Process Operation (EP55)***
  - *Actual throughput = 3,103 hours*
  - *Stack test result for lead = 0.0013 lbs of lead/hr*

Lead emissions = (3,103 hours)(0.0013 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***3 Process Operation (EP56)***
  - *Actual throughput = 3,173 hours*
  - *Stack test result for lead = 0.000006 lbs of lead/hr*

Lead emissions = (3,173 hours)(0.000006 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Lead Oxide Mill (EP57)***
  - *Actual throughput = 595.6 1,000 batteries*
  - *AP-42 Table 12.15-2 lead emission factor for lead oxide mills at storage battery production facilities = 0.12 lbs of lead/1,000 batteries*

Lead emissions = (595.6 1,000 batteries)(0.12 lbs of lead/1,000 batteries)*(1 ton/2,000 lbs)*
= 0.04 tons of lead

- ***Lead Oxide Mill (EP59)***
  - *Actual throughput = 6,046 hours*

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- *Stack test result for lead = 0.0007 lbs of lead/hr*

Lead emissions = (6,046 hours)(0.0007 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***3 Process Operation (EP60)***
  - *Actual throughput = 3,813 hours*
  - *Stack test result for lead = 0.032 lbs of lead/hr*

Lead emissions = (3,813 hours)(0.032 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.06 tons of lead

- ***Grid Casting Operations (EP61)***
  - *Actual throughput = 3,404 hours*
  - *Stack test result for lead = 0.0009 lbs of lead/hr*

Lead emissions = (3,404 hours)(0.0009 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Lead Oxide Mill (EP63)***
  - *Actual throughput = 676.1 1,000 batteries*
  - *AP-42 Table 12.15-2 lead emission factor for lead oxide mills at storage battery production facilities = 0.12 lbs of lead/1,000 batteries*

Lead emissions = (676.1 1,000 batteries)(0.12 lbs of lead/1,000 batteries)*(1 ton/2,000 lbs)*
= 0.04 tons of lead

- ***Line 12 & 13 Production (EP64)***
  - *Actual throughput = 2,901 hours*
  - *Stack test result for lead = 0.0007 lbs of lead/hr*

Lead emissions = (2,901 hours)(0.0007 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Strip Casting (EP67)***
  - *Actual throughput = 4,545 hours*
  - *Permit limit for lead = 0.081 lbs of lead/hr*

Lead emissions = (4,545 hours)(0.081 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.18 tons of lead

2006 Facility Total = 0.60 tons of lead

<u>*DNR 2006 Estimate*</u>

- ***Vacuum System Overall Process (EP30)***
  - *Flow rate of the exhaust stream = 1,230 dry standard ft3/minute*
  - *NSPS Subpart KK standard for lead-acid battery manufacturing plants = 0.00044 gr/dscf*
  - *Hours of operation of the stack = 6,240 hours*

Lead emissions = (0.00044 gr of lead/dscf)(1,230 dscf/min)*(60 min/hr)*(1 lb/7,000 gr)*(6,240 hours)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

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- ***Overall Process (EP32)***
  - *Flow rate of the exhaust stream = 2,158 dry standard ft3/minute*
  - *NSPS Subpart KK standard for lead-acid battery manufacturing plants = 0.00044 gr/dscf*
  - *Hours of operation of the stack = 6,240 hours*

Lead emissions = (0.00044 gr of lead/dscf)(2,158 dscf/min)*(60 min/hr)*(1 lb/7,000 gr)*(6,240 hours)*(1 ton/2,000 lbs)*
= 0.03 tons of lead

- ***Paste Mix Operation (EP33)***
  - *Hours of operation of the stack = 5,234 hours*
  - *April 12th, 1995 stack test result for lead = 0.061 lbs of lead/hr*

Lead emissions = (5,234 hours)(0.061 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.16 tons of lead

- ***Lead Oxide Mill (EP37)***
  - *Hours of operation of the stack = 8,760 hours*
  - *April 1st, 2008 stack test result for lead = 0.0006 lbs of lead/hr*

Lead emissions = (8,760 hours)(0.0006 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Lead Oxide Mill (EP38)***
  - *Hours of operation of the stack = 8,760 hours*
  - *April 2nd, 2008 stack test result for lead = 0.00012 lbs of lead/hr*

Lead emissions = (8,760 hours)(0.00012 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Lead Oxide Mill (EP39)***
  - *Hours of operation of the stack = 8,760 hours*
  - *April 1st, 2008 stack test result for lead = 0.0003 lbs of lead/hr*

Lead emissions = (8,760 hours)(0.0003 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***3 Process Operation (EP44)***
  - *Hours of operation of the stack = 3,620 hours*
  - *November 1st, 2007 stack test result for lead = 0.001 lbs of lead/hr*

Lead emissions = (3,620 hours)(0.001 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Grid Cast Operations (EP45)***
  - *Hours of operation of the stack = 4,545 hours*
  - *November 13th, 2007 stack test result for lead = 0.000554 lbs of lead/hr*

Lead emissions = (4,545 hours)(0.000554 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***3 Process Operation (EP46)***

- *Hours of operation of the stack = 2,376 hours*
- *November 16th, 2004 stack test result for lead = 0.0009 lbs of lead/hr*

Lead emissions = (2,376 hours)(0.0009 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.00 tons of lead*

- ***Splitter & Paste Unload (Both Vent Through EP47)***
  - *Hours of operation of the stack = 8,760 hours*
  - *August 23rd, 2005 stack test result for lead = 0.00014 lbs of lead/hr*

Lead emissions = (8,760 hours)(0.00014 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.00 tons of lead*

- ***Grid Casting (EP50)***
  - *Hours of operation of the stack = 3,916 hours*
  - *October 16th, 2007 stack test result for lead = 0.0028 lbs of lead/hr*

Lead emissions = (3,916 hours)(0.0028 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.01 tons of lead*

- ***3 Process Operation (EP55)***
  - *Hours of operation of the stack = 3,103 hours*
  - *October 17th, 2007 stack test result for lead = 0.00128 lbs of lead/hr*

Lead emissions = (3,103 hours)(0.00128 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.00 tons of lead*

- ***3 Process Operation (EP56)***
  - *Hours of operation of the stack = 3,173 hours*
  - *October 17th, 2007 stack test result for lead = 0.0097 lbs of lead/hr*

Lead emissions = (3,173 hours)(0.0097 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.02 tons of lead*

- ***Lead Oxide Mill (EP57)***
  - *Hours of operation of the stack = 4,992 hours*
  - *December 2nd, 2008 stack test result for lead = 0.0016 lbs of lead/hr*

Lead emissions = (4,992 hours)(0.0016 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.00 tons of lead*

- ***Lead Oxide Mill (EP59)***
  - *Hours of operation of the stack = 6,046 hours*
  - *December 5th, 2008 stack test result for lead = 0.002 lbs of lead/hr*

Lead emissions = (6,046 hours)(0.002 lbs of lead/hr)*(1 ton/2,000 lbs) = 0.01 tons of lead*

- ***3 Process Operation (EP60)***
  - *Hours of operation of the stack = 3,813 hours*
  - *October 16th, 2007 stack test result for lead = 0.00451 lbs of lead/hr*

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Lead emissions = (3,813 hours)(0.00451 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

- ***Grid Casting Operations (EP61)***
  - *Hours of operation of the stack = 3,404 hours*
  - *November 13th, 2007 stack test result for lead = 0.000133 lbs of lead/hr*

Lead emissions = (3,404 hours)(0.000133 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Lead Oxide Mill (EP63)***
  - *Hours of operation of the stack = 8,760 hours*
  - *May 20th, 2008 stack test result for lead = 0.000231 lbs of lead/hr*

Lead emissions = (8,760 hours)(0.000231 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Line 12 & 13 Production (EP64)***
  - *Hours of operation of the stack = 2,901 hours*
  - *November 16th, 2007 stack test result for lead = 0.0000485 lbs of lead/hr*

Lead emissions = (2,901 hours)(0.0000485 lbs of lead/hr)*(1 ton/2,000 lbs)= 0.00 tons of lead*

- ***Strip Casting (EP67)***
  - *Hours of operation of the stack = 4,545 hours*
  - *December 1st, 2008 stack test result for lead = 0.003 lbs of lead/hr*

Lead emissions = (4,545 hours)(0.003 lbs of lead/hr)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

2006 DNR Total = 0.26 tons of lead

DNR 2009 Estimate

- ***Vacuum System Overall Process (EP30)***
  - *Flow rate of the exhaust stream = 1,575 dry standard ft3/minute*
  - *NSPS Subpart KK standard for lead-acid battery manufacturing plants = 0.00044 gr/dscf*
  - *Hours of operation of the stack = 8,520 hours*

Lead emissions = (0.00044 gr of lead/dscf)(1,575 dscf/min)*(60 min/hr)*(1 lb/7,000 gr)*(8,520 hours)*(1 ton/2,000 lbs)*
= 0.025 tons of lead

- ***Overall Process (EP32)***
  - *Flow rate of the exhaust stream = 2,158 dry standard ft3/minute*
  - *NSPS Subpart KK standard for lead-acid battery manufacturing plants = 0.00044 gr/dscf*
  - *Hours of operation of the stack = 0 hours*

Lead emissions = (0.00044 gr of lead/dscf)(2,158 dscf/min)*(60 min/hr)*(1 lb/7,000 gr)*(0 hours)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Paste Mix Operation (EP33)***
  - *Lead oxide throughput = 63,188,300 pounds*

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- *September 4th, 2009 stack test result for lead = 0.000000166 lbs of lead/lb of lead oxide*

Lead emissions = (63,188,300 pounds)(0.000000166 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.005 tons of lead*

- ***Lead Oxide Mill (EP37)***
  - *Lead oxide throughput = 5,909,552 pounds*
  - *April 1st, 2008 stack test result for lead = 0.000000307 lbs of lead/lb of lead oxide*

Lead emissions = (5,909,552 pounds)(0.000000307 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0009 tons of lead*

- ***Lead Oxide Mill (EP38)***
  - *Lead oxide throughput = 7,499,646 pounds*
  - *November 25th, 2008 stack test result for lead = 0.0000000610 lbs of lead/lb of lead oxide*

Lead emissions = (7,499,646 pounds)(0.0000000610 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0002 tons of lead*

- ***Lead Oxide Mill (EP39)***
  - *Lead oxide throughput = 13,409,198 pounds*
  - *November 26th, 2008 stack test result for lead = 0.000000156 lbs of lead/lb of lead oxide*

Lead emissions = (13,409,198 pounds)(0.000000156 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.001 tons of lead*

- ***3 Process Operation (EP44)***
  - *Batteries produced = 941,783 batteries*
  - *November 1st, 2007 stack test result for lead = 0.00000264 lbs of lead/battery*

Lead emissions = (941,783 batteries)(0.00000264 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.001 tons of lead*

- ***Grid Cast Operations (EP45)***
  - *Batteries produced = 725,087 batteries*
  - *November 13th, 2007 stack test result for lead = 0.00000279 lbs of lead/battery*

Lead emissions = (725,087 batteries)(0.00000279 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.001 tons of lead*

- ***3 Process Operation (EP46)***
  - *Batteries produced = 366,036 batteries*
  - *November 16th, 2004 stack test result for lead = 0.00000823 lbs of lead/battery*

Lead emissions = (366,036 batteries)(0.00000823 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.001 tons of lead*

- ***Splitter & Paste Unload (Both Vent Through EP47)***
  - *Lead oxide throughput = 63,188,300 pounds*
  - *August 23rd, 2005 stack test result for lead = 0.00000000721 lbs of lead/lb of lead oxide*

Lead emissions = (63,188,300 pounds)(0.00000000721 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0002 tons of lead*

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- ***Grid Casting (EP50)***
    - *Lead oxide throughput = 18,479,157 pounds*
    - *February 23rd, 2009 stack test result for lead = 0.00000507 lbs of lead/lb of lead oxide*

Lead emissions = (18,479,157 pounds)(0.00000507 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.047 tons of lead*

- ***3 Process Operation (EP55)***
    - *Batteries produced = 438,110 batteries*
    - *October 17th, 2007 stack test result for lead = 0.00000771 lbs of lead/battery*

Lead emissions = (438,110 batteries)(0.00000771 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.0017 tons of lead*

- ***3 Process Operation (EP56)***
    - *Batteries produced = 674,947 batteries*
    - *November 24th, 2008 stack test result for lead = 0.0000541 lbs of lead/battery*

Lead emissions = (674,947 batteries)(0.0000541 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.018 tons of lead*

- ***Lead Oxide Mill (EP57)***
    - *Lead oxide throughput = 15,852,344 pounds*
    - *December 2nd, 2008 stack test result for lead = 0.000000870 lbs of lead/lb of lead oxide*

Lead emissions = (15,852,344 pounds)(0.000000870 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0069 tons of lead*

- ***Lead Oxide Mill (EP59)***
    - *Lead oxide throughput = 14,606,508 pounds*
    - *December 5th, 2008 stack test result for lead = 0.00000121 lbs of lead/lb of lead oxide*

Lead emissions = (14,606,508 pounds)(0.00000121 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0088 tons of lead*

- ***3 Process Operation (EP60)***
    - *Batteries produced = 528,540 batteries*
    - *October 16th, 2007 stack test result for lead = 0.0000211 lbs of lead/battery*

Lead emissions = (528,540 batteries)(0.0000211 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.0056 tons of lead*

- ***Grid Casting Operations (EP61)***
    - *Lead oxide throughput = 1,388,161 pounds*
    - *November 13th, 2007 stack test result for lead = 0.0000000775 lbs of lead/lb of lead oxide*

Lead emissions = (1,388,161 pounds)(0.0000000775 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.00005 tons of lead*

- ***Lead Oxide Mill (EP63)***
    - *Lead oxide throughput = 16,087,071 pounds*
    - *May 20th, 2008 stack test result for lead = 0.000000579 lbs of lead/lb of lead oxide*

Lead emissions = (16,087,071 pounds)(0.000000579 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0047 tons of lead*

- ***Line 12 & 13 Production (EP64)***
  - *Batteries produced = 332,097 batteries*
  - *November 16th, 2007 stack test result for lead = 0.000000415 lbs of lead/battery*

Lead emissions = (332,097 batteries)(0.000000415 lbs of lead/battery)*(1 ton/2,000 lbs) = 0.00007 tons of lead*

- ***Strip Casting (EP67)***
  - *Lead oxide throughput = 20,169,302 pounds*
  - *May 20th, 2008 stack test result for lead = 0.000000275 lbs of lead/lb of lead oxide*

Lead emissions = (20,169,302 pounds)(0.000000275 lbs of lead/lb of lead oxide)*(1 ton/2,000 lbs) = 0.0028 tons of lead*

2009 DNR Total = 0.13 tons of lead

MidAmerican Energy Co – George Neal South

The facility estimated actual lead emissions in 2005 to be 0.51 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.12 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 previously reported by MidAmerican Energy Co – George Neal South. MidAmerican Energy Co – George Neal South began reporting lead emissions, rather than lead compound emissions in their 2008 emissions inventory submittal.

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 boiler #1 in 2008 using the actual coal throughput from 2008 (as reported by the facility in the 2008 emissions inventory), the heat content of the coal (as indicated in the stack test report for boiler #4), and the approved stack test result which was conducted January 12th, 2010.

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)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs) = 0.51 tons of lead*

2005 Facility Total = 0.51 tons of lead

DNR 2008 Estimate

- ***Boiler #1***
  - *Actual throughput = 2,686,512 tons of coal*
  - *Heat content of the coal = 8,694 Btu/lb of coal*
  - *January 12th, 2010 stack test result for lead = 0.000005189 lbs Pb/MMBtu heat input*
  - *1 ton = 2,000 lbs*
  - *MMBtu = 1,000000 Btu*

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Lead Emissions = (2,686,512 tons coal)(2000 lbs/ton)*(8,694 Btu heat input/lb coal)*(1 MMBtu/1,000,000 Btu)*(0.000005189 lbs Pb/MMBtu heat input)*(1 ton/2,000 lbs)*
= 0.12 tons of lead

2008 DNR Total = 0.12 tons of lead

IPL – Ottumwa Generating Station

The facility estimated actual lead emissions in 2005 to be 0.47 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.10 tons. IPL – Ottumwa Generating Station has one coal-fired boiler that has the ability to burn fuel oil, waste oil, and sub bituminous coal. The facility has been consistent with reporting lead emissions from the coal-fired boiler stack.

The facility estimated lead emissions from the boiler in 2005 using the actual throughputs of fuel oil, waste oil, and sub bituminous coal along with their respective emission factors from FIRE (fuel oil and waste oil) and AP-42 Table 1.1-18 (sub bituminous coal) . The DNR estimated lead emissions from the fuel oil and waste oil combustion processes from the boiler in 2008 using the actual throughputs and their respective emission factors in AP-42, Tables 1.3-10 and 1.3-11. The DNR estimated lead emissions from the sub bituminous coal combustion process from the boiler in 2008 using the actual throughput (as reported by the facility in the 2008 emissions inventory) along with the approved stack test data which was conducted June 15th, 2006.

Facility 2005 Estimate

- ***Boiler #1 (Fuel Oil Combustion)***
  - *Actual throughput = 628.66 1,000gal of fuel oil*
  - *FIRE lead emission factor for fuel oil combustion = 0.001206 lbs of lead/1,000gal of fuel oil*
  - *1 ton = 2,000 lbs*

Lead Emissions = (628.66 1,000gal fuel oil)(0.001206 lbs lead/1,000gal of fuel oil)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #1 (Waste Oil Combustion)***
  - *Actual throughput = 7.17 1,000gal of waste oil*
  - *FIRE lead emission factor for waste oil combustion = 2.2 lbs of lead/1,000gal of waste oil*
  - *1 ton = 2,000 lbs*

Lead Emissions = (7.17 1,000gal waste oil)(2.2 lbs lead/1,000gal of waste oil)*(1 ton/2,000 lbs)*
= 0.01 tons of lead

- ***Boiler #1 (Sub bituminous Coal Combustion)***
  - *Actual throughput = 2,201,071.60 tons of coal*
  - *AP-42 Table 1.1-18 lead emission factor for pulverized coal-fired dry bottom tangentially fired boilers = 0.00042 lbs of lead/ton of coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (2,201,071.60 tons coal)(0.00042 lbs lead/ton of coal)*(1 ton/2,000 lbs)*
= 0.46 tons of lead

2005 Facility Total = 0.47 tons of lead

DNR 2008 Estimate

- ***Boiler #1 (Fuel Oil Combustion)***
  - *Actual throughput = 617.11 1,000gal of fuel oil*
  - *Heat content of fuel oil = 140,000 Btu/gal*

- *AP-42, Table 1.3-10 lead emission factor for fuel oil combustion = 9 lbs of lead/Trillion Btu heat input*
- *Electrostatic precipitator control of lead emissions = 75%*
- *1,000 gallons = 1,000gal fuel oil*
- *Trillion Btu = 1,000,000,000,000 Btu*
- *1 ton = 2,000 lbs*

Lead Emissions = (617.11 1,000gal fuel oil)(1,000 gal/1,000gal fuel oil)*(140,000 Btu/gal)*(Trillion Btu/1,000,000,000,000 Btu)*(9 lbs lead/Trillion Btu heat input)*(1-0.75)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #1 (Waste Oil Combustion)***
  - *Actual throughput = 5.2 1,000gal of waste oil*
  - *AP-42, Table 1.3-11 lead emission factor for waste oil combustion = 0.00151 lbs lead/1,000gal waste oil*
  - *Electrostatic precipitator control of lead emissions = 75%*
  - *1,000 gallons = 1,000gal waste oil*
  - *1 ton = 2,000 lbs*

Lead Emissions = (5.2 1,000gal waste oil)(0.00151 lbs lead/1,000gal of waste oil)*(1-0.75)*(1 ton/2,000 lbs)*
= 0.00 tons of lead

- ***Boiler #1 (Sub bituminous Coal Combustion)***
  - *Actual throughput = 2,806,696 tons of coal*
  - *June 15th, 2006 stack test result for lead = 0.0000713 lbs Pb/ton of coal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (2,806,696 tons coal)(0.0000713 lbs Pb/ton of coal)*(1 ton/2,000 lbs)*
= 0.10 tons of lead

2008 DNR Total = 0.10 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 compound emissions from their most recent emissions inventory (2008) to be 0.05 tons. Nichols Aluminum – Casting has an aluminum shredder, five furnaces, and a delacquering system for which they report lead compound emissions.

The facility estimated lead compound emissions from the aluminum shredder, melting furnaces, holding furnaces, and delacquering system 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 compound emissions from the aluminum shredder, melting furnaces, holding furnaces, and delacquering system in 2008 using PM test data and actual throughput information 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 0.054 tons for 2008.

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 of metal)(0.0384 lbs of lead compounds/ton of metal)*(1-0.99)* (1 ton/2,000 lbs)*
= 0.02 tons of 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 of metal)(0.0031 lbs of lead compounds/ton of metal)* (1 ton/2,000 lbs)*
= 0.10 tons of 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 of metal)(0.0031 lbs of lead compounds/ton of metal)* (1 ton/2,000 lbs)*
= 0.12 tons of 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 of metal)(0.0031 lbs of lead compounds/ton of metal)* (1 ton/2,000 lbs)*
= 0.17 tons of 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 of metal)(0.0031 lbs of lead compounds/ton of metal)* (1 ton/2,000 lbs)*
= 0.19 tons of 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 of metal)(0.0051 lbs of lead compounds/ton of metal)*(1-0.95)* (1 ton/2,000 lbs)*
= 0.01 tons of lead compounds (inaccurate calculation)

2005 Facility Total = 0.61 tons of lead

DNR 2008 Estimate

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- ***Aluminum Shredder***
  - *Actual throughput = 112,497 tons of scrap metal processed*
  - *August 9th, 2007 PM stack test value = 0.0364 lbs PM/ton of scrap metal processed*
  - *Scrap metal lead content = 0.5%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (112,497 tons of scrap metal processed)(0.0364 lbs of PM/ton of scrap metal processed)*(0.005)*(1 ton/2,000 lbs)*
= 0.0103 tons of lead

- ***Delacquering System***
  - *Actual throughput = 69,296 tons of scrap metal processed*
  - *August 9th, 2007 PM stack test value = 0.0167 lbs PM/ton of scrap metal processed*
  - *Scrap metal lead content = 0.5%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (69,296 tons of scrap metal processed)(0.0167 lbs of PM/ton of scrap metal processed)*(0.005)*(1 ton/2,000 lbs)*
= 0.0029 tons of lead

- ***Melting Furnace #1***
  - *Actual throughput = 64,236 tons of metal melted*
  - *July 2nd, 2008 PM stack test value = 0.116 lbs PM/ton of metal melted*
  - *Scrap metal lead content = 0.5%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (64,236 tons of metal melted)(0.116 lbs of PM/ton of metal melted)*(0.005)*(1 ton/2,000 lbs)*
= 0.0186 tons of lead

- ***Melting Furnace #2***
  - *Actual throughput = 58,620 tons of metal melted*
  - *July 2nd, 2008 PM stack test value = 0.116 lbs PM/ton of metal melted*
  - *Scrap metal lead content = 0.5%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (58,620 tons of metal melted)(0.116 lbs of PM/ton of metal melted)*(0.005)*(1 ton/2,000 lbs)*
= 0.0170 tons of lead

- ***Melting Furnace #3***
  - *Actual throughput = 47,009 tons of metal melted*
  - *August 9th, 2007 PM stack test value = 0.0167 lbs PM/ton of scrap metal melted*
  - *Scrap metal lead content = 0.5%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (47,009 tons of metal melted)(0.0167 lbs of PM/ton of metal melted)*(0.005)*(1 ton/2,000 lbs)*
= 0.0020 tons of lead

- ***Holding Furnace #1***
  - *Actual throughput = 141 tons of metal melted*
  - *July 2nd, 2008 PM stack test value = 0.116 lbs PM/ton of metal melted*

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- *Scrap metal lead content = 0.5%*
- *1 ton = 2,000 lbs*

Lead Emissions = (141 tons of metal melted)(0.116 lbs of PM/ton of metal melted)*(0.005)*(1 ton/2,000 lbs)*
= 0.0000 tons of lead

- ***Holding Furnace #2***
  - *Actual throughput = 9,896 tons of metal melted*
  - *July 2nd, 2008 PM stack test value = 0.116 lbs PM/ton of metal melted*
  - *Scrap metal lead content = 0.5%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (9,896 tons of metal melted)(0.116 lbs of PM/ton of metal melted)*(0.005)*(1 ton/2,000 lbs)*
= 0.0029 tons of lead

2008 DNR Total = 0.05 tons of lead

<u>Gerdau Ameristeel US, Inc.</u>
The facility estimated actual lead emissions in 2005 to be 0.39 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.02 tons. Gerdau Ameristeel US, Inc. has one electric arc furnace and meltshop activities that are controlled by a baghouse as well as un-captured emissions which escape from the meltshop building. The facility has been consistent with reporting lead emissions from the electric arc furnace.

The facility estimated lead emissions from the controlled (baghouse) electric arc furnace stack in 2005 using the total air exhausted from the stack in 2005, a PM stack test, and an estimation that 2% of the furnace dust collected is lead. The facility estimated the un-captured lead emissions from the electric arc furnace in 2005 using the actual throughput, a mini-mill industry specific emission factor for PM, an estimation that 1% of the dust emitted is lead, a canopy capture efficiency of 99%, and building enclosure control efficiency of 99%. The DNR estimated the captured lead emissions from the electric arc furnace and the meltshop activities (routed through the baghouse) in 2008 using the actual throughput and a stack test value from 2010 for lead. The DNR estimated the un-captured emissions (escaping from the meltshop building) from the electric arc furnace and melt shop activities in 2008 by using the actual throughput, the lead emission factor in AP-42, Table 12.5.1-7, and a conservative value for the measured frequency of visible emissions observed during the lead stack test in 2010. The longest frequency of visible emissions observed during the lead performance testing was 8 minutes. To be conservative with this estimate, DNR assumed a frequency of 16 minutes for every hour that these un-captured emissions episodes occur.

<u>Facility 2005 Estimate</u>
- ***Electric Arc Furnaces (Baghouse Stack)***
  - *Actual throughput = 188,731 MMdscf*
  - *PM stack test value = 0.00144 gr/dscf*
  - *Lead content by weight = 2%*
  - *1 MMdscf = 1,000,000 dscf*
  - *1 lb = 7,000 gr*
  - *1 ton = 2,000 lbs*

Lead Emissions = (188,731 MMdscf)(1,000,000 dscf/MMdscf)*(0.00144 gr/dscf)*(0.02 lbs lead/lb PM)*(1 lb/7,000 gr)*(1 ton/2,000 lbs)*
= 0.388 tons of lead

- ***Electric Arc Furnaces (Roof Vents)***
  - *Actual throughput = 344,767 tons of steel*
  - *Mini-mill industry specific emission factor for PM = 29.143 lbs of PM/ton of steel*
  - *Lead content by weight = 1%*
  - *Canopy capture efficiency = 99%*
  - *Building enclosure control efficiency = 99%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (344,767 tons of steel)(29.143 lbs PM/ton of steel)*(0.01 lbs Pb/lb PM)*(1-0.99)*(1-0.99)*(1 ton/2,000 lbs)*
= 0.005 tons of lead

2005 Facility Total = 0.39 tons of lead

<u>*DNR 2008 Estimate*</u>

- ***Electric Arc Furnace, Continuous Caster, South Ladle Preheats, Auto Torches, Lime Silo Equalization Port, Ladle Dryer, and Charge Handling (Baghouse Stack)***
  - *Actual throughput = 293,399 tons of metal*
  - *March 16th, 2010 stack test value for lead = 0.00000935 lbs of lead/ton of steel*
  - *1 ton = 2,000 lbs*

Lead Emissions = (293,399 tons of steel)(0.00000935 lbs lead/ton of steel)*(1 ton/2,000 lbs)*
= 0.0014 tons of lead

- ***Un-captured EAF and Meltshop Activities***
  - *Actual throughput = 293,399 tons of steel*
  - *AP-42, Table 12.5.1-7 (Charging, melting, slagging, tapping, ladle transfer to ladle furnace, ladle preheater, alloy addition to ladle furnace, ladle furnace melting, and continuous casting controlled by direct shell evacuation and roof canopy hood exhausted to baghouse) = 0.00056 lbs lead/ton of steel*
  - *Conservative frequency of un-captured emissions episodes = (16 minutes/hour)*
  - *1 ton = 2,000 lbs*

Lead Emissions = (293,399 tons of steel)(0.00056 lbs lead/ton of steel)*(16 minutes/60 minutes)*(1 ton/2,000 lbs)*
= 0.0219 tons of lead

2008 DNR Total = 0.02 tons of lead

<u>Alcoa, Inc.</u>

The facility estimated actual lead and lead compound emissions in 2005 to be 0.32 tons. The DNR estimated actual lead and lead compound emissions from their most recent emissions inventory (2008) to be 0.02 tons. In 2005, Alcoa, Inc. had seven holding furnaces, one melting furnace, and two in-line fluxer filter boxes for which they reported lead compound emissions.

The facility estimated lead compound emissions from the holding furnaces, melting furnace, and in-line fluxer filter boxes in 2005 using the actual amount of metal melted and an emission factor based on a mass balance or engineering estimate. The facility did not submit documentation showing how the emission factors were calculated.

In addition to the sources that the facility estimated lead and lead emissions for in 2005, the DNR also estimated lead and lead compound emissions in 2008 from the remaining melting furnaces, holding furnaces, and in-line fluxer filter boxes at the facility. Since there are a large number of natural gas combustion units at the facility, DNR also included a lead emissions estimate for facility-wide natural gas combustion. Alcoa, Inc. also had one melting furnace which was powered by waste oil in 2008. The DNR estimated lead compound emissions from the melting furnaces, holding furnaces, and in-line fluxer filter boxes using PM test data and actual throughput information for each emission point referenced in the inventory along with site specific lead information provided by Alcoa, Inc. Lead emissions from facility-wide natural gas combustion were calculated using the total natural gas throughput for the facility along with the lead emission factor from natural gas combustion from AP-42, Table 1.4-2. Lead emissions from the waste oil combustion from melting furnace #60 were calculated using the actual throughput reported by the facility, the lead emission factor from waste oil combustion from AP-42, Table 1.11-1, and the percent by weight of the lead in the fuel oil as indicated in a construction permit application submitted to DNR in 2009. Using the above calculations, the estimated facility-wide lead emissions are 0.02 tons for 2008.

<u>*Facility 2005 Estimate*</u>

- ***#15 In-Line Fluxer Filter Box***
    - *Actual throughput = 35,729 tons of metal*
    - *Engineering estimate for lead compounds emission factor = 0.0014 lbs of lead compounds/ton of metal*
    - *1 ton = 2,000 lbs*

Lead Emissions = (35,729 tons of metal)(0.0014 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.02 tons of lead*

- ***#16 In-Line Fluxer Filter Box***
    - *Actual throughput = 35,672 tons of metal*
    - *Engineering estimate for lead compounds emission factor = 0.0014 lbs of lead compounds/ton of metal*
    - *1 ton = 2,000 lbs*

Lead Emissions = (35,672 tons of metal)(0.0014 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.02 tons of lead*

- ***#2 Holding Furnace (Full Cycle)***
    - *Actual throughput = 19,722 tons of metal*
    - *Engineering estimate for lead compounds emission factor = 0.0007 lbs of lead compounds/ton of metal*
    - *1 ton = 2,000 lbs*

Lead Emissions = (19,722 tons of metal)(0.0007 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.03 tons of lead*

- ***#3 Holding Furnace (Full Cycle)***
    - *Actual throughput = 95,523 tons of metal*
    - *Engineering estimate for lead compounds emission factor = 0.0007 lbs of lead compounds/ton of metal*
    - *1 ton = 2,000 lbs*

Lead Emissions = (95,523 tons of metal)(0.0007 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.03 tons of lead*

- ***#4 Holding Furnace (Full Cycle)***
    - *Actual throughput = 108,571 tons of metal*
    - *Engineering estimate for lead compounds emission factor = 0.0007 lbs of lead compounds/ton of metal*

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- *1 ton = 2,000 lbs*

Lead Emissions = (108,571 tons of metal)(0.0007 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.04 tons of lead*

- ***#15 Holding Furnace (Full Cycle)***
  - *Actual throughput = 35,729 tons of metal*
  - *Engineering estimate for lead compounds emission factor = 0.0039 lbs of lead compounds/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (35,729 tons of metal)(0.0039 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.07 tons of lead*

- ***#16 Holding Furnace (Full Cycle)***
  - *Actual throughput = 34,972 tons of metal*
  - *Engineering estimate for lead compounds emission factor = 0.0039 lbs of lead compounds/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (34,972 tons of metal)(0.0039 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.07 tons of lead*

- ***#17 Holding Furnace (Full Cycle)***
  - *Actual throughput = 45,796 tons of metal*
  - *Engineering estimate for lead compounds emission factor = 0.0007 lbs of lead compounds/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (45,796 tons of metal)(0.0007 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.02 tons of lead*

- ***#18 Holding Furnace (Full Cycle)***
  - *Actual throughput = 42,915 tons of metal*
  - *Engineering estimate for lead compounds emission factor = 0.0007 lbs of lead compounds/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (42,915 tons of metal)(0.0007 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.01 tons of lead*

- ***#16 Melting Furnace (Melting, Oil)***
  - *Actual throughput = 34,672 tons of metal*
  - *Engineering estimate for lead compounds emission factor = 0.0004 lbs of lead compounds/ton of metal*
  - *1 ton = 2,000 lbs*

Lead Emissions = (34,672 tons of metal)(0.0004 lbs lead compounds/ton of metal)*(1 ton/2,000 lbs) = 0.01 tons of lead*

2005 Facility Total = 0.32 tons of lead

DNR 2008 Estimate

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- ***Emissions from facility-wide natural gas combustion***
  - *Actual throughput = 2,608.65 MMcf of natural gas*
  - *Lead emission factor for natural gas combustion from AP-42, Table 1.4-2 = 0.0005 lbs of lead/MMcf of natural gas*
  - *1 ton = 2,000 lbs*

Lead Emissions = (2,608.65 MMcf of natural gas)(0.0005 lbs of lead/MMcf of natural gas)*(1 ton/2,000 lbs)*
= 0.0007 tons of lead

- ***Emissions from waste oil combustion in melting furnace #60***
  - *Actual throughput = 265 1,000gal of waste oil*
  - *Lead emission factor for waste oil combustion from AP-42, Table 1.11-1 = 55L lbs of lead/1,000gal of waste oil where L = weight % lead in the waste oil*
  - *L = 0.0005*
  - *1 ton = 2,000 lbs*

Lead Emissions = (265 1,000gal of waste oil)(55 lbs lead/1,000gal of waste oil)*(0.0005)*(1 ton/2,000 lbs)*
= 0.004 tons of lead

- ***Melting Furnace #2***
  - *Actual throughput = 92,528 tons of metal*
  - *January 16th, 2002 PM stack test value = 0.047 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (92,528 tons of metal)(0.047 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0017 tons of lead

- ***Melting Furnace #3***
  - *Actual throughput = 110,083 tons of metal*
  - *September 17th, 2002 PM stack test value = 0.0228 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (110,083 tons of metal)(0.0228 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.001 tons of lead

- ***Melting Furnace #4***
  - *Actual throughput = 100,905 tons of metal*
  - *September 17th, 2002 PM stack test value = 0.0228 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (100,905 tons of metal)(0.0228 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0009 tons of lead

- ***Melting Furnace #15***
  - *Actual throughput = 28,117 tons of metal*

- *June 4th and 5th, 2007 PM stack test value = 0.0534 lbs of PM/ton of metal*
- *Average lead content by weight = 0.08%*
- *1 ton = 2,000 lbs*

Lead Emissions = (28,117 tons of metal)(0.0534 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0006 tons of lead

- ***Melting Furnace #16***
  - *Actual throughput = 26,288 tons of metal*
  - *September 17th, 2002 PM stack test value = 0.1019 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (26,288 tons of metal)(0.1019 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0011 tons of lead

- ***Melting Furnace #17***
  - *Actual throughput = 40,118 tons of metal*
  - *September 17th, 2002 PM stack test value = 0.0759 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (40,118 tons of metal)(0.0759 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0012 tons of lead

- ***Melting Furnace #18***
  - *Actual throughput = 42,211 tons of metal*
  - *September 17th, 2002 PM stack test value = 0.0759 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (42,211 tons of metal)(0.0759 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0013 tons of lead

- ***Melting Furnace #50***
  - *Actual throughput = 10,924 tons of metal*
  - *September 25th, 2007 PM stack test value = 0.0849 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (10,924 tons of metal)(0.0849 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0004 tons of lead

- ***Melting Furnace #60***
  - *Actual throughput = 9,934 tons of metal*
  - *September 25th, 2007 PM stack test value = 0.0849 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.08%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (9,934 tons of metal)(0.0849 lbs PM/ton of metal)*(0.0008 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0003 tons of lead

- ***Holding Furnace #2***
  - *Actual throughput = 92,531.30 tons of metal*
  - *January 16th, 2002 PM stack test value = 0.0455 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (92,531.30 tons of metal)(0.0455 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.00008 tons of lead

- ***Holding Furnace #3***
  - *Actual throughput = 110,103.43 tons of metal*
  - *April 10th, 2002 PM stack test value = 0.0952 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (110,103.43 tons of metal)(0.0952 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0002 tons of lead

- ***Holding Furnace #4***
  - *Actual throughput = 100,909.56 tons of metal*
  - *June 6th, 2007 PM stack test value = 0.3315 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (100,909.56 tons of metal)(0.3315 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0006 tons of lead

- ***Holding Furnace #15***
  - *Actual throughput = 28,125.38 tons of metal*
  - *June 4th & 5th, 2007 PM stack test value = 0.2104 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (28,125.38 tons of metal)(0.2104 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0001 tons of lead

- ***Holding Furnace #16***
  - *Actual throughput = 26,298.71 tons of metal*
  - *June 6th, 2007 PM stack test value = 0.3315 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (26,298.71 tons of metal)(0.3315 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*

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= 0.0002 tons of lead

- ***Holding Furnace #17***
  - *Actual throughput = 40,121.75 tons of metal*
  - *June 6th, 2007 PM stack test value = 0.3315 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (40,121.75 tons of metal)(0.3315 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0003 tons of lead

- ***Holding Furnace #18***
  - *Actual throughput = 42,213.64 tons of metal*
  - *June 6th, 2007 PM stack test value = 0.3315 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.0038%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (42,213.64 tons of metal)(0.3315 lbs PM/ton of metal)*(0.000038 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0003 tons of lead

- ***#50 Process Holding Furnace (Tamping)***
  - *Actual throughput = 1,249 hours of operation*
  - *January 5th – 9th, 1995 lead stack test value = 0.00026 lbs of lead/hr*
  - *1 ton = 2,000 lbs*

Lead Emissions = (1,249 hours of operation)(0.00026 lbs lead/hour of operation)*(1 ton/2,000 lbs)*
= 0.0002 tons of lead

- ***#60 Process Holding Furnace (Tamping)***
  - *Actual throughput = 1,249 hours of operation*
  - *January 5th – 9th, 1995 lead stack test value = 0.00026 lbs of lead/hr*
  - *1 ton = 2,000 lbs*

Lead Emissions = (1,249 hours of operation)(0.00026 lbs lead/hour of operation)*(1 ton/2,000 lbs)*
= 0.0002 tons of lead

- ***#2 In-Line Fluxer Filter Box***
  - *Actual throughput = 92,528 tons of metal*
  - *January 16th, 2002 PM stack test value = 0.0182 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (92,528 tons of metal)(0.0182 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.00003 tons of lead

- ***#3 In-Line Fluxer Filter Box***
  - *Actual throughput = 110,083 tons of metal*
  - *January 21st, 2003 PM stack test value = 0.1814 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (110,083 tons of metal)(0.1814 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.0003 tons of lead

- ***#4 In-Line Fluxer Filter Box***
  - *Actual throughput = 100,905 tons of metal*
  - *May 1st, 2002 PM stack test value = 0.00767 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (100,905 tons of metal)(0.00767 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.00001 tons of lead

- ***#14 In-Line Fluxer Filter Box***
  - *Actual throughput = 0 tons of metal*
  - *January 21st, 2003 PM stack test value = 0.1814 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (0 tons of metal)(0.1814 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0 tons of lead

- ***#15 In-Line Fluxer Filter Box***
  - *Actual throughput = 28,117 tons of metal*
  - *January 21st, 2003 PM stack test value = 0.1814 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (28,117 tons of metal)(0.1814 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.00008 tons of lead

- ***#16 In-Line Fluxer Filter Box***
  - *Actual throughput = 26,288 tons of metal*
  - *January 21st, 2003 PM stack test value = 0.1814 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (26,288 tons of metal)(0.1814 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
= 0.00007 tons of lead

- ***#17 In-Line Fluxer Filter Box***
  - *Actual throughput = 40,118 tons of metal*
  - *January 21st, 2003 PM stack test value = 0.1814 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

Lead Emissions = (40,118 tons of metal)(0.1814 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*

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= 0.0001 tons of lead

- ***#18 In-Line Fluxer Filter Box***
  - *Actual throughput = 42,211 tons of metal*
  - *July 22nd, 2002 PM stack test value = 0.0007 lbs of PM/ton of metal*
  - *Average lead content by weight = 0.00305%*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (42,211 tons of metal)(0.0007 lbs PM/ton of metal)*(0.0000305 lbs Pb/lb PM)*(1 ton/2,000 lbs)*
  = 0.0000005 tons of lead

2008 DNR Total = 0.02 tons of lead

<u>Lehigh Cement Company</u>
The facility estimated actual lead emissions in 2005 to be 0.27 tons. The DNR estimated actual lead emissions from their most recent emissions inventory (2008) to be 0.01 tons. Lehigh Cement Company – Mason City has one kiln/calciner/preheater. The facility has been consistent with reporting lead emissions only from the kiln/calciner/preheater.

The facility estimated lead emissions from the kiln/calciner/preheater in 2005 using actual throughput information and an emission factor from FIRE. The DNR estimated lead emissions from the kiln/calciner/preheater in 2008 using the hours of operation of the kiln/calciner/preheater in 2008 (as reported by the facility in the 2008 emissions inventory) and the August 12th, 2009 stack test for the kiln/calciner/preheater.

<u>Facility 2005 Estimate</u>

- ***Kiln/Calciner/Preheater***
  - *Actual throughput = 749,617 tons of clinker produced*
  - *FIRE lead emission factor for kiln/calciner/preheater = 0.00071 lbs of lead/ton of clinker produced*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (749,617 tons of clinker produced)(.00071 lbs of lead/ton of clinker produced)*(1 ton/2,000 lbs)*
  = 0.27 tons of lead

2005 Facility Total = 0.27 tons of lead

<u>DNR 2008 Estimate</u>

- ***Kiln/Calciner/Preheater***
  - *Hours of operation of the stack = 7,056 hours*
  - *August 12th, 2009 stack test result for lead = 0.00177 lbs of lead/hour*
  - *1 ton = 2,000 lbs*

  Lead Emissions = (7,056 hours)(.00177 lbs of lead/hour)*(1 ton/2,000 lbs)*
  = 0.01 tons of lead

2008 DNR Total = 0.01 tons of lead

<u>Winegard Co.</u>
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 (2008) to be 0.00 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 the soldering process in 2005 using the actual amount of solder processed and a mass balance which assumed the total lead contained in the solder was emitted to the atmosphere. The DNR estimated lead emissions from the soldering process in 2008 using a combination of engineering estimates and the emission factor for lead provided in AP-42 Table 12.17-2 for Miscellaneous Lead Products. The facility estimated lead compound emissions from the reflow oven in 2005 using the actual amount of solder processed and mass balance which assumed the total lead contained in the solder was emitted to the atmosphere. The DNR estimated lead emissions from the reflow oven in 2007 using a combination of engineering estimates and the emission factor for lead in AP-42 Table 12.17-2 for Miscellaneous Lead Products.

<u>*Facility 2005 Estimate*</u>

- ***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*

Lead Emissions = (7,600 lbs solder)(0.1815 lbs of lead/lb solder))*(1 ton/2,000 lbs)*
= 0.69 tons of lead compounds

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

Lead Emissions = (554.45 lbs solder)(0.50 lbs of lead/lb solder)*(1 ton/2,000 lbs)*
= 0.14 tons of lead compounds

2005 Facility Total = 0.83 tons of lead

<u>*DNR 2008 Estimate*</u>

- ***Soldering Process***
  - *Actual throughput = 2,670 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*
  - *1 ton = 2,000 lbs*

Lead Emissions = (2,670 lbs solder)(0.4 lbs lead/lb solder)*(1 ton/2,000 lbs)*(0.25 lbs of lead/ton of lead processed)*(1 ton/2,000 lbs)*
= 0.000067 tons of lead

- ***Reflow Oven***
  - *Actual throughput = 739.2 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*
  - *1 ton = 2,000 lbs*

Lead Emissions = (739.2 lbs solder)(0.4 lbs lead/lb solder)*(1 ton/2,000 lbs)*(0.25 lbs of lead/ton of lead processed)*(1 ton/2,000 lbs)*
= 0.000018 tons of lead

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2008 DNR Total = 0.00 tons of lead

Crane Valve

EPA estimated lead emissions at Crane Valve to be 0.73 tons in the 2005 NEI v2. This is the value that was reported by the facility to DNR for the 2002 emissions inventory. The facility was considered a Title V source for 2002 but then dropped out of the Title V program on March 12th, 2004. DNR received a letter from Crane Valve on February 18th, 2004 indicating that by the end of September 2003 the facility had ceased its foundry operations. The electric arc furnace and casting, grinding, and cleaning equipment were taken out of operation at that time. Furthermore, an DNR field office six inspection on August 13th, 2009 revealed that the building is now occupied by a moving company. DNR believes this facility may be removed from the list of facilities for which lead emissions need to be evaluated.

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Appendix Q: Lead Modeling Analysis for Grain Processing Corporation

IOWA DEPARTMENT OF NATURAL RESOURCES

Environmental Services Division
Air Quality Bureau
Modeling Group

M E M O R A N D U M

DATE: **5-14-10**

TO: **CATHARINE FITZSIMMONS, DAVE PHELPS, BRIAN HUTCHINS, SEAN FITZSIMMONS, LORI HANSON**

FROM: **AMBER WOLF**

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 lead 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.

ANALYSIS SUMMARY

An air dispersion modeling analysis of actual lead emissions at Grain Processing Corporation (GPC) in Muscatine has been conducted. Although GPC and the nearby Muscatine Power & Water (MP&W) are separate facilities, lead emissions from MP&W were also included in the analysis due to the proximity of the two facilities. Previous modeling conducted in April 2009 was used as the basis for this analysis. This revised modeling analysis was conducted with the most recent version of the AMS/EPA Regulatory Model (AERMOD version 09292) and includes updated emission rates, stack parameters, and meteorological data (years 2004-2008).

STACK PARAMETERS AND FACILITY OPERATING CONDITIONS

The emission units at the facilities were evaluated using the parameters listed in Table 1. The modeled emission rates were verified by the construction permitting staff. Both facilities were modeled as operating 24 hours/day, 8760 hours/year.

ANALYSIS RESULTS

Modeling results indicate the lead emissions from GPC and MP&W will cause predicted concentrations that are less than 50% of the lead NAAQS. The lead modeling results for the worst case 3-month rolling average are listed in Table 2.

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POST-PROCESSING MODEL RESULTS

Since the dispersion model AERMOD does not have 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, receptor location, and 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.

Table 1. Modeled Emission Rates and Stack Parameters

Emission Points		Actual Pb Emission Rates	Stack Parameters			
ID	Description	(lb/hr)	Stack height (ft)	Stack gas exit temp (°F)	Stack gas flow rate (acfm)	Stack tip diameter (ft)
EP001	GPC Boilers	0.973	219	379	402,340	15.00
EP70	MP&W Boiler	0.0242	220	350	118,000	8.83
EP80	MP&W Boiler	0.0193	225	335	343,430	8.53
EP90	MP&W Boiler	0.0223	300	180	612,000	10.50

Table 2. Worst Case Modeling Result for Pb for the 2004 – 2008 Meteorological Data Set

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 ($\mu g/m^3$)
July – Sept 2004	0.007	0	**0.007**	0.15

* The rolling 3-month average concentration is the highest predicted value. The location of the highest predicted concentration is detailed in Figure 1.

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Maximum Lead Concentrations
GPC and MP & W

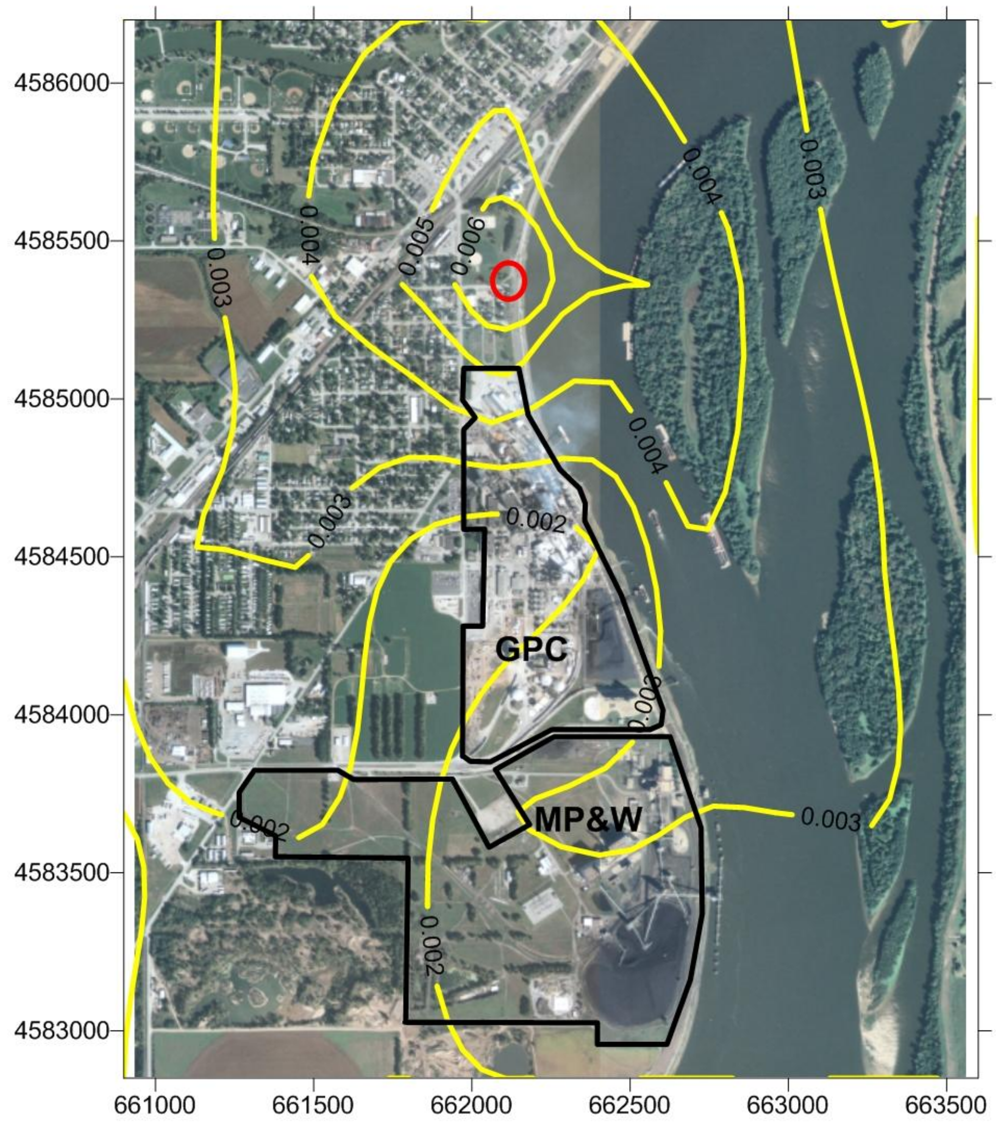

Figure 1: Modeled concentrations due to actual lead emissions from GPC and MP & W. The location of the highest predicted concentration of 0.007 ug/m3 (in red) is located at UTM coordinates 662100m (Easting), 4585350m (Northing), NAD 27. This is in the Earl Street/Musser Park area along the Mississippi River.

The NAAQS standard for lead is 0.15 ug/m3.
Contour interval = 0.001 ug/m3

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Appendix R: Lead Modeling Analysis for Walter Scott Jr. Energy Center

IOWA DEPARTMENT OF NATURAL RESOURCES

Environmental Services Division
Air Quality Bureau
Modeling Group

M E M O R A N D U M

DATE: **3/5/2010**

TO: **CATHARINE FITZSIMMONS, DAVE PHELPS, BRIAN HUTCHINS, SEAN FITZSIMMONS, PETE ZAYUDIS, LORI HANSON**

FROM: **BRAD ASHTON**

RE: **MIDAMERICAN ENERY – WALTER SCOTT JR. ENERGY CENTER (78-01-026), LEAD EMISSIONS MODELING**

CC: **JIM MCGRAW, JASON MARCEL, 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. On December 23, 2009 EPA proposed to decrease the emissions threshold for ambient monitoring to 0.5 ton/yr. MidAmerican Energy's Walter Scott Jr. Energy Center (WSEC) has lead emissions that approach this threshold. Therefore the Department has decided to proactively model the impacts from lead emissions at the facility. 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.

ANALYSIS SUMMARY

Previous modeling dated 6-12-2009 from construction Permitting project 08-516 was used as a base on which to build the current analysis. All extraneous sources from the previous analysis were deleted, and the boilers were updated with the Pb emission rates and parameters listed in Table 1. Sources were modeled using the most recent emission rates approved by the construction permit engineering staff.

Table 1. Modeled Emission Rates and Stack Parameters

Emission Point	PM_{10} (lb/hr)	Stack Height (ft)	Stack Gas Exit Temperature (°F)	Stack Tip Diameter (in)	Stack Gas Flow Rate (acfm)
Boiler 1	1.17	250.00	287	144.00	220,540
Boiler 2	1.65	250.00	316	144.00	446,508
Boiler 3	0.14	550.00	180	300.00	2,621,266
Boiler 4	0.02	551.00	207	296.00	2,445,744

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MODEL RESULTS

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

According to the results from the AMS/EPA Regulatory Model (AERMOD, dated 09292), as post-processed by Leadpost, the Pb emissions from this facility will cause predicted concentrations that are less than 50% of the Pb NAAQS. All four boilers were assumed to operate 24 hours/day, 8760 hours/year.

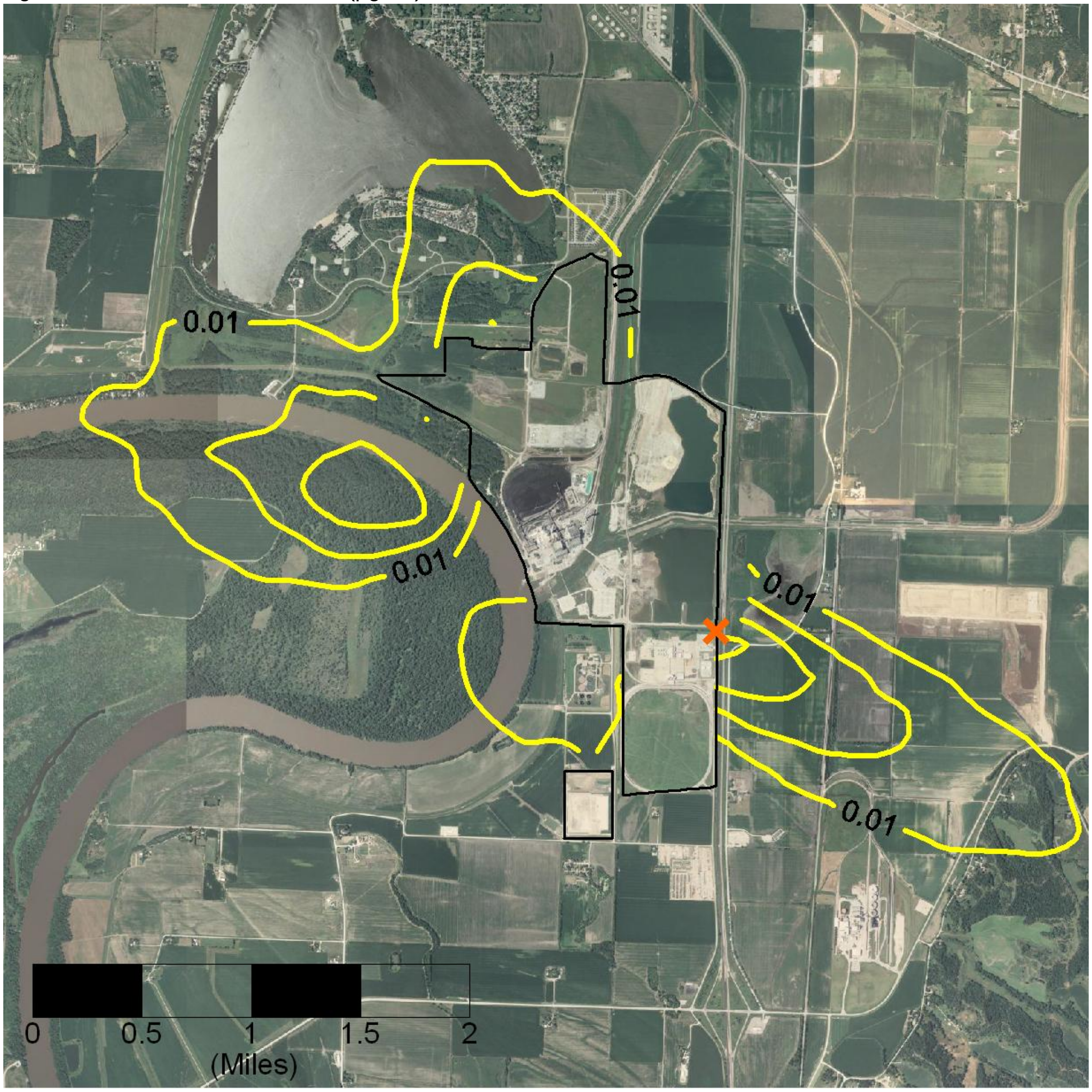
The Pb modeling result for the worst case calendar quarter and year is listed in Table 2. A visual display of isopleths is provided in Figure 1. The isopleths are based on the highest 3-month rolling average concentrations at each receptor. The location of the maximum concentration is marked with an "X". This will facilitate a determination of where the highest predicted impacts are and where monitors may best be located, if monitoring will be required.

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

Averaging Period	Year in which event occurred	Predicted Concentration* ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Rolling 3-month	Oct. – Dec. / 2001	0.028	0	0.028	0.15

* The rolling 3-month concentration is the highest predicted value. The location of the highest predicted Pb concentration is at UTM coordinates 263112 m (Easting) and 4561776 m (northing), NAD27, UTM Zone 15.

Figure 1. Modeled concentrations (µg/m^3) due to lead emissions from MidAmerican - WSEC



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Appendix S: Lead Modeling Analysis for Griffin Pipe

IOWA DEPARTMENT OF NATURAL RESOURCES

Environmental Protection Division
Air Quality Bureau
Modeling Group

M E M O R A N D U M

DATE: **4/28/10**

TO: **CATHARINE FITZSIMMONS, DAVE PHELPS, BRIAN HUTCHINS, SEAN FITZSIMMONS, 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 $\mu g/m^3$ 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 dispersion modeling analysis is to evaluate predicted ambient lead concentrations around Griffin Pipe Products Company for aid in developing a monitoring plan for the facility for 2010.

The modeling template is taken from the previous analysis done in June, 2009 with a change associated with emission parameters from the cupola (EP2) based on lead performance testing conducted on March 2, 2010. In the future, Griffin Pipe Products is proposing to install baghouse control on the cupola (EP2) and the desulfurization process (EPFG2A and EPFG2B). The addition of baghouse control to these lead emission sources will change the lead emissions characteristics from Griffin Pipe Products.

MODELING SUMMARY

A facility-wide lead NAAQS dispersion modeling analysis was conducted for Griffin Pipe Products Company located in Council Bluffs, Iowa. The DNR evaluated the ambient impacts from two sources of airborne lead emissions: EP2 (cupola and magnesium inoculation process) and the stacks EPFG2A and EPFG2B (desulfurization process).

This report presents the maximum predicted concentrations for some sensitive locations, such as schools and residences, in the vicinity of Griffin Pipe. In addition, an aerial view of the facility is provided with an overlay of concentration isopleths (lines of equal concentrations) that allow for a visual representation of the maximum predicted concentrations of airborne lead averaged over time.

For comparison purposes, the results of the current modeling analysis are compared to previous modeling analyses. The current analysis uses the most recent lead performance testing results (03/02/2010) associated with the cupola (EP2). The most recent lead performance testing results reflect the modification to the cupola off-take system from a side off-take to a 360-degree off-take system. Griffin Pipe conducted the cupola off-take system modification during the period December, 2009 to January, 2010.

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MODEL RESULTS

According to the results from the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD, dated 09292), the lead (Pb) emissions from Griffin Pipe Products Company will cause predicted concentrations that are greater than the lead NAAQS. The lead NAAQS requires that ambient concentrations of lead not exceed 0.15 $\mu g/m^3$ based on the maximum 3-month rolling average.

The emission sources for this project were evaluated using the emission rates and stack parameters listed in Table 1. The lead modeling results for the worst case calendar quarter and year are listed in Table 2. Results for the identified sensitive locations near the facility are shown in Table 3. Table 4 provides a comparison of input and output results for the current project with the previous two analyses done for this facility. Table 5 provides the change in impacts at each sensitive location from the previous analysis performed in June, 2009.

Surface mapping software is used to provide visual displays of the results. Figure 1 shows an aerial view of the Griffin Pipe facility. A visual display of the predicted lead concentration isopleths is provided in Figures 2 and 3.[11] The isopleths are based on the highest 3-month rolling average concentrations at each of the 2913 receptors in the model. Figure 3 provides a detail of the predominant downwind area just north of the plant. It shows the identified sensitive areas, such as schools and residences.

The location of the highest concentration (computed on a rolling quarter basis) has changed from near the residence 1 location to along the south boundary near the cupola (EP2) where EPFG2A is causing the largest impact. To enable a more accurate assessment of the change in predicted ambient lead impacts due to the reduction in EP2 emissions, Tables 4 and 5, as described above, have been added. These provide a basis of comparison of the results of the current modeling with previous modeling analyses performed for this facility. The contributions to the ambient lead concentrations from EP2 are generally reduced by approximately 50%, reflecting the reduction in the lead emission rate associated with the cupola (EP2). The total predicted concentrations for nine of the ten sensitive locations are reduced by an average of 35% (see Table 5). The noticeable exception is along the south boundary near EP2 where no reduction is seen at that location of highest predicted lead concentrations. This is because EPFG2A is the largest contributor in that area.

As Figures 2 and 3 indicate, the lead concentration distribution, as in previous analyses, is essentially bimodal, reflecting the summer and winter predominant wind directions. The lead emission rate reduction associated with cupola (EP2) has changed the plume interactions and moved the primary lobe from around residence 1 to around the south boundary near EP2 where the maximum concentration now occurs. Thus, the maximum predicted concentration has moved SSE along the NNW/SSE wind directions. The maximum predicted concentration was previously approximately 30 m NNW of residence 1. This area, now part of the secondary lobe of the bimodal distribution, has moved to approximately 30 m SSE of residence 1. In addition, the 0.15 $\mu g/m^3$ isopleth, which represents the NAAQS standard for lead and is represented by the orange line in Figures 2 and 3, has been reduced in extent, indicating a general reduction in ambient lead impacts. For example, the tip of the northern lobe has retreated along the SSE direction a distance of approximately 300 m from its position in the previous two modeling analyses (May and June, 2009). However, four of the ten sensitive locations still show concentrations above the lead NAAQS (see Table 3).

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

[11] Aerial photos for Figures 2 and 3 were taken from Google Earth.

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Table 1. Modeled Emission Rates and Stack Parameters

Emission Points		Stack Parameters				
ID	Description	Pb Emission Rates (lb/hr)	Stack height (ft)	Stack gas exit temp (°F)	Stack gas flow rate (acfm)*	Stack tip diameter (ft)
EP2	Cupola	0.587	125	156	60,140	7.0
EPFG2 A	Desulfurization	0.153	40	95	122,350	9.15
EPFG2 B		0.04	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

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 ($\mu g/m^3$)
May – July / 2003	0.59	0	**0.59**	0.15

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

Table 3: Ambient Contributions of Lead Based on Highest Predicted Values at Sensitive Locations

Location	Easting (NAD 27)	Northing (NAD 27)	EP2 Predicted Concentration ($\mu g/m^3$)	EPFG2A Predicted Concentration ($\mu g/m^3$)	EPFG2B Predicted Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)*
Rue Elementary School	257182	4571104	0.01	0.01	0.00	0.03
St. Albert Elementary School	257748	4570778	0.04	0.03	0.01	0.08
Residence 1	258086	4570875	0.17	0.19	0.05	**0.41**
South fence line near stack EP2	258202	4570568	0.01	0.46	0.12	**0.59**
Residence 2	258259	4570850	0.07	0.07	0.02	**0.16**
Thomas Jefferson HS	258380	4571514	0.03	0.01	0.00	0.04
Timothy Lutheran Pre-School	257503	4571689	0.03	0.02	0.01	0.06
Little Hands at Work & Play (Day Care Center)	258158	4571372	0.06	0.03	0.01	0.10
Edison Elementary School	258928	4571326	0.01	0.00	0.00	0.01
Lot for rent	258131	4570794	0.12	0.25	0.06	**0.44**

* 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 time.

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Table 4. Comparison of Modeled Emission Rates (Based on Stack Tests) and the Highest Predicted Concentrations and Their Locations

Project*	Emission Point ID	Pb Emission Rate (lb/hr)	Predicted Concentration** ($\mu g/m^3$)	Location
May, 2009	EP2 (Cupola)	1.33	0.60	NW of residence 1
June, 2009		1.2	0.61	NW of residence 1
Current		0.587	0.59	Boundary SE of EP2 (Cupola)

* Desulfurization emissions modeled as stack EPFG2 for the May, 2009 project, and modeled as stacks EPFG2A and EPFG2B for the June, 2009 and current projects.
** The rolling 3-month concentration is the highest predicted value.

Table 5: *Changes* at Sensitive Locations in Ambient Contributions of Lead Compared to the Previous Modeling Analysis Performed in June, 2009 (Based on Highest Predicted Values)

Location	Easting (NAD 27)	Northing (NAD 27)	EP2 Concentration Change ($\mu g/m^3$)	Total Concentration Change ($\mu g/m^3$)
Rue Elementary School	257182	4571104	-0.02 (-67%)	-0.01 (-25%)
St. Albert Elementary School	257748	4570778	-0.04 (-50%)	-0.04 (-33%)
Residence 1	258086	4570875	-0.21 (-55%)	-0.21 (-34%)
South fence line near stack EP2	258202	4570568	-0.01 (-50%)	0.0 (0%)
Residence 2	258259	4570850	-0.09 (-56%)	-0.09 (-36%)
Thomas Jefferson HS	258380	4571514	-0.03 (-50%)	-0.03 (-43%)
Timothy Lutheran Pre-School	257503	4571689	-0.03 (-50%)	-0.03 (-33%)
Little Hands at Work & Play (Day Care Center)	258158	4571372	-0.06 (-50%)	-0.06 (-38%)
Edison Elementary School	258928	4571326	-0.01 (-50%)	-0.01 (-50%)
Lot for rent	258131	4570794	-0.15 (-56%)	-0.15 (-25%)

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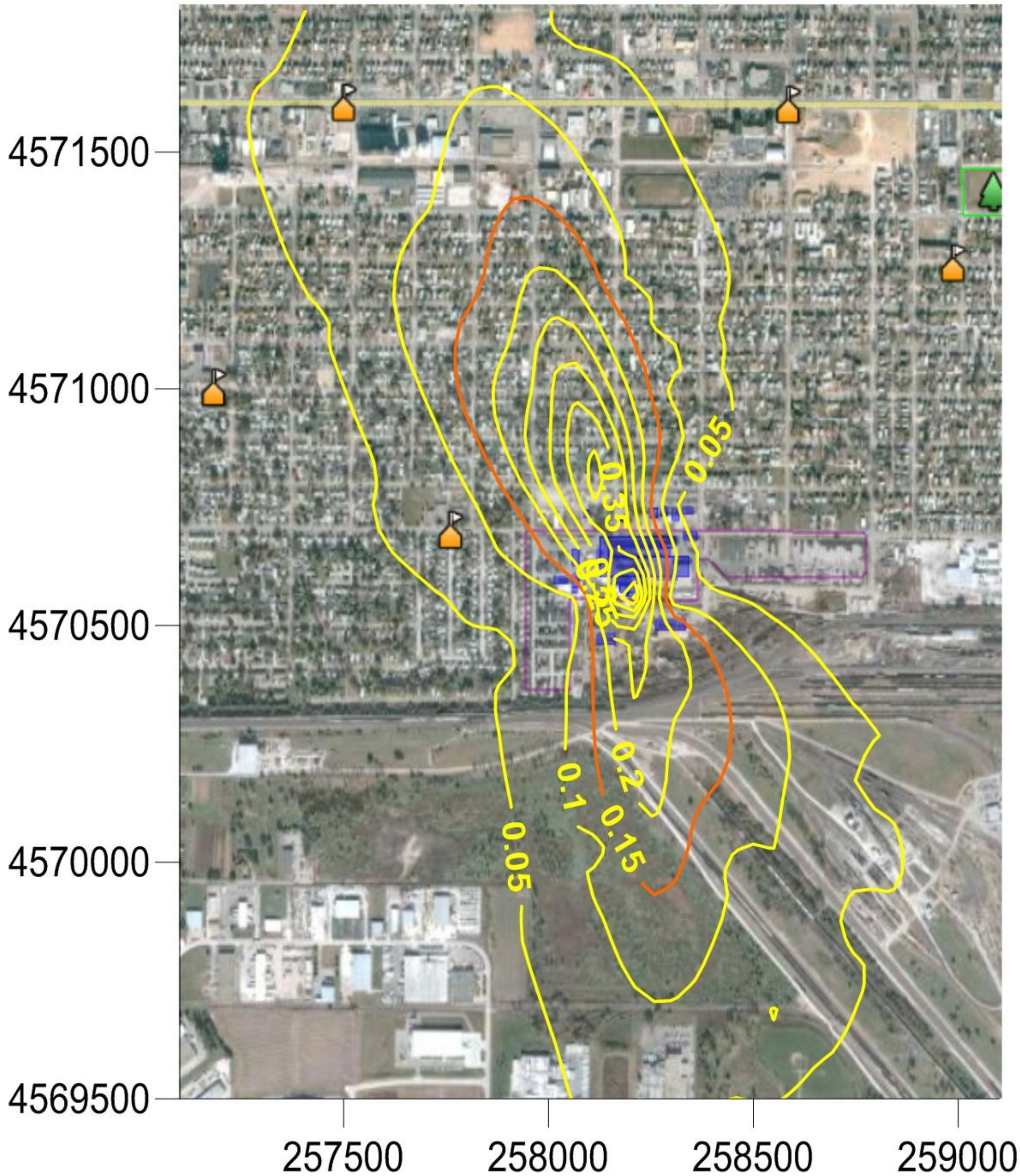
Figure 1. Aerial view of Griffin Pipe Products Company and some of the adjacent properties (mostly residential) to the north.[12]

[12] Picture taken from Microsoft Virtual Earth and horizontally compressed to fit on page.

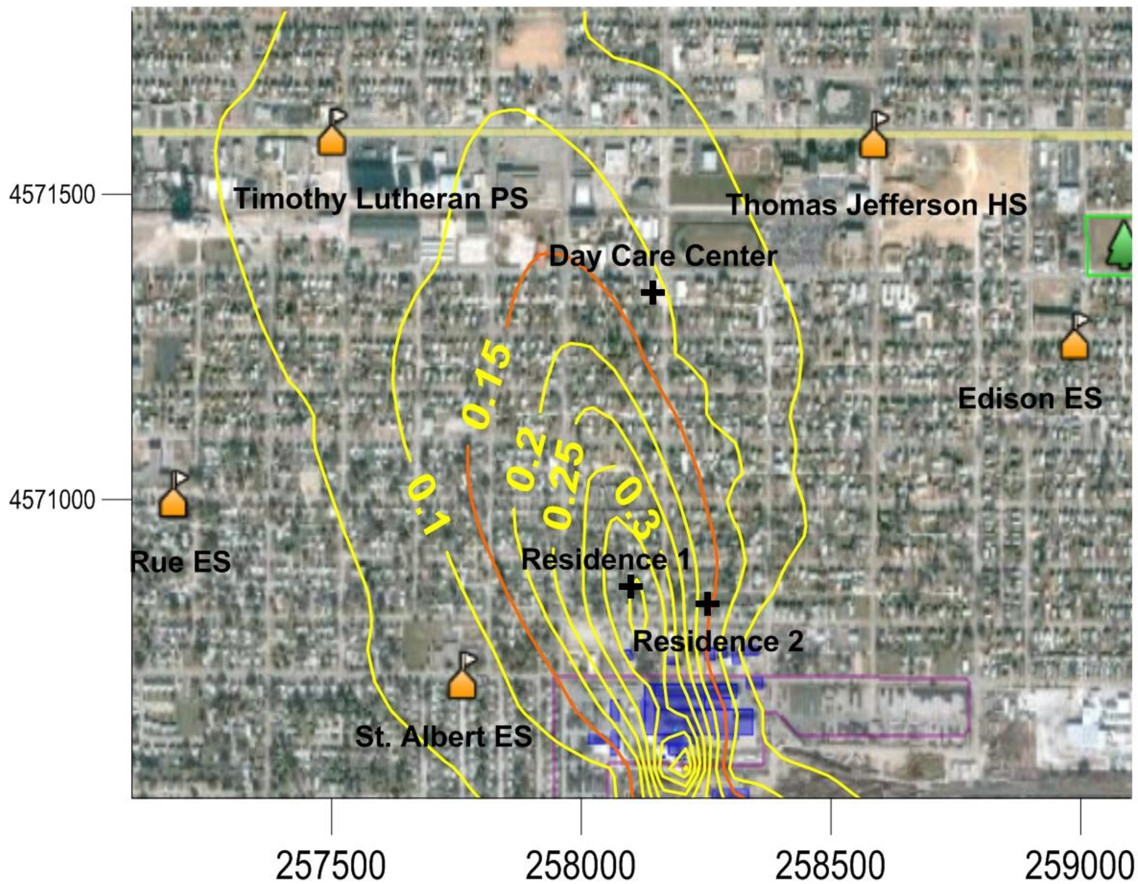
Figure 2. Modeled concentrations due to lead emissions from Griffin Pipe. The location of the highest predicted lead concentration is at UTM coordinates 258202 m (easting) and 4570568 m (northing), NAD27. This is along the south fence line near stack EP2.



contour interval = 0.05 micrograms/cubic meter

orange contour line represents the NAAQS standard for lead of 0.15 micrograms/cubic meter

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



Some identified sensitive areas

orange contour line represents the NAAQS standard for lead of 0.15 micrograms/cubic meter

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