

IOWA
EPA's Area Designations for the
2008 Lead National Ambient Air Quality Standards

Introduction

EPA has revised the level of the primary (health-based) standard from 1.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to 0.15 $\mu\text{g}/\text{m}^3$ measured as total suspended particles (TSP). EPA has revised the secondary (welfare-based) standard to be identical in all respects to the primary standard.

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as “nonattainment” those areas that violate the NAAQS and those nearby areas that contribute to violations. The table below identifies the portions of a county in Iowa that EPA proposes to designate “nonattainment” for the 2008 lead national ambient air quality standard (2008 Lead NAAQS).

Table 1. Iowa Lead NAAQS Nonattainment Areas

Area	Iowa Recommended Nonattainment County	EPA's Designated Nonattainment Counties	Nonattainment area for 1978 Lead NAAQS
Pottawattamie County	Pottawattamie County (partial) defined as: North - Avenue G South - 23rd Ave East - N16th / S 16 th West - N 35th/ S 35th St.	Pottawattamie County (partial) defined as: North - Avenue G South - 23rd Ave East - N16th / S 16 th West - N 35th/ S 35th St.	None

Within one year of a new NAAQS rulemaking, Section 107(d)(1) of the Clean Air Act requires the Governor of each state to submit to the EPA a list of all areas (or portions thereof) designating those areas as nonattainment, attainment or unclassifiable. Further, EPA is required to designate all areas (or portions thereof) no later than two years following the new NAAQS rulemaking. However, the period of time EPA has to promulgate the designations may be extended by one year if insufficient information exists to make the designations. In the Federal Register notice for the final lead NAAQS rule, EPA recognized that the existing lead monitoring network was insufficient to evaluate attainment for the new NAAQS at locations consistent with EPA's proposed new monitoring network siting criteria and data collection requirements. Many new ambient lead monitors only began operation in January 2010. Therefore, EPA designated nonattainment areas, those with existing violating monitors, effective November 3, 2010. In October 2011, EPA intends to promulgate designations for all areas not previously designated in November 2010. This action includes both areas with monitored violations of the NAAQS from newly deployed ambient air monitors and those that have been recommended as in “attainment” or “unclassifiable/attainment.”

Technical Analysis for Pottawattamie County, Iowa Nonattainment Area

This technical analysis for portions of Pottawattamie County identifies the area with a monitor that violates the 2008 Lead NAAQS and evaluates nearby sources for contributions to lead concentrations in ambient air in the area. EPA has evaluated the county based on the weight of evidence of the following factors recommended in EPA guidance:

- Air quality in potentially included versus excluded areas;
- Emissions and emissions-related data in areas potentially included versus excluded from the nonattainment area, including population data, growth rates and patterns, and emissions controls;
- Meteorology (weather/pollutant transport patterns).
- Jurisdictional boundaries (e.g., counties, municipalities, political subdivisions of the state, etc.); and
- Other relevant information submitted to or collected by EPA.

Figure 1 is a map of the area analyzed depicting the location and design value of the air quality monitor measuring a violation of the 2008 Lead NAAQS in Pottawattamie County, Iowa, and the potential sources of lead concentrations to ambient which may be contributing to the violating monitor.

On March 29, 2011, the State of Iowa recommended that portions of Pottawattamie County, Iowa, identified in Figure 2, be designated as “nonattainment” for the 2008 Lead NAAQS based on air quality data from 2009 through 2010. The state’s recommendation¹ was based on analysis of monitoring and modeling data. The IDNR’s recommended nonattainment area uses conservative modeling and adds a factor of conservatism by extending the recommended boundaries beyond the area where the isopleths indicate that predicted lead concentrations in air are one-half the Lead NAAQS.

Based on EPA’s technical analysis described below, EPA recommends designating portions of Pottawattamie County as nonattainment for the 2008 Lead NAAQS, based upon currently available information. Iowa recommended that the remainder of the State Iowa be designated as “unclassifiable/attainment.” The EPA concurs with Iowa’s recommendation and proposes to designate all areas of the state other than the area specifically described as “nonattainment” in Figure 2 as “unclassifiable/attainment” in its October 2011 designations.

1. Air Quality Data

This factor considers the Lead Design Value (in $\mu\text{g}/\text{m}^3$) for the air quality monitor in Council Bluffs, Pottawattamie County, Iowa, and the surrounding area based on data collected by the IDNR from November 3, 2009 to the present. A monitor’s design value indicates whether that

¹ “Lead Nonattainment Boundary Recommendations, Council Bluffs, IA, Technical Support Document,” Iowa Department of Natural Resources, March 29, 2011.

Figure 1. Pottawattamie County Lead Nonattainment Area

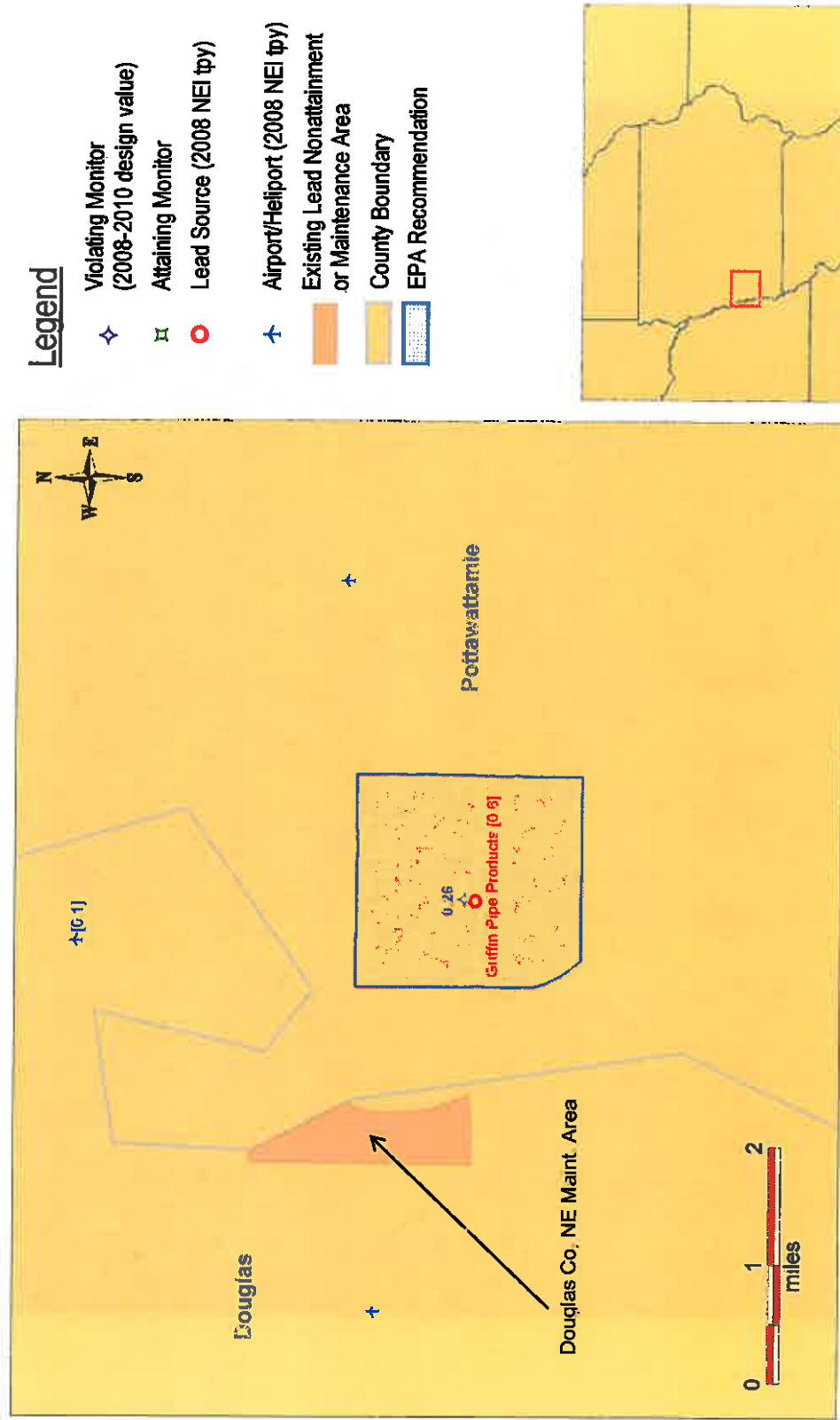


Figure 2. State Recommended Lead NAAQS Nonattainment Area



Source: "Lead Nonattainment Boundary Recommendations, Council Bluffs, IA, Technical Support Document," Iowa Department of Natural Resources, March 29, 2011.

monitor attains a specified air quality standard; in this case the 2008 Lead NAAQS the level of which is $0.15 \mu\text{g}/\text{m}^3$. The design value for the monitor in Pottawattamie County is shown in Table 2.

Table 2. Pottawattamie County Air Quality Data

County	State Recommended Nonattainment?	Monitor Name	Lead Design Value 2009-2010 ($\mu\text{g}/\text{m}^3$)
Pottawattamie	Yes	Griffin Pipe Monitor ID #191550011	0.26

A violation of the 2008 Lead NAAQS for the monitor listed in Table 2 above was measured by a monitor in Pottawattamie County, Iowa. Therefore, some area in the county and possibly additional areas in surrounding counties must be designated nonattainment. The absence of a violating monitor alone is not a sufficient reason to eliminate nearby counties as candidates for nonattainment status. Each area has been evaluated based on the weight of evidence of the eight factors (collectively combined into five like groupings) and other relevant information.

The violating monitor is depicted in Figure 3 below. The violating monitor is a Federal Equivalent Method (FEM) monitor in the predominant downwind direction, approximately 0.1 miles from the Griffin Pipe Corporation Products (Griffin Pipe) facility. Modeling conducted by IDNR and submitted to EPA was used to locate this monitor in the area predicted to measure the maximum ambient lead concentration in air. Data from the monitor from November 2009 through December 2010 have been quality assured by IDNR and submitted to EPA's AQS database for further review and verification. As Table 3 below indicates, the monitor violated the standard in six rolling calendar quarters in 2010.

**Table 3. 3-Month Rolling Averages for Lead
Pottawattamie County Ambient Air Monitor**

Dates	3-Month Rolling Average ($\mu\text{g}/\text{m}^3$)	2008 Lead NAAQS Violation
Nov '09 – Jan '10	0.10	
Dec '09 – Feb '10	0.03	
Jan – Mar 2010	0.07	
Feb – Apr 2010	0.12	
Mar – May 2010	0.14	
Apr – Jun 2010	0.17	X
May – Jul 2010	0.20	X
Jun – Aug 2010	0.26	Maximum
Jul – Sep 2010	0.24	X
Aug – Oct 2010	0.25	X
Sep – Nov 2010	0.18	X
Oct – Dec 2010	0.14	

Figure 3. Location of Pottawattamie County Ambient Air Monitor for Lead



Source: "Lead Nonattainment Boundary Recommendations, Council Bluffs, IA, Technical Support Document," Iowa Department of Natural Resources, March 29, 2011.

2. Emissions and Emissions-Related Data

Evidence of lead emissions sources in the vicinity of a violating monitor are an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county level emission data for lead and population data since the date represented by those emissions data.

Table 4 below shows total emissions of lead for sources greater than 0.1 tons per year (tpy) in and around the recommended Pottawattamie County nonattainment area. Emissions data were generally derived from the 2008 National Emissions Inventory, version 1.5 (NEI08V1.5). NEI08V1.5 was the most current version of the national inventory available in 2011 when these data were compiled for the designations process (http://www.epa.gov/ttn/chief/net/2008nei_v1/lead_facility_v1_5_final.xls).

Table 4. Lead Emissions for Pottawattamie, Douglas, Sarpy and Mills Counties

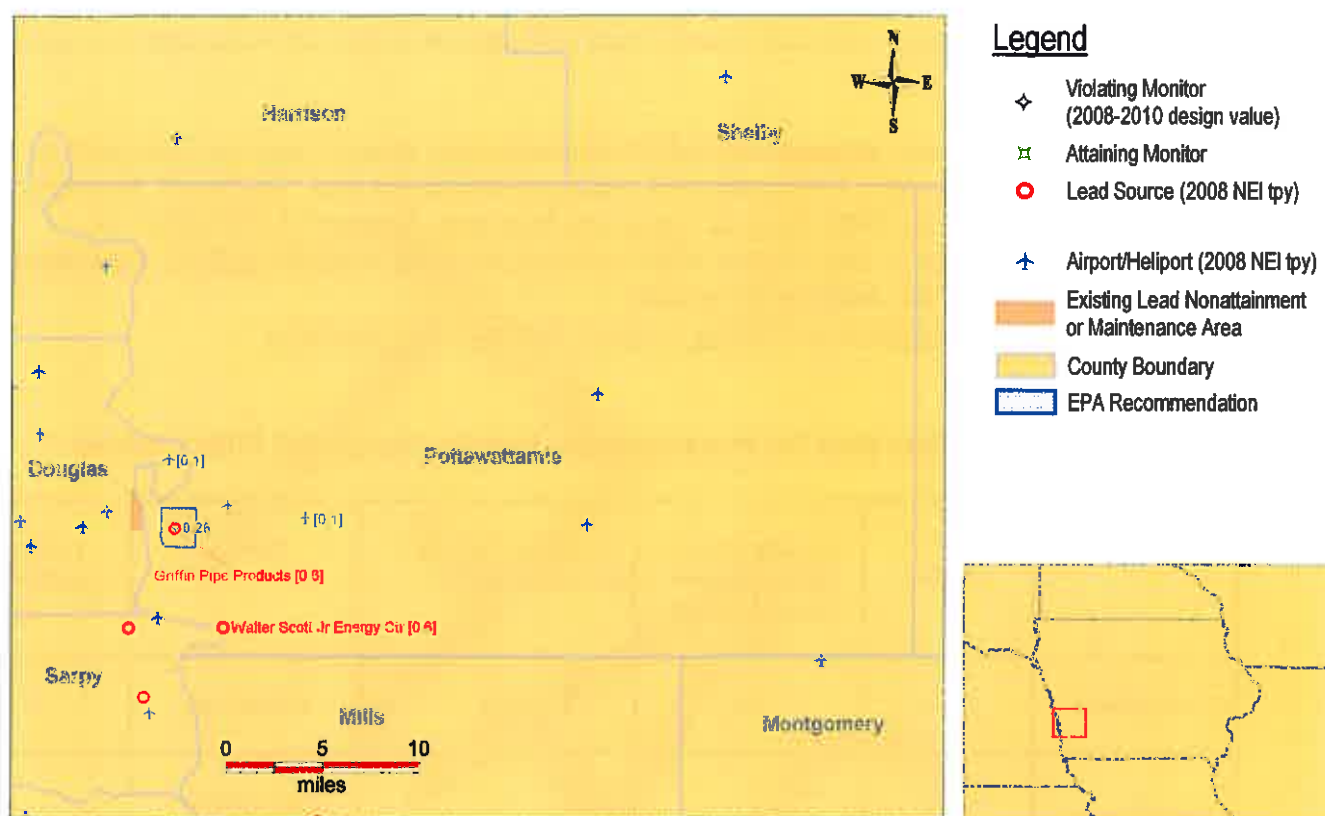
County	State	Facility in State Recommended Nonattainment Area?	Facility – Total Air Emissions (tpy)	Facility	Total County Lead Emissions (tpy)
Pottawattamie	Iowa	Yes	0.59 ¹	Griffin Pipe	1.2 ¹
Pottawattamie	Iowa	No	0.58 ¹	MidAmerican – Walter Scott Energy Center	1.2 ¹

¹ – NEI08V1

Of the facilities listed above, only the MidAmerican – Walter Scott Energy Center (WSEC), a power plant approximately 5.5 miles south-southeast of Griffin Pipe and the violating lead monitor, reported lead emissions greater than 0.5 tpy. WSEC, depicted in relation to the Griffin Pipe facility and violating monitor in Figure 4 below, operates four coal-fired electric generating units. The coal used to fuel the electric generating units at WSEC naturally contains lead which is released into the atmosphere from the burning coal. IDNR conducted modeling for this facility and requested a waiver from lead monitoring in its 2010 Network Monitoring Plan (IDNR 2010). As discussed in Section 9.0, Other Relevant Information, modeling for the nonattainment area recommendation demonstrates the WSEC facility does not contribute to the Lead NAAQS violation at the monitor. The modeled contribution of WSEC to the nonattainment area was 0.0006 µg/m³ which is less than 1% of the Lead NAAQS.

There is one airport facility in Douglas County, Nebraska, which is directly north of the Griffin Pipe facility, with aircraft using leaded aviation gas that emits 0.1 tpy lead. It is the Eppley Airfield (KOMA) in Figure 4 below. The state did not provide analyses (such as air quality modeling) to examine the potential impact of this airport on the violating monitor.

Figure 4. Omaha – Council Bluffs Area Lead Sources



3. Population Data, Growth Rates and Patterns

Table 5 shows the 2008 population for Pottawattamie County, Iowa, which includes the proposed nonattainment area. These data help assess the extent to which the concentration of human activities in the area and concentration of population-oriented commercial development may indicate emissions-based activity contributing to elevated ambient lead levels. This may include ambient lead contributions from activities that would disturb lead that has been deposited on the ground or on other surfaces. Re-entrainment of historically deposited lead typically is not reflected in the emissions inventory.

Table 5. Population Data

County	State Recommended Nonattainment?	2008 Population	2008 Population Density (pop/sq mi)	Population Change 2000-2008	Population % Change 2000-2008
Pottawattamie County, Iowa	Yes, partial	89,647	94	1682	2

Source: U.S. Census Bureau estimates for 2008 (<http://www.census.gov/popest/datasets.html>)

This factor considers population growth for 2000-2008 in the area considered for the nonattainment designation. Table 5 above shows population and population growth for Pottawattamie County, Iowa. All population data is from the U.S. Census Bureau http://www.census.gov/popest/counties/CO-EST2008-popchg2000_2008.html.

Population in Pottawattamie County grew a modest 2%. Population growth is not expected to correlate with increases in lead emissions. Significant changes in industrial activity within the county that would cause an increase in area lead concentrations are difficult to predict, but are not anticipated. EPA has considered the population growth rate for this area and does not believe that it affects the boundary determination.

4. Emissions Controls

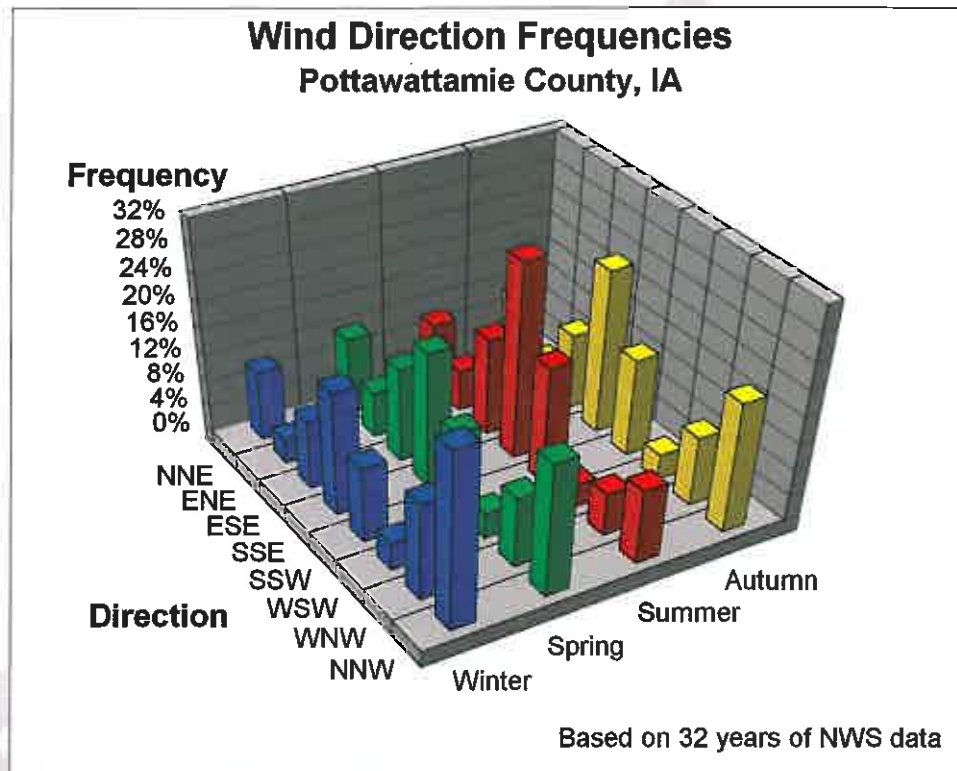
Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 4 above represent emissions levels taking into account any control strategies implemented on stationary sources in Pottawattamie County before 2008.

The Griffin Pipe facility has recently implemented air pollution control activities as a part of its Prevention of Significant Deterioration (PSD) permitting (IDNR 2011). The PSD project was required to resolve a significant (> 0.6 tpy) increase in lead emissions which occurred at the facility. Activities included: replacement of the existing wet scrubber system for the cupola furnace with a baghouse; addition of a second baghouse to control emissions from the magnesium inoculation and desulfurization processes; and installation of two new chemical storage silos, one for a chemical that will be added to the gas stream after exiting cupola and before the baghouse for sulfur dioxide control, and the other for a chemical to be added to the gas stream for the treatment of heavy metals in the baghouse. The air pollution control equipment was installed in order to demonstrate that the facility meets the Best Available Control Technology (BACT) criteria. The facility must also utilize a scrap management plan to control the amount of lead contained in the scrap metal it processes. The final PSD permit was issued on December 7, 2010. The baghouses have been operational since January 2011. Implementation of the PSD project is expected to greatly reduce lead air emissions.

5. Meteorology

For this factor, EPA considered data from 32 years of National Weather Service average frequency of wind direction by season. The data on meteorology are depicted in Figure 5 below. These data may provide evidence of the potential for lead emissions sources located upwind of a violating monitor to contribute to ambient lead levels at the violation location.

Figure 5. Wind Direction Frequencies



The three-dimensional bar chart above shows the wind frequencies in eight directions for the four seasons. The chart frequencies reflect the directions from which the winds come. Based on Figure 5, it may be concluded that the wind originates predominately from the north-northwest (NNW) in the winter months and from the east-southeast (ESE) during summer months.

In its analysis, IDNR used data from the nearest Automated Surface Observing System (ASOS) meteorological station located at Eppley Airfield (KOMA) in Omaha, Nebraska (IDNR 2011). KOMA is approximately 3 miles to the north-northwest (NNW) of Griffin Pipe monitor in Council Bluffs, Iowa. Based on the data from the ASOS meteorological station at KOMA, IDNR concluded that the predominant wind directions were NNW and south-southeast (SSE).

Wind direction appears to have a strong influence on lead concentrations at the violating monitor. IDNR's analysis concludes that on days when the 24-hour average lead concentrations exceed $0.15 \mu\text{g}/\text{m}^3$, winds are typically out of the SSE (IDNR 2011). Further, IDNR concluded

that winds from the NNW, which also occur frequently, are rarely measured on days for which high lead concentrations are measured in the air monitor.

6. Geography/Topography

The geography/topography analysis evaluates the physical features of the land that may have an effect on the air shed and, therefore, on the distribution of lead over the proposed Pottawattamie County nonattainment area.

Council Bluffs is located on the eastern banks of the Missouri River and extends eastward into Pottawattamie County. The topography of Pottawattamie County consists of flat river bottoms from three to 10 miles wide along the Missouri River. Bluffs extending 100 to 300 feet above the floodplain demark the extent of the generally flat river bottoms. Further east in Pottawattamie County the terrain transitions into areas of steep ravines and hills, followed by gently rolling prairie (IDNR 2011).

The proposed nonattainment area does not have any geographical or topographical barriers significantly affecting air pollution transport within its air shed. Therefore, this factor did not play a significant role in determining the nonattainment boundary.

7. Jurisdictional boundaries

Existing jurisdictional boundaries may be helpful in determining a boundary for purposes of nonattainment designations, and for purposes of carrying out the governmental responsibilities of planning for attainment of the lead NAAQS and implementing control measures. These existing boundaries may include an existing nonattainment or maintenance area boundary, a county or township boundary, a metropolitan area boundary, an air management district, or an urban planning boundary established for coordinating business development or transportation activities.

In the area surrounding the violating monitor, the proposed nonattainment area lies within the jurisdictional boundary of the City of Council Bluffs, Iowa. The City of Council Bluffs encompasses approximately 39.7 square miles (IDNR 2011). Based on the modeling data which are described in Section 9 below, IDNR recommended a nonattainment area that is considerably smaller than the city limits. Rather, the IDNR recommended nonattainment area is defined by major roadways that it believes are durable and more recognizable to the public. This is reasonable considering the chemical properties of lead: elemental lead and lead compounds are heavier and tend to deposit from ambient air faster and in a shorter distance from the source than lighter molecular weight pollutants.

8. Other Relevant Information

EPA received additional information from the State relevant to establish a nonattainment area boundary for portions of Pottawattamie County, Iowa. As briefly mentioned above, IDNR submitted the results of a dispersion model analysis in support of its boundary

determination. EPA considered this information and conducted an independent analysis in making its boundary determination for the Pottawattamie County nonattainment area.

In accordance with the Lead NAAQS Final Rule, the presumptive boundary of the nonattainment area is the entire county with a violating monitor. The State and/or EPA may conduct additional area-specific analyses that could lead to a departure from the presumptive boundary.

Boundaries may be recommended on the basis of one or any combination of the following techniques in addition to the eight-factor analysis:

- Qualitative analysis;
- Spatial interpolation of air quality monitoring data; or
- Air quality simulation by dispersion modeling.

IDNR elected to use dispersion modeling for making its boundary recommendation to EPA. EPA evaluated IDNR's analysis and conducted independent verification and analysis as discussed below.

IDNR used AERMOD, EPA's preferred dispersion model for the analysis conducted. The modeling was performed for two scenarios: absent baghouse controls using actual emissions rates based on stack testing conducted in March 2010; and with baghouse controls installed in January 2011 using BACT emissions limits specified in the facility's air construction permit for the PSD project. Emissions modeled under this scenario were 0.28 lbs lead per hour, or 1.23 tpy¹, which is approximately a factor of two greater than the facilities emissions reported emissions of 0.58 tpy listed above in Table 4.

Other potential sources of lead from the area power plants and cement kiln discussed in Section 2 above were modeled based on potential to emit. The WSEC facility, which is approximately 5.5 miles from Griffin Pipe and the violating monitor, had the greatest contribution to the nonattainment area of all the Iowa and Nebraska sources of lead emissions modeled. The modeling determined that WSEC contributed 0.0006 $\mu\text{g}/\text{m}^3$ of lead to the receptor grid area, which is less than 1% of the level of the Lead NAAQS. Therefore, the modeling confirms that the Griffin Pipe facility is the source of lead measured at the violating monitor and modeled to determine the extent of the Lead NAAQS violation.

In IDNR's model scenario absent baghouse controls, violations of the NAAQS were predicted to the north and south from the Griffin Pipe facility. The highest predicted lead concentration for this scenario, 0.60 $\mu\text{g}/\text{m}^3$, occurred along the southern boundary of the facility near the cupola stack. Modeled impacts from other potential sources of lead including the coal fired power plants and cement kiln discussed in Section 3, Emissions, above, ranged from <0.0001 to 0.0006 $\mu\text{g}/\text{m}^3$ of lead.

As the isopleths in Figure 6 below indicate, in the scenario absent baghouse controls, the predicted area that exceeds the 0.15 $\mu\text{g}/\text{m}^3$ Lead NAAQS extends approximately one-third mile to the north and one-fourth mile to the south. There is a sharp decrease in the lead

concentrations as the distance from the facility increases, as would be predicted based on the physical properties of lead.

As Figure 7 below indicates, in the scenario with baghouse controls, the predicted lead concentrations are below the Lead NAAQS. The highest lead concentration predicted by the model in this scenario was $0.054 \mu\text{g}/\text{m}^3$. Concentrations of lead for the potential lead-emitting facilities remained the same in the scenario modeled with baghouse controls because the only change in this scenario specifically relates to air pollution control equipment installed at the Griffin Pipe facility; the model inputs for the other facilities remained the same.

Using the outcomes of its modeling effort and its eight-factor analysis, the IDNR recommended boundaries for the Lead NAAQS nonattainment area depicted in Figure 2 above. The IDNR's recommended nonattainment area uses the most conservative model run, the scenario absent baghouse controls, and adds a factor of conservatism by extending the recommended boundaries beyond the area where the isopleths indicate that predicted lead concentrations in air are one-half the Lead NAAQS.

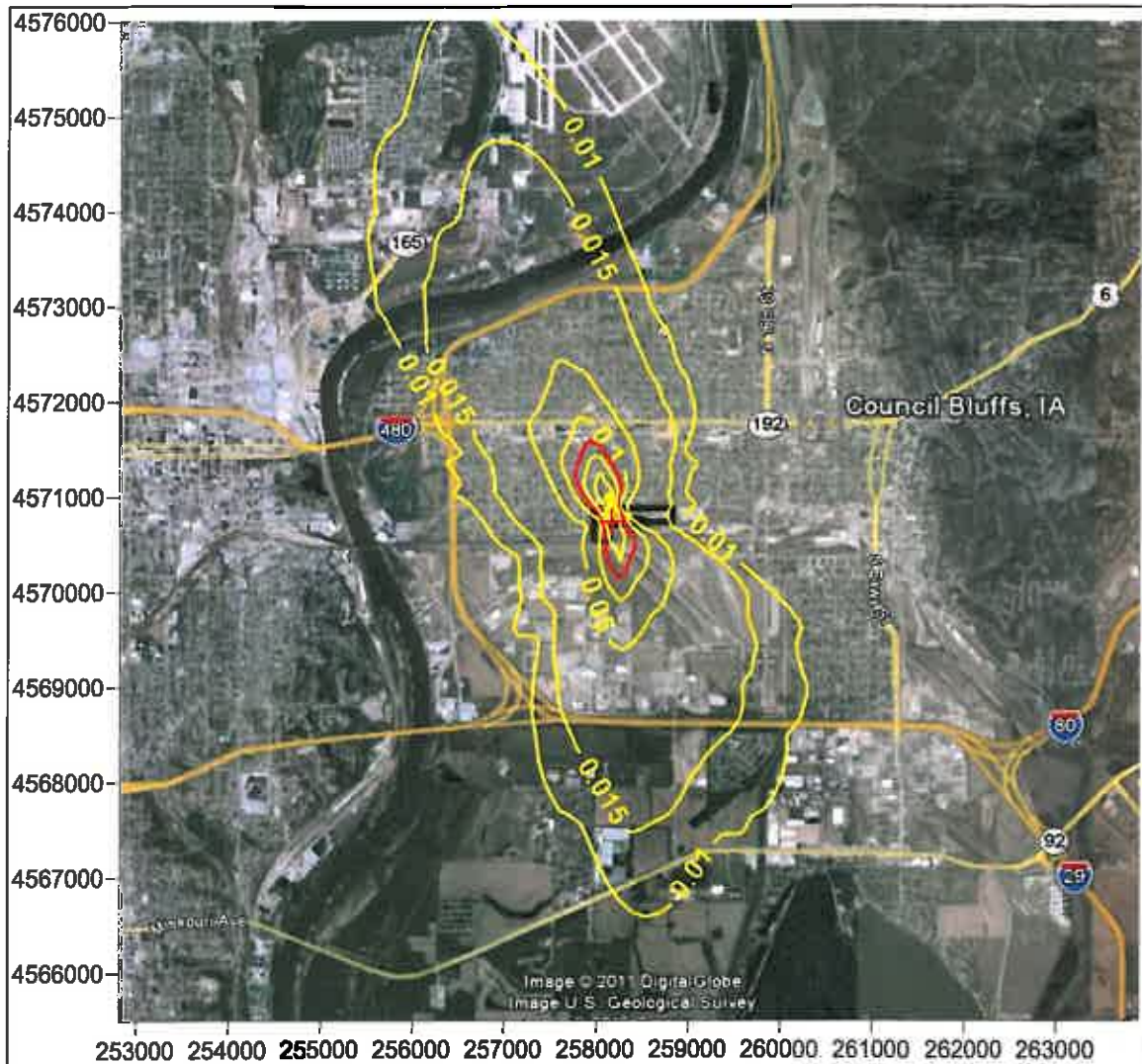
EPA conducted an independent review of IDNR's model and determined the modeling effort was generally comprehensive and done in accordance with EPA modeling guidance (Daye 2011). EPA's model output for the absent baghouse controls scenario is depicted in Figure 8 below.

Summary

EPA intends to designate portions of Pottawattamie County, Iowa which include the Griffin Pipe facility in Figure 2 as the nonattainment area for the 2008 Lead NAAQS. The boundaries of the proposed nonattainment area are based on major roadways in Council Bluffs, Iowa.

The air quality monitor in Pottawattamie County located NNW of the facility shows violations of the 2008 Lead NAAQS based on 2009 - 2010 air quality data. Therefore, a nonattainment designation is required for all or some of Pottawattamie County. The eight-factor analysis and other relevant information, including modeling results, supports a partial county designation for Pottawattamie County. Based on its consideration of all the relevant, available information, as described above, EPA believes that the boundaries described herein encompass the entire area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the 2008 Pb NAAQS.

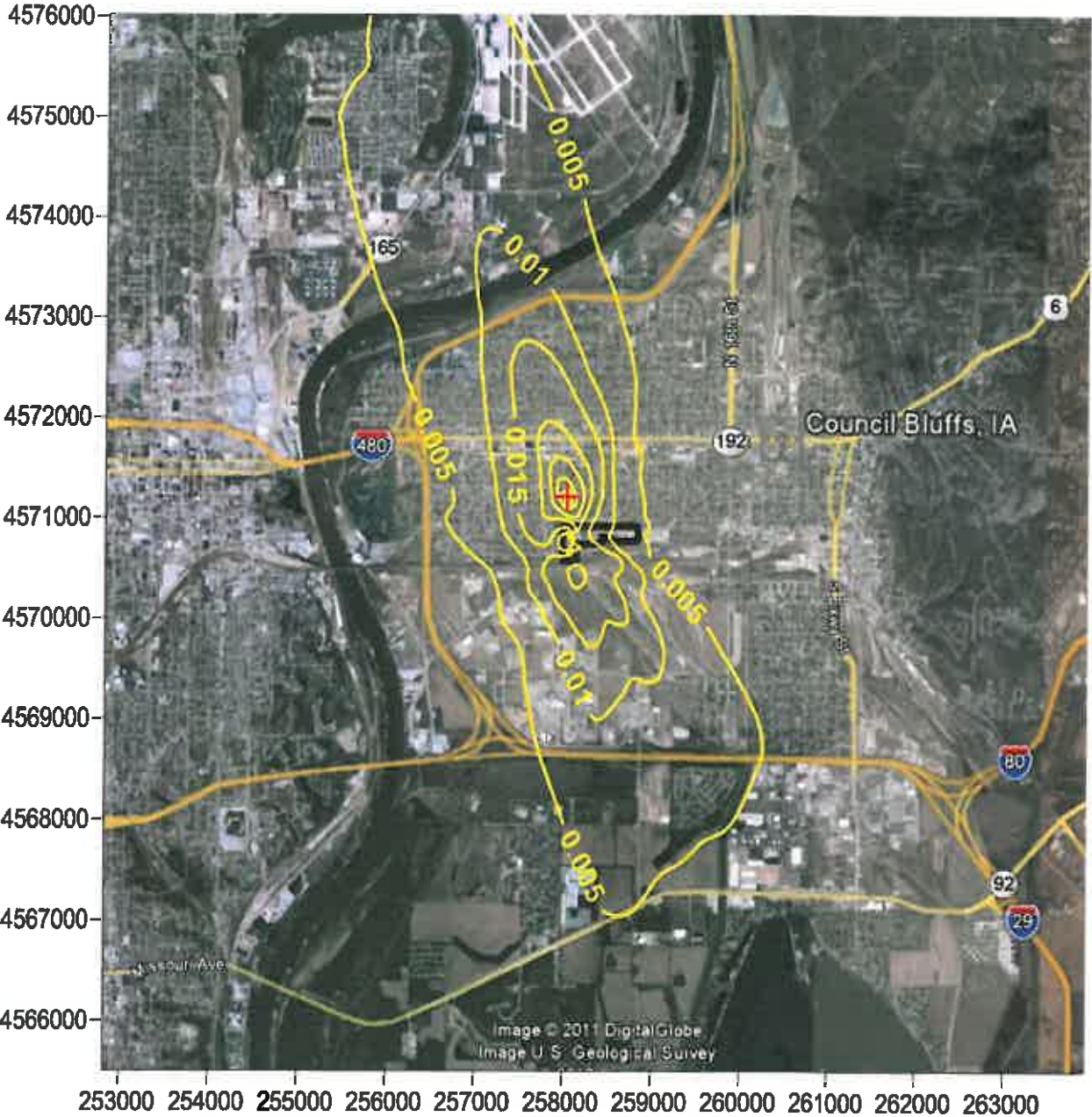
Figure 6. IDNR Air Dispersion Model Results - Absent Baghouse Controls



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

innermost contour represents the 0.35 micrograms/cubic meter concentration isopleth;
the point of maximum concentration of 0.60 micrograms/cubic meter is located along the
southern property line indicated by the red + symbol.

Figure 7. IDNR Air Dispersion Model Results – with Baghouse Controls



innermost contour represents the 0.050 micrograms/cubic meter concentration isopleth; the point of maximum concentration of 0.054 micrograms/cubic meter is indicated by the red + symbol.

Figure 8. EPA Air Dispersion Model Result – Absent Baghouse Controls



NOTE: The Environmental Protection Agency does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any injury or loss resulting from reliance upon the data and/or model.
 July 13, 2017 2:00

Scale: 1:10000
 Map: 29-150-011-001 (March, 2017)
 Model: 29-150-011-001 (March, 2017)
 (Scale: 1:10000)



**Pottawattamie County
 Lead NAAQS**
 Nonattainment Boundary
 Recommendation
 Lead Model with no background

References

“Iowa Ambient Air Monitoring 2010 Network Plan,” Iowa Department of Natural Resources, June 2010.

“Lead Nonattainment Boundary Recommendations, Council Bluffs, IA, Technical Support Document,” Iowa Department of Natural Resources, March 29, 2011.

Daye, Richard. Email correspondence to Stephanie Doolan, U. S. Environmental Protection Agency (EPA) Region 7, Air Planning and Development Branch, dated May 27, 2011.

Definition of important terms used in this document:

- 1) **Designated “nonattainment” area** – an area which EPA has determined, based on a State recommendation and/or on the technical analysis included in this document, has violated the 2008 Lead NAAQS, based on the most recent three years of quality assured air quality monitoring data from 2008-2010 including at least one valid three-month site mean above the level of the 2008 Lead NAAQS, or that contributes to a violation in a nearby area.
- 2) **Designated “unclassifiable/attainment” area** – an area which EPA has determined does not contribute to a violation of the 2008 Lead NAAQS in a nearby area and either: (1) meets the 2008 Lead NAAQS, based on the most recent three years of quality assured air quality monitoring data from 2008-2010 including 36 consecutive valid three-month site means (including the last two months of 2007), or (2) has no monitors or has incomplete air quality monitoring data for 2008-2010 but has no violations of the 2008 Lead NAAQS.
- 3) **Designated “unclassifiable” area** – an area which EPA has determined cannot be classified on the basis of available information as meeting or violating the 2008 Lead NAAQS, based on the most recent three years of quality assured air quality monitoring data from 2008-2010, but for which available monitoring data from the same or a recent period indicate a significant likelihood that the area may be violating the 2008 Lead NAAQS.
- 4) **Violating monitor** – an ambient air monitor whose valid design value exceeds 0.15 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). As described in Appendix R of 40 CFR part 50, a violation can be based on either Pb-TSP or Pb-PM10 data and only three months of data are necessary to produce a valid violating design value.
- 5) **1978 Lead NAAQS** – $1.5 \mu\text{g}/\text{m}^3$, National Ambient Air Quality Standard for lead promulgated in 1978. Based on Pb-TSP indicator and averaged over a calendar quarter.
- 6) **2008 Lead NAAQS** - $0.15 \mu\text{g}/\text{m}^3$, National Ambient Air Quality Standard for lead promulgated in 2008. Based on Pb-TSP indicator and a three-month rolling average. Pb-PM10 data may be used in limited instances, including to show nonattainment.

