KANSAS
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 ($\mu g/m^3$) to 0.15 $\mu g/m^3$ 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 Kansas that EPA proposes to designate "nonattainment" for the 2008 lead national ambient air quality standard (2008 Lead NAAQS).

Table 1. Kansas Lead NAAQS Nonattainment Areas

Area	Kansas Recommended Nonattainment County	EPA's Designated Nonattainment Counties	Nonattainment area for 1978 Lead NAAQS
Saline County	Saline County (partial) defined as: North - Schilling Rd South – Water Well Rd East – ¼ mile west of S. Ohio St. West - 9th St.	Saline County (partial) defined as North - Schilling Rd South – Water Well Rd East – ¼ mile west of S. Ohio St. West - 9th 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 Saline County, Kansas Nonattainment Area

This technical analysis for portions of Saline 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 Saline County, Kansas, and the potential sources of lead concentrations to ambient which may be contributing to the violating monitor.

On May 10, 2011, the State of Kansas recommended that portions of Saline County, Kansas, be designated as "nonattainment" for the 2008 Lead NAAQS based on air quality data from 2010. The Kansas Department of Health and Environment's (KDHE's) recommended boundaries for the nonattainment area are depicted in Figure 2 (KDHE 2011).

Based on EPA's technical analysis described below, EPA recommends designating portions of Saline County as nonattainment for the 2008 Lead NAAQS, based upon currently available information. Kansas recommended that the remainder of the state be designated as "unclassifiable/attainment." The EPA concurs with Kansas' 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 $\mu g/m^3$) for the air quality monitor in Salina, Saline County, Kansas, and the surrounding area based on data collected by the KDHE from February 7, 2010, to the present. A monitor's design value indicates whether that monitor attains a specified air quality standard; in this case the 2008 Lead NAAQS the level of which is 0.15 $\mu g/m^3$. The design value for the monitor in Saline County is shown in Table 2.

Figure 1. Saline County, Kansas, Lead NAAQS Violating Monitor

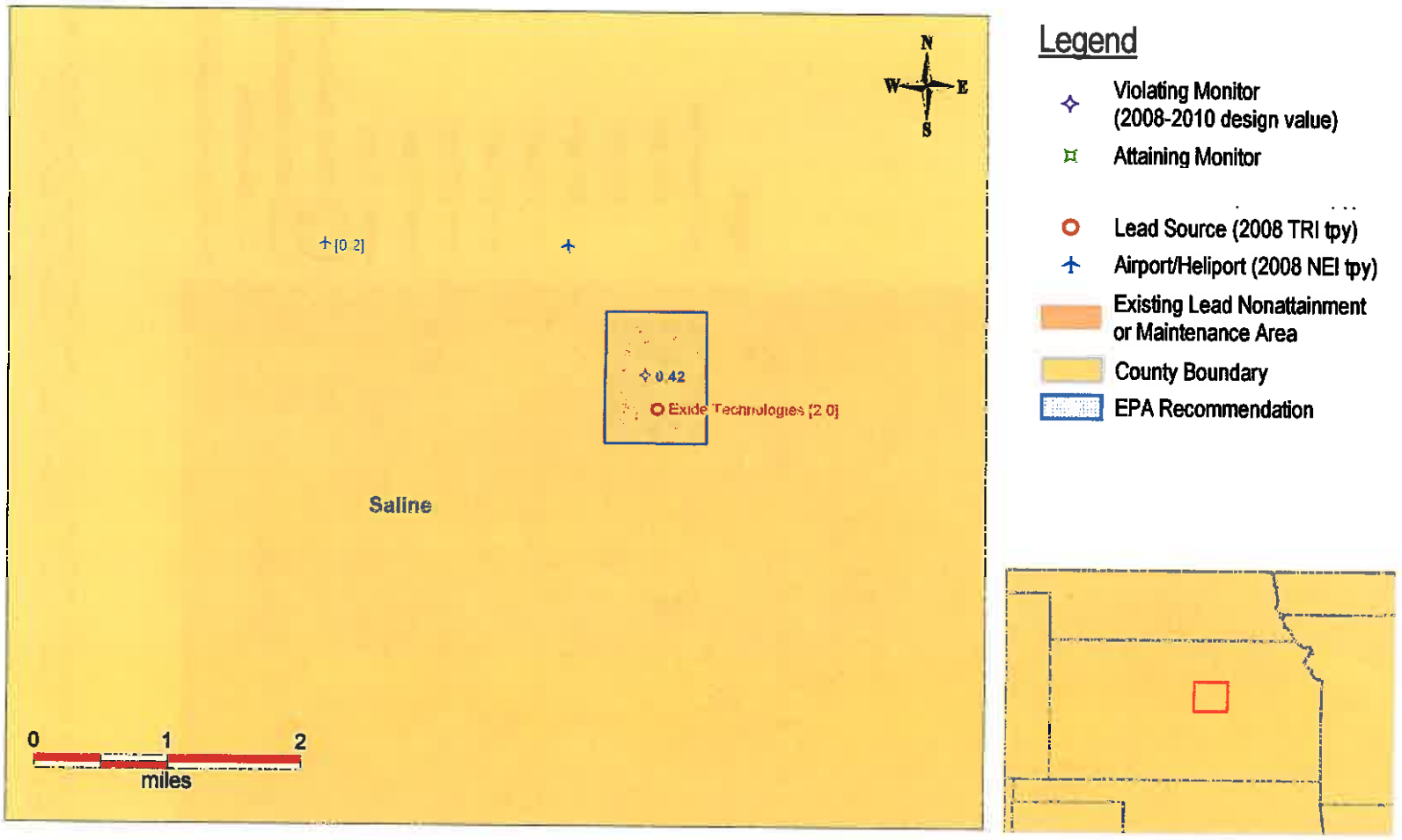
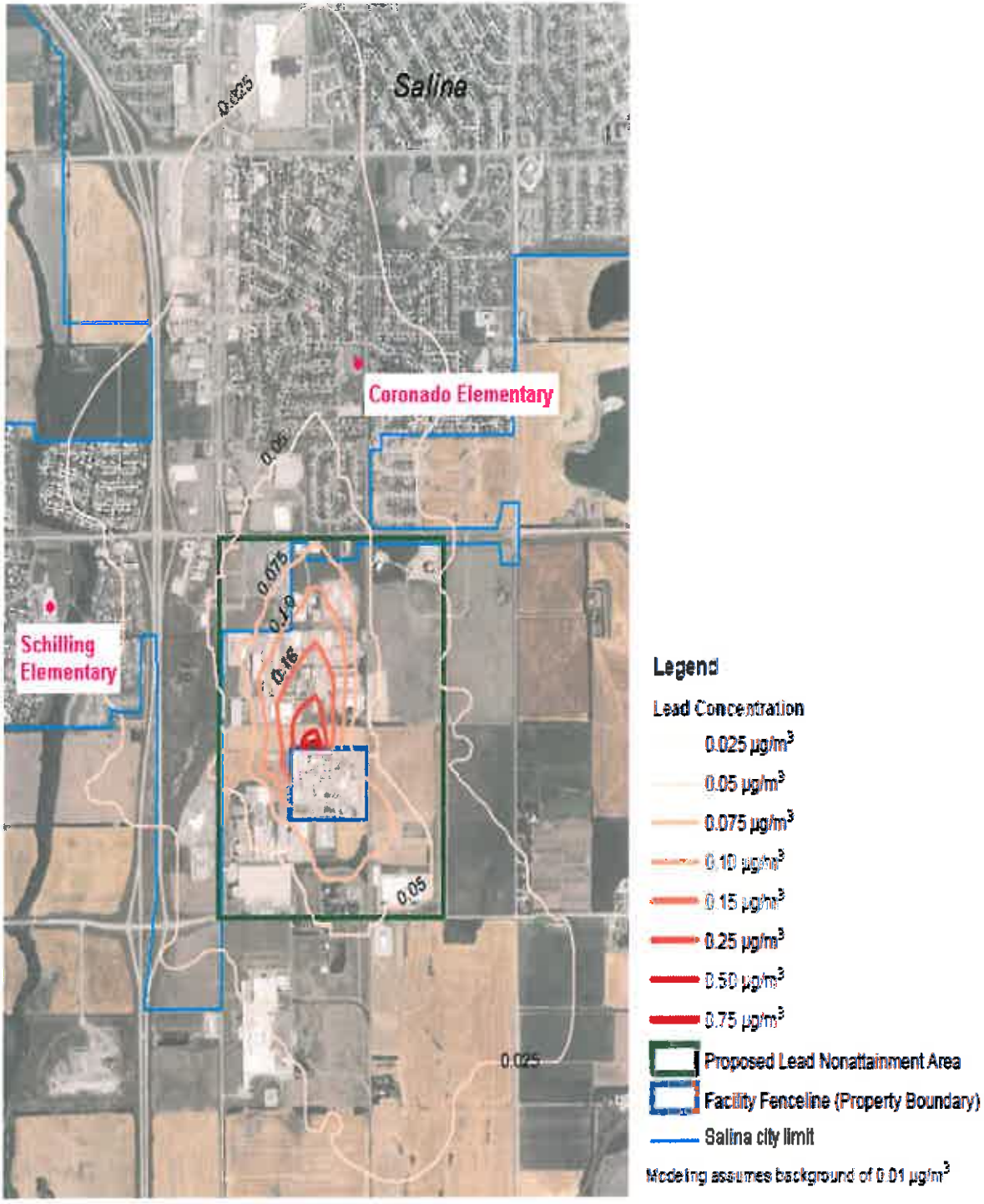


Figure 2. State Recommended Lead NAAQS Nonattainment Area



Source: "*Technical Support Document for the Recommendation of Nonattainment Boundaries in Kansas for the 2008 Lead National Ambient Air Quality Standard,*," Kansas Department of Health and Environment, May 10, 2011.

Table 2. Saline County Air Quality Data

County	State Recommended Nonattainment?	Monitor Name	Lead Design Value 2010 ($\mu g/m^3$)
Saline	Yes	Exide Monitor ID #201690004	0.421

A violation of the 2008 Lead NAAQS for the monitor listed in Table 2 above was measured by a monitor in Saline County, Kansas. 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, on the north side of the Exide Technologies (Exide) fence line. Ambient air monitoring began at the Exide facility because the facility reports lead emissions over one ton per year (tpy), which was the threshold for monitoring established in the 2008 Lead NAAQS Final Rule (73 FR 67062). Data from the monitor have been collected and are reported through February 2011 in Table 3 below. 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
Saline County Ambient Air Monitor

Dates	3-Month Rolling Average ($\mu g/m^3$)	2008 Lead NAAQS Violation
Feb – Apr 2010	0.097	
Mar – May 2010	0.096	
Apr – Jun 2010	0.107	
May – Jul 2010	**0.231**	X
Jun – Aug 2010	**0.324**	X
Jul – Sep 2010	**0.421**	Maximum
Aug – Oct 2010	**0.353**	X
Sep – Nov 2010	**0.274**	X
Oct – Dec 2010	**0.158**	X
Nov '10 – Jan '11	0.094	
Dec '10 – Feb '11	0.108	

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

Source: "*Technical Support Document for the Recommendation of Nonattainment Boundaries in Kansas for the 2008 Lead National Ambient Air Quality Standard,*," Kansas Department of Health and Environment, May 10, 2011.

2. *Emissions and Emissions-Related Data*

Evidence of lead emissions sources in the vicinity of a violating monitor is 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 any growth in lead emitting activities since the date represented by those emissions data.

As mentioned above, the Exide facility in Salina, Kansas, reports lead emissions greater than 1.0 tpy. The facility manufactures lead acid batteries for automobiles, trucks, and watercraft. Lead emissions result from breaking open used batteries, re-melting the lead, and reformulating new batteries. The lead is released in particulate form and generally captured within building structures or by air pollution control equipment; however, some lead particulates escape to the ambient air, depending on the degree of facility process enclosures and the efficiency of air pollution control equipment. Historic lead emissions from the Exide facility are as follows:

Year	Lead Emissions (tpy)
2005	3.08
2006	3.12
2007	3.31
2008	2.25
2009	2.15
2010	2.17

The 2010 lead emission data above are based on stack test data (KDHE 2011). KDHE reports that a compliance inspection noted that the facility was operating at full capacity in 2007, the year the facility reported the highest lead emissions. It should also be noted that in a letter dated January 24, 2011, from Exide to KDHE, the facility lists a number of air emission control projects that have occurred from 2005 to the present which have likely resulted in reduced lead emissions from the maximum reported in 2007. The letter has been included as Appendix A to KDHE's TSD (KDHE 2011). Those projects are discussed in greater detail in Section 5 below.

Table 4 below shows total emissions of lead for sources greater than 0.1 tons per year (tpy) in and around the recommended Saline County nonattainment area. Emissions data were generally derived from the 2008 National Emissions Inventory, version 1.5 (NEI08V1.5) except as otherwise noted. 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). As footnoted in the table, AP-42 was used to calculate emissions for one of the facilities. AP-42, *Compilation of Air Pollutant Emission Factors* (http://www.epa.gov/ttnchie1/ap42/), is the primary reference for EPA's emission factor information. An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors in AP-42 have been developed and compiled from source test data, material balance studies, and engineering estimates. This reference is used to estimate emissions from facilities when no stack test data are available. The total lead emissions for Saline County listed in Table 4 below were derived from EPA's TRI database. Facilities are required by the Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. 11001 et seq. (1986), to report emissions for regulated air toxics, which includes lead, to this database. The 2.4 tpy estimate for total county emissions provided in Table 4 below was derived by adding up all the lead emissions reported for all facilities in Saline County reporting to the TRI database.

Table 4. Lead Emissions for Saline County, Kansas

Facility	Facility – Total Air Emissions (tpy)	Facility in State Recommended Nonattainment Area?
Exide Technologies	2.17[1]	Yes
Metlcast Products	0.14[2]	Yes
Salina Municipal Airport	0.17[3]	No
Total County Lead Emissions (tpy)	2.4[4]	

[1] – Based on 2010 stack testing
[2] – 2010 Kansas Emissions Inventory (KEI) and AP-42 calculation
[3] – 2008 National Emissions Inventory Version 1.5 (NEI08V1.5)
[4] – Toxic Release Inventory (TRI) 2008

The Metlcast Products (Metlcast) facility is located to the north of the Exide facility, near the violating lead monitor. The Metlcast facility uses three electric induction furnaces to cast gray iron. The scrap metal used to produce the gray iron most likely has varying amounts of lead, depending on the source of the scrap. When heated, the lead is driven off the molten metal in the form of particulates. Elemental lead and lead compounds in the form of particulates are captured by the facility's air pollution control equipment; however, some lead-contaminated particulates escape to the ambient air. Lead emissions from this facility were estimated by KDHE using AP-42.

There is one airport facility in Saline County with aircraft using leaded aviation gas that emits 0.1 tpy or more, the Salina Municipal Airport listed in Table 4 above. The state did not provide analyses (such as air quality modeling) to examine the potential impact of the airport on the violating monitor.

3. Population Data, Growth Rates and Patterns

Table 5 shows the 2008 population for Saline County, Kansas, 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
Saline County, Kansas	Yes, partial	54,657	76	1,012	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 Saline County, Kansas. All population data is from the U.S. Census Bureau http://www.census.gov/popest/counties/CO-EST2008-popchg2000_2008.html.

Population in Saline 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 Saline County before 2008.

The Exide facility is classified as a "synthetic minor" source and has a Class II operating permit issued by the State of Kansas on January 15, 2004. From 2006 to the present, Exide has implemented or is in progress on a number of updates to the facility's air pollution control equipment. The updates are summarized in a January 24, 2011, letter to KDHE which is Attachment A to its TSD (KDHE 2011). From 2006 to the present, air pollution control equipment upgrades conducted or in progress include replacement of 10 oxide mills, associated baghouses, and the additional of High Efficiency Particulate Air (HEPA) filters for each source; and baghouse replacements for the #2, #3 and #4 baghouses. Although this information was not considered as a part of the boundary recommendation, planned activities at the Exide facility include replacement of two more oxide mills, replacement of baghouse #5; relocation of the oxide mill diverter valves to a ventilated, enclosed building; and an upgrade to the ball mill ventilation.

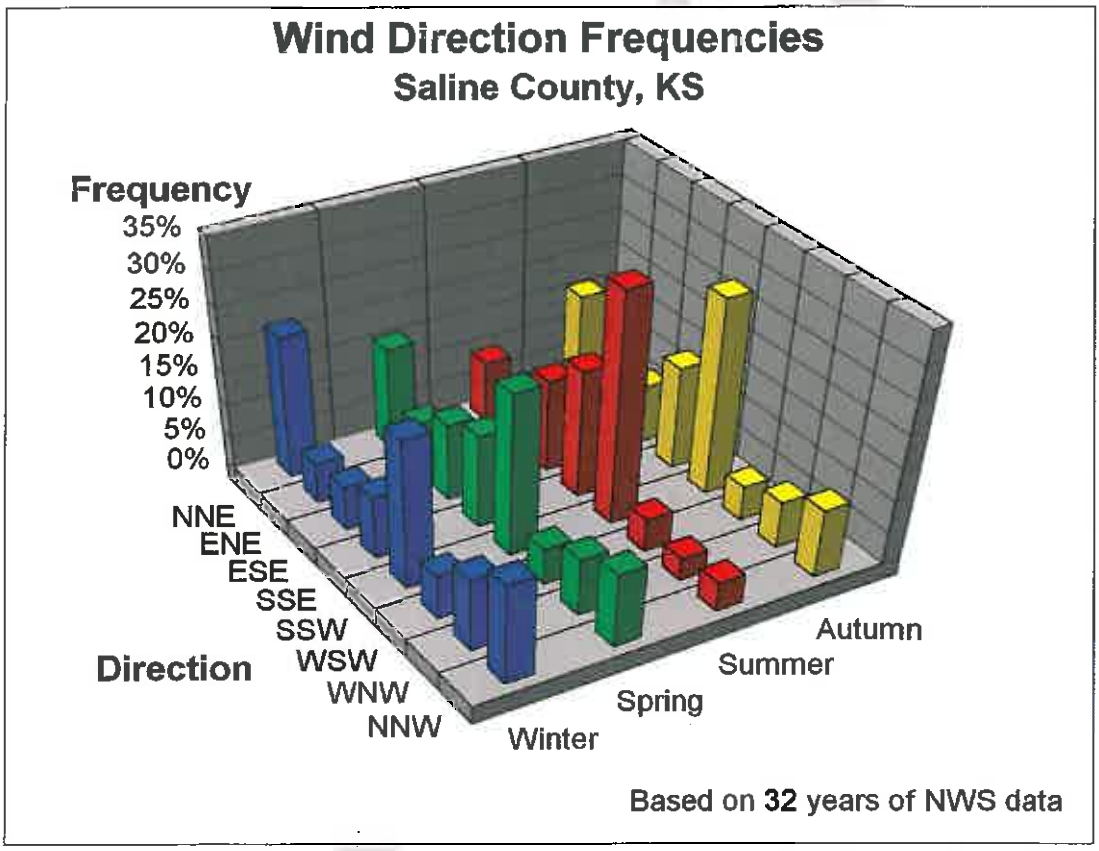
As discussed above, KDHE estimated lead emissions for the Metlcast facility which lies to the north of the Exide facility and the violating lead air monitor. The Metlcast facility is subject to

the 2008 National Emission Standard for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries Area Sources, promulgated at 40 CFR part 63, subpart ZZZZZ, which contains control requirements for reducing the lead content of foundry charge materials. These requirements are expected to reduce future lead air emissions from the facility.

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 4 below. These data help depict the potential for lead emissions sources located upwind of a violating monitor to contribute to ambient lead levels at the violation location.

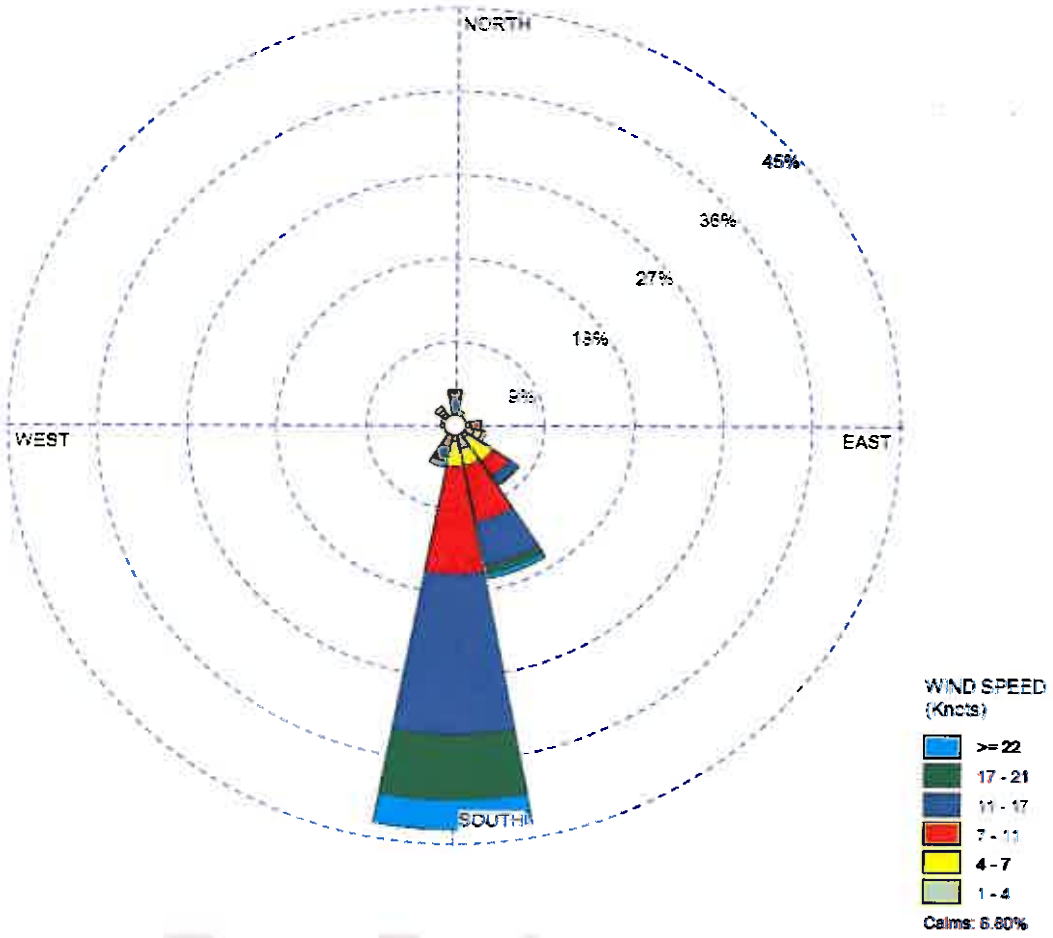
Figure 4. Wind Direction Frequencies



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 4, it may be concluded that the wind originates predominately from the south-southwest most of the year, but winds originate from the north-northeast about 20% of the time in the winter months.

KDHE obtained meteorological data from the Salina Municipal Airport depicted in Figure 5. KDHE's analysis based on local information indicates that the winds predominantly originate from the south and south-southwest, with the highest frequency of winds blowing from the south.

Figure 5. Wind Rose for Days with Monitoring Data in Excess of 0.15 µg/m^3 in 2010



Source: "*Technical Support Document for the Recommendation of Nonattainment Boundaries in Kansas for the 2008 Lead National Ambient Air Quality Standard*," Kansas Department of Health and Environment, May 10, 2011.

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 Saline County nonattainment area.

Saline County, Kansas, is characterized by flat to gently rolling terrain. Total topographic relief in the county is 160 m. The proposed nonattainment area does not have any geographical or topographical barriers significantly limiting 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.

Only a small portion of the state recommended nonattainment area lies within the jurisdictional boundary of the City of Salina, Kansas. The Exide facility and violating monitor lie in Saline County. Based on the modeling data which are described in Section 8 below, KDHE instead recommended a nonattainment area that is bounded by major roadways rather than jurisdictional boundaries.

8. *Other Relevant Information*

EPA received additional information from the state relevant to establish a nonattainment area boundary for portions of Saline County, Kansas. As briefly mentioned above, KDHE 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 Saline 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.

KDHE elected to use the results of dispersion modeling for making its boundary recommendation to EPA. EPA evaluated the state's analysis and conducted independent verification and analysis as discussed below.

The air dispersion modeling used to inform the state's recommended nonattainment boundaries was conducted by ENVIRON International Corporation (ENVIRON) under contract to Exide. The modeling report may be found in Appendix B of KDHE's TSD (KDHE 2011). ENVIRON

used AERMOD, EPA's preferred dispersion model for the analysis conducted. The modeling was performed using actual facility emissions for "longterm" NAAQS averaging times, e.g., annual and quarterly averages of emissions.

As the isopleths in Figure 2 indicate, the predicted area that exceeds the 0.15 $\mu g/m^3$ 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. The state-recommended nonattainment area is bounded on the north by Schilling Road, on the east by a north-south line one quarter mile west of South Ohio Street, on the south by East Water Well Road, and on the west by South Ninth Street.

As noted above, ENVIRON used annual and quarterly averages of emissions data. EPA believes it is more conservative to use a maximum hourly emission rate, rather than annual and quarterly averages, given that compliance with the standard is based on monitoring data collected on a once every six (1/6) day schedule, and these lead monitoring data are then averaged to obtain monthly means. The monthly means from each three month period are averaged to obtain rolling three month average data for comparison with the NAAQS. Using annual and quarterly averages could potentially miss process variations that would be captured in the monthly or three month averages. EPA conducted an independent review of ENVIRON's modeling analysis (Daye 2011). The results of EPA's analysis, also using AERMOD, are depicted in Figure 6 below.

ENVIRON conducted the air modeling using a "background" lead concentration of 0.01 ug/m^3 from the Wichita, Kansas, area. EPA analyzed monitored lead concentrations on dates/times in 2010 when the wind direction was not from Exide toward the monitor (excluding 135 to 225 degrees) to estimate ambient air lead concentrations not attributable to the Exide facility. Significant concentrations of lead were detected during those dates/times. It was determined that a "background" value of 0.01 ug/m^3 is not representative of the lead concentrations not attributable to Exide in the area surrounding the violating monitor, indicating that there are other possible source(s) of lead associated with the recommended nonattainment area. EPA calculated a three-month value for ambient lead concentrations not attributable to Exide of 0.05 ug/m^3 by averaging daily values only when meteorological data indicated hourly northerly winds. EPA judges that the most likely source of emissions causing ambient lead concentrations observed at the monitors when winds are northerly is the Metlcast facility.

Figure 6 below depicts EPA's air dispersion modeling, which uses a "background" value of 0.05 ug/m^3 to represent the concentrations estimated to be attributable to non-Exide sources, specifically the Metlcast facility. Using this "background" value of 0.05 ug/m^3 instead of 0.01 ug/m^3 for the Wichita area, the isopleths representing the level of the Lead NAAQS, 0.15 ug/m^3, extend approximately an additional 200 m farther north, but remain within KDHE's recommended nonattainment area boundary. When utilizing EPA's more conservative background of 0.05 ug/m^3, the results demonstrate that the boundary encompasses not only the predicted nonattainment area, but also provides a margin of safety, including the entire isopleth of 0.11 ug/m^3. EPA believes that, when using this more conservative approach, the technical analysis supports the recommended boundary, and captures the area of predicted nonattainment and the contributing sources.

Summary

EPA intends to accept the state's recommended boundary of portions of Saline County, Kansas, (Figure 2) which include the Exide and Metlcast facilities as the nonattainment area for the 2008 Lead NAAQS. The boundaries of the proposed nonattainment area are defined by major roadways surrounding the facilities.

The air quality monitor in Saline County located to the north of the Exide facility and to the south of the Metlcast facility shows violations of the 2008 Lead NAAQS based on 2010 air quality data. Therefore, a nonattainment designation is required for all or some of Saline County. The eight-factor analysis and other relevant information, including modeling results, supports a partial county designation for Saline 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. EPA Air Dispersion Model Results

References

"*Technical Support Document for the Recommendation of Nonattainment Boundaries in Kansas for the 2008 Lead National Ambient Air Quality Standard,*," Kansas Department of Health and Environment, May 10, 2011.

Daye, Richard; Email correspondence to Stephanie Doolan, 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 (ug/m3). 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 $\mu g/m^3$, 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 $\mu g/m^3$, 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.