Illinois
Area Designations For the
2008 Lead National Ambient Air Quality Standards

EPA has revised the level of the primary (health-based) standard from 1.5 micrograms per cubic meter (μg/m³) to 0.15 μg/m³ 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 partial county in Illinois that EPA intends to designate "nonattainment" for the 2008 lead National Ambient Air Quality Standard (2008 lead NAAQS).

Area	Illinois Recommended Nonattainment County	EPA's Designated Nonattainment County
Chicago	Cook (partial)	Cook (partial)

Table 1: Illinois Nonattainment Area for the 2008 Lead NAAQS

Technical Analysis for Chicago

Introduction

This technical analysis for Chicago identifies the partial county with a monitor that violates the 2008 lead NAAQS, and evaluates nearby counties for contributions to lead concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following factors recommended in previously issued 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/transport patterns);
- Geography/topography (mountain ranges or other air basin boundaries);
- Jurisdictional boundaries (*e.g.*, counties, air districts, reservations, etc.); and,
- Any other relevant information submitted to or collected by EPA.

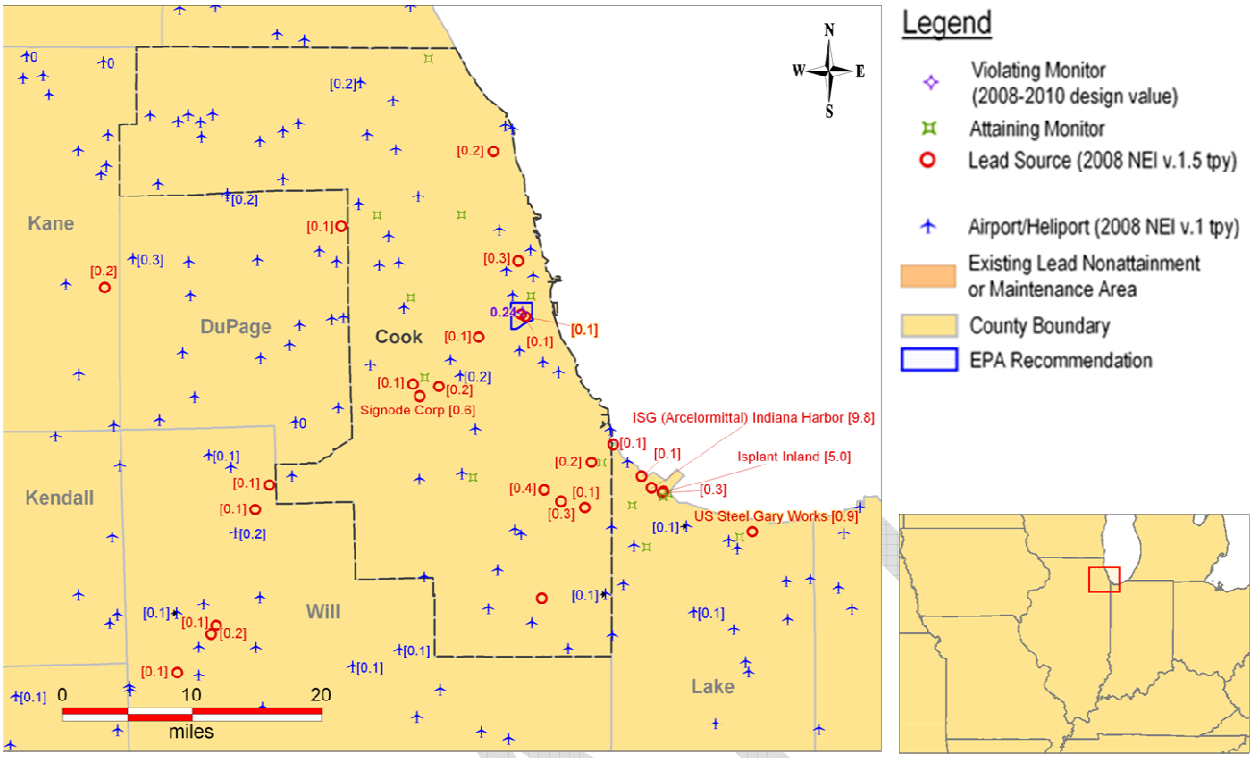

Figure 1: Chicago, Illinois Area and Surrounding Counties
(Office of Air Quality and Planning Standards - OAQPS)

Figure 1 is a map of the area analyzed showing the locations and design values of air quality monitors in the area, and the counties surrounding any violating air quality monitors. Source data is also labeled in Figure 1 with the following guidelines: if the source emitted 0.5 or more tons per year (tpy), the symbol, name of the facility, and emissions are labeled; if the source emitted 0.1 – 0.5 tpy, only the symbol and emissions are labeled; and if the source emitted less than 0.05 tpy, only the symbol is shown.[1] Emissions in Chicago and the surrounding areas will be discussed in the section addressing emissions in Cook County. The location of the detailed area in relation to the remainder of the State is shown in the bottom right corner of the figure.

[1] Emissions greater than 0.05 tpy round up to 0.1 tpy, and they are marked with the symbol and the emissions value.

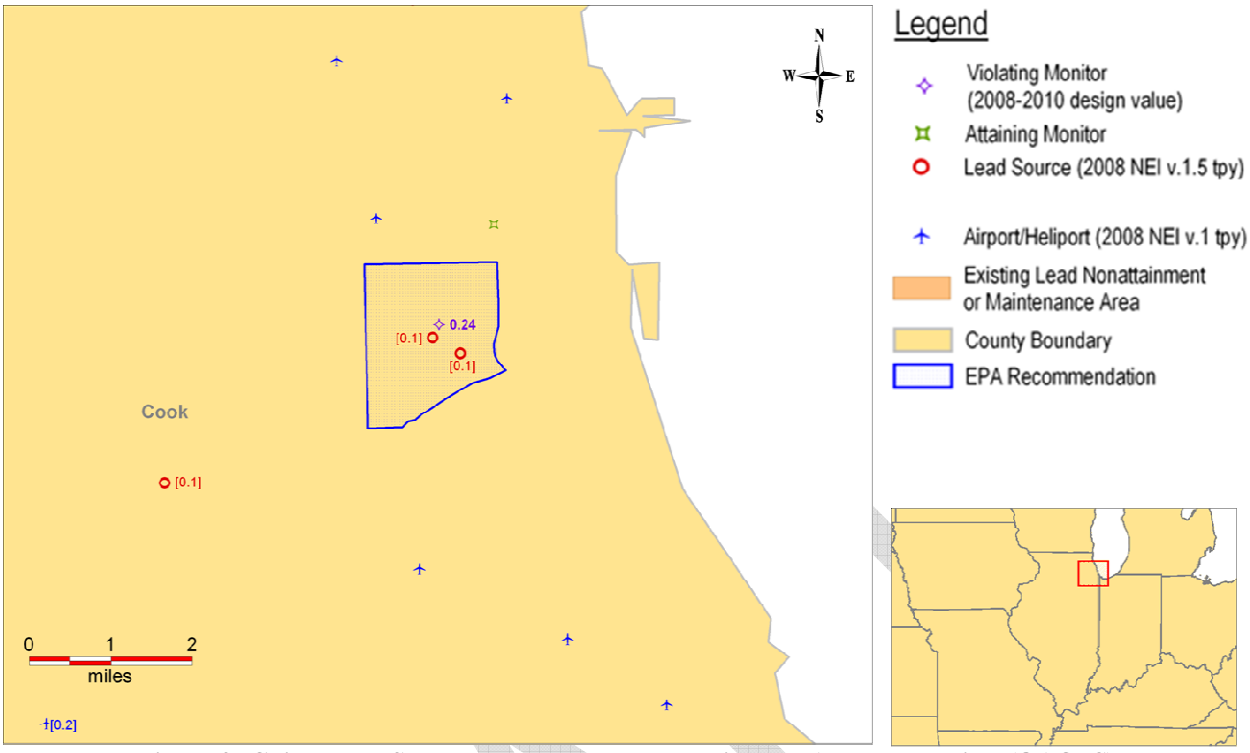

Figure 2: Chicago, IL State Recommended Nonattainment Area Local View (OAQPS)

Figure 2 shows the location and design value of air quality monitors on a localized Chicago area view. Again, source data is labeled with the following guidelines: if the source emitted 0.5 or more tpy, the symbol, name of the facility, and emissions are labeled; if the source emitted 0.1 – 0.5 tpy, only the symbol and emissions are labeled; and if the source emitted less than 0.05 tpy, only the symbol is shown. In this figure, the State recommended nonattainment area is shown by the blue outline.

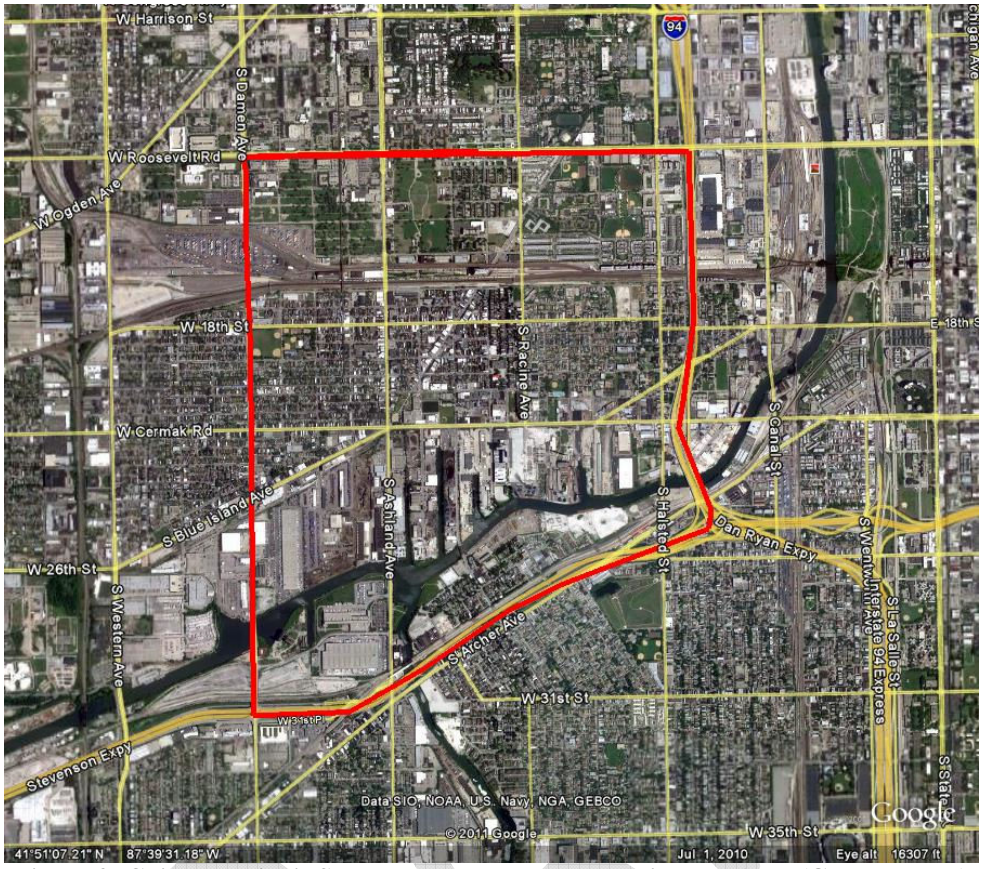

Figure 3: Chicago, Illinois State Recommended Nonattainment Area (Google Earth)

Figure 3 shows the State recommended nonattainment area boundary for the Chicago area. The boundary is shown the red outline, and is encompassed by the following roads or thoroughfares: Roosevelt Rd. to the north, the Dan Ryan Expressway to the east, the Stevenson Expressway to the south, and Damen Ave. to the west. In this map, the distance between Roosevelt Rd. (at the north) and the Stevenson Expressway by way of Western Ave. (at the western edge of the map) is 2.15 miles. The distance between Western Ave. and Halsted St. is 2.0 miles.

In June 2011, Illinois recommended that portions of Cook County be designated as nonattainment for the 2008 lead NAAQS based on monitored air quality data collected between 2008 and 2010. The State's recommendation was based on data from Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitors located in Illinois. Laurel L. Kroack, Director of the Bureau of Air at the Illinois Environmental Protection Agency (IEPA), submitted the State's recommendation to EPA in a letter dated June 10, 2011.

Based on EPA's technical analysis described below, EPA is intending to designate portions of Cook County in Illinois as nonattainment for the 2008 lead NAAQS as part of the Chicago nonattainment area based upon currently available information. This county is listed above in Table 1.

Detailed Assessment

Air Quality Data

This factor considers the lead design values (in $\mu g/m^3$) for air quality monitors in Cook County in Chicago and the surrounding area based on data for the 2008 – 2010 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 2008 lead NAAQS are met at a monitoring site when the identified design value is valid and less than or equal to 0.15 $\mu g/m^3$. A design value is only valid if minimum data completeness criteria are met. A lead design value that meets the NAAQS is generally considered valid if it encompasses 36 consecutive valid 3-month site means (specifically for a 3-year calendar period and the 2 previous months). For this purpose, a 3-month site mean is valid if valid data were obtained for at least 75 percent of the scheduled monitoring days in the 3-month period. A lead design value that does not meet the NAAQS is considered valid if at least one 3-month mean that meets the same 75 percent requirement is above the NAAQS. That is, a site does not have to monitor for 3 full calendar years in order to have a valid violating design value; a site could monitor just 3 months and still produce a valid (violating) design value.

The 2008 lead NAAQS design values for Cook County in Chicago and the surrounding area are shown in Table 2 below, and Cook County shows a violation of the 2008 lead NAAQS. Therefore, some area in this county and possibly additional areas in surrounding counties must be designated nonattainment. It should be noted there are multiple monitors in Cook County, but the remainder of the monitors in Cook County have recorded air quality data showing that the 2008 lead NAAQAS has not been violated. IEPA has recommended only the area surrounding the violating monitor as nonattainment for the 2008 lead NAAQS. This particular monitor, located at 1241 W. 19th St. (AQS ID 17310110), is in very close proximity to H. Kramer & Company (Kramer). The primary products manufactured at this facility are brass and copper ingots. The location of this monitor will be discussed in the section addressing emissions for Cook County.

However, the absence of a violating monitor alone is not a sufficient reason to eliminate nearby areas as candidates for nonattainment status. Each area has been evaluated based on the weight of evidence of these factors and other relevant information.

County	State Recommended Nonattainment?	Monitor Name	Monitor Air Quality System ID	Monitor Location	Lead Design Value, 2008-2010 ($\mu g/m^3$)
Cook, Illinois	**Yes**	**Perez Elementary**	**17310110**	**1241 W. 19th St. (41.85591, -87.65842)**	**0.24**
Cook, Illinois	No	Alsip	170310001	4500 W. 123rd St. (41.67099, -87.73246)	0.02
Cook, Illinois	No	114th St.	170310022	3535 E. 114th St. (41.68717, -87.53932)	0.05
Cook, Illinois	No	Harrison	170310026	735 W. Harrison St. (41.87372, -87.64533)	0.03*
Cook, Illinois	No	Wilson	170310052	4850 Wilson Ave. (41.96548, -87.74993)	0.02
Cook, Illinois	No	Schiller Park	170313103	4743 Manheim Rd. (41.96519, -87.87626)	0.01
Cook, Illinois	No	Summit	170313301	Intersection of 60th St. and 74th Ave. (41.78277, -87.80538)	0.02
Cook, Illinois	No	Northbrook	170314201	750 Dundee Rd. (41.14000, -87.79923)	0.01
Cook, Illinois	No	Maywood	170316003	1500 Maybrook Dr. (41.87220, -87.82616)	0.03

The monitor in bold has the highest 2008 - 2010 design value in the respective county.
*based on 2008 – 2009 monitored values

Table 2: Chicago, Illinois and Surrounding Area Air Quality Data

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 any growth in lead emitting activities since the date represented by those emissions data.

Emissions

Emissions data for industrial and airport sources[2] were derived from the 2008 National Emissions Inventory, version 1.5 (NEI08V1.5), which was the most current version of the

[2] There are approximately 20,000 airport facilities in the U.S. at which leaded aviation gasoline is consumed. Leaded aviation gasoline is used almost exclusively in piston-engine aircraft.

national inventory available in 2011 when these data were compiled for the designations process. See http://www.epa.gov/ttn/chief/net/2008nei_v1/lead_facility_v1_5_final.xls. EPA recognizes that for certain counties, we have no information on any emissions increases or decreases that may have occurred since 2008. For example, certain large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2008. Some States provided updated information on emissions and emission controls in their comments to EPA. Illinois did not provide emissions data for Cook County in its June 2011 submittal.

Table 3 shows total emissions of lead for violating and potentially contributing counties in and around the Chicago area. Specifically, sources in Cook County that emit 0.1 tpy or greater of lead (or sources that EPA anticipates as contributing at least 0.1 tpy) according to the NEI08V1.5 have been identified in Table 3.

County	Facility in State Recommended Nonattainment Area?	Facility Name	NEI08V1.5 (tpy)	Address	City
Cook County, Illinois	No	Signode Corp.	0.6	7701 W. 71st St.	Bridgeview
Cook County, Illinois	No	Mittal Steel USA - Riverdale Inc.	0.4	13500 S. Perry Ave.	Riverdale
Cook County, Illinois	No	Saint-Gobain Containers Inc.	0.3	13850 Cottage Grove Ave.	Dolton
Cook County, Illinois	No	Sipi Metals Corp.	0.3	1720 N. Elston Ave.	Chicago
Cook County, Illinois	No	Hoist Lift Truck	0.2	6499 W. 65th St.	Chicago
Cook County, Illinois	No	Horsehead Corp.	0.2	2701 E. 114th St.	Chicago
Cook County, Illinois	No	C.E. Niehoff & Co.	0.2	2021 Lee St.	Evanston
Cook County, Illinois	Yes	H. Kramer & Co.	0.1	1339 W. 21st St.	Chicago
Cook County, Illinois	No	Corn Products International Inc.	0.1	6400 S. Archer Ave.	Bedford Park
Cook County, Illinois	No	Plastics Color Corp. of Illinois	0.1	14201 Paxton Ave.	Calumet City
Cook County, Illinois	No	Crawford Electric Generating Station	0.1	3501 S. Pulaski Ave.	Chicago
Cook County, Illinois	Yes	Fisk Electric Generating Station	0.1	1111 W. Cermak Rd.	Chicago
Cook County, Illinois	No	Chicago Extruded Metals Co.	0.1	1601 S. 54th Ave.	Chicago
		Cook County Total Lead Emissions*	4.3		

Table 3: Cook County Lead Emissions for Stationary Sources

*Total emissions for Cook County included emissions from airport facilities using leaded aviation fuel. The total emissions also include emissions from sources that emit less than 0.1 tpy.

The monitor located at 1241 W. 19th St. was deployed in January 2010 as part of Illinois' expanded ambient monitoring network for lead,[3] and as discussed previously is in very close proximity to Kramer. As reflected in Table 3, there are two facilities in the State recommended nonattainment area that emit at, or above, 0.1 tpy of lead. Kramer is one of these facilities, as is the Fisk Electric Generating Station. Analysis performed by IEPA indicates that the Kramer facility is primarily responsible for the elevated levels of lead in the State recommended nonattainment area. This analysis will be discussed in the section addressing other relevant information.

As seen in Figure 1 and Figure 2, there are multiple airport facilities in Cook County that use leaded gasoline. However, there are no airport facilities in the State recommended nonattainment area. In its June 2011 submittal, Illinois EPA did not provide analyses, *e.g.,* air quality modeling, to examine the potential impact of these airports on the violating monitor.

Figure 4 below shows the location of Kramer (red star) and the monitor associated with this facility (yellow pin). The distance between the center of the facility and the monitor is approximately 964', or 0.18 miles. Additional discussion about the characteristics of this area follows below.

Figure 4: Perez Elementary School Monitor Location (Google Earth)

[3] Counties in Illinois with lead monitors deployed prior to January 2010 include: Macoupin, Madison, Peoria, St. Clair, and elsewhere in Cook. In addition to the monitor located at 1241 W. 19th St., monitors were also deployed in January 2010 in the following locales in Illinois: Rockford, Decatur, Bartonville, Mapleton, and Sterling.

Population Data, Growth Rates, and Patterns

Table 4 shows the 2008 population for each county in the area being evaluated, as well as the population density (people/square mile) for each county in that 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.

County	State Recommended Nonattainment?	2008 Population	2008 Population Density (pop/sq mi)	Population Change 2000-2008	Population % Change 2000-2008
Cook, Illinois	No (partial)	5,294,664	5,535	-82,428	-2

Table 4: Population Data for Cook County, Illinois
(U.S. Census Bureau estimates for 2008 and estimation of the area of U.S. Counties)
http://www.census.gov/popest/datasets.html

Specific to the immediate area surrounding the Kramer facility are the following traits: a population density of greater than 7,500 persons per square mile (the 2000 Census reports that the area actually has a population density of approximately 15,000 persons per square mile); a significant representation of children under 18 years of age; a significant representation of those that do not speak English well; a significant representation of those that have less than a 12th grade education; and, a significant representation of families that live at or below the poverty level.

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 2 represent emissions levels taking into account any control strategies implemented on stationary sources in Chicago before 2008. As part of its June 2011 submittal, Illinois EPA did not include additional information on controls put into place since 2008 at the Kramer facility.

Meteorology (weather/transport patterns)

For this factor, EPA considered 32 years of data from National Weather Service instruments and other meteorological monitoring sites in the area. Historical wind direction frequencies are included in Figure 5 and Table 6. 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.

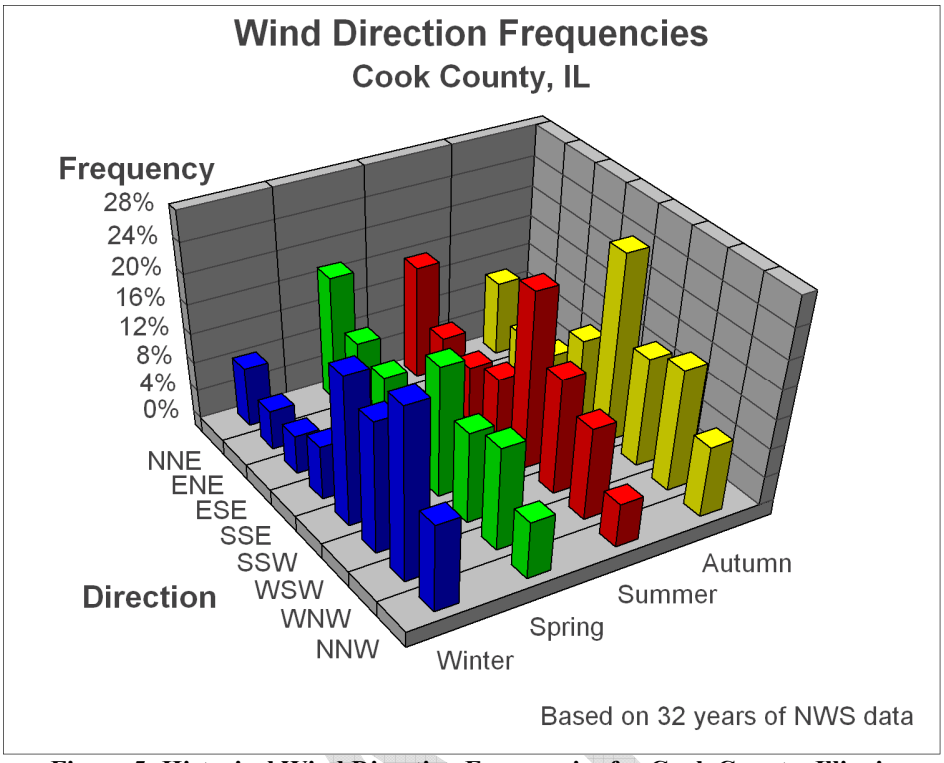

Figure 5: Historical Wind Direction Frequencies for Cook County, Illinois

Figure 5 is a 3-dimensional bar chart that shows the wind frequencies in 8 directions for the 4 seasons. These data are taken from 1960-1992 Solar and Meteorological Surface Observation Network information issued jointly by the U.S. Department of Commerce: National Climatic Data Center and the U.S. Department of Energy: National Renewable Energy Laboratory. The chart frequencies reflect the directions from which the winds come.

Cook County Wind Frequencies	
Frequency as a %	Seasonal Wind Directions
8.20	WINWINDFNNE
5.40	WINWINDFENE
5.30	WINWINDFESE
7.40	WINWINDFSSE
20.40	WINWINDFSSW
17.90	WINWINDFWSW
23.40	WINWINDFWNW
12.00	WINWINDFNNW
17.30	SPRWINDFNNE
11.40	SPRWINDFENE
9.90	SPRWINDFESE
9.10	SPRWINDFSSE
17.90	SPRWINDFSSW
12.50	SPRWINDFWSW
14.10	SPRWINDFWNW

7.90	SPRWINDFNNW
15.50	SUMWINDFNNE
8.70	SUMWINDFENE
7.70	SUMWINDFESE
9.30	SUMWINDFSSE
24.10	SUMWINDFSSW
15.90	SUMWINDFWSW
12.70	SUMWINDFWNW
6.00	SUMWINDFNNW
10.20	AUTWINDFNNE
5.60	AUTWINDFENE
5.90	AUTWINDFESE
11.10	AUTWINDFSSE
25.70	AUTWINDFSSW
15.00	AUTWINDFWSW
16.80	AUTWINDFWNW
9.80	AUTWINDFNNW

Table 5: Historical Wind Frequency Data as Percents for Cook County, Illinois

As shown in Figure 5 and Table 5, the period with the highest wind frequency occurs in all seasons with winds blowing from a variation of the southwest; therefore, special care must be made when determining the nonattainment boundary to the east and northeast of the violating monitor.

Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might have an effect on the air shed and, therefore, on the distribution of lead over Chicago and the surrounding area.

The Chicago 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.

Jurisdictional boundaries

Existing jurisdictional boundaries may be helpful in articulating 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 EPA's August 21, 2009 guidance memorandum, "Area Designations for the 2008 revised Lead National Ambient Air Quality Standard," EPA reiterated that the presumptive boundary for each nonattainment area should be the county containing the violating monitor. This concept was first introduced in the guidance for the 1978 lead NAAQS designations, and is described in

the 1992 General Preamble (57 FR 13549). This same presumptive boundary guidance was addressed most recently in the final rulemaking for the 2008 lead NAAQS (73 FR 66964). EPA observed, however, that States have the flexibility in their recommendations to deviate from the presumptive county boundary to portions of the county containing the violating monitor, stating that any "nonattainment area boundaries that deviate from presumptive county boundaries should be supported by an assessment of several factors…," all of which have been discussed already in this document, except for jurisdictional boundaries.

The State recommended nonattainment area is completely enclosed by the city of Chicago and Cook County. The Chicago Metropolitan Agency for Planning is responsible for transportation infrastructure, land use, and long term economical development for Cook County, and IEPA is responsible for all air quality regulatory programs in every county in the State.. As a result, air quality planning efforts to address the impending lead nonattainment area in Chicago should not be problematic. It should be noted that the final rulemaking for the 2008 lead NAAQS (73 FR 66964) specifically addressed transportation conformity by stating, "In light of the elimination of lead additives from gasoline, transportation conformity does not apply to the Lead NAAQS." The State recommended boundaries for the Chicago nonattainment area are comprised of well-known streets and thoroughfares.

Other Relevant Information

EPA received additional relevant information from Illinois for establishing the nonattainment area boundary for Chicago. This information will be discussed below.

As reflected in Table 3, there are two sources in the State recommended nonattainment area that have reported emissions of approximately 0.1 tpy. Previous discussion of meteorological data indicates that there is a very strong representation of winds that blow from the southwesterly direction. Through its own analysis, IEPA has determined that the highest concentrations of lead have been recorded at the Perez Elementary School monitor when the wind has come from the southwest. IEPA provided the following information to EPA February 22, 2011:

Date	Monitored Value ($\mu g/m^3$)	Wind Direction
12/10/2010	1.53	SW
4/2/2010	1.40	SW
8/30/2010	0.90	S
12/28/2010	0.77	SW
9/23/2010	0.62	SW
5/2/2010	0.26	SW
11/22/2010	0.23	SW
7/19/2010	0.21	SW
10/29/2010	0.21	SW
6/25/2010	0.17	S
6/1/2010	0.16	SE

Table 6: Wind Direction on Dates with Highest Monitored Values

Table 6 displays data that is sorted by the highest monitored values recorded at the Perez Elementary School monitor. As reflected in the table, the highest values monitored values generally occurred on days when the wind was blowing from the southwest. This trend is consistent with the relationship between the location of the monitor and the Kramer facility. Based on the location of Kramer in relationship to the monitor, IEPA has determined that Kramer is responsible for the elevated lead levels in the State recommended nonattainment area.

In order to confirm this finding, IEPA installed a temporary second monitor located at Benito Juarez High School on March 11, 2011. The locations of the temporary monitor, the Perez Elementary School monitor, as well as the Kramer facility are contained in Figure 6 below.

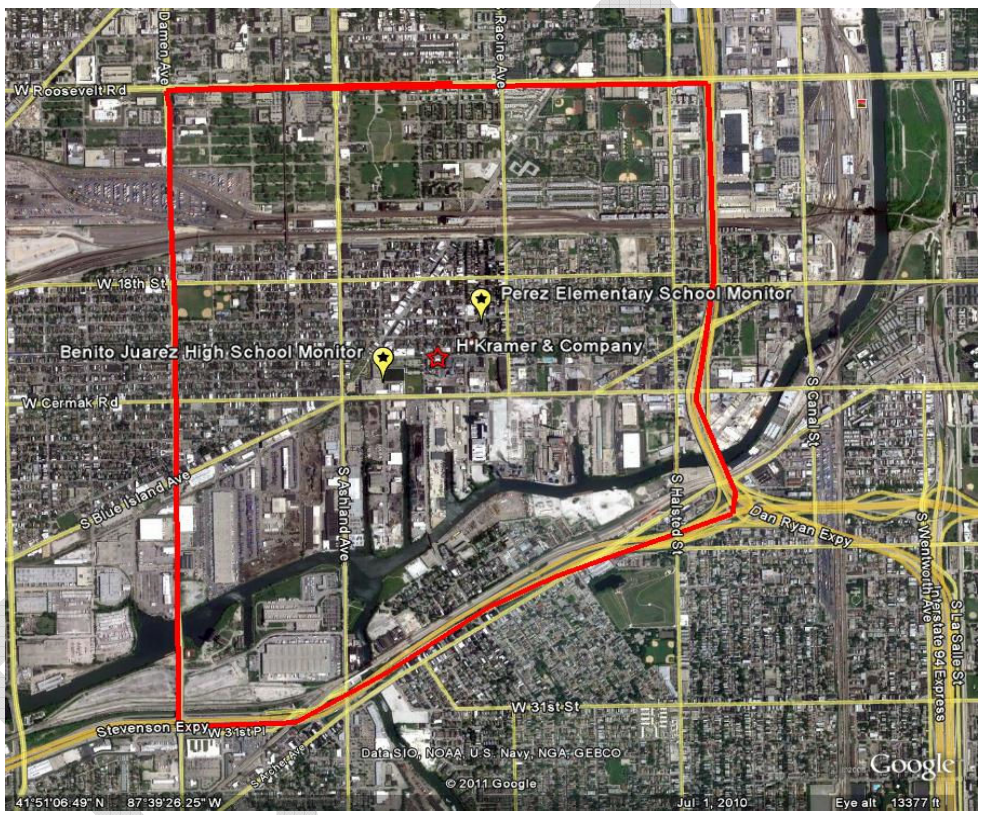

Figure 6: Location of Monitors in Relation to H. Kramer & Company

Based on the data collected at the temporary monitor in conjunction with their initial analysis of wind direction and monitored values at the Perez Elementary School monitor, IEPA has concluded that the Kramer facility is the source responsible for the elevated lead levels in the State recommended nonattainment area. After reviewing the relevant information from IEPA, EPA agrees with Illinois' assessment that Kramer is the primary source responsible for the elevated levels of lead in the State recommended nonattainment area.

EPA observes that the State and/or EPA may conduct additional area-specific analyses that could lead to a departure from the presumptive boundary of the entire county. Specifically, boundaries may be recommended based on the preceding factors analysis and one or more of the following

techniques: qualitative analysis, spatial interpolation of air quality monitoring data, and air quality dispersion modeling.

EPA's own additional analysis includes a conservative approach to interpolating the dispersion of lead emissions from the Kramer facility in a linear fashion. Due to the physical properties of lead, the greatest impact of lead emissions is generally closest to the source, but EPA is assuming through a linear interpolation that if the monitored value at Perez Elementary School is 0.24 $\mu g/m^3$ at a distance of approximately 0.20 miles away from the facility in the downwind direction, a distance of 0.40 miles from the facility should capture likely impacts of approximately 0.12 $\mu g/m^3$. The distance from the Kramer facility to the northeast edge of the State recommended nonattainment area is approximate 1.2 miles. Accordingly, EPA believes that the State recommended nonattainment area is a sufficient and conservative approach to capture all areas experiencing an impact equal to, or greater than, the 2008 lead NAAQS.

Conclusion

After considering the factors described above, EPA has preliminarily determined that it is appropriate to include the portion of the county listed in Table 1 in the Chicago nonattainment area for the 2008 lead NAAQS.

The air quality monitor in Cook County shows a violation of the 2008 lead NAAQS, based on 2008-2010 air quality data. The cumulative process of this multi-factor analysis in conjunction with the additional information provided by the State, as well as a conservative approach to spatial interpolation of lead concentrations supports the final nonattainment area. EPA finds it appropriate to designate the portions of Cook County that are encompassed by Damen Ave. on the west, Roosevelt Rd. on the north, the Dan Ryan Expressway on the east, and the Stevenson Expressway on the south, as nonattainment for the 2008 lead NAAQS. This area is depicted below in Figure 7. Based on the consideration of all the relevant and 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 lead NAAQS.

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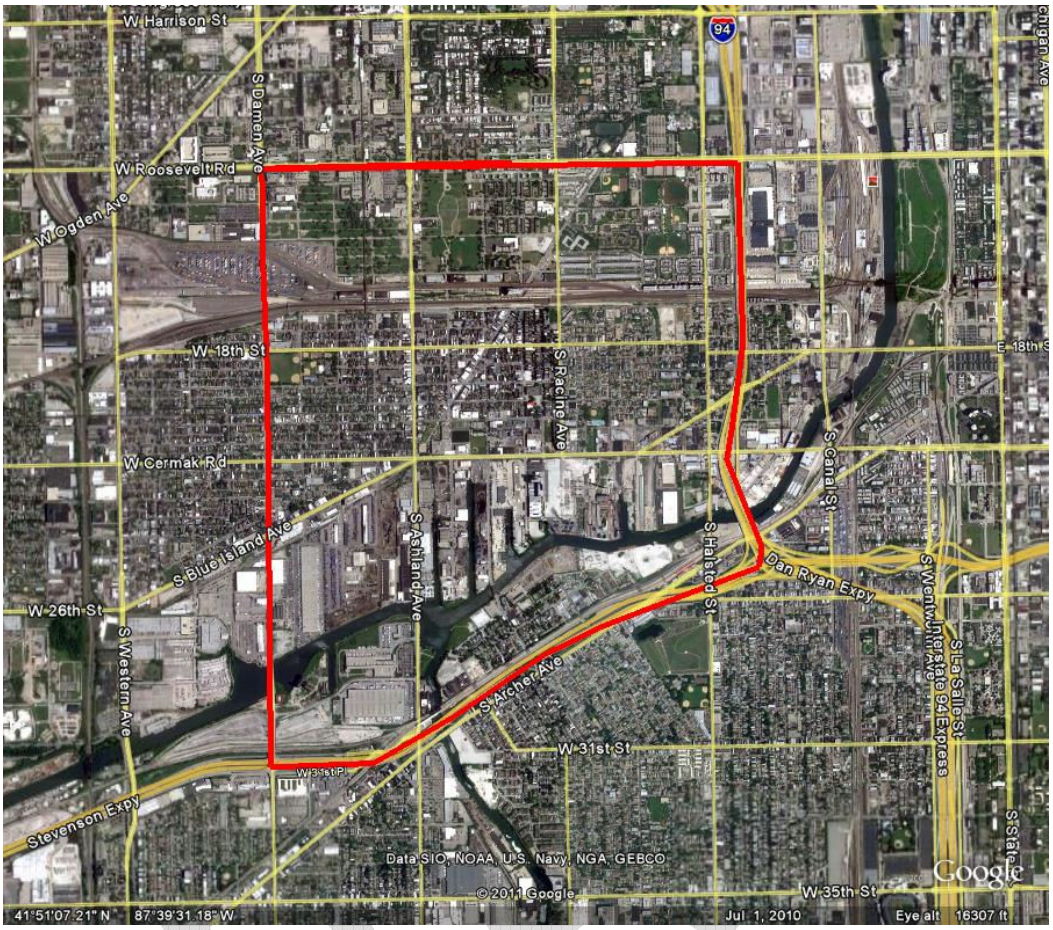

Figure 7: Chicago, Illinois Nonattainment Area Boundaries

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 3 years of quality assured air quality monitoring data from 2008-2010 including at least a singular valid 3-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 3 years of quality assured air quality monitoring data from 2008-2010 including 36 consecutive valid 3-month site means (including the last 2 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 3 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**) Recommended nonattainment area –** an area a State or Tribe has recommended to EPA be designated as nonattainment.

5) **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.

6) **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.

7) **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.