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## Technical Support Document

### *Definition of important terms used in this document:*

- 1) **Designated “unclassifiable”** – an area where EPA could not determine if there was a violation of the 2008 Lead national ambient air quality standard (NAAQS) or a contribution to a violation in a nearby area, because there was insufficient air quality data for both 2006-2008 and 2007-2009 and where additional monitoring data for 2010 could not result in a different designation.
- 2) **Designated “attainment”** – an area which EPA has determined, based on the most recent 3 years of certified air quality data from 2006-2008 or 2007-2009, has no violations of the 2008 Lead NAAQS during 36 consecutive valid 3-month site means; and which EPA has further determined does not contribute to a violation of the 2008 Lead NAAQS in a nearby area and that additional monitoring data from 2010 could not result in a different designation.
- 3) **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 a violation of the 2008 Lead NAAQS during the most recent three consecutive years of quality-assured, certified air quality data.
- 4) **Prior nonattainment area** – an area that is currently designated as nonattainment or maintenance for the 1978 Lead NAAQS (including both current nonattainment areas and maintenance areas).
- 5) **Recommended nonattainment area** – an area a State or Tribe has recommended to EPA be designated as nonattainment.
- 6) **Violating monitor** – an ambient air monitor whose design value exceeds 0.15 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). As described in Appendix R of part 50, a violation can be based on either lead-total suspended particles (Pb-TSP) or Pb-PM<sub>10</sub> data and only three months of data are necessary to produce a valid violating design value.
- 7) **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.
- 8) **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-PM<sub>10</sub> data may be used in limited instances, including to show nonattainment.

**Tennessee  
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 ( $\mu\text{g}/\text{m}^3$ ) 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 national ambient air quality standard (NAAQS) and those nearby areas that contribute to violations.** The table below identifies the counties or portions of counties (or tribal areas) in Tennessee that EPA intends to designate “nonattainment” for the 2008 lead national ambient air quality standard (2008 Lead NAAQS).

Table 1: Area Designation

Area (listed alphabetically)	Tennessee Recommended Nonattainment Counties	EPA’s Designated Nonattainment Counties	Nonattainment area for 1978 Lead NAAQS
Bristol, Tennessee	Sullivan (partial)	Sullivan (partial)	No

**Technical analysis for Bristol, Tennessee**

**Introduction**

This technical analysis for the Bristol Area identifies a portion of Sullivan County with a monitor that violates the 2008 Lead NAAQS and evaluates nearby counties (if appropriate) 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 previous 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 (e.g., modeling where done appropriately).

Figure 1: Sullivan County Area of Bristol, Tennessee

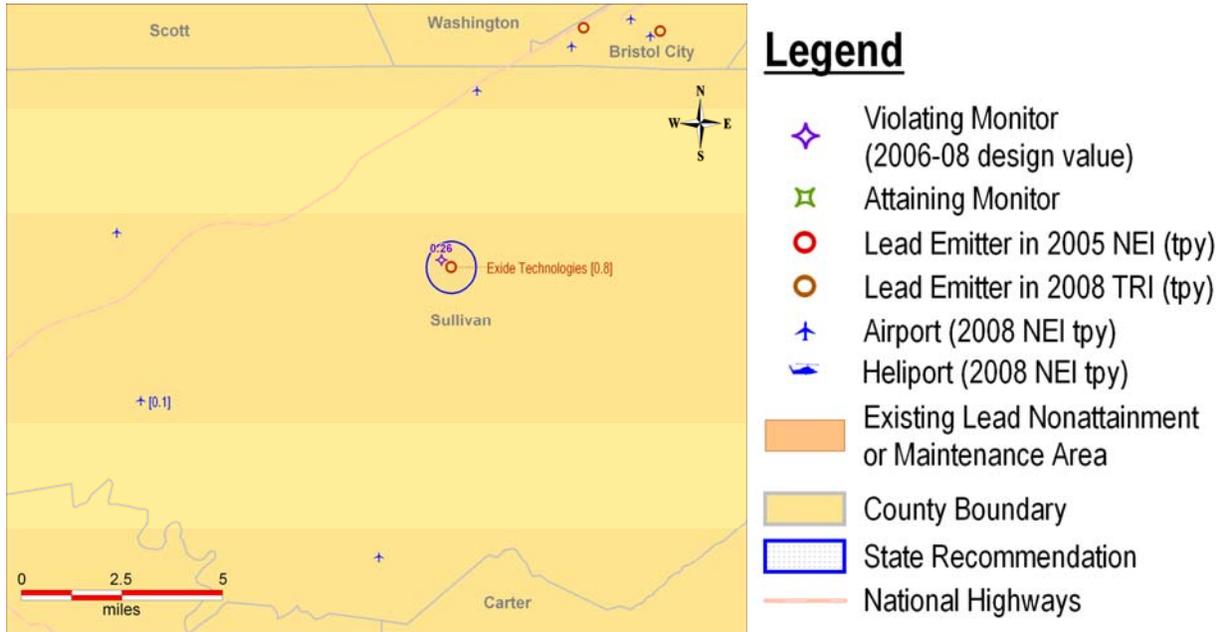
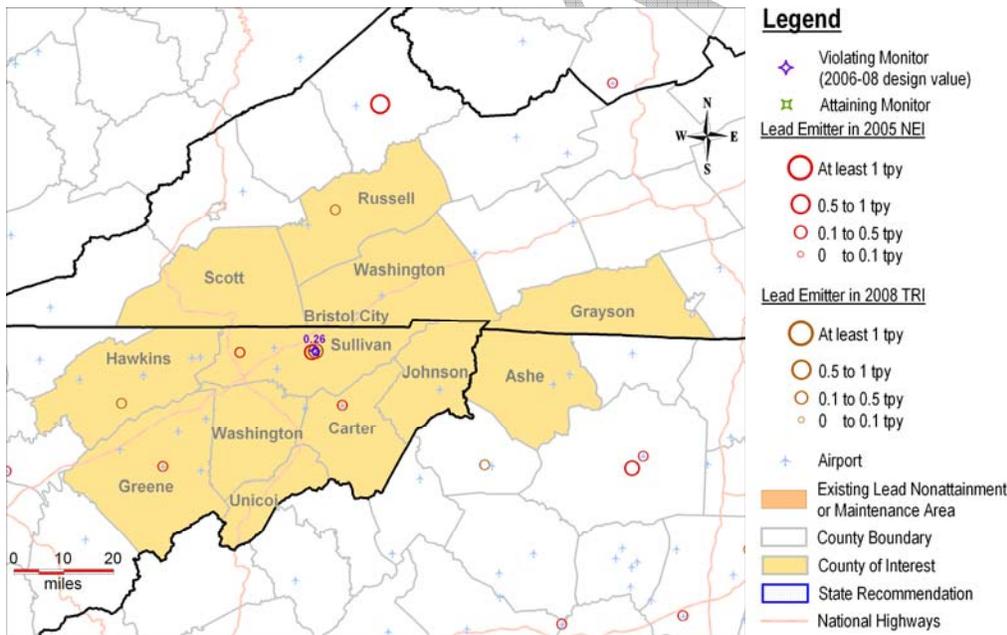


Figure 2: Bristol, Tennessee Area and Surrounding Counties



Figures 1 and 2 are maps of the area analyzed showing the location and design value of the air quality monitors in the area, the counties surrounding the violating air quality monitor, and Tennessee’s recommended “nonattainment” boundary. The violating monitor in the Bristol Area is located in Sullivan County in close proximity to Exide Technologies, shown in Figure 1.

The Bristol Area was not designated nonattainment for the 1978 Lead NAAQS. For each revision to a NAAQS EPA is required to conduct a separate designation action, which may result in the same or a different nonattainment boundary.

On October 16, 2009, the State of Tennessee provided EPA with their original recommendation that a portion of Sullivan County, be designated as “nonattainment” for the 2008 Lead NAAQS based on air quality data from 2006-2008. Specifically, Tennessee recommended that an area located within a 1.0 kilometer (km) radius surrounding the Universal Transverse Mercator (UTM) coordinates of 4042923 meters East (E), 386267 meters North (N), Zone 17, which surrounds the Exide Technologies facility, be designated nonattainment. Their recommendation was based on data from Federal Reference Method or Federal Equivalent Method monitors located in the State. On June 8, 2010, Tennessee revised their recommendation based on recent modeling that had been conducted by the State. The revised recommendation from Tennessee was for an area located within a 1.25 kilometer radius surrounding the UTM coordinates 4042923 meters E, 386267 meters N, Zone 17, which surrounds the Exide Technologies facility, to be designated nonattainment.

Based on EPA's technical analysis described below, EPA is intending to designate the entire portion of Sullivan County in Tennessee, located within a 1.25 kilometer radius surrounding the UTM coordinates 4042923 meters E, 386267 meters N, Zone 17, which surrounds the Exide Technologies facility, as nonattainment for the 2008 Lead NAAQS, as the Bristol 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  $\mu\text{g}/\text{m}^3$ ) for air quality monitors in Sullivan County in the Bristol Area and the surrounding area based on data for the 2007-2009 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  $0.15 \mu\text{g}/\text{m}^3$ . 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 two 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 three full calendar years in order to have a valid violating design value; a site could monitor just three months and still produce a valid (violating) design value.

The 2008 Lead NAAQS design values for Sullivan County in the Bristol Area are shown in Table 2.

Table 2: Air Quality Data

County	State Recommended Nonattainment	Monitor Name	Monitor Air Quality System ID	Monitor Location	Lead Design Value, 2006 - 2008 ( $\mu\text{g}/\text{m}^3$ )	Lead Design Value, 2007-2009 ( $\mu\text{g}/\text{m}^3$ )
<b>Sullivan County, TN</b>	<b>Sullivan County (partial)</b>		471633001		<b>0.26</b>	<b>0.26</b>
			471633002		0.08	0.08
			471633003		0.11	0.11

Monitors in Bold have the highest design value in the respective county.

Sullivan County shows one monitor violating the 2008 Lead NAAQS. Therefore some area in this county and possibly additional areas in surrounding counties must be designated nonattainment. However, 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 and other relevant information.

The violating monitor located in Sullivan County is located in close proximity to Exide Technologies, 364 Exide Drive, in Bristol, Tennessee. The monitoring objective, according to the EPA monitor locator, is source-oriented. The emissions from Exide Technologies will be discussed in the corresponding section below.

### ***Emissions and Emissions-Related Data***

Evidence of Lead emissions sources surrounding 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.

### Emissions

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 2, which is the most up-to-date version of the national inventory available when these data were compiled for the designations process in 2009. See <http://www.epa.gov/ttnchie1/net/2005inventory.html>. EPA recognizes that for certain counties, emissions may have changed since 2005. For example, certain large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some States provided updated information on emissions and emission controls in their comments to EPA. Tennessee and Eastman Chemical Company confirmed the 2005 NEI emissions data were incorrect for Eastman Chemical Company, and provided the actual 2008 emissions for the facility. For the rest of the Bristol Area, EPA relied on the 2005 NEI emissions data. However, states may provide additional information regarding source emissions prior to EPA's final action on lead designations. These data are provided in Table 3 below.

Table 3 shows total emissions of Lead (given in tons per year (tpy)) for violating and potentially contributing counties in the Bristol Area with sources emitting (or anticipate to contribute) greater than 0.1 tpy of lead according to the 2005 NEI.

There are approximately 20,000 airport facilities in the U.S. at which leaded aviation gasoline is consumed. To evaluate the potential impact of emissions at and near these facilities, EPA recommends that States use the draft 2008 NEI. Data for airport facilities in Sullivan County which use leaded aviation gasoline are included in Table 4.

Table 3: Lead Emissions

County	Facility in State Recommended Nonattainment Area?	Facility Name	Facility Location	2005 NEI (tpy)
Sullivan County, TN	Yes	Exide Technologies	364 Exide Drive, Bristol	0.78
	No	Eastman Chemical Co, Tennessee Operations	100 North Eastman Road, Kingsport	0.30

According to the 2005 NEI data, Sullivan County has two sources emitting at or above 0.1 tpy. The greatest emitter of lead in the County is Exide Technologies. Eastman Chemical Company was also considered, but is located approximately 23 km from the violating monitor. Based on the distance from the violating monitor, EPA believes that Eastman does not influence the ambient Lead levels at the monitor.

Table 4: Airport Facilities Using Leaded Aviation Gas in Sullivan County

City	Facility Name	Type	2008 draft NEI (tpy)	Distance to Violating Monitor (kilometers)
Bristol	Tri Cities Regional	Airport	0.16	13.46

There is one airport facility with aircraft using leaded aviation gas in Sullivan County that emits 0.1 tpy or more. The State has not provided analyses (such as air quality modeling) to examine the potential impact of these airports on the violating monitor.

Bristol Motor Speedway is located in Sullivan County (but not within the recommended boundary), and was considered in this analysis as a potential source of lead emissions. The National Association for Stock Car Auto Racing (NASCAR) currently uses a special unleaded fuel that was developed and was used by the start of the 2008 season as a result of its partnership with EPA and its fuel supplier, Sunoco. While NASCAR racing is the primary activity ongoing at Bristol Motor Speedway, there are other racing events that may currently use leaded fuel. EPA notes that the last monitored violation at the Sullivan County monitors occurred in January 2008; however, there appears to be no obvious correlation between monitored violations at the Exide facility and major events at Bristol Motor Speedway, prior to or since the removal of leaded fuel for NASCAR events.

### Population Data

Table 5 shows the 2008 population for each county in the area being evaluated, as well as the population density 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. Reentrainment of historically deposited Lead 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
Sullivan County, Tennessee	Sullivan County (partial)	153,900	358	981	1

[Source of data: U.S. Census Bureau estimates for 2008 (<http://www.census.gov/popest/datasets.html>) and estimation of the area of U.S. Counties]

### Growth rates and patterns

This factor considers population growth from 2000 to 2008. A county with rapid population growth is generally an integral part of an urban area and likely to be contributing to lead concentrations in the area. Sullivan County had a one percent population change during the eight year time period. EPA has considered the population growth rate for this area and does not believe that it affects the boundary recommendation.

### Emissions Controls

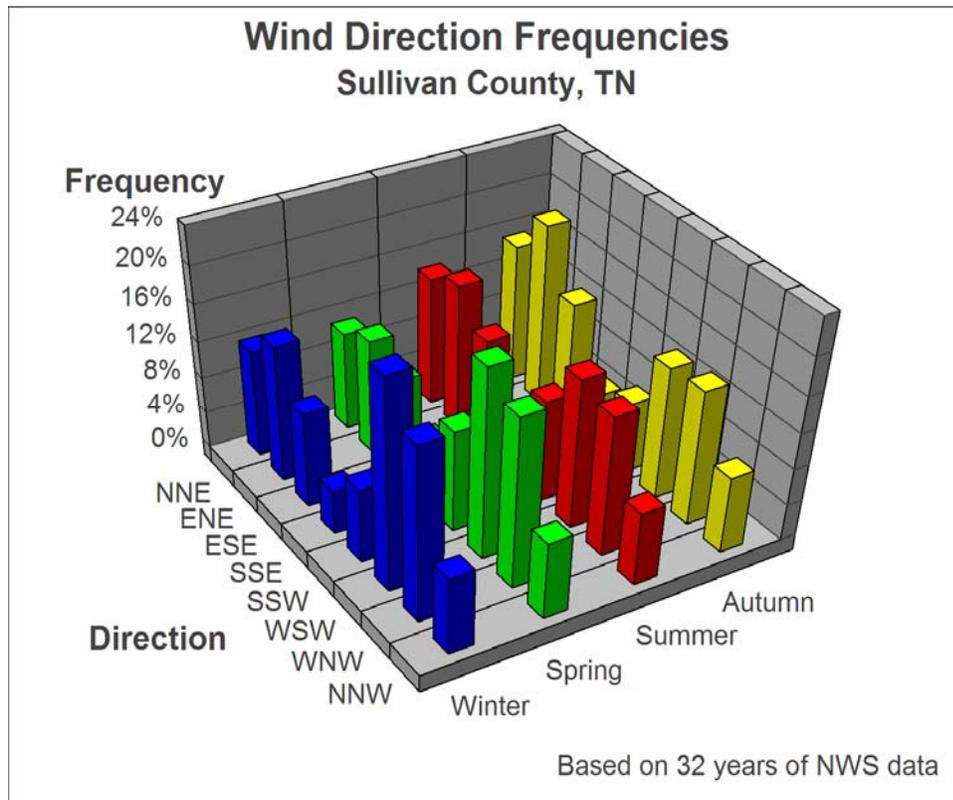
Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 2 represent emissions levels taking into account any control strategies implemented in the Bristol Area before 2005 on stationary sources. The Exide facility is a newer facility than most lead sources, constructed new and commencing operation in 1994 in an enclosed structure for the purpose of new battery manufacturing new batteries. EPA has not received any additional information on emissions reductions resulting from controls put into place since 2005.

### ***Meteorology (weather/transport patterns)***

For this factor, EPA considered data from National Weather Service (NWS) instruments and other meteorological monitoring sites in the area, usually associated with major airport operation. A three-dimensional bar chart shows the wind frequencies in eight directions, for the four seasons, based on thirty two years of historical data<sup>1</sup> for the Bristol Area. These historical 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 violating monitor location, in the season of the violation.

<sup>1</sup> This data was 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.

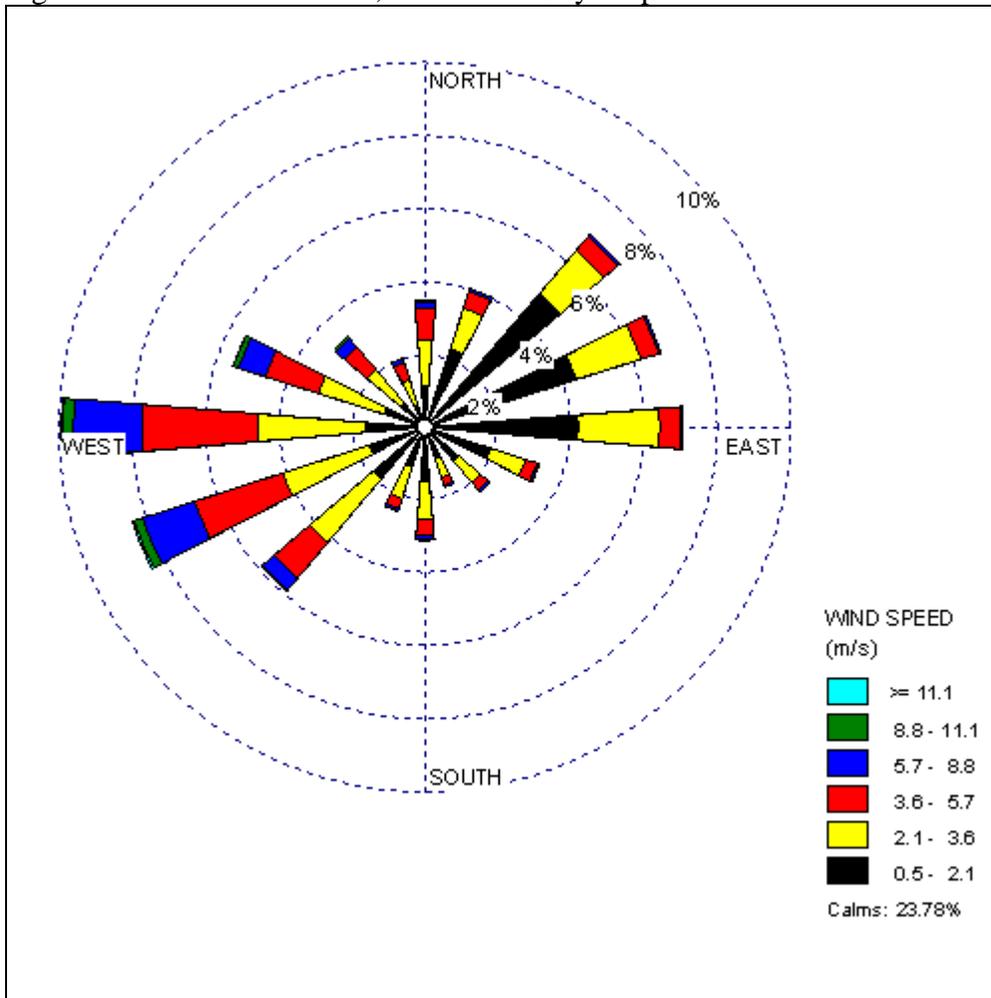
Figure 3: Historic Wind Direction Frequency in each of Four Seasons for Sullivan County, Tennessee



As seen in Figure 3 above, the predominant wind direction during the Winter and Spring is originating from the West/Southwest (WSW), while in the Summer and Autumn it is from the East/Northeast (ENE), indicating that special consideration must be applied when determining the northeastern and southwestern boundaries of the nonattainment area. This figure shows that elevated pollution levels may be attributed to wind directions originating from the WSW and ENE.

For each air quality monitoring site, EPA also developed a “wind rose,” which provides information about how wind speed and direction are distributed at the NWS monitoring station during the 30-year time period. The “spokes” on the diagram indicate the frequency of winds blowing FROM a particular direction. The length of a spoke shows the amount of time (in percentage) that the wind blows from that direction. Each concentric dotted-line circle on the diagram represents increasing frequencies as you move out from the center. The spokes also provide information about the speed of the winds blowing from that direction. Each spoke is broken into discrete frequency categories that are color-coded to indicate the percentage of time that wind speeds are within that category (e.g., for winds blowing from the East, approximately two percent of the time the wind speeds are between 2.1 – 3.6 meters/second (m/s)).

Figure 4: Bristol Wind Rose; Bristol/Tri-City Airport



Annual Wind Rose – 30 years (1961-1990)

Figure 4 provides an annual wind rose diagram for the Bristol Area. The wind rose was generated from 30 years (1961-1990) of wind speed and wind direction data collected at the NWS meteorological monitoring station located at the Bristol/Tri-City Airport (NWS Station # 13877). This station has the most representative long-term record of wind data for the Bristol Area, including the lead monitoring site.

The Bristol Area wind rose is consistent with the wind direction bar chart in Figure 3 above and indicates there is a predominant wind that blows from the West and Southwest approximately 23 percent of the time, with a secondary wind peak from the East/Northeast approximately 21 percent of the time. The wind speeds are less than 3.6 m/s more than 50 percent of the time. It is also important to note that winds are classified as calm (less than 0.5 m/s) approximately 23 percent of the time. The wind rose indicates that lead sources located in West/Southwest and East/Northeast from the monitoring site in the Bristol Area could influence the monitored ambient air concentrations during different time periods. Also, the higher frequency of low to moderate wind speeds would indicate that air emissions sources located closer to the monitor have a larger influence than those located more distant from the monitor.

EPA considered this historical wind direction and wind speed data to show evidence of the potential transport patterns for lead emissions sources located upwind and/or in close proximity to that of a violating monitor to contribute to ambient lead levels at 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 the Bristol Area.

The Bristol 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***

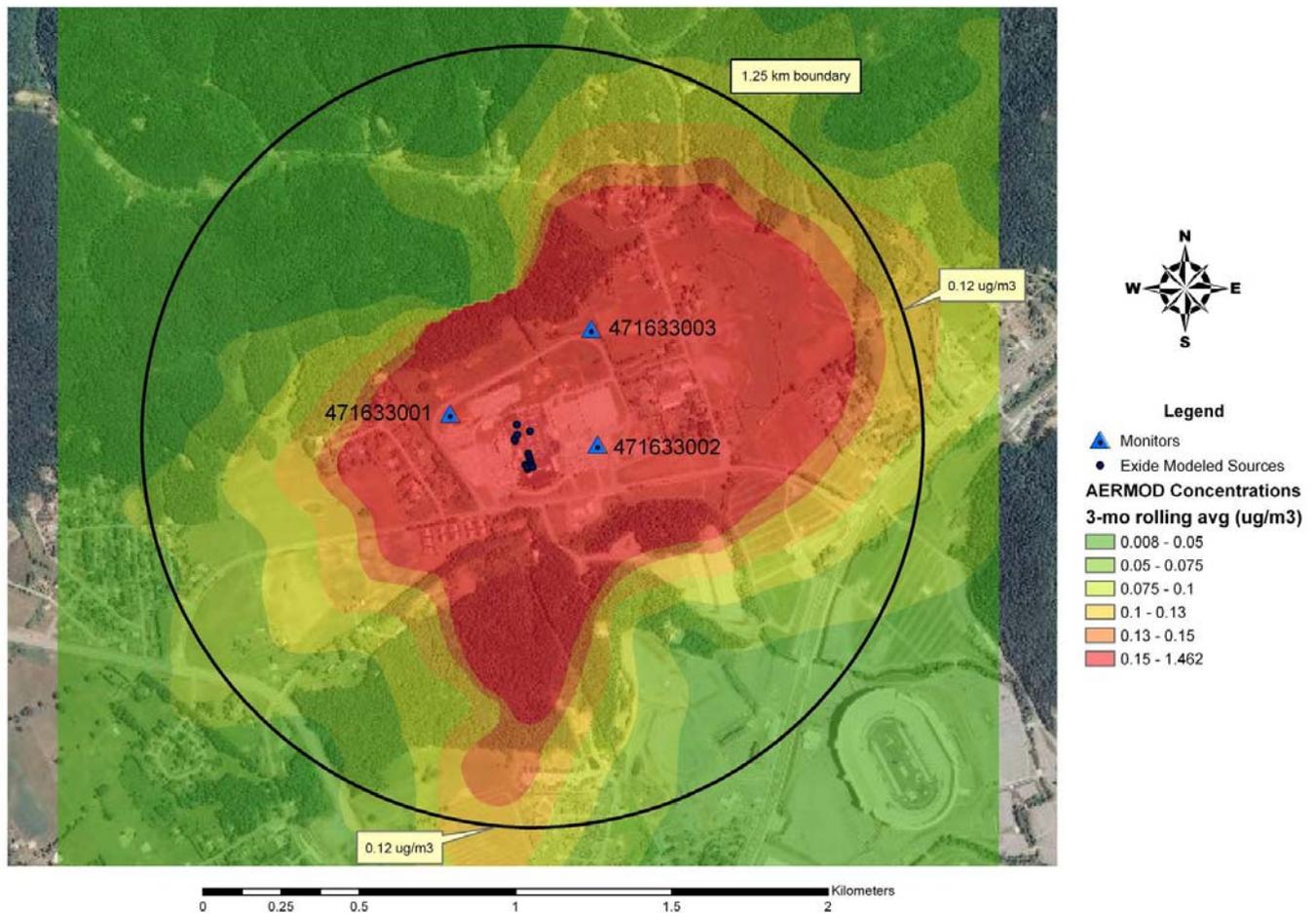
Existing jurisdictional boundaries may be helpful in articulating a boundary for purposes of nonattainment designations, and for purposes of carrying out the governmental responsibilities of planning for attainment of the Lead NAAQS and implementing control measures. These existing boundaries may include 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.

The Bristol Area does not have any jurisdictional boundaries that affect this analysis. Therefore, this factor did not play a significant role in determining the nonattainment boundary.

### ***Other Relevant Information***

Tennessee submitted air quality modeling to support their recommendation of a 1.25 km radius boundary surrounding the Exide facility on June 2, 2010. Tennessee also revised their recommended boundary on June 8, 2010. The modeling is based on permitted allowable emissions levels, and therefore overpredicts the observed design value at nearby monitors. The maximum modeled concentration is nearly  $1.5 \mu\text{g}/\text{m}^3$ , which is much higher than the 2007-2009 design value of  $0.26 \mu\text{g}/\text{m}^3$ . In their revised request, Tennessee expanded the recommended boundary from a radius of 1.0 km around the monitor to 1.25 km around the Exide facility so that all of the modeled values above the level of the Lead standard are contained within the Bristol Area boundary. The maximum modeled Lead value on the outer edge of Tennessee's modified recommended boundary is  $0.12 \mu\text{g}/\text{m}^3$ , about 20 percent below the standard of  $0.15 \mu\text{g}/\text{m}^3$ .

# Exide AERMOD Modeling



## Conclusion

After considering the factors described above, EPA has preliminarily determined that it is appropriate to include a portion of Sullivan County in the Bristol nonattainment area for the 2008 Lead NAAQS. This area is located within a 1.25 km radius surrounding the UTM coordinates 4042923 meters E, 386267 meters N, Zone 17, which surrounds the Exide Technologies facility, as recommended by Tennessee.

EPA is basing this preliminary nonattainment designation determination and boundary on the fact that Sullivan County contains an air quality monitor that shows a violation of the 2008 Lead NAAQS, based on 2007-2009 air quality data. The Exide Technologies facility is largest emissions source located near the violating monitors, and EPA believes this facility caused and/or contributed to the violating monitor during this period. Exide is a newer facility than most lead sources, constructed new and commencing operation in 1994 in an enclosed structure for the purpose of manufacturing new batteries. No other lead activities, such as primary or secondary smelting, have occurred at this location. Therefore, historical soil lead contamination in the surrounding area is expected to be less than at other facilities which have been operating

longer and have had higher historical lead emissions from less-controlled operations. The conservative modeling of emissions from the Exide facility indicate that a boundary within a 1.25 km radius surrounding the UTM coordinates 4042923 meters E, 386267 meters N, Zone 17, which surrounds the Exide Technologies facility, is a sufficient distance to encompass the area that exceeds the Lead NAAQS.

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 Lead NAAQS.

DRAFT