CHAPTER 3. AIR QUALITY ASSESSMENT METHODOLOGY

This chapter presents the methods used to estimate the air quality impacts of the emissions control strategies outlined in Chapter 4 of this document. To begin, we first describe the air quality assessment tool developed by EPA to relate lead emissions to ambient lead concentrations. We then explain how this tool was used to estimate the air quality impacts of each hypothetical emissions control strategy. The air quality impacts of these hypothetical control strategies are summarized in Chapter 4.

EPA used the air quality assessment methodology presented in this chapter to assess the final lead NAAQS of 0.15 µg/m^3 and the five alternative standards included in this document. We note that the Agency is setting the final standard as the maximum quarterly rolling average concentration, whereas the proposed rule included two options for the averaging time and form of the standard: the maximum quarterly average concentration across a three-year period (i.e., the maximum quarterly mean) and the second highest monthly average concentration across a three-year period (i.e., the second maximum monthly mean).   The decision to set the final standard as a maximum quarterly rolling average concentration, however, was made after much effort had been expended to assess the costs and benefits of the final and alternative standards as second maximum monthly mean concentrations. Because this decision was reached late in the analytic process, EPA used the air quality assessment methodology presented in this chapter to assess the 0.15 µg/m^3 standard as a second maximum monthly mean concentration rather than as a maximum quarterly rolling average concentration.

To assess the implications of using second maximum monthly mean concentrations for this analysis, we compared second maximum monthly mean concentrations to maximum quarterly concentrations. Ideally, we would compare second maximum monthly concentrations for each monitor area to the corresponding maximum quarterly rolling average concentration, but historical data for the latter were not readily available. In the absence of these data, we compared the second maximum monthly mean to the maximum quarterly mean. For the full universe of 86 counties where monitor readings for lead were available, the second maximum monthly mean is, on average, 0.03 µg/m^3 higher than the maximum quarterly mean. In addition, when we statistically test the difference between the second maximum monthly mean and the maximum quarterly mean concentrations in these 86 counties, we confirm that the former is likely to be higher than the latter.[1] When we limit the analysis to the 21 counties included in this analysis (i.e., the 21 counties with second maximum monthly mean concentrations above 0.1 µg/m^3, which is the most stringent standard analyzed in this document), we reach the same general conclusion—that the second maximum monthly mean is, on average, higher than the maximum quarterly mean.[2] This suggests that we may overestimate the emissions reductions,

---

[1] For all 86 counties where monitor data are available, the 95 percent confidence interval for the difference between the second maximum monthly mean and the maximum quarterly mean suggests that the former is 0.007 to 0.062 µg/m^3 higher than the latter.

[2] For the 21 counties analyzed in this RIA, the 95 percent confidence interval for the difference between the second maximum monthly mean and the maximum quarterly mean suggests that the second maximum monthly mean is 0.002 to 0.146 µg/m^3 higher than the maximum quarterly mean.

costs, and benefits associated with the final and alternative standards and that we may underestimate the number of areas able to attain each standard.

3.1   Air Quality Assessment Tool

To assess the air quality impact of the hypothetical emissions controls implemented under the final NAAQS, EPA would ideally use a detailed air quality model that simulates the dispersion and transport of lead to estimate local ambient lead concentrations. Although models with such capabilities are available for pollutants for which EPA frequently conducts air quality analyses (e.g., particulate matter and ozone), regional scale models are currently neither available nor appropriate for Pb.[3] Dispersion, or plume-based models, are recommended for compliance with the Pb NAAQS and were used for the Pb NAAQS risk assessment case studies. However, dispersion models are data-intensive and more appropriate for local scale analyses of emissions from individual sources. It was not feasible to conduct such a large-scale data intensive analysis for this RIA. As a result, the simplified analysis developed for this RIA, while distance-weighting individual source contributions to ambient Pb concentrations, could not account for such locally critical variables as meteorology and source stack height. Instead of using a data-intensive modeling approach, EPA developed a more simplified air quality assessment tool to estimate the air quality impacts of each lead emissions control strategy.

In general, air quality analyses conducted in support of the current Agency Pb NAAQS review focused on the Pb-TSP monitoring sites represented in the Air Quality System (AQS) database with sufficient 1-, 2-, or 3-year data records for the years 2003-2005; this database encompasses 189 monitoring sites located in 86 distinct counties. For this particular analysis, we concentrated on county maxima monitors exceeding the lowest alternative target NAAQS level (0.1 μg/m^3). The identification of the county maxima monitors and subsequent processing were based on the alternative NAAQS form of second maximum monthly Pb-TSP average over a 3-year period (in this case, 2003-2005).[4] Specifically, we identified 21 monitors (located in 21 counties) which we analyzed with the hereto described air quality assessment tool. This assessment tool employs a source-apportionment approach to estimate the extent to which each of the following emissions sources contribute to observed lead concentrations in the proximate areas of those 21 monitors:

---

[3] U.S. Environmental Protection Agency (2007c), Review of the National Ambient Air Quality Standards for Lead: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper, section 2.4, EPA-452/R-07-013, Office of Air Quality Planning and Standards, RTP, NC.

[4] In the Proposed Rule Analysis, monitors / counties were initially selected based on an alternative NAAQS form of maximum monthly Pb-TSP average. The Agency focus switched to second maximum monthly after considerable effort had already been made in the Proposed Rule RIA assessment. Although the metric values were switched for all monitors included in the analysis and reprocessed accordingly, the initial monitor selection was not repeated using the different metric. Thus, in some isolated instances, a monitor utilized for the Proposed Rule RIA was not the monitor with the county highest second maximum monthly average (though it was the one with the county highest maximum monthly average). For the Final Rule Analysis, the identification of monitors with maximum second monthly means was corrected; accordingly, some of the monitors in this analysis differ from those used in the Proposed Rule Analysis.

- Background lead
- Miscellaneous, re-entrained dust
- Emissions from area non-point sources
- Indirect fugitive emissions from active industrial sites
- Direct point source emissions[5]

After allocating a portion of the observed lead concentration for each monitor area to the first three categories listed above, the assessment tool apportions the remaining concentration among all inventoried point sources within ten kilometers of each monitor location.[6] Once the tool has determined the contribution of each point source to the observed lead concentration, it is then possible to determine how the application of pollution controls to individual point sources translates into changes in the observed lead concentration for each monitor area. To apportion the ambient lead concentration for each monitor area to the five categories presented above, the air quality assessment tool employs the following approach:

Step 1: Estimate baseline air quality value. Drawing from the 2003-2005 Pb-TSP NAAQS-review database, the air quality assessment tool records the second maximum monthly mean ambient lead concentration for the 21 monitor locations where this concentration exceeds 0.1 $\mu g/m^3$, the most stringent of the NAAQS alternatives considered in this document. These concentrations, adjusted for the expected implementation of MACT controls implemented after 2002, $PM_{2.5}$ NAAQS controls included as part of the illustrative $PM_{2.5}$ control strategy described in the $PM_{2.5}$ NAAQS RIA,[7] and the controls listed in the 2007 Missouri Lead SIP revisions, serve as the baseline air quality values for this analysis.[8]

For the final rule, the specification of baseline air quality values differs from the proposed rule in two ways:

1. First, in some areas, monitor geo-coordinates and ambient lead concentration data were adjusted to reflect the air quality monitor with the limiting value for the alternative NAAQS form of second maximum monthly Pb-TSP average. For the Proposed Rule analysis, we incorrectly used the geo-coordinates and ambient lead

---

[5] For the purposes of this analysis, airports servicing piston-engine aircraft that use leaded aviation gasoline are treated as point sources. The volume of avgas produced in the U.S. in 2002 was 6,682 thousand barrels or 280,644,000 gallons. This information is provided by the DOE Energy Information Administration. Fuel production volume data obtained from http://tonto.eia.doe.gov/dnav/pet/hist/mgaupus1A.htm accessed November 2006.

[6] Note that although the air quality assessment tool distinguishes between the portion of the observed lead concentration attributable to point source emissions and that attributable to indirect fugitive emissions from active point sources, this analysis assumes that the two contributions are directly related, and any reduction in the air quality impact of point source emissions would produce a corresponding reduction in the air quality impact of indirect fugitive emissions from point sources in that monitor area. The process used to relate the contributions of these two categories is described in further detail below.

[7] U.S. Environmental Protection Agency. *Regulatory Impact Analysis: 2006 National Ambient Air Quality Standards for Particle Pollution*. October 2006.

[8] Note also that to estimate the value of the point source influence factor described above, the air quality assessment tool uses lead concentration data from 2003 through 2005 and lead emissions data for 2002. Ideally, this factor would be estimated based on concentration and emissions data for the same time period.

concentration data from the monitor in each geographic area of analysis with the highest maximum monthly Pb-TSP average, rather than the monitor with the highest *second* maximum monthly Pb-TSP average. In most areas, the limiting monitor was the same for both NAAQS forms, but in three monitor areas (Jefferson County, MO, Sullivan County, TN, and Dallas County, TX), the air quality monitor changed. Where the monitor location changed, the set of sources with emissions affecting each monitor area also changed to reflect the new range of influence surrounding the new monitor locations.

2. Secondly, because the 0.05 $\mu g/m^3$ standard examined in the proposed rule RIA is not considered in this analysis, monitors with lead concentrations exceeding only that standard (i.e., monitors with second maximum monthly Pb-TSP averages between 0.05 $\mu g/m^3$ and 0.1 $\mu g/m^3$) are excluded from the analysis. Thus, the number of monitor locations analyzed has therefore decreased from 36 in the proposed rule RIA to 21 in this analysis.

MACT controls: For most point sources, lead emissions as specified in the 2002 National Emissions Inventory (NEI) served as the base case emissions for our 2016 analysis; as with the PM$_{2.5}$ NAAQS RIA and ozone RIA, no growth factors were applied to the 2002 NEI emissions estimates for industrial sources to generate our emissions estimates for 2016. In general, lead emissions from these source categories are trending downward over time due to various factors including lack of growth in particular industrial sectors, implementation of alternative lower-emitting production practices at facilities, and/or recent regulations coming into effect. However, where possible, we adjusted the 2002 NEI lead emissions values to reflect the estimated control efficiency of MACT standards with post-2002 compliance deadlines, because the 2002 NEI would not reflect the impact of those controls reasonably anticipated to be in place by 2016.

We identified 41 existing MACT rules with post-2002 compliance deadlines that affect sources included in this analysis. Of these, we focused on rules affecting the 20 industries responsible for the largest lead emissions according to the 2002 NEI. Ideally, we would apply control efficiency data for each of these rules to the 2002 lead emissions estimates for the corresponding emissions sources. Consulting Federal Register documentation for these rules, as well as EPA's internal MACT rule summary data, we were able to identify control efficiency information for just nine of these rules. The sources affected by these nine rules, however, represent 78 percent of the lead emissions from sources affected by MACT rules with post-2002 compliance deadlines. For three of these rules, EPA expects no incremental reduction in lead emissions. For two of these rules (integrated iron & steel and pressed & blown glass), the control efficiency information that we identified is specific to metal Hazardous Air Pollutants (HAPs, e.g., lead). For the remaining four rules, we obtained information on their overall HAP control efficiency from the Federal Register and from EPA's internal MACT summary data. Table 3-1 summarizes the control efficiencies found for each of the nine MACT rules with available control efficiency data. Due to the uncertainty that future MACT rules may cover sources of Pb emissions, this analysis does not assume the promulgation of future MACT rules.

PM$_{2.5}$ NAAQS controls: In addition to adjustments for MACT rules, we also adjusted the 2002 NEI emissions estimates to account for compliance measures required by the

September 2006 revision to the PM$_{2.5}$ NAAQS included as part of the illustrative PM$_{2.5}$ control strategy described in the PM$_{2.5}$ NAAQS RIA. Because EPA expects PM emissions controls to be implemented at certain of these sources in order to reach attainment with the PM$_{2.5}$ standard, we incorporated them into the base case emissions values used in our analysis.

Table 3-1.
CONTROL EFFICIENCIES FOR POST-2002 MACT RULES AFFECTING SOURCES OF LEAD EMISSIONS

MACT Rule	Data Source	Control Efficiency	Observed Pollutant
Integrated Iron and Steel Manufacturing	1	65.4%	Metal HAP
Iron and Steel Foundries	2,3	36.5%	HAP
Petroleum Refineries	4	86.6%	HAP
Secondary Aluminum Production	4	68.6%	HAP
Industrial/Commercial/Institutional Boilers & Heaters – Coal	4	33.3%	HAP
Pressed and Blown Glass and Glassware Manufacturing	5	97.6%	Metal HAP
Primary Nonferrous Metals – Zinc, Cadmium, and Beryllium	6	0%	N/A
Secondary Nonferrous Metals	5	0%	N/A
Primary Copper Smelting	6	0%	N/A
Key to Data sources:			

Key to Data sources:
1. Economic Impact Analysis of Final Integrated Iron and Steel NESHAP, Center for Regulatory Economics and Policy Research, September 2002
2. 67 FR 78273
3. Economic Impact Analysis of Final Iron and Steel Foundries NESHAP, RTI International, August 2003
4. EPA's internal MACT summary data
5. 72 FR 73179
6. 72 FR 2929

Of the 21 lead monitor areas considered in this RIA, five are located in counties predicted to be in nonattainment with the revised PM$_{2.5}$ standard in 2016, as specified in the PM$_{2.5}$ NAAQS RIA. For 20 point sources in these areas, EPA identified PM controls from the control technology database used in the controls and cost analysis for the PM NAAQS RIA. The controls anticipated to be applied consisted of fabric filters (with a 99 percent expected control efficiency), upgrades to electrostatic precipitators (67 percent), and the installation of capture hoods vented to a baghouse (85 percent). For each source with controls identified in the PM NAAQS RIA, we applied the control efficiency for the appropriate control technology to its 2002 NEI emissions to produce the new, PM NAAQS-adjusted baseline emissions for that source. For this analysis, we assume that these expected control efficiencies will remain constant throughout the relevant time period.

Step 2: Estimate background lead concentration: EPA estimates that the average background lead concentration is so small (0.0005 μg/m^3) as to be irrelevant for the purposes of this analysis. Given the resolution of the lead monitoring devices supporting this analysis, the air quality assessment tool assumes that background lead concentrations have no measurable contribution to violations at the design value monitors. However, given the nature of the

conducted analysis for estimating "miscellaneous re-entrained dust" (see Step 3 below), background concentrations are, in fact, encompassed in that category.
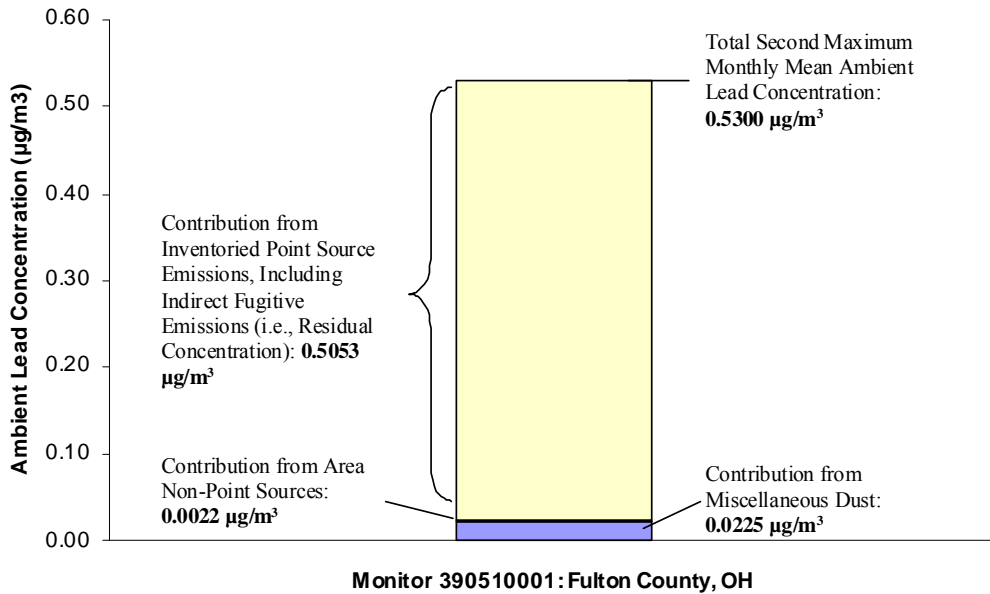
      Step 3: Estimate the contribution of miscellaneous re-entrained dust. Although the lead emissions constituting the miscellaneous re-entrained dust category are of uncertain origin, they are believed to encompass 1) re-entrained dust emitted from past stationary and past mobile sources (e.g., leaded gas), including the contribution from transport; and 2) dust emitted from demolition, construction, and/or sandblasting activities, and 3) uninventoried mobile-related emissions (e.g., from Pb wheel weights, brake wear and trace Pb from gas/diesel and lube oil consumption) . Rather than estimating the site-by-site contribution of miscellaneous re-entrained dust, the air quality assessment tool applies a national estimate of the central tendency of the contribution of miscellaneous re-entrained dust to ambient lead concentrations. EPA developed this national estimate by evaluating data from ambient TSP monitors with a negligible impact from NEI lead emission sources. For the purposes of this analysis, EPA defines "negligible impact" to mean that NEI point and non-point lead-emitting sources, with associated fugitive emissions, have no contribution to the measured ambient lead concentration. Accordingly, EPA judged the ambient lead concentration measured at these TSP monitors to be entirely due to miscellaneous re-entrained dust.

      Of the 189 sites included in the 2003-2005 TSP NAAQS-review database, EPA deemed 90 sites to have negligible impact from active sources based on two criteria: 1) each site was not identified as "source oriented" in previous EPA analysis; and 2) each site had cumulative point and area non-point emissions of 0.01 tons per year or less within a one-mile radius of the monitor.[9] As a central tendency of the contribution of miscellaneous, re-entrained dust, EPA found the median ambient lead concentration at these sites to be 0.0225 $\mu g/m^3$. Although this represents the average concentration at the national level, actual concentrations associated with miscellaneous re-entrained dust may vary by area. Nevertheless, in general this value typically represents a small portion of the baseline concentration at each monitor, as indicated by Figure 3-1, which illustrates the composition of the baseline lead concentration at the Fulton County, Ohio monitor.

      Step 4: Estimate the contribution of area nonpoint sources. A portion of observed lead concentrations results from emissions from area non-point sources (e.g., households). The air quality assessment tool estimates the contribution of lead-emitting area non-point sources to ambient lead concentrations based on data from the 2002 area non-point lead emission inventory. This inventory is generally summarized at the county level, and EPA assumes that each county's area non-point emissions were uniformly distributed within each county. Based on this assumption, the air quality assessment tool also assumes that the extent to which area non-point sources contribute to ambient lead concentrations is proportional to the ratio of county-level area non-point lead emissions to total county-level lead emissions. Because this ratio differs by county, the area non-point source contribution to ambient lead concentrations also differs for each monitor site, but it generally composes a small portion of the overall concentration, as illustrated by the Fulton County, Ohio example in Figure 3-1.

---

[9] Sites classified as source oriented in previous EPA analysis were identified via a reference list used in EPA Trends Report analyses. This list encompasses 119 sources and was last updated in 2003.

Figure 3-1.
APPORTIONMENT OF THE BASELINE SECOND MAXIMUM MONTHLY MEAN LEAD
CONCENTRATION AMONG SOURCE CATEGORIES IN FULTON COUNTY, OHIO

Monitor 390510001: Fulton County, OH

       Step 5: Estimate the residual concentration after removing the contributions of miscellaneous re-entrained dust and area non-point source emissions.   Based on the results of the four previous steps, the air quality assessment tool estimates the intermediate remaining second maximum monthly mean lead concentration (hereafter, "residual concentration") by subtracting the contributions of miscellaneous re-entrained dust and area non-point source emissions from the baseline air quality value. The residual concentration represents the total concentration fraction associated with emissions from inventoried point sources and indirect fugitive emissions from industrial sites. In the case of Fulton County, Ohio, the residual concentration is 0.5053 µg/m^3, or the baseline concentration of 0.5300 µg/m^3 less the 0.0225 µg/m^3 and 0.0022 µg/m^3 concentration fractions associated with miscellaneous dust and area non-point sources, respectively.

Step 6: Determine the contribution of each inventoried point source to the ambient lead concentration at each monitor, accounting for indirect fugitive emissions from nearby active industrial sites. For each monitor area, the air quality assessment tool attributes the residual concentration derived in Step 5 to each point source according to its lead emissions as well as its distance from the monitor. After weighting each source's emissions according to its distance from the monitor and applying an adjustment to account for the impact of indirect fugitive emissions, the air quality assessment tool then estimates the total contribution of each source to the ambient lead concentration at the nearest monitor. We describe this approach in more detail below.

Step 6.1: Weight the emissions from each source by its distance from the monitor.

To account for the fact that, all else equal, lead emissions closer to the monitor have a greater impact on ambient lead concentrations, the tool assumes that each source's contribution to the concentration is proportional to its share of the total distance-weighted point source emissions for the monitor area. [Note that the tool does not contain data sufficient to assess the influence of other factors, such as stackheight and local meteorological conditions, that could affect the relative contribution of each point source to monitored Pb concentrations.]

For each source, the tool calculates distance-weighted emissions using the following equation:

(Equation 3-1) $DWE_S = \dfrac{E_S}{D_S^{3/2}}$

where:

- DWE_S = Distance-weighted 2002 NEI emissions for source S,
- E_S = 2002 NEI emissions for source S, and
- D_S = Distance between source S and the monitor location.

Step 6.2: Adjust the distance-weighted emissions to incorporate the impacts of indirect fugitive emissions.

After calculating the distance-weighted emissions for each source, the air quality assessment tool applies an additional adjustment to account for indirect fugitive emissions from active industrial sites near each monitor.[10] These indirect fugitive emissions are thought to result from materials handling and on-site activities that re-entrain previously deposited lead-containing dust. Unlike area non-point source emissions, indirect fugitive emissions are linked to point sources and are not captured in the 2002 NEI. Indirect fugitive emissions, however, <u>do not</u> include fugitives associated with industrial processes at point sources, as these direct, process-based fugitive emissions <u>are</u> reflected in the 2002 NEI point source inventory. Relative to point source emissions, fugitive emissions tend to consist of coarser particles that are emitted closer to the ground and are therefore assumed to have a more localized effect on ambient air

---

[10] Airport emissions are also reflected in the residual concentration. For the purposes of this analysis, airports are treated as point sources, although as discussed further in chapter 4, no controls are applied to airports.

quality. Reflecting this consideration, the air quality assessment tool assumes that only indirect fugitive emissions from sources within one mile of the monitor would have an impact on the monitor reading, and even then only in situations where the cumulative emissions of such nearby sources are "significant" (i.e., typically where the aggregate 1-mile radius point source emissions are greater than one ton).

To estimate the extent to which indirect fugitive emissions contribute to ambient lead concentrations near active industrial sites, EPA conducted a study of nine sites where previously active lead-emitting sources had ceased or paused production. Assuming that activities conducive to re-entrainment continue for a short period after production had ceased, EPA compared ambient lead concentrations before and after these production stoppages. After subtracting the contribution from un-inventoried miscellaneous dust (as in Step 3 above) and from area non-point sources (as in Step 4 above), EPA found that the average post-stoppage lead concentration represented approximately 15 percent of the average pre-stoppage concentration. For this analysis, therefore, EPA assumes that the contribution of indirect fugitive emissions from active industrial sites within one mile of the lead monitors represents approximately 15 percent of the total contribution attributable to these sources.

The air quality assessment tool estimates contribution of indirect fugitive emissions to observed lead concentrations as follows:

- First EPA identified large sources within one mile of the monitor location that were expected to have indirect fugitive emissions that would affect the monitor's air quality reading.

- For each identified source, EPA adjusted its distance-weighted emissions to account for the additional fugitive emissions emanating from that source. Reflecting the results of the analysis described above, EPA adjusted sources with indirect fugitive emissions by multiplying their distance-weighted emissions by 20/17, or 117.65 percent.[11]

For all sources, the air quality assessment tool applies the adjustment for indirect fugitive emissions using the following equation:

(Equation 3-2) $fDWE_S = DWE_S \cdot \left(1 + f_S \cdot \frac{3}{17}\right)$

where:

- $fDWE_S$ = Distance-weighted 2002 NEI emissions for source S, adjusted to account for indirect fugitive emissions,
- DWE_S = Distance-weighted 2002 NEI emissions for source S,

---

[11] As stated above, EPA estimates that 15 percent of the total contribution from active industrial sites within one mile of lead monitors is attributable to indirect fugitive emissions. Accordingly, 85 percent of the total contribution from these sites is attributable to direct emissions. The ratio of the total contribution from these sources to the contribution from direct emissions is therefore 100/85, or 20/17.

- f_S = Indicator for whether a source has indirect fugitive emissions affecting the monitor (assigned a value of 1 if a source is within one mile of the monitor and has indirect fugitive emissions, and 0 otherwise).

Step 6.3: Estimate contribution of each source to ambient lead concentrations based on fugitive-adjusted distance-weighted emissions.

After calculating the distance-weighted emissions for each source using Equation 3-1 and incorporating the impacts of indirect fugitive emissions using Equation 3-2, the air quality assessment tool estimates each source's contribution to the ambient lead concentration as follows:

(Equation 3-3) $C_S = C_P \cdot \dfrac{fDWE_S}{fDWE_P}$

where:

- C_S = The portion of that monitor area's ambient lead concentration attributable to source S,
- C_P = Total contribution of point source emissions (and associated industrial fugitives) to the ambient lead concentration (i.e., the remaining concentration after subtracting background and area source contributions from the baseline air quality value),
- $fDWE_S$ = Fugitive-adjusted, distance-weighted 2002 NEI emissions for source S, and
- $fDWE_P$ = Sum of fugitive-adjusted, distance-weighted 2002 NEI emissions for all point sources in the monitor area.

Continuing with the Fulton County, Ohio example presented in Figure 3-1, Table 3-2 illustrates the process by which the contribution of each point source in Fulton County is apportioned based on its emissions and distance from the monitor location. Note that the source contribution from Source B is several orders of magnitude larger than the source contribution from Source A, even though lead emissions from Source B are only twice those from Source A.

Table 3-2.
APPORTIONMENT OF THE TOTAL POINT SOURCE CONTRIBUTION TO THE AMBIENT LEAD CONCENTRATION AMONG INVENTORIED POINT SOURCES IN FULTON COUNTY, OHIO

Monitor Location	Fulton County, OH	
Total Point Source Contribution to Ambient Lead Concentration (μg/m^3) **[C$_P$]**	0.5053	
Source	Source A	Source B
2002 NEI Emissions (tpy) **[E$_S$]**	0.1500	0.338
Distance from Monitor to Source (km) **[D$_S$]**	3.4707	0.0554
2002 NEI Distance-Weighted Emissions (tpy/km$^{3/2}$) **[DWE$_S$]**	0.0232	25.8982
Fugitive Emissions Affect Monitor? **[f$_S$]**[1]	No	Yes
Distance-Weighted Emissions with Fugitive Adjustment (tpy/km$^{3/2}$) **[fDWE$_S$]**	0.0232	30.4685
Total Distance-Weighted Emissions (tpy/km$^{3/2}$) **[fDWE$_P$]**	30.4917	
Share of Total Distance-Weighted Emissions **[fDWE$_S$ / fDWE$_P$]**	0.0761%	99.9239%
Source Contribution to ambient lead concentration (μg/m^3) **[C$_S$ = C$_P$ * fDWE$_S$/fDWE$_P$]**	0.0004	0.5049

[1] "No" and "Yes" in this row correspond to values of 0 and 1 for f$_S$, respectively, as defined in Equation 3-2.

In this analysis, airports were treated as point sources. Currently, there are 3,410 aviation facilities in the NEI of which, 24 are included in this analysis due to their proximity to one of the 24 monitors that were identified using the criteria described in Section 3.1. Among the 21 monitors in this analysis, there are 18 monitors with at least one airport located within ten kilometers of the monitor (six monitors have two airport facilities within ten kilometers). This analysis estimates that the contribution of leaded aviation gasoline to lead measured at the monitors ranges from 0.00002 to 0.047 μg/m^3. There are currently no TSP lead monitors located within one mile of an airport servicing aircraft that operate on leaded aviation gasoline. In addition to the 24 airport facilities within ten kilometers of the monitors in this analysis, there are heliport and airport facilities where piston-engine aircraft might operate that are not currently in the NEI and for which we do not currently have lead emissions estimates.[12]

---

[12] Memo to the RIA Docket -HQ-OAR-2008-0253 Titled 'Small airport facilities within ten kilometers of monitors in the Lead Regulatory Impact Analysis that are currently missing from EPA's National Emissions Inventory' submitted by Marion Hoyer, Meredith Pedde and Bryan Manning.

3.2.   Using the Air Quality Assessment Tool to Estimate Impacts of Point Source Emissions Controls

Through the process described in Chapter 4, we used a least-cost optimization model to estimate the extent to which point source lead emissions could decline under the control strategies developed for the final NAAQS and the alternative standards summarized in Chapter 1.[13] To estimate the air quality impact of these reductions, we developed a three-step process for estimating ambient lead concentrations based on the air quality assessment tool described above. This process is as follows:

1.   For each alternative standard, we applied identified controls to individual point sources, according to the cost optimization model. Because the air quality assessment tool translates lead emissions to air quality impacts by applying a constant distance-weighting for each source, the percent reduction in a source's contribution to ambient lead concentrations was the same as the combined control efficiency of all emissions controls applied to that source. Based on these source-specific reductions, we estimated each point source's contribution (including the contribution from indirect fugitive emissions) to the ambient lead concentration following the implementation of emissions controls.

2.   For each monitor area, we summed the individual point source contributions estimated in Step 1 to obtain the total ambient lead concentration attributable to inventoried point sources (including ambient lead associated with indirect fugitive emissions).

3.   Holding the contributions from area non-point sources and miscellaneous re-entrained dust constant between the baseline and policy case, we added these to the total contribution from point sources (estimated in step 2) to yield the new estimate for the total ambient lead concentration.

---

[13] As described in Chapter 4, our analysis did not consider controls on lead emissions from airports. Therefore, we kept lead emissions from airports constant in both the baseline and policy scenarios.