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DRAFT

Technical Note – Lead (Pb) Ambient Air Monitoring Network Design Issues

BACKGROUND

On November 12, 2008 EPA substantially strengthened the national ambient air quality standards (NAAQS) for lead (see 73 FR 66964). EPA 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) and revised the secondary (welfare-based) standard to be identical in all respects to the primary standard. In conjunction with strengthening the lead (Pb) NAAQS, the EPA promulgated new monitoring requirements including new design requirements for the Pb NAAQS surveillance network (40 CFR Part 58, Appendix D, paragraph 4.5). Monitoring is now required for Pb sources that may contribute to violations of the Pb NAAQS [“source-oriented monitoring”, paragraph 4.5(a)]. Monitoring is also required in large urban areas [“non-source-oriented monitoring”, paragraph 4.5(b)].

SOURCE-ORIENTED MONITORING REQUIREMENTS

What Pb sources need to have a source-oriented Pb monitor?

According to 40 CFR Part 58, Appendix D, paragraph 4.5(a), state and, where appropriate, local agencies are required to conduct ambient air Pb monitoring considering Pb sources that are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each Pb source that emits 1.0 or more tons per year, unless the appropriate EPA Regional Administrator grants a waiver.

When are source-oriented Pb monitors required to begin sampling?

According to 40 CFR Part 58.10(a)(4), source-oriented Pb monitors are required to begin sampling by January 1, 2010. Monitoring agencies are required to identify which Pb sources will be monitored and site locations in their annual network plan required to be submitted to the EPA Regional Administrator by July 1, 2009.

What emission estimates should be used for determining if a Pb source emits at least 1.0 tons per year?

According to 40 CFR Part 58, Appendix D, paragraph 4.5(a), monitoring agencies are to use either the most recent National Emission Inventory (NEI, <http://www.epa.gov/ttn/chief/eiinformation.html>) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) to determine if a Pb source emits more than 1 ton per year. In addition to the NEI, monitoring agencies should also consider Toxics Release Inventory (TRI, <http://www.epa.gov/tri/>) estimates. Examples of

site-specific data include stack test data, permit limits, and other sources of information that may be more appropriate than estimates based on AP-42 emission estimates. Emission estimates should be rounded to one decimal place using conventional rounding procedures.

Under what conditions can a waiver for a source-oriented monitor be granted?

According to 40 CFR Part 58, Appendix D, paragraph 4.5(a), a monitoring agency can receive a waiver from the source-oriented monitoring requirement for a given source emitting 1.0 or more tons per year of Pb if it can demonstrate that the Pb source will not contribute to a maximum Pb concentration (based on a maximum 3-month rolling average over three years of monitoring data) in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means).

Is a waiver needed for Pb sources with emissions of less than 1.0 tons per year?

Waivers are only required for Pb sources with emissions greater than or equal to 1.0 tons per year. Monitoring agencies are encouraged to review and improve, if appropriate, National Emission Inventory (NEI) emission estimates for all lead sources including those identified as having an emission rate of 1.0 tons per year. If a monitoring agency determines that a source of Pb emissions is less than 1.0 tons per year, they are to document the revised emission estimate in the monitoring plan required by 40 CFR part 58.10(a)(4), subject to public comment and the EPA Regional Administrator's review and acceptance, and should submit the corrected emission estimate to the NEI.

How should Pb monitoring locations be selected for source-oriented monitors?

According to 40 CFR Part 58, Appendix D, paragraph 4.5(a), source-oriented monitors are to be sited at the location of predicted maximum concentration in ambient air taking in to account the potential for population exposure, and logistics. Typically, dispersion modeling will be required to identify the location of predicted maximum concentration.

Locations may be selected that are not the maximum concentration when it is not practical to locate a monitor (e.g., the location of maximum concentration is located in a road, or in a lake), or where there is no potential for population exposure (e.g., remote mines with no nearby residences or community centers). In these cases, the monitor may be sited at the location with the highest predicted concentration that is both practical and has the potential for population exposure. Note that the potential for human exposure is not necessary for a location to be considered valid for the purpose of compliance with the Pb NAAQS, however, monitoring agencies are allowed to consider the potential for human exposure when selecting a monitoring location.

The location must also meet the siting requirements of 40 CFR Part 58, Appendix E.

What is the definition of “ambient air”?

Ambient air is defined in 40 CFR Part 50.1 as “that portion of the atmosphere, external to buildings, to which the general public has access.” The EPA has developed a number of memorandums which help to interpret the definition of ambient air, including the following –

<http://www.epa.gov/scram001/guidance/mch/ama1.txt>

<http://www.epa.gov/scram001/guidance/mch/ama2.txt>

<http://www.epa.gov/scram001/guidance/mch/ama3.txt>

<http://www.epa.gov/scram001/guidance/mch/ama4.txt>

<http://www.epa.gov/scram001/guidance/mch/ama5.txt>

Monitoring agencies are encouraged to contact their EPA Regional monitoring contact if they have additional questions regarding the definition of ambient air.

Where should source-oriented monitors be located for airports?

As with other Pb sources, source-oriented monitors for airports should be sited in ambient air at the location of predicted maximum Pb concentration. Typically, the location of maximum Pb concentration will be downwind of the take off strip near the “blast fence.”

Do existing source-oriented monitoring sites that are not sited at the location of predicted maximum concentration need to be moved to the location of predicted maximum concentration?

According to 40 CFR Part 58, Appendix D, paragraph 4.5(a), source-oriented monitors are to be sited at the location of predicted maximum concentration in ambient air taking in to account the potential for population exposure, and logistics. As such, existing sites that are not located at the location of maximum should be moved to the location of maximum concentration in ambient air taking in to account the potential for population exposure, and logistics. However, if the existing monitoring site is currently measuring Pb concentrations that exceed the Pb NAAQS on a 3-month rolling average, a new site should be established at the location of predicted maximum concentration, and the existing site should be maintained for a long enough period to demonstrate that the new site is consistently measuring higher Pb concentrations.

How many years of historic data are required to demonstrate ambient concentrations are less than 50% of the NAAQS when requesting a source-oriented monitor waiver?

The new monitoring requirements do not specify how many years of data are necessary to demonstrate that ambient concentrations are less than 50% of the NAAQS when requesting a source-oriented monitor waiver. As such, it is up to the EPA Regional Administrator’s judgment how much data is necessary to demonstrate that ambient concentrations are less than 50% of the NAAQS when requesting a source-oriented monitor waiver. Clearly, three complete years of monitoring data which demonstrates ambient concentrations are less than 50% of the NAAQS should be sufficient. However, there may be cases where Pb concentrations are so low that just 1 year of data may be sufficient, in the EPA Regional Administrator’s judgment, to determine that ambient concentrations are less than 50% of the NAAQS.

How recent must historical monitoring data be for use in requesting a source-oriented monitor waiver?

The new monitoring requirements do not specify how recent historical data must be to demonstrate that ambient concentrations are less than 50% of the NAAQS when requesting a source-oriented monitor waiver. As such, it is up to the EPA Regional Administrator’s judgment to determine how recent historical data must be and still be usable to demonstrate that ambient concentrations are less than 50% of the NAAQS when requesting a source-oriented monitor waiver.

There are a number of practical considerations that apply to the use of historical data. For example, data collected before 1990 are unlikely to be useful for this purpose as most areas of the country had ambient Pb concentrations greater than 50% of the NAAQS due to the use of Pb in gasoline. Also, changes to the emission characteristics of a site (e.g., a significant increase in emissions) occurring after monitoring had ended should be considered when determining if historical data is still appropriate for use in requesting a waiver.

Must historical data used to support a source-oriented monitoring waiver be obtained from FRM or FEM Pb-TSP monitors?

The new monitoring requirements do not state that historical data must be collected with an FRM or FEM to be used in requesting a waiver. As such, other non-FRM or FEM monitoring data may be used if, based on the EPA Regional Administrator's judgment, the sampling and analysis methods provide a scientifically sound estimate of Pb-TSP. For example, the EPA Regional Administrator may accept Pb-PM₁₀ measurement collected using either a low volume or high volume PM₁₀ sampler in areas where Pb is not expected to be in the ultra-coarse fraction of PM.

When may Pb-PM₁₀ monitors be used for a source-oriented monitor?

According to 40 CFR Part 58, Appendix C, paragraph 2.10, Pb-PM₁₀ samplers can be approved for use at source-oriented sites if the monitoring agency can demonstrate (through modeling or historic monitoring data from the last 3 years) that Pb concentrations (either Pb-TSP or Pb-PM₁₀) will not equal or exceed 0.10 micrograms per cubic meter on an arithmetic 3-month mean and the source is expected to emit a substantial majority of its Pb in the fraction of PM with an aerodynamic diameter of less than or equal to 10 micrometers.

How would one determine if a source is expected to emit a substantial majority of its Pb in the fraction of PM with an aerodynamic diameter of less than or equal to 10 micrometers?

AP-42 contains particle size distributions for a number of common emission sources which can be used in the absence of site specific particle size distribution information. Judgment should be used in the absence of applicable AP-42 guidance based on the nature of the emission source, any applicable controls, etc. For instance, Pb emissions from a melting pot (such as used in Pb casting operations) would primarily be emitted as a fume and would not be expected to contain Pb in coarse particles. However, fugitive emissions from a storage pile of crushed batteries (as found at a secondary lead smelter) would be expected to contain Pb in ultra-coarse PM.

NON-SOURCE-ORIENTED MONITORS

In what urban areas are non-source-oriented monitors required?

According to 40 CFR Part 58, Appendix D, paragraph 4.5(a), State and, where appropriate, local agencies are required to conduct Pb monitoring in each CBSA with a population equal to or greater than 500,000 people as determined by the latest available census figures.

At this time, the latest census estimates are provided at the following link -
<http://www.census.gov/popest/metro/CBSA-est2007-annual.html>

When are non-source-oriented Pb monitors required to begin sampling?

According to 40 CFR Part 58.10(a)(4), non-source-oriented Pb monitors are required to begin sampling by January 1, 2011. Monitoring agencies are required to identify which CBSA will be monitored and site locations in their annual network plan required to be submitted to the EPA Regional Administrator by July 1, 2010.

Under what conditions can a waiver be granted for a non-source-oriented monitor?

There are currently no waiver provisions for non-source-oriented monitors. In some cases, non-source Pb monitoring data may be available from an existing station in an urban area required to have this monitoring (e.g., a National Air Toxics Trends Stations). As long as the Pb monitoring station(s) meet the network design criteria and utilize an approved Pb FRM or FEM, existing stations may be used to meet this requirement. Such monitors would still need to be documented in the annual monitoring network plans that are due no later than July 1, 2010.

When may Pb-PM₁₀ monitors be used for non-source-oriented monitors?

According to 40 CFR Part 58, Appendix C, paragraph 2.10 of Appendix C to 40 CFR Part 58, Pb-PM₁₀ samplers can be approved for use at non-source-oriented sites if the monitoring agency can demonstrate there is no existing monitoring data indicating that the maximum arithmetic 3-month mean Pb concentration (either Pb-TSP or Pb-PM₁₀) at the site was equal to or greater than 0.10 micrograms per cubic meter during the previous 3 years.

How should Pb monitoring locations be selected for non-source-oriented monitors?

According to paragraph 4.5(b), non-source-oriented sites must be located to measure neighborhood scale Pb concentrations in urban areas impacted by re-entrained dust from roadways, closed industrial sources which previously were significant sources of Pb, hazardous waste sites, construction and demolition projects, or other fugitive dust sources of Pb. Modeling is not needed to locate these monitors because these monitors are intended to be neighborhood scale monitors rather than “maximum concentration” monitors.

The location must also meet the siting requirements of 40 CFR Part 58, Appendix E.

Who should I contact to determine the locations of hazardous waste sites, construction and demolition projects, or other fugitive dust sources of Pb?

Monitoring agencies should contact their state or Regional contacts for air permitting and or Superfund for assistance in identifying the locations of hazardous waste sites, construction and demolition projects, or other fugitive dust sources of Pb.

OTHER ISSUES

What should be done about existing Pb monitors that do not meet either of the source-oriented or non-source-oriented requirements? Should they be continued?

Monitoring agencies that will be required to operate either a source-oriented or non-source-oriented monitor are encouraged to relocate existing Pb monitoring sites to locations suitable to meet the new monitoring requirements. However, monitoring sites that are currently identified as exceeding the Pb NAAQS should not be moved or relocated if they are showing the highest Pb concentrations (on a 3-month rolling average) at this time.

Monitoring agencies that will not be required to operate either a source-oriented or non-source-oriented monitor may discontinue an existing Pb monitor according to the requirements of 40 CFR Part 58.14.

FOR FURTHER INFORMATION

This document and other documents intended to assist monitoring agencies implement the Pb monitoring requirements can be found at - <http://www.epa.gov/ttn/amtic/pb-monitoring.html>

For additional information, please contact Kevin Cavender of the Air Quality Assessment Division, Ambient Air Monitoring Group, 919-541-2364, cavender.kevin@epa.gov.