

APPENDIX D

Example Application: Secondary Lead Smelter

DRAFT

**EPA Contract EP-D-05-096, Assignment 4-07
EPA Project Manager: Daniel G. Bivins**

**MACTEC Work Order No. 201001192
MACTEC Project No. 688009S509**

**Submitted To:
MACTEC Federal Programs
Research Triangle Park, NC**

Prepared By:
John A. Cooper and Aaron Siemers
Cooper Environmental Services, LLC
Portland, OR

December 3, 2010

Summary

This hypothetical example illustrates how Guide for Developing a Multi-Metals Fence-Line Monitoring Plan for Fugitive Emissions Using X-Ray Based Monitors (Guide) can be applied to quantify and characterize air quality issues associated with stack and fugitive emissions from secondary lead smelters. Secondary lead smelters are relatively prevalent in the United States and are usually located in large urban areas with significant receptor populations and general air quality issues. Lead emissions are a national concern, and lead is the only metal included in the National Ambient Air Quality Standards (NAAQS) promulgated by the United States Environmental Protection Agency (U.S. EPA). Lead is a potent neurotoxin, and has been linked to mental impairment in adults and developmental disabilities in children. The lead NAAQS was recently lowered from 1.5 $\mu\text{g}/\text{m}^3$ to 0.15 $\mu\text{g}/\text{m}^3$, reflecting new scientific understanding that virtually no level of lead in the blood is safe for human health.

States have five years to achieve compliance with the new standard, and a number of locations near secondary lead smelters are currently out of attainment. For this example, a secondary lead smelter near downtown Los Angeles (The Facility) is developing a lead NAAQS attainment plan. The goal of the plan is to use near-real-time (NRT) multi-metals ambient air monitors to assess potential threats to a local airshed from fugitive and process stack lead emissions, identify major fugitive lead sources within the facility and develop successful engineered emissions controls.

A key to compliance with the lead NAAQS at The Facility is accurate identification of sources within the smelter responsible for measured high lead detection at the NAAQS total suspended particulate (TSP) monitors. Many studies of fugitive emissions at secondary lead smelters show that short-term spikes in concentrations are the major contributors to total monthly lead TSP. As such, this plan incorporates a fence line metals monitor to characterize these expected concentration spikes and correlate the elevated lead concentrations with particle size, wind speed and direction, plant activity, and monitor location. Using this contextual information, fugitive sources can be identified and engineered controls can be developed to curb lead emissions and comply with the lead NAAQS.

Table of Contents

Procedure Flow Diagram	D-2
1. Driver	D-3
2. Goals: Defining Ambient Goals and Compliance	D-5
3. Local Airshed Characteristics	D-9
4. Monitoring Plan	D-14
5. References	D-18

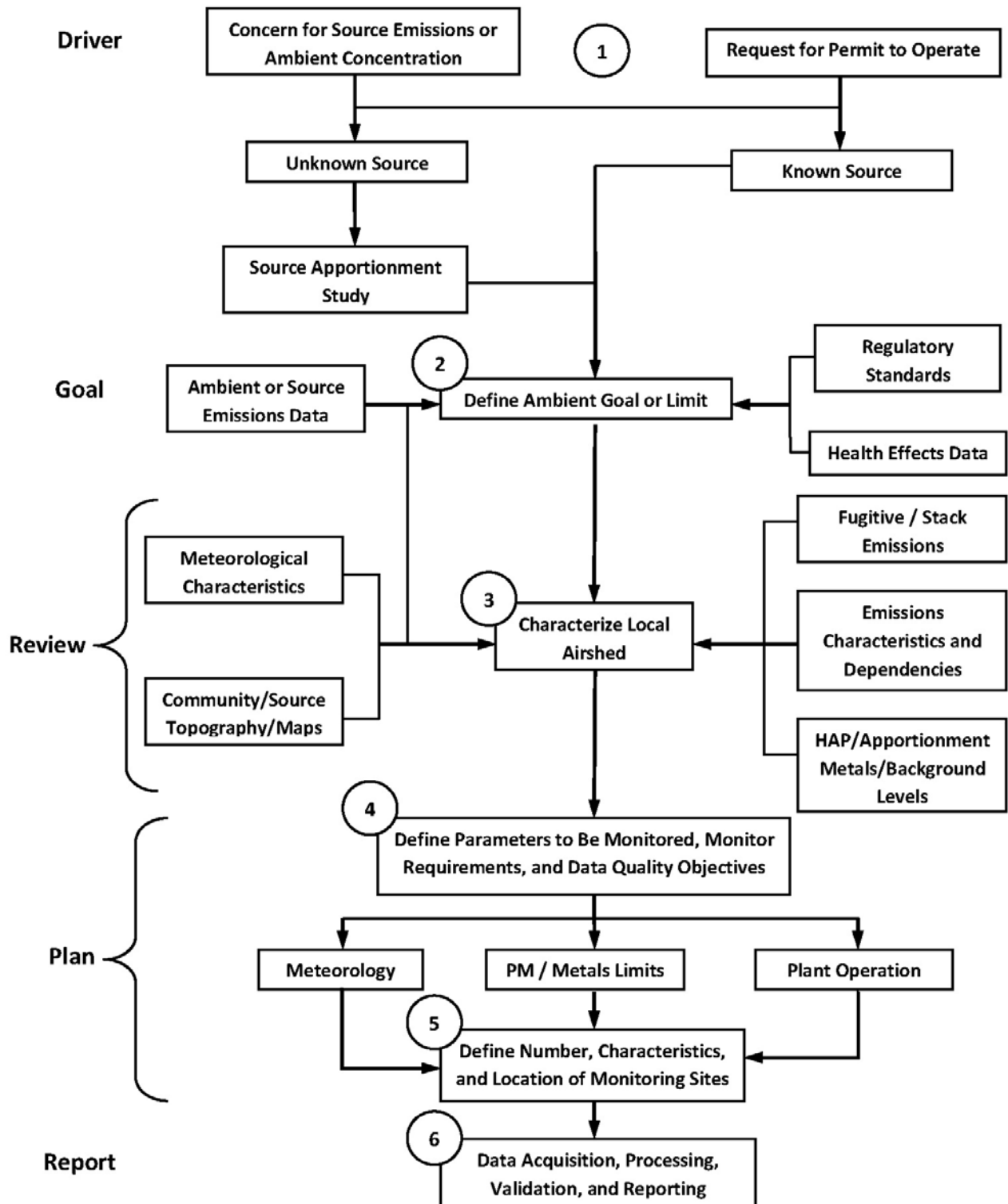


Figure 1. Procedure Flow Diagram

1.0 Driver – Ambient Lead Emissions in an Urban Setting

For this hypothetical example, the Guide is applied to establish a fugitive emissions Hazardous Ambient Metals Compliance Plan (Plan) for a secondary lead smelter located southeast of downtown Los Angeles, California (The Facility). The Facility recycles automobile lead-acid batteries and other lead-bearing material. The Facility is one of the largest secondary lead smelters in the United States (EPA, 1998), and is situated on 24 acres of land in a dense industrial/commercial area near a major railway corridor and U.S. Interstate 5. Residential neighborhoods are located to the north, east, and south within a mile radius of the facility.

The secondary lead smelter location has been utilized for various metals fabrication and recovery purposes since 1922, and lead-acid battery recycling has been the primary industrial function of the site since the early 1970s. The facility produces around 100,000 tons of lead annually, which is the equivalent of recycling approximately 11 million automotive batteries, or the entire annual consumption of the state of California. Lead-acid batteries usually represent 60 - 90% of the raw materials at a secondary lead smelter (EPA, 1998). Other raw materials include lead pipe, lead covered cable, and scrap solder. At The Facility, lead-acid batteries and other lead-bearing materials arrive via truck or rail car. The batteries are mechanically deconstructed and acid, lead alloys, lead-oxide paste and polypropylene are isolated. The polypropylene is shipped off-site for recycling into additional plastic products. The waste acid is mixed with on-site waste water and storm-water, and managed and treated as a hazardous waste before being discharged into the local sewer. The standard lead recycling process proceeds in a reverberatory or blast furnace as lead sulfate paste and lead alloy is heated, or "sweated" with coke and fluxing agents like soda ash, silica, and limestone. The $PbSO_4$ and PbO are reduced to lead metal (EPA, 1998). Blast furnaces produce a relatively hard lead-antimony alloy, and reverberatory furnaces produce a more pure, soft lead metal.

Lead emissions are the primary concern. Cadmium, antimony, arsenic, chromium, nickel, and manganese emissions may also be associated with The Facility. Emissions may occur from process sources, process fugitive sources or from lead dust fugitive sources. Process sources include stack emissions from the blast furnace and the reverberatory furnace. Process fugitive sources include the smelting furnace and dryer charging hoppers, chutes and skip hoists, smelting furnace lead taps and molds during tapping, refining kettles, dryer transition pieces, and agglomerating furnace product taps. Lead dust fugitive sources include toxic dust from facility roadways, storage piles, materials handling transfer points, transport areas, storage areas, process areas, and buildings.

Regulation of emissions from secondary lead smelters is mandated by the Clean Air Act Title 40 CFR 63, National Emission Standards for Hazardous Air Pollutants, subpart X. Specific emissions targets are set by the regulations for both stack and fugitive emissions using the Maximum Achievable Control Technology (MACT) guidelines. Annual performance tests are conducted to determine compliance with standards.

In November 2008 the U.S. EPA revised the NAAQS for lead from $1.5 \mu\text{g}/\text{m}^3$ to $0.15 \mu\text{g}/\text{m}^3$ over a three-month rolling average period. Stricter ambient standards reflect new scientific

understanding of the health risks associated with exposure to lead. Recent studies suggest that there is no level of lead in blood that is safe for humans. Well-documented health effects include lower IQ, weakened memory, and learning disabilities in children, and cardiovascular problems, kidney problems and higher blood pressure in adults.

The Facility has been out of compliance with both the historic lead NAAQS and the updated lead NAAQS since December 2007. In the fall of 2007, California's Air Quality Management District (AQMD) received a number of public complaints reporting significant particulate fallout from the plant in the immediately adjacent neighborhood. Subsequent investigations found ambient levels of lead in the neighborhood ranging from 2 – 3 $\mu\text{g}/\text{m}^3$. More recent data from September 2010 give lead values ranging from 0.03 $\mu\text{g}/\text{m}^3$ - 0.50 $\mu\text{g}/\text{m}^3$.

Due to the lead exceedances above the NAAQS, the AQMD revised The Facility's permit, cutting throughput for the facility 50%, and imposing 27 additional conditions designed to reduce the lead emissions from the smelter into the surrounding neighborhood. However, The Facility's progress in implementing the corrective action plan has not yet resulted in compliance with the lead NAAQS.

1.1 Daily Variability in Fugitive Emissions and Real-Time Multi-Metals Monitoring

Secondary lead smelters utilize wet scrubbers and baghouses to control lead concentrations in stack emissions. However previous studies at secondary lead smelters indicated that fugitive lead emissions can be comparable or even higher than stack emissions (Goya, 2005). A significant portion of the ambient lead concentrations found near The Facility are hypothesized to be related to process fugitive sources and fugitive dust sources. Fugitive emissions sources can be particularly difficult to control due to their sporadic nature and the problems identifying the specific source.

Current lead monitors near The Facility collect 24-hour integrated samples and report over this period. However, continuous multi-metals ambient air monitoring devices can sample from a range of one sample every fifteen minutes to one sample every four hours, and can provide more detailed, high resolution data characterizing the variability in lead concentrations throughout the course of the smelter's daily operations. When analyzed with plant process records and meteorological records, near-real-time data can prove invaluable in determining the specific source of ambient lead.

Due to shifting wind conditions and dynamic smelter operations, ambient metals concentrations can range as much as two to three orders of magnitude within a 24-hour sampling period. Detailed concentration plots derived from NRT monitoring can identify the specific times in which ambient lead concentration is elevated, recording the times in which the largest fraction of potential exceedence occurred. Fence line NRT multi-metals monitoring data, when correlated with plant records and meteorological data, can provide a detailed account of the contribution to

lead concentrations from fugitive emissions, help identify fugitive sources, characterize risks to human health, and assist in developing a successful NAAQS compliance plan.

2.0 Goals: Defining Goals and Compliance

The Facility is currently not in attainment with the National Ambient Air Quality Standard for lead. Local workers and residents in the area surrounding the facility are being exposed to lead concentrations that are potentially dangerous to human health. For this example, a hypothetical Hazardous Ambient Metal Compliance Plan (Plan) to monitor local ambient air near the secondary lead smelter has been developed using the Procedure Flow Diagram. **(Figure 1)**

The goals of the continuous multi-metals ambient air monitoring program are to: 1) provide comprehensive, high quality ambient metals data within the local airshed to assess and protect public health; 2) identify sources and develop engineered controls to problematic fugitive emissions; and 3) to aid in enforcing compliance with applicable standards.

Continuous ambient multi-metals monitoring is the appropriate air monitoring approach at The Facility for a number of reasons:

- 1) The Facility is out of attainment with a nationwide ambient air standard and previous compliance initiatives have not fully succeeded in reducing ambient lead concentrations to acceptable levels.
- 2) Near-real-time continuous metals monitoring analyzed with facility records and meteorological data can assist regulators and plant management in source apportionment and help to develop an effective corrective action plan.

2.1.0 Source Emissions Data: Primary Element(s) of Health/Regulatory Concern

Lead is the primary element of health and regulatory concern for risks from ambient air near secondary lead smelters. Numerous studies indicate that stack and fugitive lead emissions are the primary pollution issue associated with secondary lead smelters (EPA, 1984). Data from a 1984 EPA study titled *Secondary Lead Smelter Test of Area Source Fugitive Emissions for Arsenic, Cadmium, and Lead* showed that fugitive lead emissions are generally greater than arsenic by two orders of magnitude and cadmium by three orders of magnitude.

2.1.1 Source Emissions Data: Secondary Elements of Concern

Secondary elements of concern include antimony, arsenic, and cadmium. Antimony is a component of automobile batteries as an alloy with lead, and therefore can be detected in secondary lead smelter emissions at significant levels. Arsenic and cadmium are present in trace amounts in lead alloys. Arsenic and cadmium both have well-defined chronic and acute exposure health risks.

2.1.2 Source Apportionment: Identifying fugitive sources

Accurate source apportionment is a critical goal of the Hazardous Ambient Metals Compliance Plan. Source apportionment can be analyzed from four basic approaches: 1) particle size; 2) plant activity/time; 3) chemistry; 4) and wind direction and speed.

- 1) Particle size is a helpful source identifier, as specific size fractions are generally associated with unique operations and processes at the secondary lead smelter. For instance the lead $PM_{2.5}$ (2.5 μg or less) size fraction is generally associated with high-heat smelting processes. Ambient air samples high in the lead $PM_{2.5}$ fraction will therefore be primarily derived from the melting and refining of the lead, and a successful fugitive emissions corrective action plan should focus on related engineered controls. Larger size fraction samples can be associated with fugitive dust and mechanical smelting operations such as the storage and processing of raw materials, and corrective action will necessarily address those sources. As the fugitive emissions study proceeds at The Facility, the PM inlet of the ambient metals monitor can be altered as necessary to achieve Plan goals.
- 2) Plant activity and operations observations are helpful in determining the source of fugitive lead emissions. Near-real-time data, coupled with direct observations and facility records can be utilized to relate elevated concentrations in ambient monitors with specific smelter operations or practices.
- 3) The chemistry of each sample may also associate an elevated concentration with a specific secondary smelter source. For example, concentrations high in antimony and cadmium can be linked to high heat smelting operations, as the trace metals and alloys within the ore are released during heating. Alternately, a broad metals fingerprint in a sample may indicate a fugitive dust source.
- 4) Wind speed and direction can also be utilized to develop simple contaminant transport models and associate high lead concentrations with specific smelter locations.

Near-real-time multi-metals monitors are especially designed for fugitive emissions monitoring, and have unique capabilities that can assist in fugitive source identification.

2.2 Regulatory Standards

The federal Clean Air Act requires the U.S. EPA to establish National Ambient Air Quality Standards for pervasive wide-spread pollutants from diverse sources that are dangerous to human health and the environment. Lead is currently the only metal included in the NAAQS. The NAAQS for lead was updated in 2008 from 1.5 $\mu\text{g}/\text{m}^3$ to 0.15 $\mu\text{g}/\text{m}^3$. Facilities that emit lead in excess of one ton per year are required to monitor points of maximum off-site impact and are given three to five years to comply with the new standard. Specific non-attainment areas surrounding a facility are calculated based off of permitted facility emissions, dispersion models and receptor models. If the facility is not in attainment with NAAQS standards, a state implementation plan must be developed and implemented within a given time frame to control

stack and fugitive emissions and achieve compliance. **Figure 3** illustrates nation-wide areas not in attainment with the new lead NAAQS as of June, 2010.

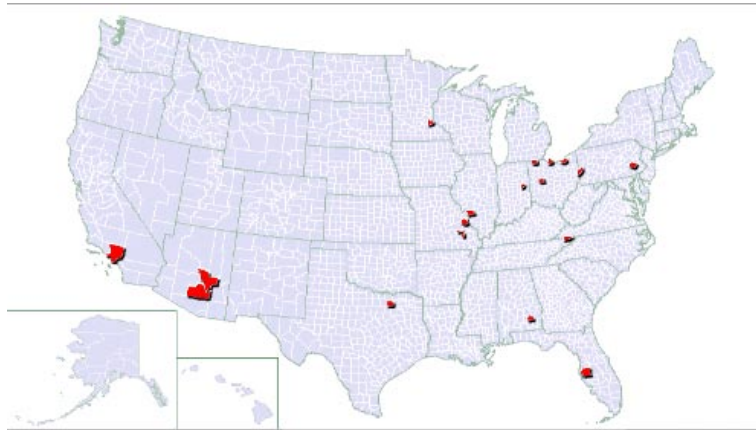


Figure 3. Nation-wide non-attainment areas for lead NAAQS

2.3 Health Effects Data

Health risk to humans from lead exposure is one of the most widely researched topics in environmental and public health. Chronic lead poisoning damages a variety of the body's systems. Common chronic exposure symptoms include a loss of short term memory, depression, nausea, abdominal pain, loss of coordination, and tingling in the extremities. Fatigue, headaches, torpor, slurred speech and sleep disorders may also be present. In children, lead exposure may have more pronounced, immediate health impacts, and include lower IQ, developmental disorders and behavior disorders such as increased aggression. Recent scientific studies strongly suggest that no blood level of lead is safe for humans. However, the normal range is considered to be $< 5 \mu\text{g}/\text{dl}$. A 1996 study of children living near The Facility showed blood lead levels higher than those in the control group, but within the normal range (California DHS, 1996).

Lead is a relatively common environmental pollutant. However, since the phasing out of leaded gasoline in the early 1970s, ambient lead levels in the United States have dropped significantly across the country. The majority of lead emissions and ambient lead exposure today is associated with coal and oil combustion, waste incineration, metals recycling, smelters, and foundries.

2.4 Demonstrating Compliance

The national TSP lead NAAQS set at $0.15 \mu\text{g}/\text{m}^3$ is for a rolling three month average period. However, California's Air Quality Management District has established a stricter, one month average standard for ambient lead concentrations at The Facility, and is proposing a rule that The Facility be in compliance by January 2012.

Nationwide lead monitoring stations to demonstrate compliance with the lead NAAQS are either non-source oriented or source oriented. Source-oriented ambient metals samplers are located near facilities like The Facility which emit greater than one ton of lead per year. Monitors are located at or near the fence line of the facility in areas of maximum impact to assess compliance with the new standard. **Table 1** details recent lead data from The Facility.

Table 1. July 2010, average lead concentration in $\mu\text{g}/\text{m}^3$ in local ambient monitors. See Figure 9 for locations.

NAAQS	Mid East Site	SW Site	New NE Site	New N site	Mid Site
0.15	0.34	0.13	0.64	0.76	0.27

Compliance at The Facility is based upon monthly averages of lead data emerging from the EPA approved Total Suspended Particulate lead monitors on site. The data is compared to the lead NAAQS to determine if the airshed is in attainment with federal and state ambient air standards. If current ambient lead concentrations at the secondary lead smelter persist, The Facility will not be in attainment when the new standard goes into effect in 2012.

While The Facility has implemented some emissions controls, and lead concentrations in specific monitors show declining levels, further corrective action is necessary to reduce ambient lead concentrations to acceptable levels. Fugitive emissions of lead, which generally are comparable to stack emissions in concentration and volume, can be difficult to identify and control. Multi-metals continuous ambient air monitors will help to identify sources and develop engineered controls to reduce problematic fugitive emissions at The Facility.

2.4.1 Lead NAAQS Compliance Plan

In this hypothetical example, a multi-metals continuous monitor will be deployed at The Facility and data will be collected at the initial location for a period of six months. The monitor will: 1) further characterize areas that are not in compliance with the NAAQS; 2) determine the specific times in which the majority of lead emissions occur; and 3) provide a basic source apportionment identifying problematic lead sources.

After the initial six month monitoring period, a corrective action plan will be developed by regulators and The Facility designed to limit process fugitive and lead dust fugitive emissions to acceptable standards.

Figure 4 illustrates the goals of the Lead NAAQS Compliance Plan (Compliance Plan). The long-term goals of the Compliance Plan will be contingent upon successful control on stack, process fugitive and fugitive dust emissions. Successful implementation of the Compliance Plan will reduce lead concentrations near The Facility to levels below the lead NAAQS. Long-

term goals are to lower ambient lead concentrations to near background levels, or less than $0.05 \mu\text{g}/\text{m}^3$, over the following decade.

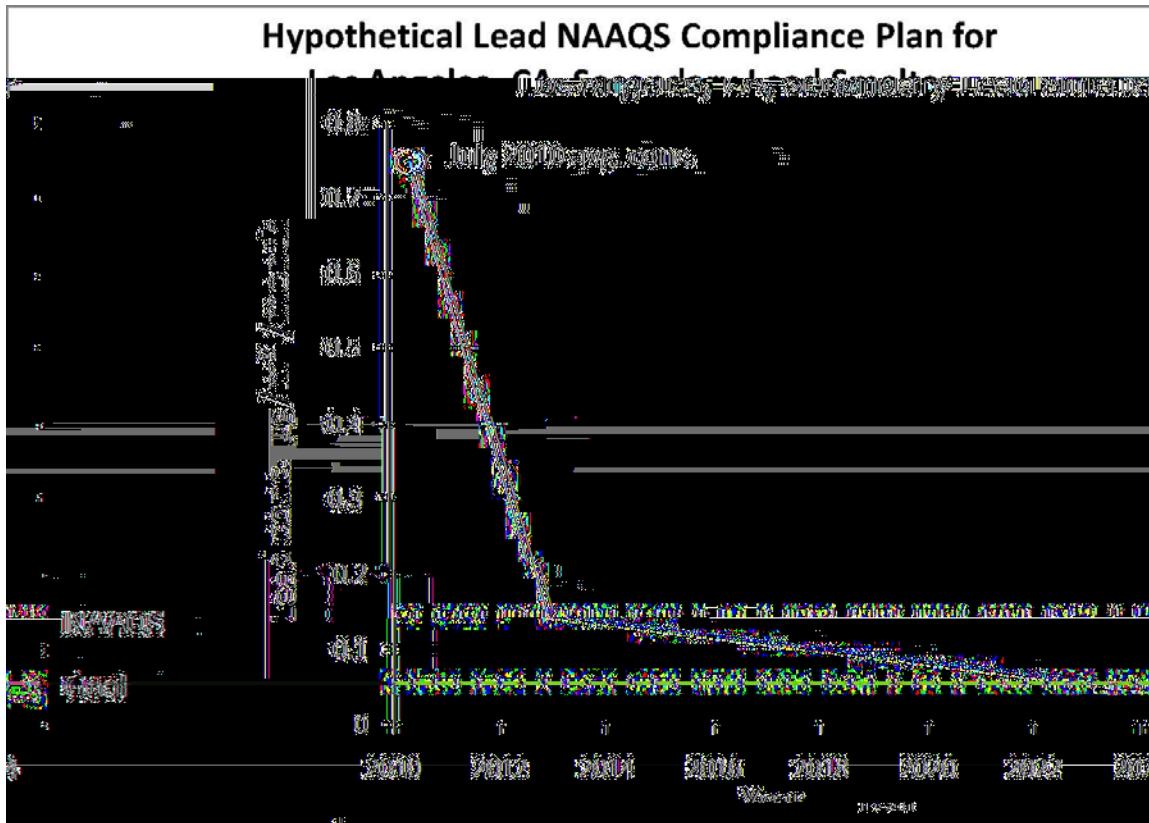


Figure 4. NAAQS Compliance Plan for Secondary Lead Smelter

3.0 Local Airshed Characteristics

3.1 Meteorological Characteristics

The Facility is located in the greater Los Angeles metropolitan area in southern California, U.S.A. and is less than five miles from downtown Los Angeles. The climate of the Los Angeles area is categorized as Sub-Tropical Mediterranean, with warm to hot, dry summers and mild to cool, wet winters. The average yearly temperature is 66°F . The region is relatively dry and receives an average of 35 days of measurable precipitation per year, with total precipitation averaging around 15 inches, occurring primarily between winter and spring.

The Facility lies at about 230 feet above mean sea level in what is known as the Los Angeles Basin. The basin is bounded to the north by the Santa Monica Mountains and to the east and south by the Santa Ana Mountains. The Los Angeles area is well-known for its air pollution problems associated with the basin geography of the region, atmospheric inversion, a significant industrial sector, and a large population heavily reliant upon automobile transportation. Relatively low annual rainfall also adds to air particulate issues, as rainfall clears smog. While

air pollution problems are improving, in 2007 and 2008 the American Lung Association ranked Los Angeles as the most polluted city in the country with elevated levels of short-term and annual air particulate pollution. **Figure 5** shows the location of the secondary lead smelter, and downtown Los Angeles, CA.

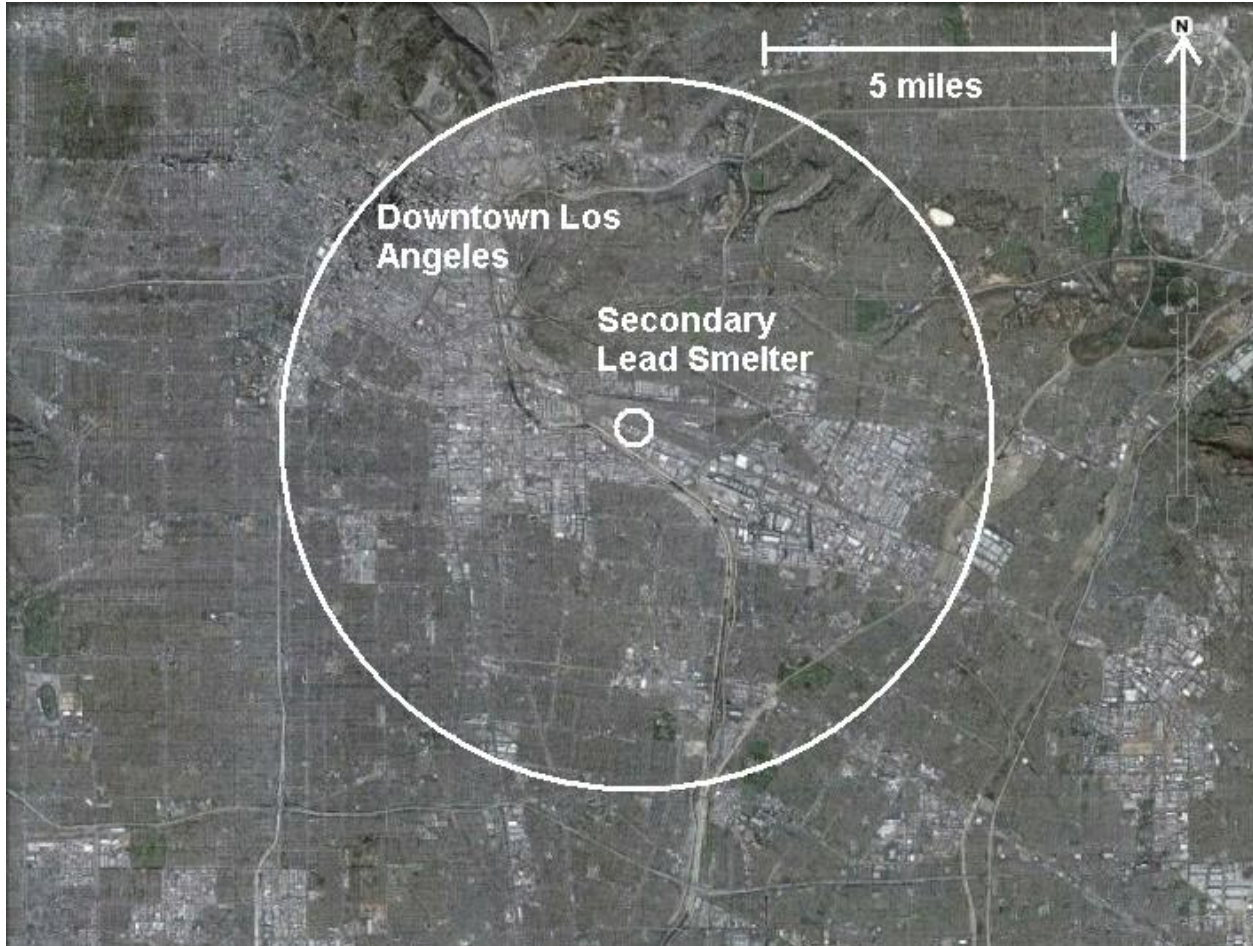


Figure 5. The Facility, secondary lead smelter near downtown Los Angeles.

Typical wind directions in Los Angeles are primarily from the west and west-south-west and average around eight miles per hour. **Figure 6** illustrates average wind speed and direction conditions in the Los Angeles region, averaged over a four year period.

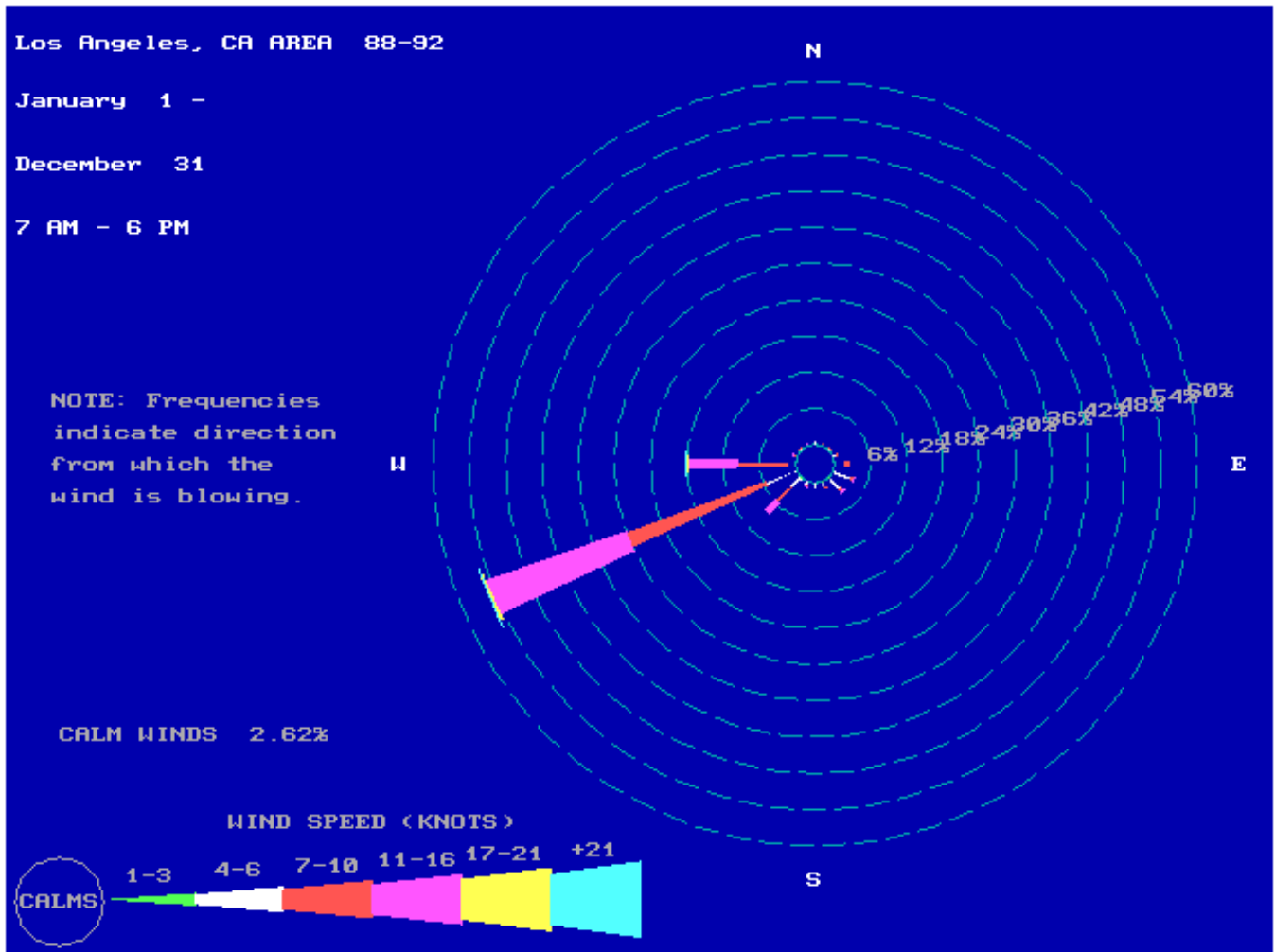


Figure 6. Average Annual Wind Rose for Los Angeles, CA, 1988 – 1992. 1 knot = 1.15 mph

3.2.1 Source Characteristics –Secondary Lead Smelter Maps



Figure 7. Secondary Lead Smelter Facility Aerial Map



Figure 8. Secondary Lead Smelter Facility Map

3.2.2 Source Characteristics

Lead emissions at secondary lead smelters occur from process sources, process fugitive sources or from lead dust fugitive sources. Process sources include stack emissions from the blast furnace and the reverberatory furnace. The smoke and fumes from the furnace are collected and vented. A baghouse or wet scrubber is installed to reduce lead emissions from the stack. Wet electrostatic precipitators and regenerative thermal oxidizers have also been shown to be effective means to reduce lead stack emissions. The main emission stacks at the secondary lead smelters are around 100 feet or less. **Figure 7** and **Figure 8** depict the secondary lead smelter lead-acid battery recycler in Los Angeles, California.

Total ambient lead concentrations from process fugitive and fugitive dust sources are generally comparable to contributions from stack emissions, especially in facilities with modern stack pollution control technology (EPA, 1984). Process fugitive sources at a secondary lead smelter include the smelting furnace and dryer charging hoppers, smelting furnace lead taps and molds during tapping, as well as refining kettles, dryer transition pieces; and agglomerating furnace product taps. Lead dust fugitive sources include toxic dust from roadways, storage piles, materials handling transfer points, transport areas, storage areas, process areas, and buildings.

Fugitive lead emissions can occur throughout the standard operations of the facility and the smelting process. A study by the U.S. EPA published in March, 1984, entitled Secondary Lead Smelter Test of Area Source Fugitive Emissions for Arsenic, Cadmium, and Lead, found that the majority of fugitive emissions occur from the facility roadway, however if the roadway was kept watered, emissions dropped from 82 grams/hour to 12 grams/hour. The study determined that the second largest source of fugitive lead particulate was the smelting process itself, such as the reverberatory and blast furnace, the dryer charging hoppers, refining kettles, and the lead taps and molds. During charging, tapping, and other furnace procedures, lead particulate matter and fumes escape the hoods and vents that serve as air pollution collection and control devices. The study recorded fugitive lead emissions from the smelting building at 80 grams/hour. The slag dross storage, battery breaking area, and the raw materials storage area, were also relatively large sources of fugitive emissions at the study area. See **Table 2**.

Table 2. 1984 EPA Study of fugitive lead emission rates at a secondary lead smelter

	Smelter Bldg.	Road (dry)	Road (wet)	Raw Materials Storage	Slag/Dross Storage	Battery Breaking Area
Pb Emission Rate Avg. (range) g/hr	80 (32 -160)	82 (8.3-210)	12 (3.6-19)	67 (12-240)	30 (12-56)	13 (9.3-16)

Ambient lead particle size can be categorized in three ranges; the nuclei mode (<0.1 µm); the accumulation mode (0.1 – 2 µm); and the large particle mode (>2 µm). Urban atmospheric lead is primarily found in the accumulation mode size range, at about 0.2 to 0.3 µm. However, the proximity of the secondary lead smelter source to the air monitor will affect sample particle size. Combustion and smelting releases sub-micron size lead particulate. Lead particles emitted during the smelting process will be significantly smaller (< 1 µm) than lead particles released due to mechanical processes at the site (> 2µm), and can be utilized for source apportionment of the facility's lead emissions.

4.0 Monitoring Plan

4.1 Parameters to Monitor

4.1.1 Meteorology

Real-time, comprehensive meteorological data will be gathered in conjunction with the lead concentration data in order to fully characterize potential facility sources. Local meteorological wind and precipitation data will be necessary to characterize potential contaminant transport in the area and will be used in close conjunction with the continuous ambient lead data to analyze potential emissions sources.

4.1.2 Elements, PM and Sampling Frequency

The ambient air FLM devices will monitor for the primary and secondary elements of health and regulatory concern, as well as accompanying metals.

Primary Elements of Health and Regulatory Concern: lead (Pb)

Secondary Elements of Health and Regulatory Concern: cadmium (Cd), arsenic (As), and antimony (Sb)

Accompanying metals: chromium (Cr), copper (Cu), zinc (Zn), silver (Ag), manganese (Mn), selenium (Se) calcium (Ca), scandium (Sc), titanium (Ti), vanadium (V), iron (Fe), cobalt (Co), nickel (Ni), bromine (Br), tin (Sn), and mercury (Hg)

The ambient air metals FLM devices can be fit with TSP, PM₁₀, and PM_{2.5} inlets to limit particle size. A PM₁₀ inlet will be the primary inlet utilized by the study in order to measure the full range of coarse and fine particulate fraction of ambient metals near the secondary lead smelter. The PM_{2.5} inlet would be utilized, if necessary, for source apportionment studies.

4.1.3 Plant Processes and Events

Secondary lead smelter operations and processes will be monitored along with ambient lead concentration and meteorology. **Table 2** details the range of emission rates previously recorded from specific fugitive sources at secondary lead smelters. It is highly probable that elevated lead concentrations can be associated with specific smelter events and operations. Detailed

records of secondary lead smelter operations, analyzed with emerging real-time lead data, will provide a comprehensive set of information to identify and reduce fugitive emissions.

4.2 Monitoring Sites

The multi-metals ambient air monitoring device will be located utilizing established site guidelines for siting ambient lead monitors around stationary sources (EPA,1997). The Hazardous Ambient Metal Compliance Plan (Plan) will use existing lead sampling sites established by California's AQMD and The Facility. For this example, four sampling sites for the continuous multi-metals ambient air sampling device have been established and a rotating monitoring plan will be discussed and developed. See **Figure 9** for sampling locations.



Figure 9. California AQMD and Facility sampling locations. Continuous multi-metals monitoring site in the Hazardous Ambient Metals Compliance Plan are circled.

Based off of recent lead data (**see Table 1**), The New North, Northeast, Mid, and Mid East ambient lead sampling locations are all currently detecting lead in concentrations that exceed the NAAQS. Continuous hourly lead data from these sites will characterize the quantity of the lead emissions, provide data on the specific times in which the majority of lead emissions occur, and aid in fugitive source identification.

4.3 Monitoring Plan

Initially, the continuous multi-metals ambient air sampling device will be located at the NEW N sampling location. This site consistently has the highest ambient lead concentrations, and is the optimal location to study fugitive emissions at The Facility and develop controls. After six months of sampling in which corrective action and fugitive mitigation plans should be developed and applied, the monitor will be re-located to the New Northeast site, followed by the Mid East and Mid sites. However, successful mitigation of lead concentrations at the New N site will reduce over-all lead concentrations, and therefore should be the focus of the fugitive emissions Plan. If an extended sampling period is determined to be necessary to characterize lead emissions and identify sources, then the continuous multi-metals ambient air sampling device would be semi-permanently stationed at the problematic sampling location. As the study progresses, source identification proceeds, and corrective action controls are applied, the continuous multi-metals ambient sampling device may be relocated to the other sampling locales, depending upon the greatest lead impact.

While the sample analysis technology and method of X-Ray fluorescence utilized by the real-time multi-metals sampling devices is mainstream and EPA approved, it is not currently approved for total suspended particulate matter (TSP), which is the required parameter for the lead NAAQS. However the monitor can be fit with a TSP inlet if necessary for correlative data gathering, and can be used in conjunction with local TSP lead monitors to further regulatory goals.

4.3.1 Monitoring Protocol

Multi-metals ambient air continuous sampling devices can be programmed to sample at a range of intervals from high resolution data such as sampling every fifteen minutes, to lower resolution data like sampling once every four hours. Higher time resolution provides more information to regulators and the secondary lead smelter managers to assess and protect worker and public health, and to more fully characterize smelter operations on emissions.

Air samples are collected on a tape medium that is relatively expensive. In this case, where ambient fugitive lead emissions may vary substantially throughout the day, the multi-metals ambient air sampling device will initially be programmed to sample every hour. After a month of ambient air sampling, data can be analyzed to determine how hourly lead data compares to daily averaged lead data. If continuous ambient lead monitoring is prolonged at The Facility, the data can be examined to assess if a decrease in sampling frequency would reduce costs without adversely impacting the source apportionment and other data goals of the project.

Data can be available within two hours of sampling event, streamed via wireless or cabled connection to regulators and smelter managers, and stored on the on-board computer system. Sampling tape will be changed out periodically as necessary by trained technicians. Samples will be collected, labeled with location, time interval and sampler identification information, and stored and preserved by regulators or plant technicians.

The multi-metals continuous ambient air monitors will be protected from weather conditions with a shelter and rain guard. A TSP, PM₁₀ or PM_{2.5} inlet will direct size selected particulate to the sampler, and electrical lines and data acquisition cables will run from the shelter to the nearest phone/internet connection.

4.4 Data Processing and Reporting

4.4.1 Quality Assurance

Multi-metals ambient air sampling devices are initially calibrated by the manufacturer using thin film standards which are inserted into the monitor to provide a control metals concentration from which calibrations can be based. Periodic audits of the monitors are conducted using a Quantitative Reference Aerosol Generator (QAG) to test the machines X-ray fluorescence and sample analysis components. The QAG is an effective quality assurance tool and can be utilized to ensure accurate data is provided by the device. The QAG disperses a control metals aerosol sample to the device, which is then compared against the recorded value analyzed by the monitor. The QAG individually tests a wide range of metal concentrations against the monitoring unit, and the accuracy is determined by testing the relative bias of the monitor. The multi-metals ambient air sampling devices will be audited and serviced by trained technicians consistent with the device manufacturer's recommendations (See Appendix B).

4.4.2 Regulators

The Facility is currently not in attainment with the 2008 lead National Ambient Air Quality Standard. The Facility has five 5 years to achieve attainment status. However, the California AQMD has developed more stringent requirements in Proposed Rule 1420, which requires The Facility to be in attainment by January 2012, submit a compliance plan if ambient air lead concentrations exceed 0.12 µg/m³ averaged over a one month period, and implement various other engineered controls to reduce ambient lead emissions.

This hypothetical example utilizes continuous multi-metals ambient air sampling devices as another tool for regulators and Facility operators to achieve compliance with the lead NAAQS. Regulators could potentially recommend the sampling device to the secondary lead smelter as part of a compliance plan, or The Facility itself may want to initiate hourly sampling as a way to achieve compliance. Regardless, the California AQMD will regulate the emissions of The Facility based upon existing rules and regulations including the NAAQS and Proposed Rule 1420.

4.4.3 Plant

Near real-time data emerging from the ambient metals-air monitoring system will be available to The Facility in order to adequately characterize emissions and develop more effective emissions controls.

4.4.4 Internet and Public

Regulators will maintain a public internet location that details appropriate rules and regulations, outlines the ambient lead goals, shows the data emerging from the monitoring location(s), and provides a venue for regulators to answer any questions that the public or industry may have over the monitoring program and attainment with the lead NAAQS. Data on the site will be updated daily to ensure quality assurance of the reported values.

5.0 References

- 1) U.S EPA (1998) *Locating and Estimating Air Emissions from Sources of Arsenic and Arsenic Compounds*. Report No. EPA 454/R-98-013 U.S. Environmental Protection Agency, Research Triangle Park, NC.
- 2) Goyal et al. *Estimation of Fugitive Lead Emission Rates from Secondary Lead Facilities Using Hierarchical Bayesian Models, Environmental Science and Technology*, Vol 39 No. 13. May 2000
- 3) U.S. EPA (1984) *Optimum Sampling Site Exposure Criteria For Lead*. Report No. EPA 450/4-84-012, U.S. Environmental Protection Agency, Research Triangle Park, NC.
- 4) U.S. EPA (1984) *Secondary Lead Smelter Test of Area Source Fugitive Emissions for Arsenic, Cadmium and Lead*. EMB Report 845LD3. U.S. Environmental Protection Agency, Research Triangle Park, NC.
- 5) California DHS, *Evaluation of Lead Levels in Children Living Near A Los Angeles County Battery Recycling Facility*, Berkeley, CA: California Department of Health Services, 1996
- 6) U.S.EPA (1987) *PM10 State Implementation Plan Development Guideline*. Report No. EPA 450/2-86-001, U.S. Environmental Protection Agency, Research Triangle Park, NC.
- 7) U.S. EPA (1982) *Basic Air Pollution Meteorology*. Report No. EPA 450/2-82-009, U.S. Environmental Protection Agency, Research Triangle Park, NC.
- 8) U.S. EPA (1997) *Guidance for Siting Ambient Air Monitors Around Stationary Lead Sources*. Report No. EPA 454/R-92-009. U.S. Environmental Protection Agency, Research Triangle Park, NC.
- 9) U.S. EPA (1983) *Secondary Lead Smelter: Arsenic, Cadmium and Lead Emissions, General Battery Corporation, Reading, Pennsylvania*. EMB Report 83SLD2. U.S. Environmental Protection Agency, Research Triangle Park, NC.

- 10) California AQMD, *Proposed Amended Rule 1420.1 – Emissions Standard for Lead from Large Lead-Acid Battery Recycling Facilities*, Diamond Bar, CA: California Air Quality Management District, 2010
- 11) Yanca, et al. *Validation of Three New Methods for Determination of Metal Emissions Using a Modified Environmental Protection Agency Method 301*, Air and Waste Management Association, Vol. 56. December 2006.