Chapter 3b: Emissions Inventory and Source Attribution

Chapter 3b Highlights

- Information about the sources of air pollution in this community is presented in a "source attribution" analysis
- Diesel particulate matter is currently the main air toxic pollutant in this community, and it comes mostly from on-road and off-road mobile sources
- Other key air toxic pollutants in this community are 1,3-butadiene (mostly from the chemical industry) and benzene
- In future years, diesel emissions will decrease substantially due to ongoing and newly proposed regulations, but these emissions continue to be the main driver of air toxics cancer risk in this community

The Community Emission Reduction Plan (CERP) identifies air quality priorities based on community input and evaluation of technical data on emission sources in the community. The CERP defines actions and strategies to reduce the emissions and exposure burden from sources of criteria air pollutants (CAPs) and toxic air contaminants (TACs). To accurately determine emission reductions from these actions and strategies, a baseline reference needs to be established. The baseline reference can be achieved through an emissions inventory that includes an accounting of sources and their resulting emissions. This rigorous accounting of sources, their emissions and their contribution to cumulative exposure burden is what the CARB guidelines identify as a source attribution analysis. Per the direction of CARB guidelines, source attribution is required to meet AB 617 statutory requirements.

CARB recommended five technical approaches to conduct source attribution analysis. They are emissions inventory, air quality modeling, targeted air monitoring/back trajectory/pollution roses/inverse modeling, chemical mass balance and positive matrix factorization. Among them, based on the availability of data and resources, an emissions inventory and an air quality modeling analysis are source attribution tools employed to identify sources contributing to air pollution levels in the community, with an emphasis on identifying sources within the community (emissions inventory). More information on source attribution methods is included in the Source Attribution Methodology report.[1] The most recent air quality modeling analysis was conducted as part of the Multiple Air Toxics Exposure Study (MATES IV) in 2015, which showed Diesel Particulate Matter (DPM) was the air pollutant that contributed most to the air toxics cancer risk in the South Coast AQMD, with the Southeast Los Angeles (SELA) community having higher air toxics cancer risk compared to the overall average. MATES V is currently under development and will update cancer risk estimation for the community as well as the South

[1] South Coast Air Quality Management District, Methodology for Source Attribution Analyses for the first year AB 617 Communities in the South Coast Air Basin (Technical Report), 2019. http://www.aqmd.gov/docs/default-source/ab-617-ab-134/technical-advisory-group/source-attribution-methodology.pdf. Accessed October 23, 2020.

Coast Air Basin. A community-specific emissions inventory was developed for criteria air pollutants (CAPs) and TACs based on the most recent available datasets.

Figure 3b-1 Contribution of major source categories to NOx emissions, VOC emissions, PM2.5 emissions in the Southeast Los Angeles community in 2018 (tons/year)

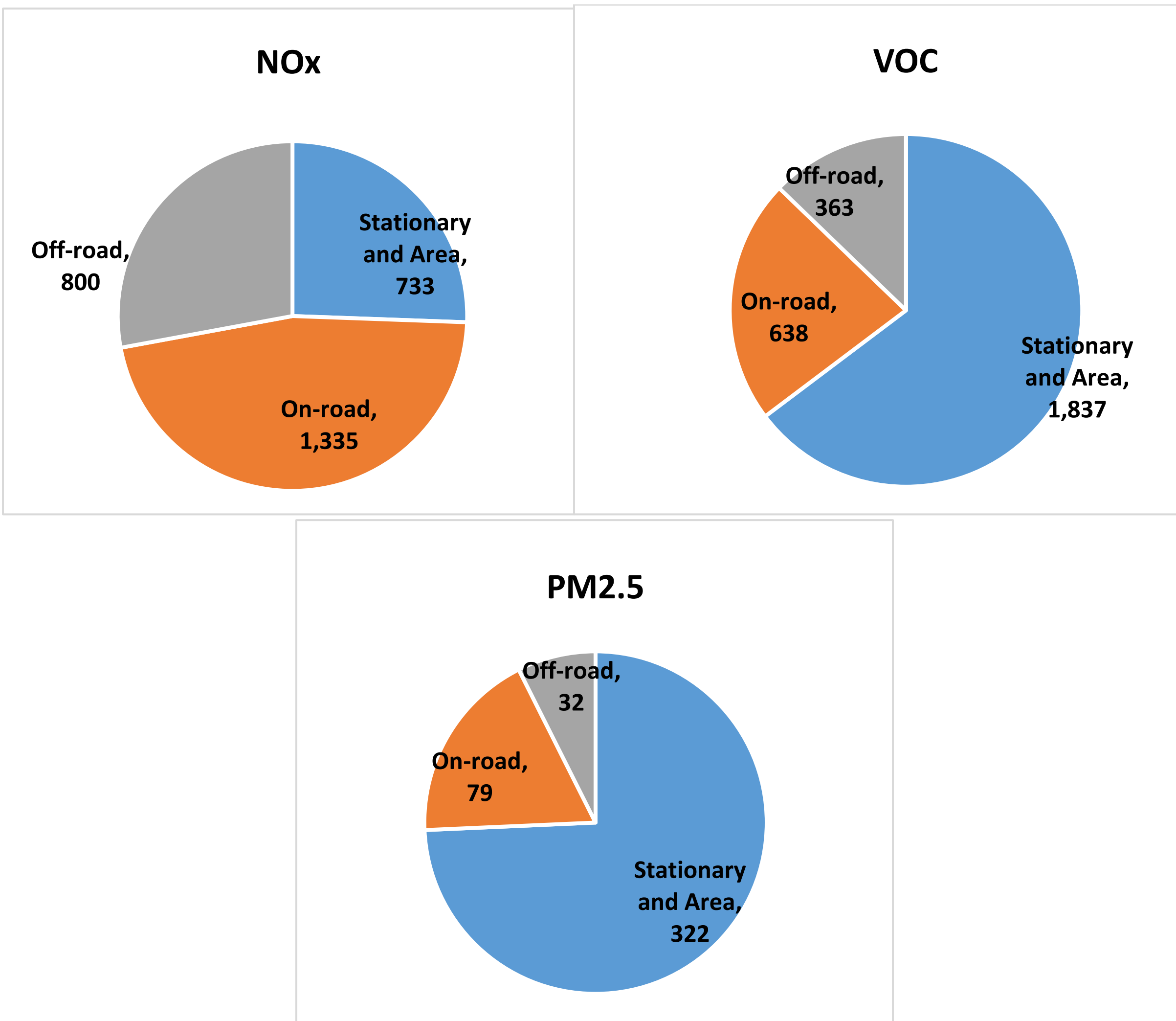


Figure 3b – 1 shows the contribution of major source categories to NOx emissions, VOC emissions, and PM2.5 emissions in SELA in 2018. The main sources of air pollutant emissions in the SELA community are on-road vehicles, trains, off-road equipment, and industrial activities.

NO_X emissions in this community are dominated by mobile sources – both on-road and off-road – which account for 75% of the total emissions in 2018. Heavy-duty trucks, trains, and off-road equipment are the largest sources of NOx. Stationary sources contribute 25% of the NOx emissions in this community, mostly from natural gas fuel combustion in the residential, commercial, and industrial sectors.

VOC emissions are dominated by area sources, with consumer products being the largest source. Passenger vehicles and off-road equipment such as lawn mowers and other small gasoline engines, are the largest contributors to VOC emissions from on-road and off-road sources, respectively.

Unlike NOx and VOC, direct PM2.5 emissions come from a wide variety of activities, which include commercial cooking, light and medium-duty automobiles, wood and paper industries, fuel combustion and off-road equipment.

Figure 3b-2 Southeast Los Angeles Community TACs Emissions (toxicity-weighted diesel equivalent) in 2018

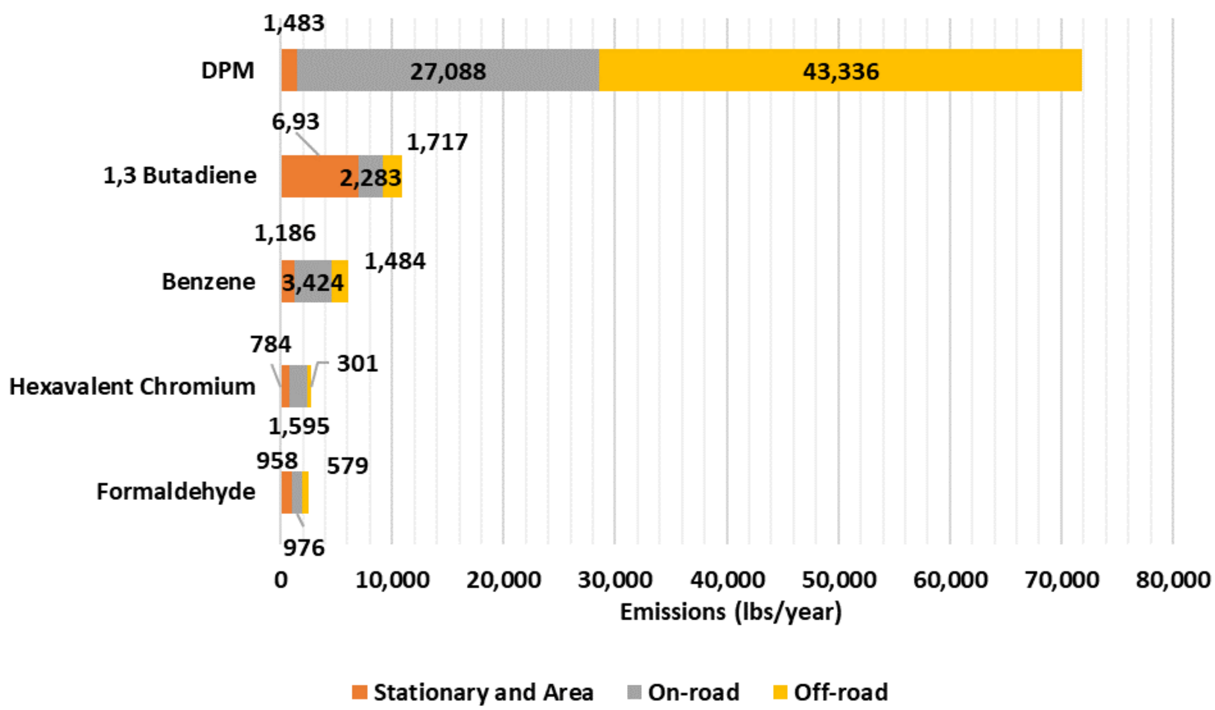


Figure 3b – 2 shows TAC (toxic air contaminants) emissions in SELA in 2018. TAC emissions in the SELA community are dominated by diesel particulate matter (DPM) from diesel exhaust. DPM is emitted from heavy-duty trucks, trains, and industrial off-road equipment. 1,3 butadiene is the second most important TACs based on toxicity-weighted emissions, and the major source is plastic production. Other significant TAC species includes benzene and formaldehyde, which are mostly emitted from mobile sources.

Future NOx emissions in the community are expected to decrease due to continued implementation of existing regulations on mobile sources and recent and upcoming regulations on major stationary source facilities. VOC emissions are also expected to decline, although they will decline more slowly than NOx emissions. Emissions of DPM from heavy-duty trucks are also expected to decrease substantially due to upcoming deadlines for CARB's Truck and Bus Regulation. CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation will also contribute to reducing DPM. However, off-road vehicles will continue to be the largest contributor to DPM through 2030. Emissions of 1,3-butadiene from stationary sources are expected to increase slightly in the future years, due to growth in economic activity. However, in future years, DPM is still projected to be the main contributor to air toxics cancer risk in this community.

Trends for TAC emissions are shown in Figure 3b – 3. Diesel PM continues to dominate the TAC emission inventory in future years, despite a significant reduction in DPM from heavy-duty trucks. DPM decreases by 65% from 2018 through 2030. The second largest contributor to air toxics is 1,3-butadiene, with emissions increasing slightly due to slight increases in plastic production partially offset by reductions in emissions from vehicles. Benzene and formaldehyde emissions decrease throughout the 12-year period due to decreases in the emissions from vehicles, whereas emissions from metals (i.e., cadmium, nickel, arsenic and lead) experience small variability due to changes in industrial activities. Hexavalent chromium emissions decrease from 2018 to 2030 due to decrease in vehicle emissions that is partially offset by a slight increase in industrial emissions.

Details on the source attribution for Southeast Los Angeles can be found in Appendix 3b. Furthermore, Appendix 5b, 5c, and 5e – 5g contain more emissions and source attribution information as it pertains to the five air quality priorities: truck traffic and freeways, rendering facilities, metal processing facilities, railyards and locomotives, and general industrial facilities.[2]

[2] The green spaces air quality priority (Chapter 5d) does not include emissions information as it does not apply to the goals of this priority.

Figure 3b – 3 Total emission trends for toxic air contaminants in Southeast Los Angeles (toxicity-weighted diesel-equivalent emissions, lbs/year) for the year of 2018, 2025 and 2030

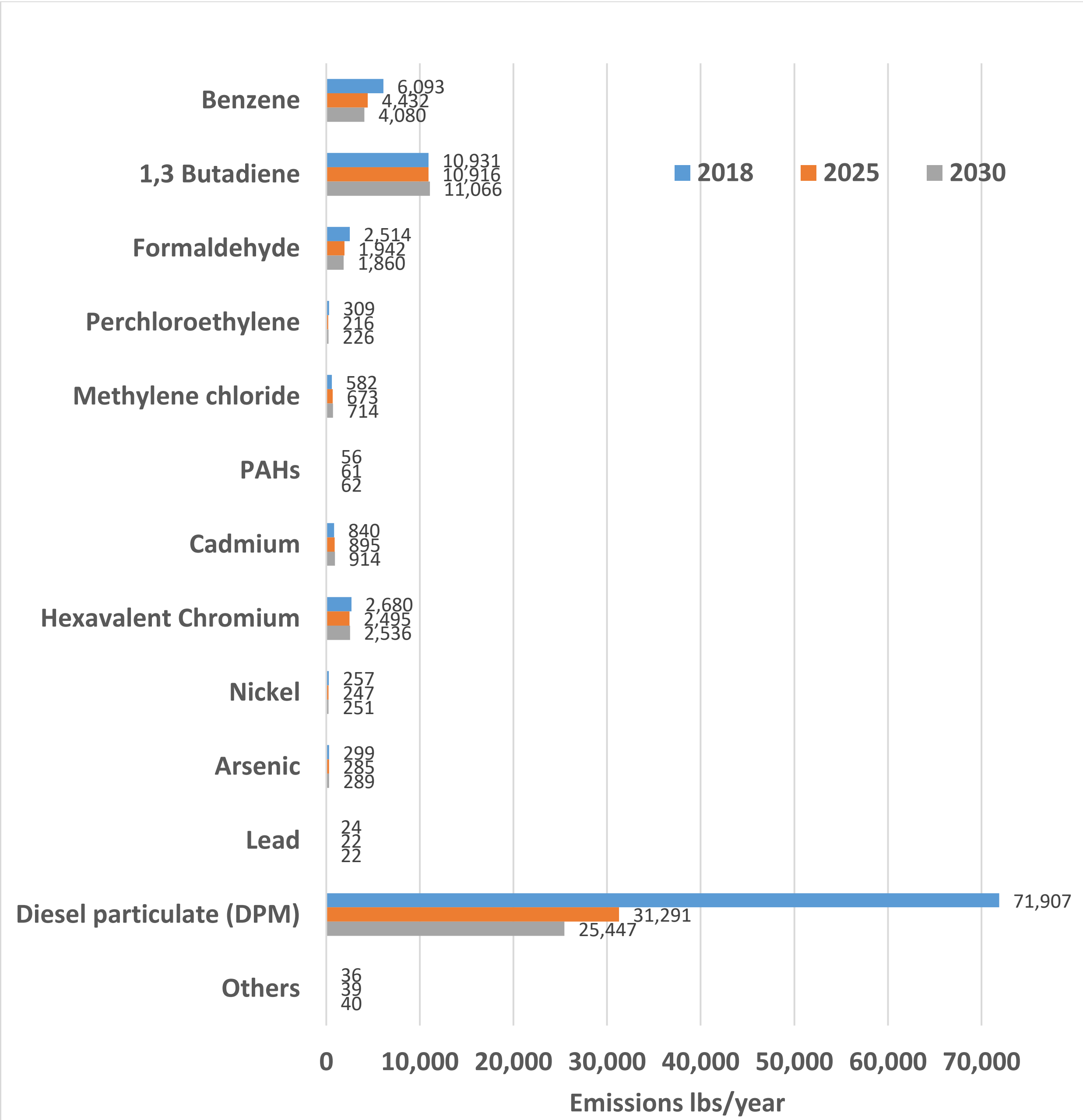


Figure 3b – 4 Toxic Air Contaminant Emissions from On-Road Mobile Sources in the Southeast Los Angeles community for the year 2018 (toxicity-weighted diesel equivalent in lbs/year)

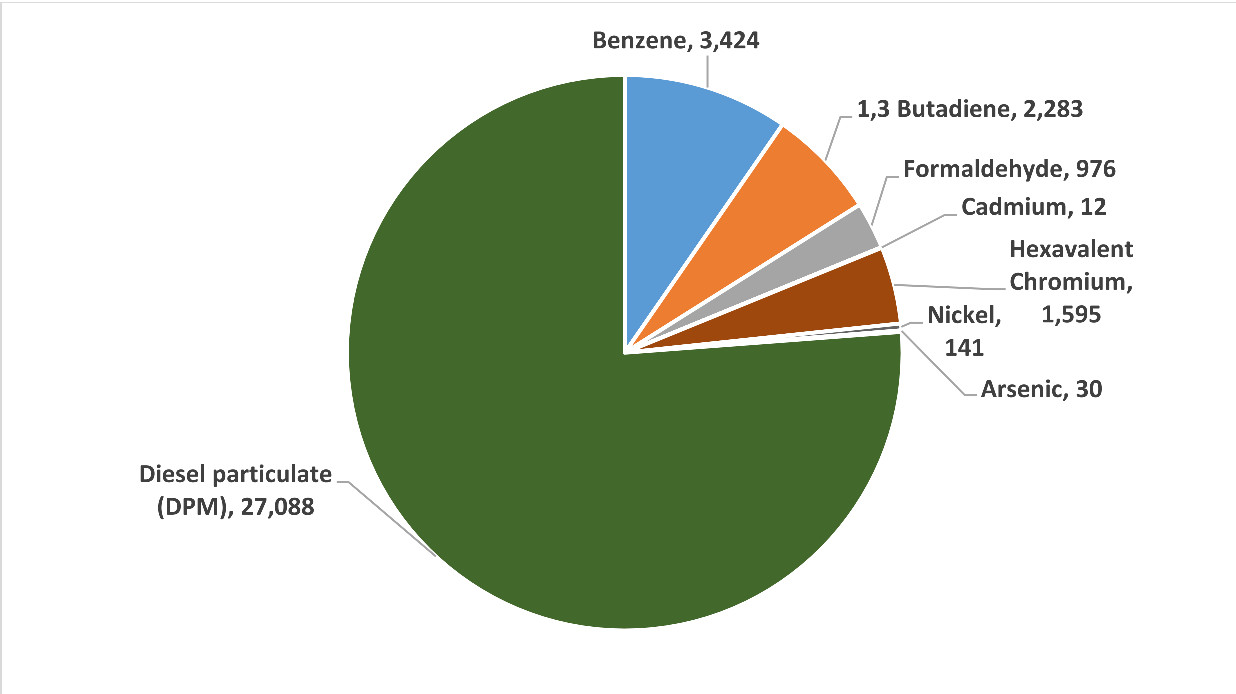
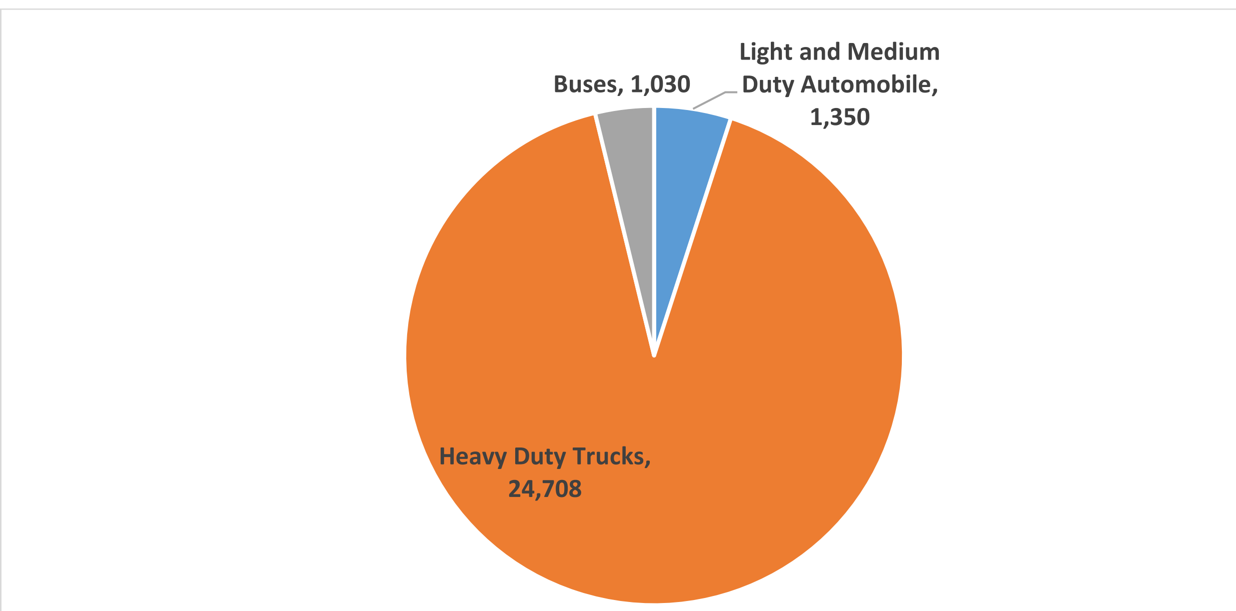


Figure 3b-5 Source attribution of Diesel PM Emissions from On-Road Mobile Sources in the Southeast Los Angeles Community for 2018 (lbs/year)



Emissions estimation contains inherent uncertainties, due to numerous assumptions and limited datasets, many of which are difficult to validate. Estimated emissions of toxic air contaminants have an even higher degree of uncertainty compared to estimates of criteria pollutants emissions. Challenges for estimating TACs include the vast number of TAC species, extremely low ambient concentrations for some species, the higher costs of measurements and complexity of source tests, and the variety of processes from which TACs are emitted. The AB 617 guidance document recommends the use of reported emissions when available. Toxic emissions from point sources can also be estimated using speciation profiles using the same method as for area and mobile sources. However, large discrepancies are sometimes observed between directly reported TACs and speciated toxic emissions based on PM and VOC emissions. The large discrepancies observed may be due to non-specific or outdated chemical speciation profiles or indicate a need to improve measurement and reporting accuracy. Mobile source air toxics inventories contain similar uncertainties.

It is important to note that many of the South Coast AQMD regulations addressing toxic metal pollution emissions from industrial facilities (e.g., South Coast AQMD Rule 1407 and Rule 1469) include requirements that reduce fugitive emissions from these facilities. Fugitive emissions can often account for most of the toxic metal emissions from a facility. Unfortunately, the methods available to create an emissions inventory are not able to reflect fugitive emissions from these facilities. Therefore, while the inventory may not show an overall decrease in toxic metal emissions, the regulations result in overall decreased emissions due to reductions in fugitive emissions. While the emissions presented in the current report are the best currently available, further improvement is required to adjust the likely bias. Further adjustment will be explored to support the upcoming MATES V study and updates to CERPs in current and upcoming AB617 communities.