Chapter 3 – Technical Assessment
Emission Inventory Data

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Emissions Inventory and Source Attribution

The San Diego Portside Community contains various sources of air pollution that fall into one of the following categories: on-road and off-road mobile equipment, stationary sources (businesses regulated by the District), and area sources (such as residential fuel combustion, consumer products use, construction and demolition, and commercial cooking). The stationary sources include, but are not limited to ship building and repair businesses, electric utilities, national security, autobody repair shops, metal fabrication and coating operations, petroleum bulk terminals, gasoline service stations, dry cleaning operations, and medicinal and botanical manufacturing. The Portside Community also has more than 13 miles of freeways that support regional and local transportation needs, including Interstate Highways 5 and 15. The freeways and roadways are heavily travelled by pass-through traffic (including both commuters and goods movement that does not originate or end in the Portside Community) as well as local business and residential traffic. Source attribution analyses, using the 2018 year as the pre-Community Emissions Reduction Plan baseline year, highlights that on-road and off-road mobile sources are the driver for diesel particulate matter (DPM) emissions in the community with the major contributors being commercial harbor craft, off-road diesel equipment, heavy-heavy duty vehicles, and medium-heavy duty vehicles.

The pollutants contributing the most to the air toxics cancer risk in this community are DPM[1], metals such as arsenic, and organic gases such as benzene, 1,3-butadiene, and methylene chloride[2]. Arsenic is mainly attributable to construction and demolition activities as well as dust from roadways[3]. Both benzene and 1,3-butadiene are from on-road and off-road mobile sources while methylene chloride emissions are from consumer product use[4]. In addition to community-wide risk, certain stationary source operations involving air toxic pollutants impact the health risk affecting business and residences in close proximity to the operations. For the stationary source operations within the Portside Community, this localized risk comes primarily from DPM and hexavalent chromium from certain welding operations[5]. The analyses presented in this chapter also present in more detail the breakdown on sources of oxides of nitrogen (NO_x), reactive organic gases (ROG), and particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$). ROG are also sometimes called volatile organic compounds (VOC).

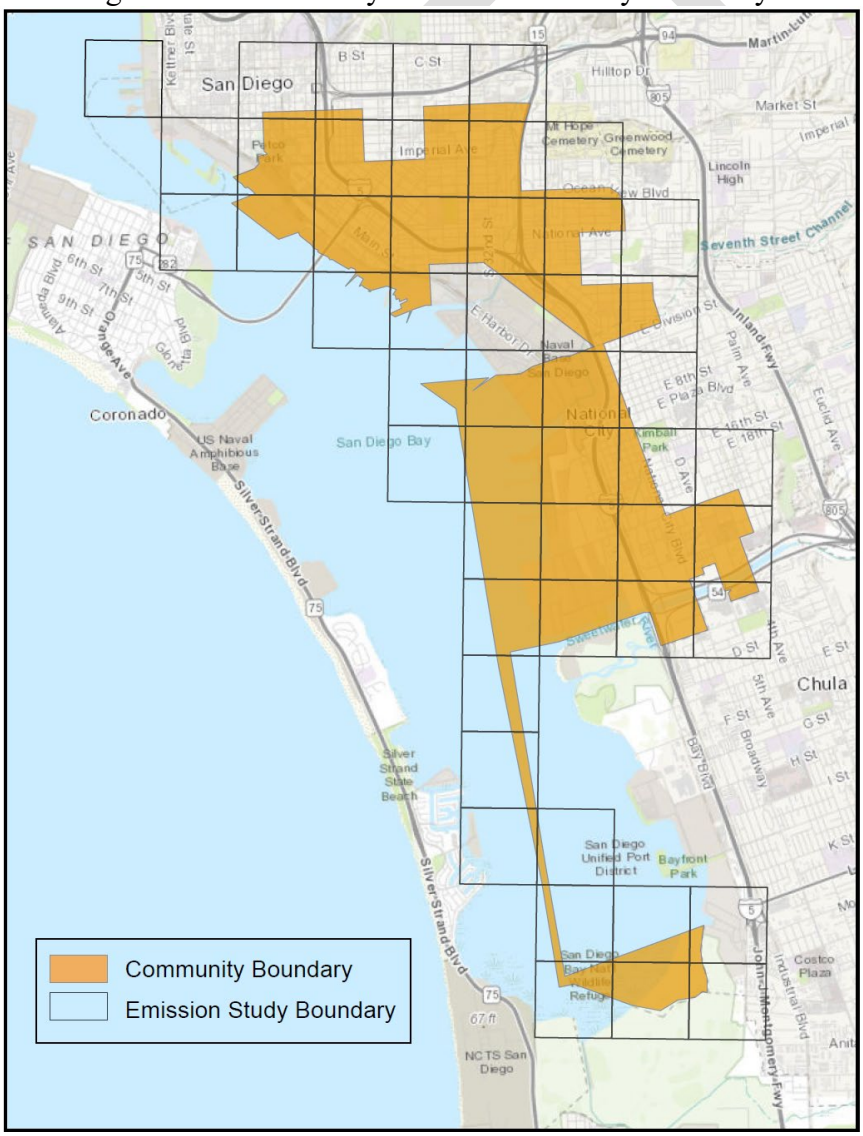
Community-level emissions and their sources will be discussed in this chapter but the detailed emissions are contained in Appendices 3a and 3b for toxics and criteria pollutants, respectively. The following sections contain discussions on baseline year emissions of criteria and toxic air contaminants (TAC) in the Portside Community, with a summary of emissions at the end of this chapter.

[1] CARB's estimated statewide cancer risk due to DPM is 460 per one million in 2014.
[2] Chapter 4 – Technical Assessment Monitoring Data
[3] Appendix 3a: Toxic Pollutants
[4] Appendix 3a: Toxic Pollutants
[5] Based on Health Risk Assessments for sources under the Air Toxics "Hot Spots" Program

Base Year Emissions Inventory and Source Attribution

There are many sources that contribute to the emissions in the San Diego Portside Community but not all the sources contribute pollutant species equally. These sources are grouped into one of four categories: On-road mobile sources, off-road mobile sources, area sources, and stationary sources. To determine the area, off-road and on-road mobile source information, the California Air Resources Board (CARB), in discussions with the District and the Community Steering Committee, set an emissions study boundary using standardized one-kilometer grid cells used within their inventory to encompass the Portside Community, but this study will also include some areas just outside the community boundary, as shown below in Figure 3-1. Additionally, due to their magnitude and potential impact on the Portside Community, emissions from cruise ships berthed in the upper left grid cell are included in the off-road mobile source category.

Figure 3-1. Community vs. Emission Study Boundary[6]



[6] Data provided by CARB

Tables 3-1 and 3-2 below display the baseline emissions determined for the Portside Community in 2018, and is based on the information in Appendices 3a and 3b. Emissions were calculated using methods that best collected the activity data, such as product or fuel use, vehicle miles travelled, or population density, that results in the emissions. Stationary source emissions were calculated by using the District's Emission Inventory data that was provided by regulated facilities[7]. Area and both off-road and on-road mobile source emissions were estimated through multiple channels, such as fuel consumption tracking, population and activity surveys, vessel visits, etc., paired with the U.S. Environmental Protection Agency and CARB emission factors for those sources. Population, employment, housing, roads and railways were also considered when determining emission sources and their impact. For the area and both off-road and on-road mobile sources, county information for all the metrics were narrowed down into the emissions study area to determine community emissions (including some areas just outside the community).

Table 3-1 provides the breakdown of the criteria pollutant emissions of interest by percentage and source. The table paired with the various area maps illustrate the community's main source impact being petrochemical fuel combustion and the associated emissions.

Table 3-1. 2018 Community Baseline Criteria Emissions Summary[8]

Source Category	NOx (tons/year)	ROG (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
OFF-ROAD MOBILE	**922.4** (63.1%)	**317.8** (25.5%)	**36.2** (5.0%)	**34.4** (17.7%)
ON-ROAD MOBILE	**462.8** (31.6%)	**259.9** (20.8%)	**69.5** (9.5%)	**32.1** (16.5%)
STATIONARY	**50.6** (3.5%)	**215.3** (17.3%)	**33.2** (4.6%)	**8.8** (4.5%)
AREA	**26.6** (1.8%)	**455.0** (36.5%)	**589.2** (80.9%)	**118.9** (61.2%)
TOTAL (tons/year)	**1462.4**	**1248.0**	**728.1**	**194.2**

NOx: Nitrogen Oxides
ROG: Reactive Organic Gases
PM_{10} Particulate Matter 10 Microns or Smaller
$PM_{2.5}$ Particulate Matter 2.5 Microns or Smaller

Table 3-2 provides the breakdown of selected toxic air contaminant (TAC) emissions by percentage and source. These include TACs that the District has air monitoring data for and determined drives the cancer risk from the monitored pollutants[9], as well as DPM, which CARB

[7] Stationary source inventories are available at https://www.sandiegocounty.gov/content/sdc/apcd/en/engineering/Permits/Engineering_Emissions_Inventory/Engineering_Phase_2_Toxics_Facility_Emissions.html
[8] Based on Appendix 3b: Criteria Pollutants
[9] Chapter 4 – Technical Assessment Monitoring Data

has estimated the statewide cancer risk[10], and hexavalent chromium which can cause localized elevated cancer risk[11]. .

Table 3-2. 2018 Community Baseline Emission Summary for selected Toxic Air Contaminants [12]

Source Category	Arsenic (lb/yr)	Benzene (lb/yr)	1,3-Butadiene (lb/yr)	Hexavalent chromium (lb/yr)	DPM (lb/yr)
OFF-ROAD MOBILE	**0.08** (0.2%)	**17,196** (52.8%)	**3,462** (63.3%)	**0.56** (1.9%)	**44,200** (77.9%)
ON-ROAD MOBILE	**1.1** (2.9%)	**14,601** (44.8%)	**1756** (32.2%)	**6.42** (21.2%)	**11000** (19.4%)
STATIONARY SOURCES	**0.9** (2.4%)	**409** (1.3%)	**83** (1.5%)	**2.18** (7.2%)	**1,504** (2.7%)
AREA SOURCES	**37** (94.4%)	**372** (1.1%)	**164** (3.0%)	**21.09** (69.7%)	**0** (0%)
TOTAL (pounds/year)	**39**	**32,578**	**5,466**	**30.2**	**56,800**

Uncertainties in Emissions Inventories

Over the years, emission inventories have become more robust, and improvement and updates to emission inventories are continuously made to ensure the most accurate inventory is used for emission focused programs, such as the community emission reduction program. Community-scale emission inventories for stationary, areawide, and mobile sources are developed using the best and latest available data inputs for estimating and spatially allocating emissions. Emissions from sources are estimated using a variety of inputs, such as activity data, emission factors, spatial surrogates, future growth and control factors, and pollutant speciation profiles. However, with each input, a level of uncertainty can exist when calculating emissions within a community due to data availability, representativeness, and limitations, and disparity between county or regional level data to community level data.

For all sources, activity and emission factors used to calculate emissions might be incomplete, outdated, and not completely represent the current year or community. For example, activity profiles for a source might be developed either based on reported data, survey results, reported studies, or purchased data from previous years and might not accurately represent the current year of an emission inventory. Area and certain off-road mobile source estimates which are based on general methodologies that use regional activity assumptions and generic industry-wide or average emission factors have inherent uncertainties in the estimates. The speciation profiles used to calculate toxic air contaminants are based on information from literature reviews and lab testing and may not always reflect all emission processes and activities resulting in those

[10] CARB's estimated statewide cancer risk due to DPM is 460 in one million in 2014

[11] Based on Health Risk Assessments for sources under the Air Toxics "Hot Spots" Program

[12] Based on Appendix 3a: Toxic Pollutants for pollutants discussed in Chapter 4 – Technical Assessment Monitoring Data and based on Health Risk Assessments for sources under the Air Toxics "Hot Spots" Program

emissions. Additionally, speciation profiles might not include all toxics emitted from a specific source or in some cases it may include additional toxics compared to the pollutants that are actually emitted.

Spatially allocating emissions related to area, off-road mobile, and on-road mobile sources within communities can sometimes be difficult due to not having complete and detailed information related to activity location data for some source categories. In this case spatial surrogates which best fit emission activity are developed to allocate county level total emissions to the local level. For example, emission from consumer products are estimated using overall sales data, and spatially allocated within the community using population as a surrogate.

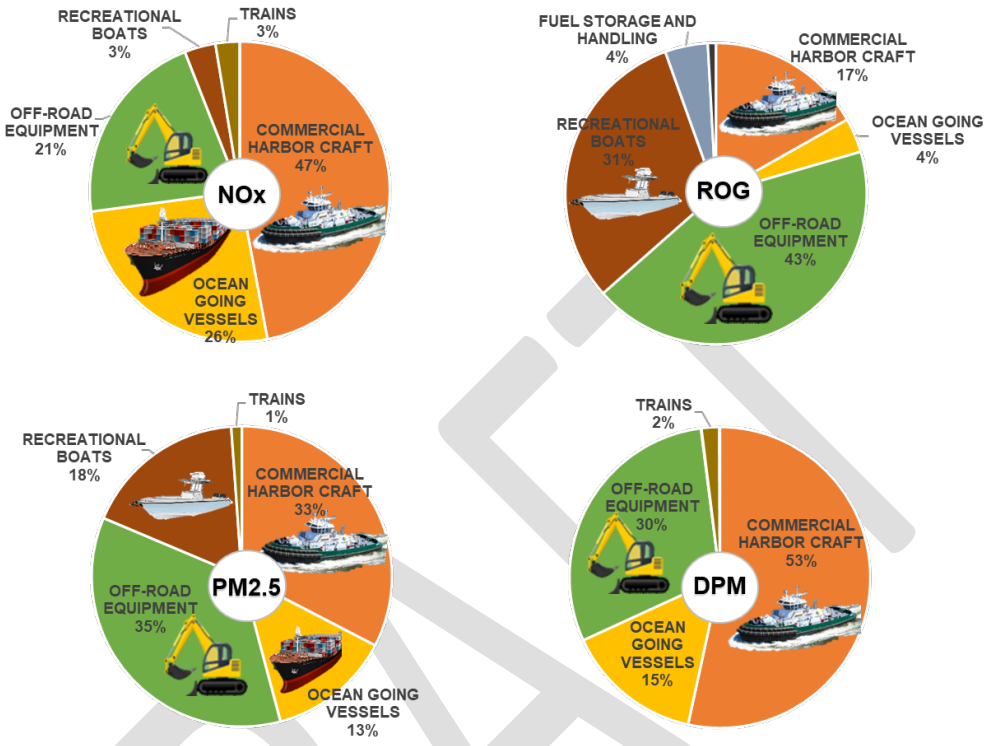
Future year emission projections use many assumptions based on industrywide economic forecasts, historical data, adopted regulations etc., making it challenging to project accurate emission estimates even at regional scales, let alone at the community level. Additionally, current forecasting factors do not consider current events like the ongoing pandemic and its impact on the economy, and therefore inventories for future years beyond 2020 may need further revisions as better data becomes available.

Contributors to Emissions in the Community

In this community, NO_x emissions, a component of smog, are driven by off-road mobile sources, with the major contributors being ocean going vessels and commercial harbor craft (Figure 3-2). On-road mobile sources are the second highest NO_x contributor (Table 3-1) with light duty vehicles as the leading emitter and heavy-heavy duty vehicles following it (Figure 3-3). Area and stationary sources of NO_x emissions are almost entirely from fuel combustion with area sources being driven by residential fuel consumption used for heating and stationary sources driven by industrial equipment fuel consumption[13].

[13] Appendix 3b: Criteria Pollutants

Figure 3-2. Off-Road Mobile Source Emissions[14]



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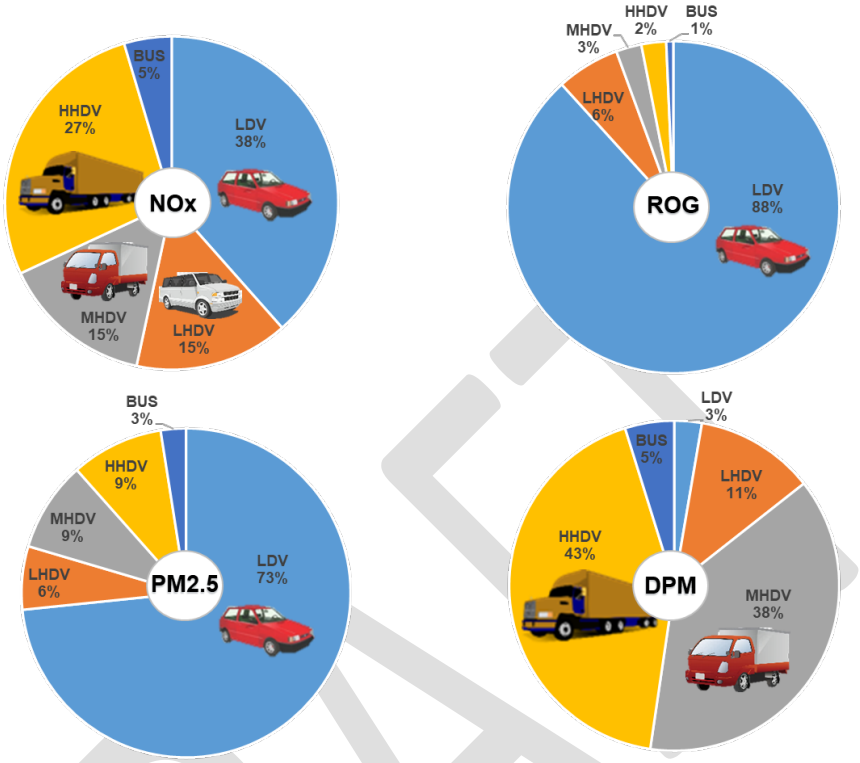
[14] Data Provided by CARB

Figure 3-3. 2018 On-Road Mobile Source Emissions[15]



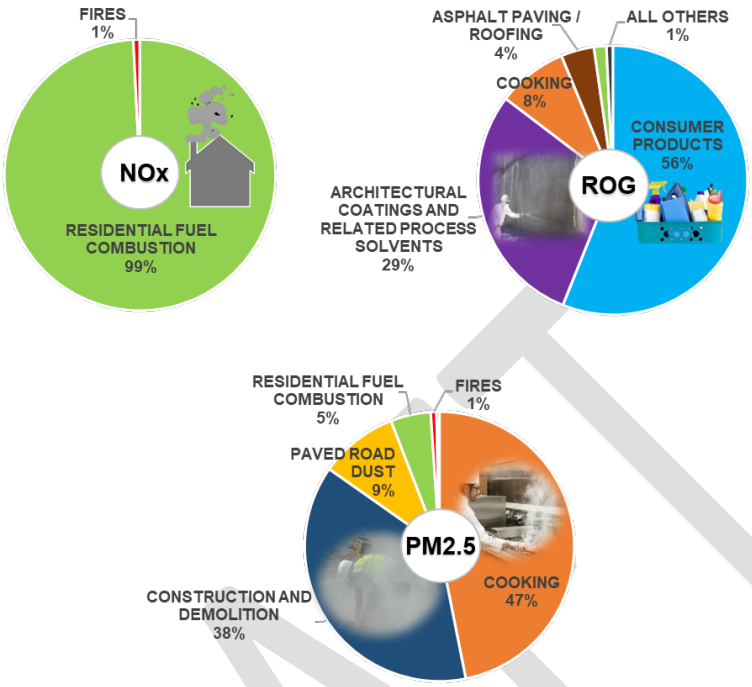
DPM emissions are associated with NO_x emissions and are also driven by off-road mobile sources with the major contributors being commercial harbor craft and off-road equipment (Table 3-1 and Figure 3-2). On-road mobile equipment is the second highest DPM contributor (Table 3-1), with heavy-heavy duty vehicles and medium-heavy duty vehicles as the leading emitters (Figure 3-3). Stationary sources of DPM are entirely from fuel combustion in engines[16]. There are no area source DPM emissions.

ROG emissions from area sources (Table 3-1) are associated with consumer products (like aerosols and cleaners), architectural coatings and solvents (Figure 3-4). The second highest category for ROG emissions is off-road mobile sources (Table 3-1), with the main contributors being off-road equipment and recreational boats (Figure 3-2). On-road mobile sources are the third leading ROG category (Table 3-1), where light-duty vehicles are the predominant source (Figure 3-3). Stationary source ROG emissions were obtained from facility emission inventories and are led by marine coating operations and gasoline distributing (Table 3-3).

[15] Data provided by CARB

[16] Appendix 3b: Criteria Pollutants

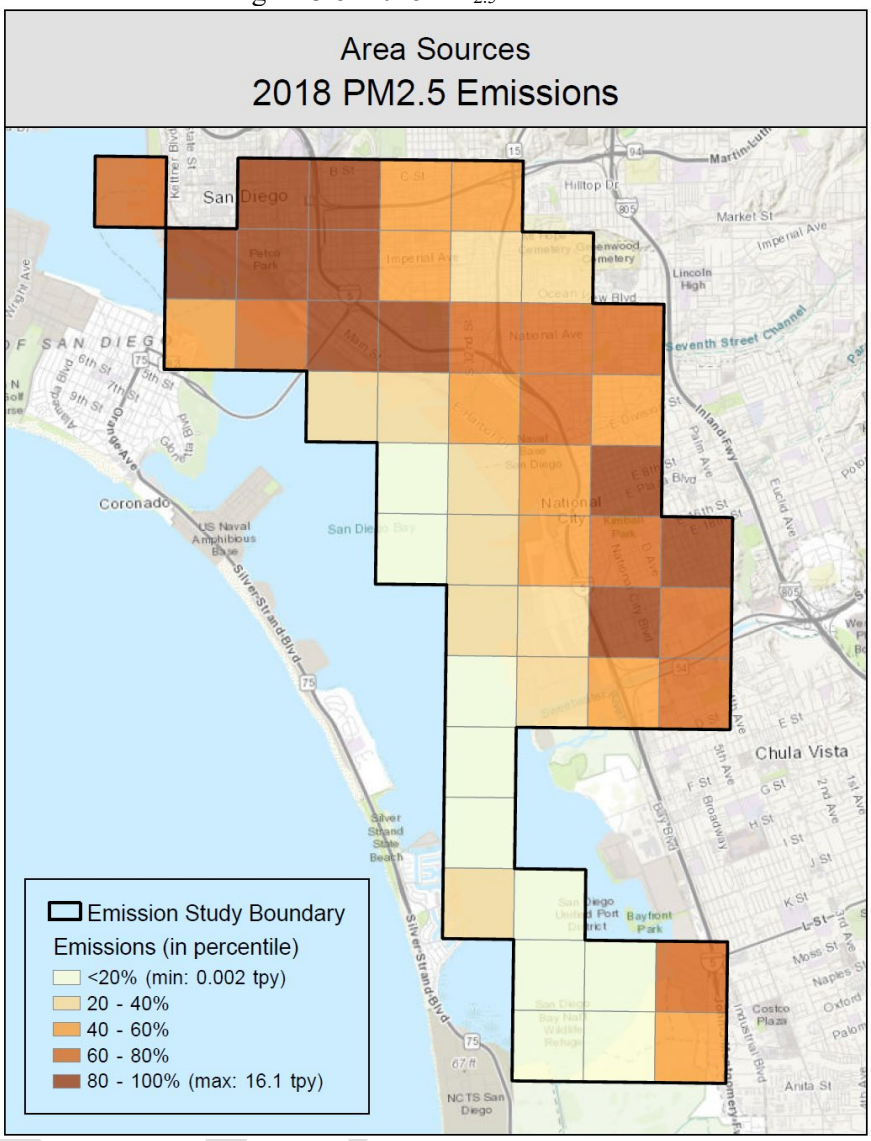
Figure 3-4. 2018 Area Source Emissions[17]



Area sources are the leading source category for particulate matter less than 10 micrometers in diameter (PM_{10}) and $PM_{2.5}$ in the Portside Community (Table 3-1). As $PM_{2.5}$ is more harmful to people than PM_{10}, $PM_{2.5}$ will be the focus of this discussion. $PM_{2.5}$ area source emissions are mainly from commercial cooking operations and construction/demolition (Figure 3-4). Road dust, though caused in part by mobile sources, is also an area source that contributes to the total $PM_{2.5}$ emissions in the community. The large freeways running through the area along with highly trafficked streets near the waterfront are the sources of the road dust. Figure 3-5 shows the $PM_{2.5}$ emissions following along those roadways. However, traffic on the residential streets further from the freeways and industrial throughway also contribute to the $PM_{2.5}$ total emissions.

[17] Data provided by CARB

Figure 3-5. 2018 $PM_{2.5}$ Emissions[18]



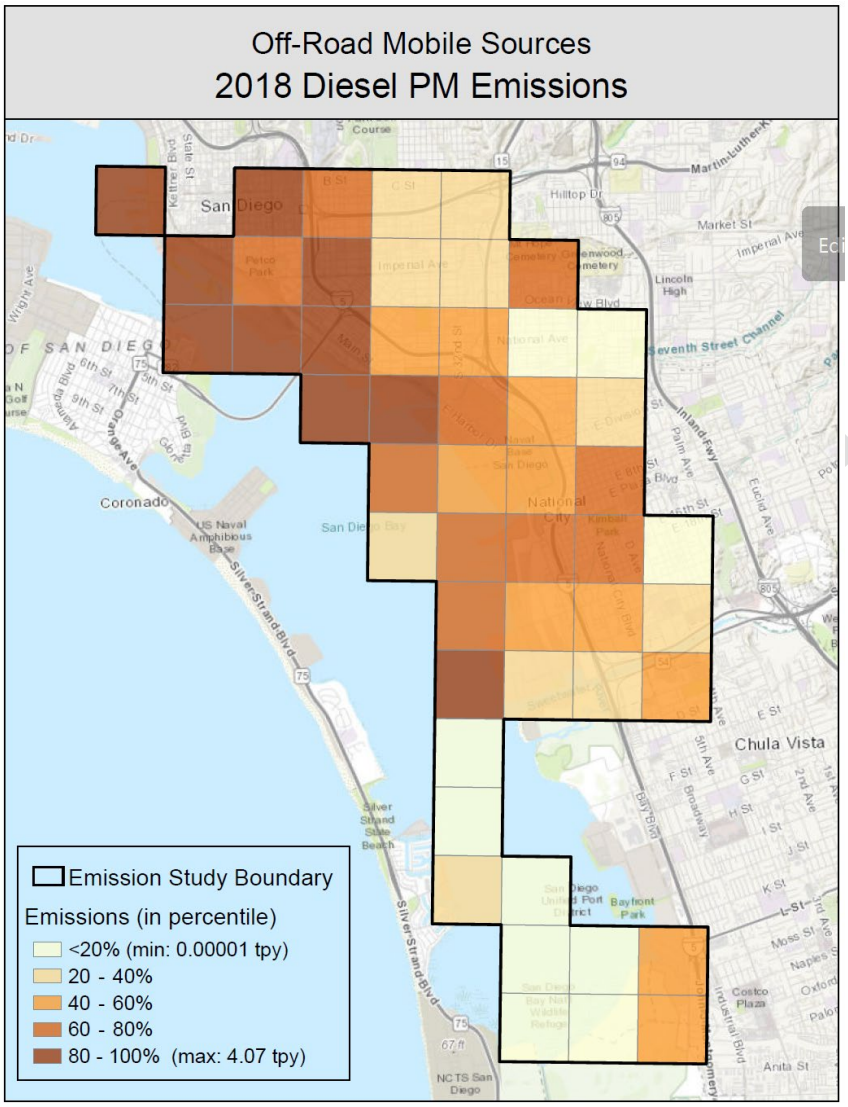
TAC emissions from stationary sources were determined using facility emissions inventory reports. TAC emissions associated with area sources, on-road and off-road mobile sources were calculated using industry specific pollutant speciation profiles applied to Total Organic Gases (TOG) and PM emissions.

As mentioned above, off-road mobile sources contribute about 78% of the total DPM emissions for the Portside community. Combustion of petroleum-based fuels generate a variety of emissions including DPM and NO_x. Off-road mobile source emissions are driven by fuel consumption and the correlation between DPM and NO_x can be seen below, with the similar percentages between sources as seen in Figure 3-2, above. Off-road mobile sources mostly support the waterfront operations and nearby industry that supports those operations, which is shown by the high emission

[18] Data Provided by CARB

grid cells in Figure 3-6 below. Figure 3-6 shows the relation between the freeways and DPM – the emissions are highest where freeways SR 94, SR 75 (San Diego Coronado Bay Bridge), and I-5 meet the port (upper left of the map).

Figure 3-6. 2018 Off-Road Diesel PM Emissions Percentile Map[19]

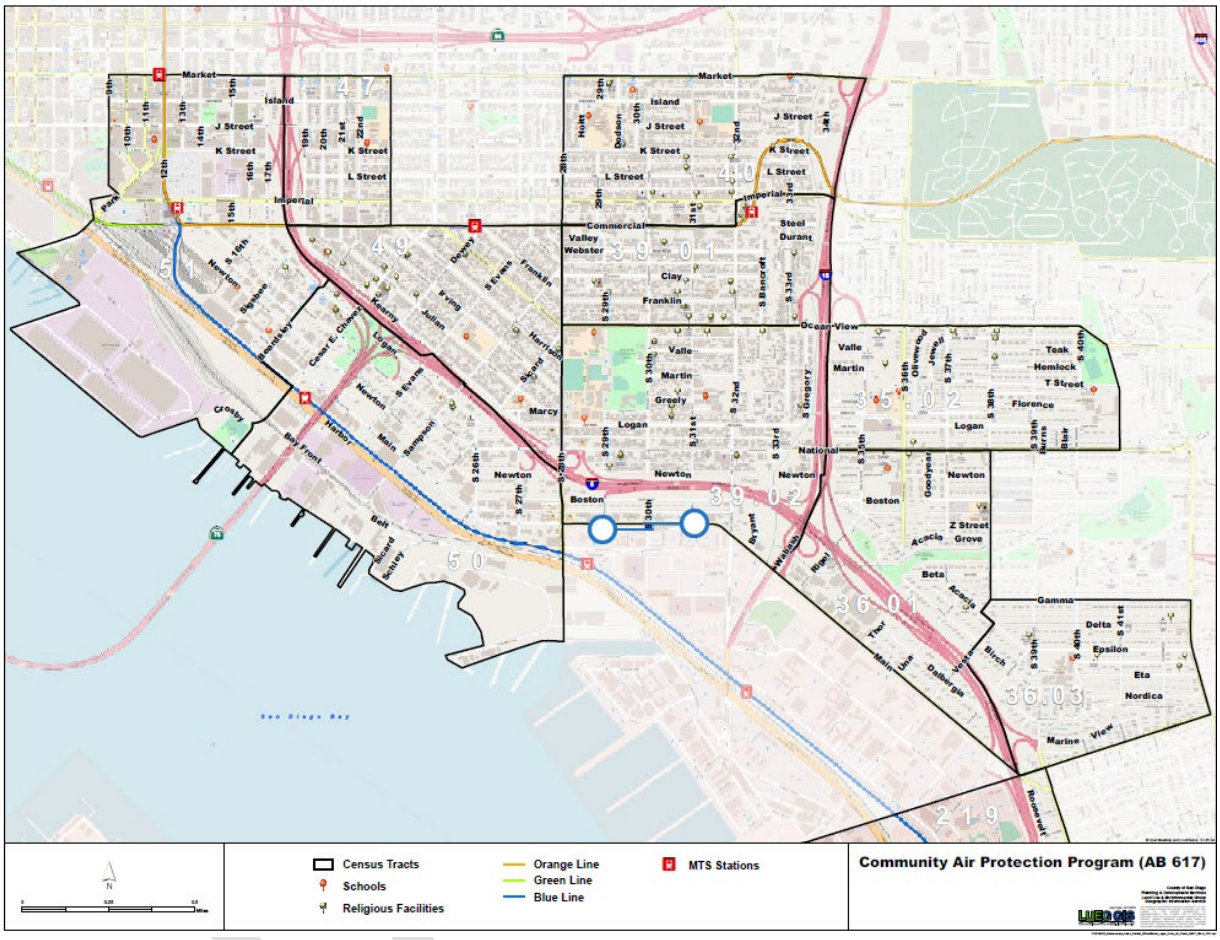


The inland freeway (I-5) that runs through the Portside Community is paralleled by a coastal road (Harbor Drive) that can be viewed as an unofficial split between industry and residential area. The side of Harbor Drive closer to the water is where industry is focused while the residential population is eastward. The darkly shaded grid cells, showing higher emissions, do frequently cross over into the residential population and these emissions can directly affect sensitive receptors in the area such as schools, parks, playgrounds, and residential dwellings. Figures 3-7 and 3-8

[19] Data provided by CARB

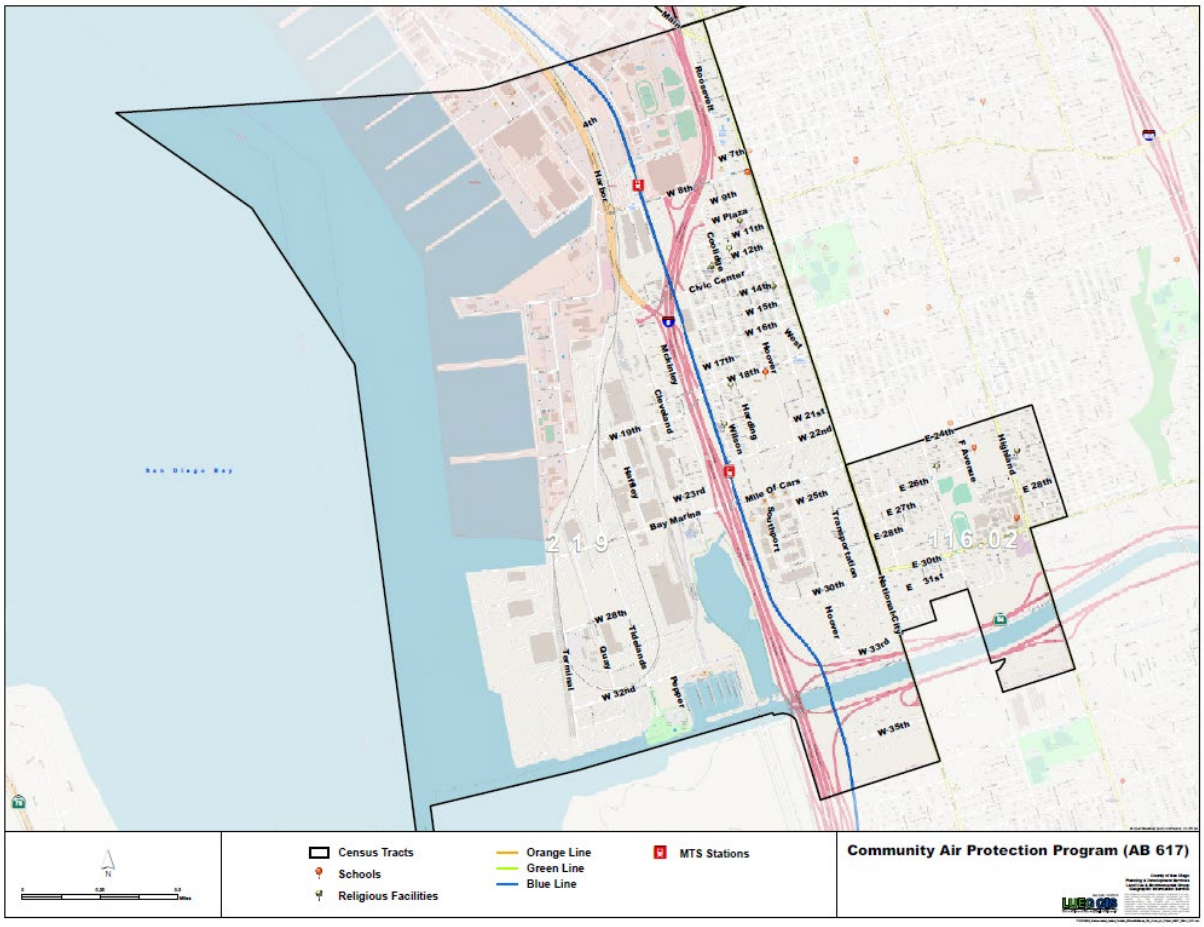
below are maps of the northern and southern parts of the community, respectively, with some receptors of importance (schools and religious centers) flagged. Parks and residential dwelling proximity can also be seen more clearly in relation to freeways and the harbor in Figures 3-7 and 3-8. Within the community boundary there are 22 schools, 14 licensed daycare facilities, and one hospital which need to be considered when prioritizing emissions.

Figure 3-7. AB617 Northern Sector[20]



[20] https://www.sandiegocounty.gov/content/sdc/apcd/en/community-air-protection-program--ab-617-/ab-617-community-maps.html

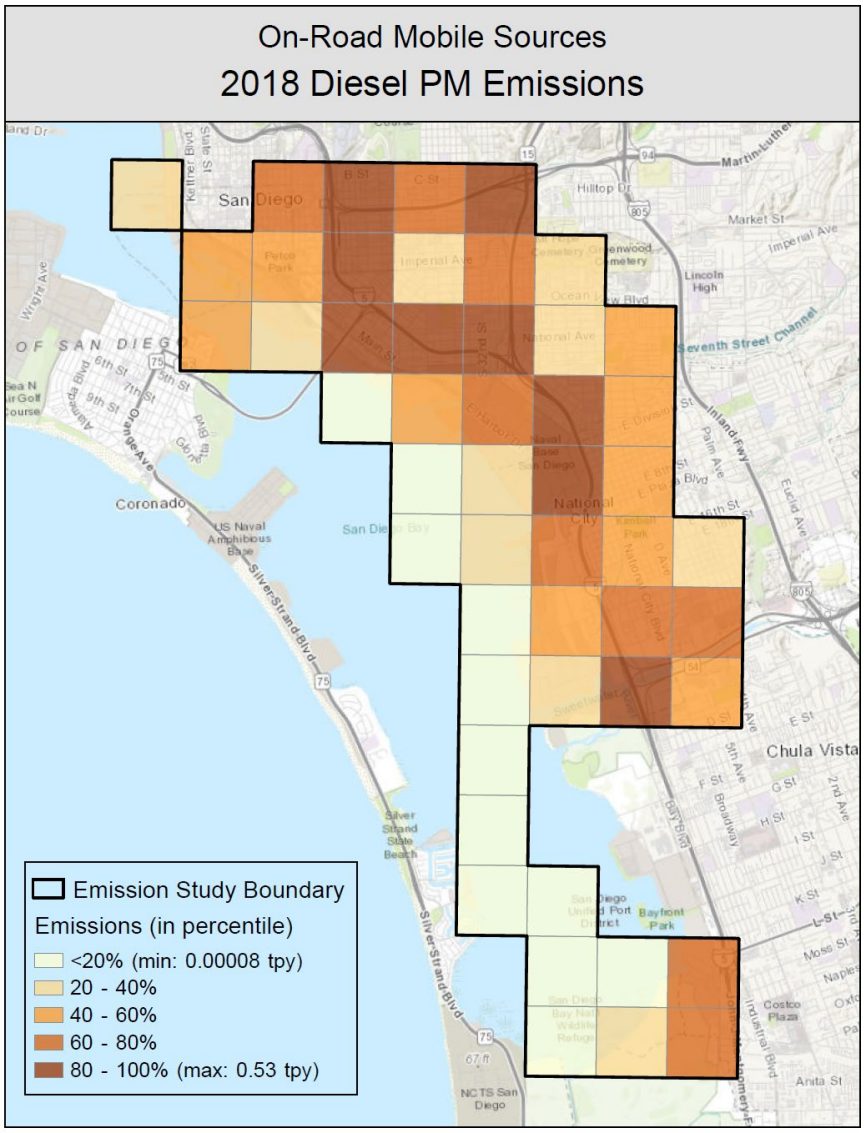
Figure 3-8. AB 617 Southern Sector[21]



DPM is the carcinogen of most concern in the County and Portside Community but it is not the only pollutant of concern nor is it the sole precursor of PM_{10} and $PM_{2.5}$. Though the particulate emissions are not entirely dependent on one another they do all have similar high percentile locations that mainly follow the I-5 freeway and areas with more commercial cooking operations and construction and demolition activities, or are concentrated in the area at the top left corner of the map as seen in Figures 3-5 and 3-9.

[21] https://www.sandiegocounty.gov/content/sdc/apcd/en/community-air-protection-program--ab-617-/ab-617-community-maps.html

Figure 3-9. 2018 On-Road Diesel PM Emissions[22]



On-road mobile source emissions share a very similar breakdown in emissions to off-road mobile source emissions. On-road emissions (Figure 3-9) tend follow the freeways whereas the off-road emissions (Figure 3-6) follow the coast therefore residents between the two areas will be exposed to higher levels of DPM. CARB, the District and the Community Steering Committee will be evaluating the risk from DPM in the community. Figure 3-3 above shows the breakdown of on-road emission sources which can be compared to Figure 3-2 above for off-road emission sources. On-road and off-road mobile sources share similarities between ROG and $PM_{2.5}$ trends even though they have different equipment sources. This trend is similar to the correlation between NO_x and DPM emission sources –on-road and off-road share these correlations due to the nature of combustible fuels whereas area and stationary sources have a greater variety of

[22] Data provided by CARB

emission sources and don't necessarily share the same trends. When both mobile source emissions are combined, they outweigh the area and stationary sources for NO_x and DPM.

However, area and stationary source emissions are also impactful on the community because they drive the emissions of $PM_{2.5}$ and ROG which can have serious acute and chronic health risks[23,24.] There is also more diversity in source types between area and stationary emissions. Area sources in the community vary from residential fuel consumption to construction and demolition to consumer products (Figure 3-4). Area sources make up approximately 62% of the total $PM_{2.5}$ emissions in the Portside Community (Table 3-1) with commercial cooking operations being the largest contributor followed by construction/demolition occurring in the area (Figure 3-4). Area sources also make up approximately 37% of the ROG emissions with evaporation of consumer products and architectural coatings/solvents producing the majority of those emissions (Table 3-1).

Stationary sources are also contributors to ROG emissions. Within the community and emission boundary there are 79 permitted facilities and 318 permitted operations. The larger industries in the community are ship building and repair, electric utilities, metal coating services, petroleum bulk stations, and national security. The ROG emissions from these industries are mostly from marine coating operations and other solvent evaporation at large industry facilities and petroleum production marketing (Table 3-3).

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[23] Appendix 3a: Toxic Pollutants

[24] The state Office of Environmental Health Hazard Assessment (OEHHA) publishes cancer risk values (https://oehha.ca.gov/media/CPFs042909.pdf) and reference exposure levels for short and long-term non-cancerous health impacts (https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary). CARB also posts this information (https://ww2.arb.ca.gov/sites/default/files/classic//toxics/healthval/contable.pdf).

Table 3-3. 2018 Stationary Source Emissions Summary[25]

Stationary Sources	NOx	ROG	PM_{10}	$PM_{2.5}$
Cleaning and Surface Coatings Tons Per Year (TPY)	**0.00**	**170.97**	**5.28**	**0.00**
Autobody Refinishing	0.00	2.73	0.09	0.00
Cold Solvent Degreasing	0.00	1.91	0.00	0.00
Marine Coatings	0.00	154.24	4.73	0.00
Metal Parts and Products Coatings	0.00	2.40	0.18	0.00
Paper, Film and Fabric Coatings	0.00	2.14	0.00	0.00
Wood Product Coatings	0.00	1.21	0.01	0.00
Miscellaneous Cleaning and Coating Processes	0.00	7.33	0.27	0.00
Fuel Combustion (TPY)	**48.35**	**4.60**	**8.77**	**8.77**
Boilers	7.44	1.97	2.73	2.73
Engines	13.71	2.45	0.75	0.75
Flares	0.04	0.00	0.01	0.01
Motor Vehicle and Mobile Equipment	0.00	0.00	0.24	0.24
Turbines	26.64	0.14	4.92	4.92
Miscellaneous Combustion Equipment	0.68	0.04	0.12	0.12
Industrial Processes (TPY)	**2.06**	**11.49**	**19.48**	**0.00**
Abrasive Blasting	0.00	0.00	6.51	0.00
Plasma Spray Operations	0.00	0.00	0.00	0.00
Welding	0.00	0.00	4.69	0.00
Mineral Industry			6.43	
Miscellaneous Industrial Processes	2.06	11.49	1.77	0.00
Petroleum Production and Marketing (TPY)	**0.00**	**27.93**	**0.00**	**0.00**
Bulk Gasoline Loading Rack	0.00	6.33	0.00	0.00
Bulk Gasoline Vapor Processor	0.00	2.05	0.00	0.00
Gasoline Bulk Storage Tanks	0.00	18.78	0.00	0.00
Petroleum Marketing	0.00	0.77	0.00	0.00
Waste Disposal	**0.00**	**0.12**	**0.00**	**0.00**
Landfill Operations	0.00	0.12	0.00	0.00
Wastewater	**0.00**	**0.01**	**0.00**	**0.00**
Pump Station	0.00	0.01	0.00	0.00
Grand Total (TPY)	**50.57**	**215.12**	**33.53**	**8.77**

Stationary point sources can be seen following Harbor Drive and the I-5 freeway in Figure 3-10 below and this can be compared to the ROG percentile map for area sources in Figure 3-11

[25] Appendix 3b: Criteria Pollutants

below. There are similar trends in location for all sources and tracks with freeway positioning and how industry (and residents) have built around and within them.

Figure 3-10. Map of stationary point sources

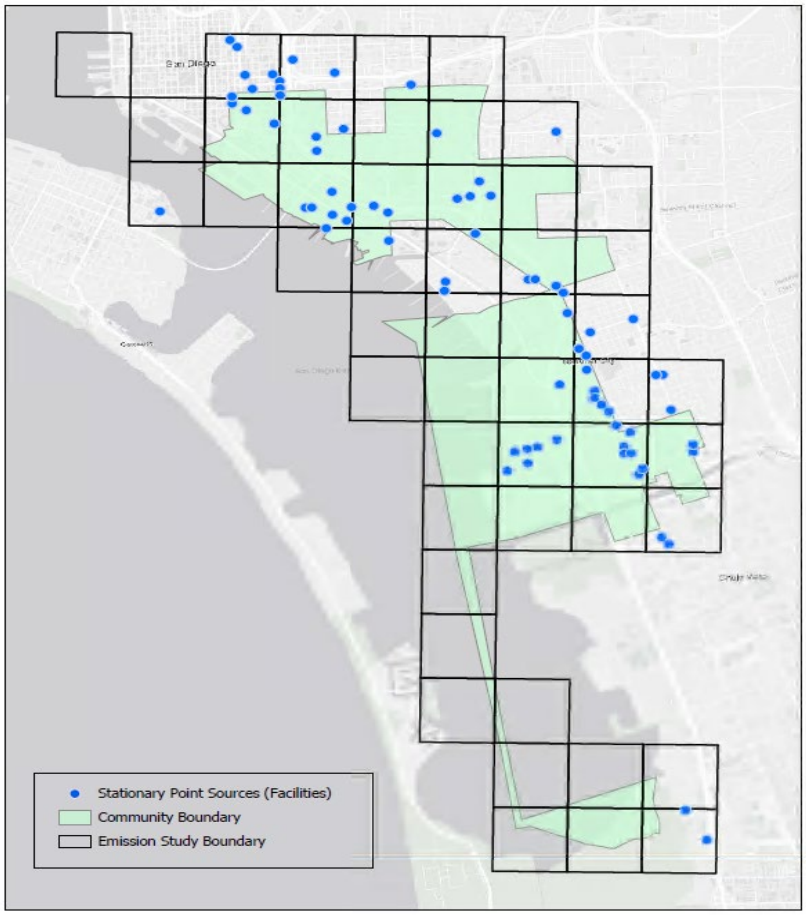
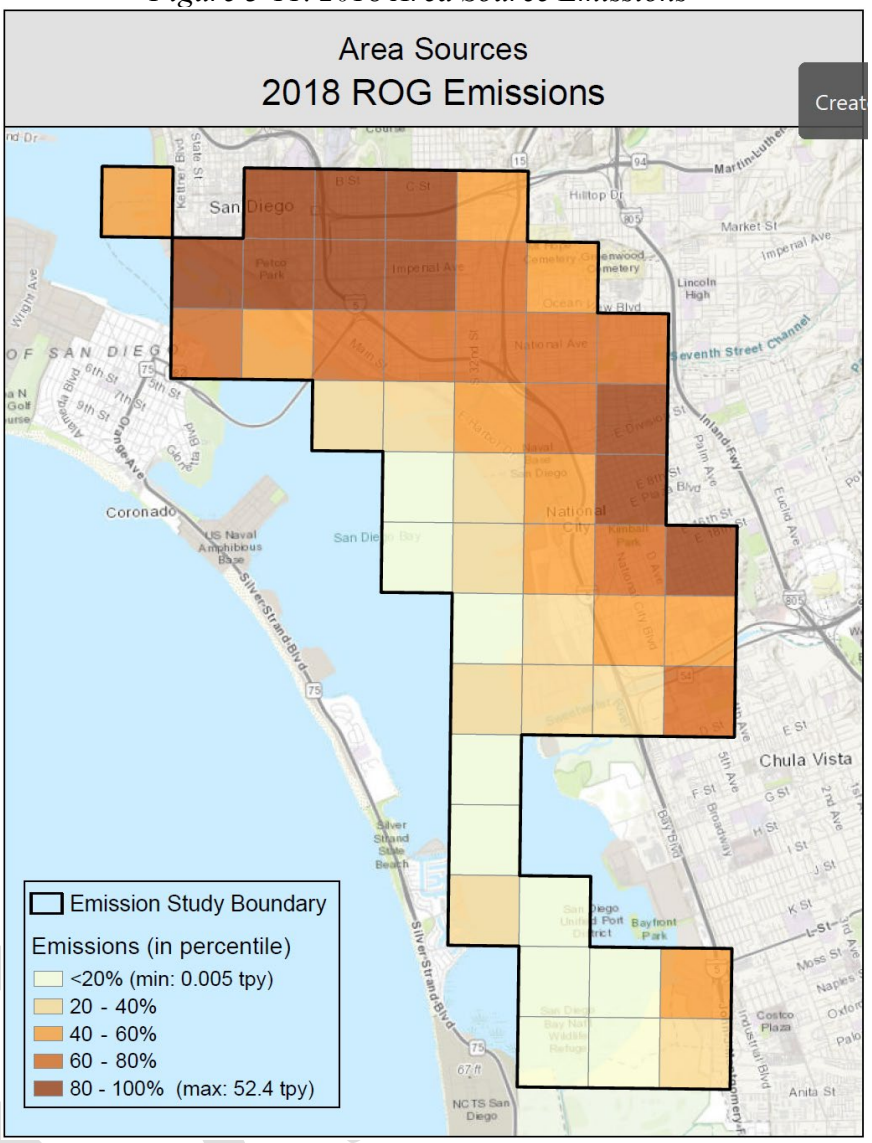


Figure 3-11. 2018 Area Source Emissions[26]



In absence of a risk analysis that encompasses all the TAC emissions within a community, it can be difficult to determine which TACs pose the greatest risks. One way to compare different toxic pollutants is to look at Toxicity Weighted Emissions (TWE). TWE are adjusted emissions for TACs that have Office of Environmental Health Hazard Assessment (OEHHA) approved health values. They are calculated by multiplying the mass emissions of each TAC by the corresponding health values as determined by OEHHA, molecular weight adjustment factors accounting for the molecular weight fraction of a compound associated with the specific health effects, maximum hours of emissions, and normalization factors. TWEs are not risks, but the weighted emissions are useful to compare the relative toxicity of TACs.

[26] Data provided by CARB

There are three types of risk that are associated with TAC emissions. Cancer risk is the risk of contracting cancer due to long term exposure to a TAC (40 years of exposure, starting at birth, for residents and 30 years of exposure for workers). Non-cancer risk is determined for TAC that can cause health effects in a short-term exposure (acute) or long-term exposure (chronic). The non-cancer risk is expressed as an index to the Reference Exposure Level (REL), the level at which health effects can be caused from breathing air that contains a TAC (if the index is less than one, the concentration of the TAC is below the REL, and if it is above one, the concentration is above the REL).

The tables and figures below show the top 10 TACs based on the TWEs for each of the three types of risk in the Portside community. The top TWE is also broken out to show the contribution from each source.

Table 3-4- Top 10 TACs Based on Cancer Risk Toxicity Weighted Emissions Within the Community[27]

TAC	Total Emissions (lbs/year)	Cancer Risk Weighted
Diesel Particulate Matter (DPM, total)	56,559	130,651
Off-Road Mobile Sources	*44,150*	*101,987*
On-Road Mobile Sources	*10,904*	*25,189*
Stationary Sources	*1,504*	*3,475*
Area Sources	*0*	*0*
Chromium, hexavalent (& compounds)	30	34,941
Area Sources	*21*	*24,354*
On-Road Mobile Sources	*6*	*7,420*
Stationary Sources	*2*	*2,518*
Off-Road Mobile Sources	*0.6*	*649*
Benzene	32,578	7,275
Off-Road Mobile Sources	*17,196*	*3,840*
On-Road Mobile Sources	*14,601*	*3,260*
Stationary Sources	*409*	*90*
Area Sources	*372*	*69*
1,3-Butadiene	5,466	7,154
Off-Road Mobile Sources	*3,462*	*4,532*
On-Road Mobile Sources	*1,756*	*2,298*
Area Sources	*164*	*215*
Stationary Sources	*83*	*109*
Formaldehyde	66,018	3,050
Off-Road Mobile Sources	*39,389*	*1,820*
On-Road Mobile Sources	*15,103*	*698*
Area Sources	*10,232*	*473*
Stationary Sources	*1,304*	*65*
Cadmium	60	1,943
Area Sources	*40*	*1,305*

[27] Based on Appendix 3a: Toxic Pollutants

Stationary Sources	*18*	*586*
Off-Road Mobile Sources	*1*	*36*
On-Road Mobile Sources	*1*	*16*
Naphthalene	3,964	1,038
Area Sources	*2,640*	*691*
Off-Road Mobile Sources	*658*	*172*
On-Road Mobile Sources	*649*	*170*
Stationary Sources	*17*	*4*
Arsenic	39	987
Area Sources	*37*	*932*
On-Road Mobile Sources	*1*	*29*
Stationary Sources	*1*	*24*
Off-Road Mobile Sources	*0*	*2*
Acetaldehyde	39,100	813
Off-Road Mobile Sources	*17,734*	*369*
Area Sources	*13,676*	*284*
On-Road Mobile Sources	*7,339*	*153*
Stationary Sources	*351*	*7*
Ethylbenzene	43,804	843
Stationary Sources	*29,281*	*564*
Off-Road Mobile Sources	*6,542*	*126*
On-Road Mobile Sources	*6,092*	*117*
Area Sources	*1,889*	*36*

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Figure 3-12. 2018 Cancer Toxicity Weighted Emissions[28]

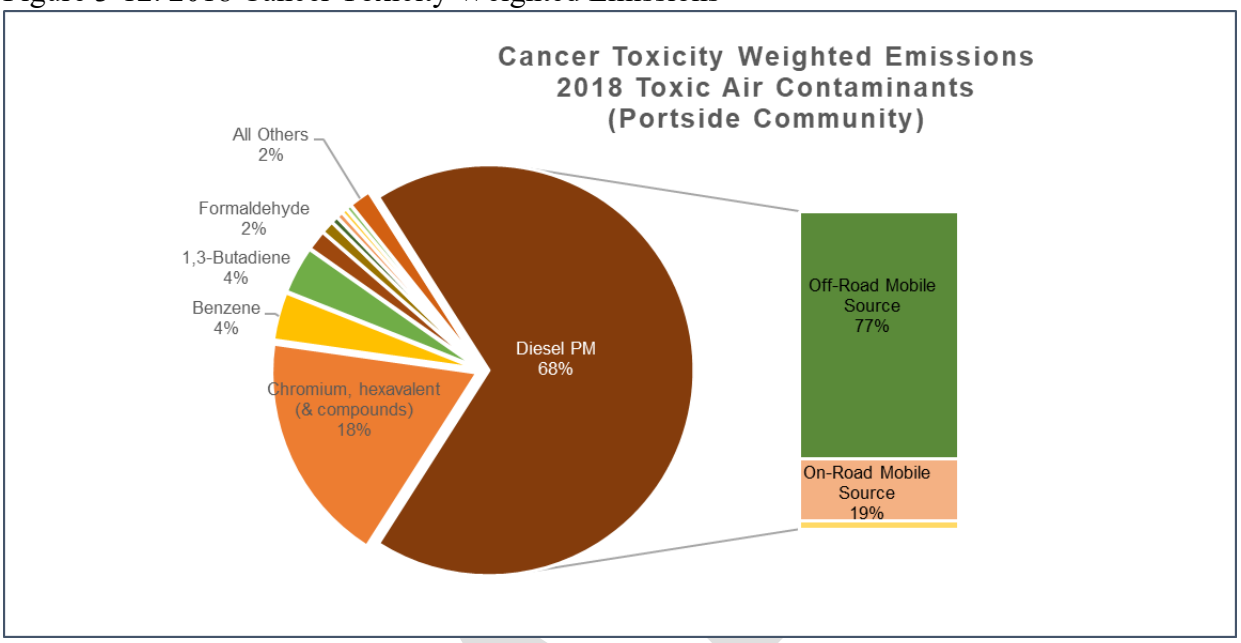

Table 3-5. Top 10 TACs Based on Chronic Non-Cancer Risk Toxicity Weighted Emissions Within the Community[29]

TAC	Total Emissions (lbs/year)	Chronic Non-Cancer Risk Weighted
Chlorine (total)	7,064	605
Area Sources	*6,7334*	*577*
On-Road Mobile Sources	*328*	*28*
Off-Road Mobile Sources	*1*	*0*
Stationary Sources	*0*	*0*
Manganese	2,327	443
Area Sources	*2,018*	*384*
On-Road Mobile Sources	*178*	*34*
Stationary Sources	*125*	*24*
Off-Road Mobile Sources	*6*	*1*
Nickel	354	433
Stationary Sources	*137*	*167*
Area Sources	*119*	*146*
On-Road Mobile Sources	*71*	*87*
Off-Road Mobile Sources	*27*	*33*
Diesel Particulate Matter (DPM)	56,559	194
Off-Road Mobile Sources	*44,150*	*151*
On-Road Mobile Sources	*10,904*	*37*
Stationary Sources	*1,504*	*6*
Area Sources	*0*	*0*

[28] Based on Appendix 3a: Toxic Pollutants

[29] Based on Appendix 3a: Toxic Pollutants

Benzene	32,578	186
Off-Road Mobile Sources	*17,196*	*98*
On-Road Mobile Sources	*14,601*	*83*
Stationary Sources	*409*	*3*
Area Sources	*372*	*2*
Formaldehyde	66,018	126
Off-Road Mobile Sources	*39,389*	*75*
On-Road Mobile Sources	*15,103*	*29*
Area Sources	*10,232*	*20*
Stationary Sources	*1,304*	*2*
Cadmium	60	51
Area Sources	*40*	*34*
Stationary Sources	*18*	*15*
Off-Road Mobile Sources	*1*	*1*
On-Road Mobile Sources	*1*	*1*
1,3-Butadiene	5,466	47
Off-Road Mobile Sources	*3,462*	*30*
On-Road Mobile Sources	*1,756*	*15*
Area Sources	*164*	*1*
Stationary Sources	*83*	*1*
Arsenic	39	44
Area Sources	*37*	*42*
On-Road Mobile Sources	*1*	*1*
Stationary Sources	*1*	*1*
Off-Road Mobile Sources	*0*	*0*
Acrolein	825	40
Off-Road Mobile Sources	*672*	*33*
On-Road Mobile Sources	*95*	*4*
Area Sources	*36*	*2*
Stationary Sources	*21*	*1*

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Figure 3-13. 2018 Chronic Non-Cancer Toxicity Weighted Emissions[30]

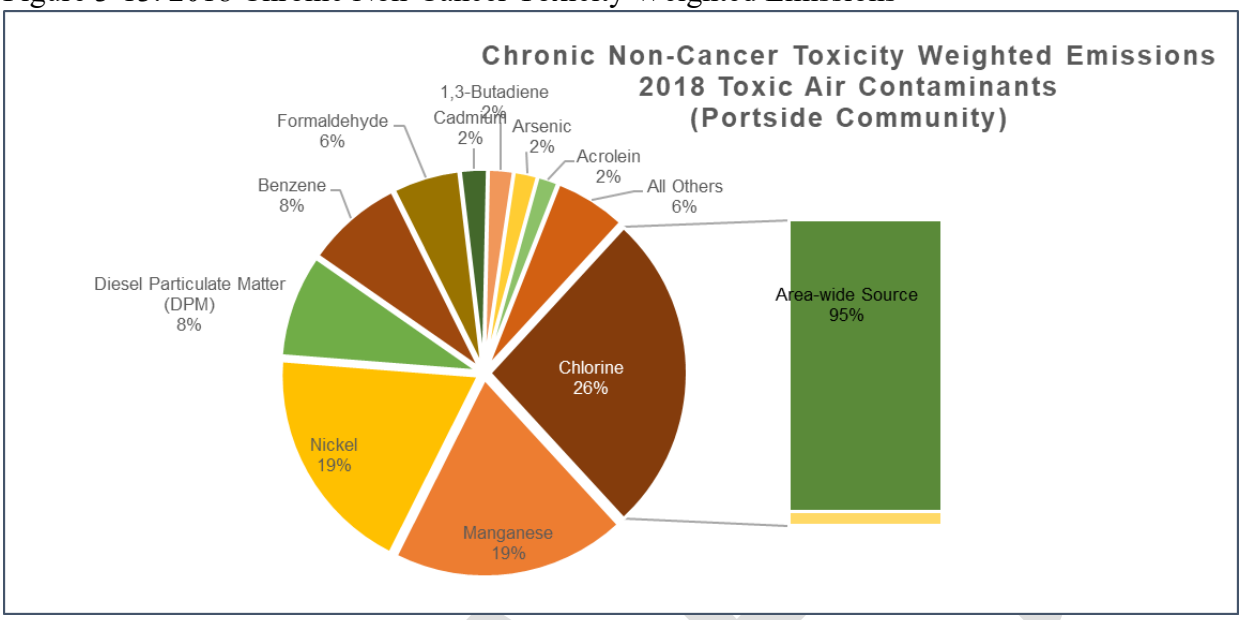

Table 3-6. Top 10 TACs Based on Acute Non-Cancer Risk Toxicity Weighted Emissions Within the Community[31]

TAC	Total Emissions (lbs/year)	Acute Non-Cancer Risk Weighted
Nickel (total)	354	303
Stationary Sources	*137*	*117*
Area Sources	*119*	*102*
On-Road Mobile Sources	*71*	*60*
Off-Road Mobile Sources	*27*	*23*
Benzene	32,578	207
Off-Road Mobile Sources	*17,196*	*109*
On-Road Mobile Sources	*14,601*	*93*
Stationary Sources	*409*	*3*
Area Sources	*372*	*1*
Formaldehyde	66,018	206
Off-Road Mobile Sources	*39,389*	*123*
On-Road Mobile Sources	*15,103*	*47*
Area Sources	*10,232*	*32*
Stationary Sources	*1,304*	*4*
Acrolein	825	56
Off-Road Mobile Sources	*672*	*46*
On-Road Mobile Sources	*95*	*7*
Area Sources	*36*	*2*
Stationary Sources	*21*	*1*

[30] Based on Appendix 3a: Toxic Pollutants
[31] Based on Appendix 3a: Toxic Pollutants

Arsenic	39	33
Area Sources	*37*	*31*
On-Road Mobile Sources	*1*	*1*
Stationary Sources	*1*	*1*
Off-Road Mobile Sources	*0*	*0*
Acetaldehyde	39,100	14
Off-Road Mobile Sources	*17,734*	*6*
Area Sources	*13,676*	*5*
On-Road Mobile Sources	*7,339*	*3*
Stationary Sources	*351*	*0*
Ammonia	230,157	12
Area Sources	*147,567*	*8*
On-Road Mobile Sources	*82,342*	*4*
Stationary Sources	*247*	*0*
Off-Road Mobile Sources	*0*	*0*
Mercury	35	10
Area Sources	*31*	*9*
Stationary Sources	*4*	*1*
Off-Road Mobile Sources	*0*	*0*
On-Road Mobile Sources	*0*	*0*
Copper	4,938	8
Stationary Sources	*3,738*	*6*
On-Road Mobile Sources	*1,200*	*2*
Off-Road Mobile Sources	*0*	*0*
Area Sources	*0*	*0*
Chlorine	7,064	6
Area Sources	*6,7334*	*5*
On-Road Mobile Sources	*328*	*1*
Off-Road Mobile Sources	*1*	*0*
Stationary Sources	*0*	*0*

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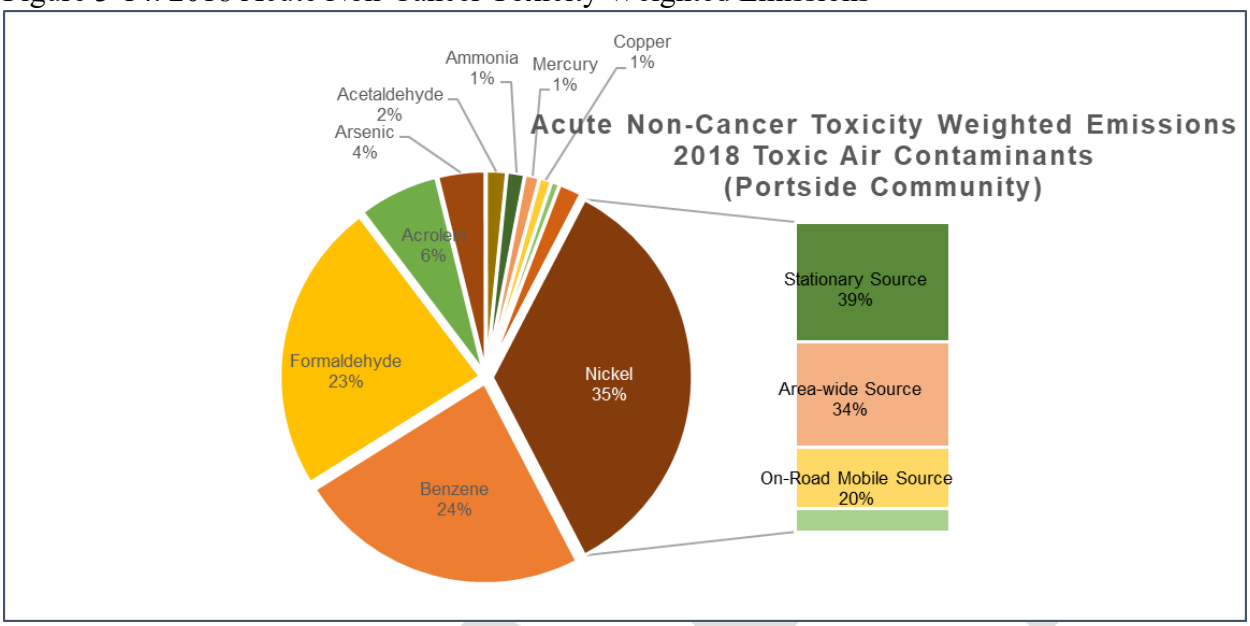
Figure 3-14. 2018 Acute Non-Cancer Toxicity Weighted Emissions[32]



Conclusion

The main sources of air pollution in the San Diego Portside Community are off-road mobile sources, on-road mobile sources, and certain area source emissions, as shown in Table 3-7, below.

Table 3-7. 2018 Community Emissions Contributions Summary

Source Category	Criteria Pollutants[33]
Mobile-Off-Road	37.1%
Area	31.1%
Mobile-On-Road	23.0%
Stationary	7.8%

NO_x emissions in the Portside Community are dominated by mobile sources, mostly off-road, that account for approximately 95% of the NO_x and DPM total emissions, as shown in Tables 3-1 and 3-2. Commercial harbor craft, ocean going vessels, light duty vehicles, and heavy-heavy duty vehicles are the major NO_x emission contributors, as shown in Figures 3-2 and 3-3. Stationary and area NO_x emissions are primarily from fuel combustion for residential and industry and only make up around 5% of NO_x emissions in the Portside Community, as shown in Tables 3-1 and 3-3 and Figure 3-4.

ROG emissions are driven by area sources, followed by mobile sources. As shown in Table 3-1, area sources and mobile sources combined make up over 80% of VOC emissions in the Portside Community. Area source ROG emissions are primarily from the evaporation of consumer products, as shown in Figure 3-4. Off-road ROG emissions are driven by off-road industrial

[32] Based on Appendix 3a: Toxic Pollutants
[33] Based on Table 3-1

equipment and recreational watercraft, as shown in Figure 3-2. On-road mobile source ROG emissions are almost entirely driven by light weight passenger vehicles, as shown in Figure 3-3. Stationary source ROG emissions are primarily from marine and other coating operations, and solvent evaporation operations (such as solvent cleaning and gasoline storage and marketing), as shown in Table 3-3.

Approximately 62% of $PM_{2.5}$ emissions are from miscellaneous area sources, such as commercial cooking, construction and demolition, and paved road dust, as shown in Table 3-1 and Figure 3-4. Mobile source $PM_{2.5}$ emissions are led by light duty vehicles, off-road equipment, and commercial harbor craft, as shown in Figures 3-2 and 3-3 as well as Appendix 3b. Stationary source operations contribute only approximately 4% of the $PM_{2.5}$ emissions in the community, as shown in Table 3-1.

Based on the limited risk information currently available from exposure to TACs in the Portside Community, the cancer risk is driven by DPM[34], hexavalent chromium[35], and benzene and 1,3-butadiene[36]. For the non-cancer risks (short- and long-term), risk estimates are not currently available. Toxicity Weighted Emissions are used to compare different TACs to inform which TACs should be prioritized for reduction in emissions and/or exposure as they take the amount of emissions and their toxicity to allow an equal comparison. Figures 3-12, 3-13 and 3-14 present these weighted emissions for the Portside Community. The cancer risk weighted emissions (Figure 3-12) are consistent with the risk information available, as they are lead by DPM, hexavalent chromium (from construction and demolition operations and certain stationary source welding operations)[37], benzene and 1,3-butadiene (from mobile sources)[38]. For the non-cancer chronic (long-term) TACs (Figure 3-13), the highest weighted emissions are for chlorine and manganese (from area sources)[39] and nickel (from stationary source welding and abrasive blasting operations and from area sources)[40]. The leading weighted emissions for acute (short-term) non-cancer TACs (Figure 3-14) are nickel (from stationary source welding and abrasive blasting operations and from area sources)[41] and formaldehyde and benzene (primarily from mobile sources)[42].

[34] CARB's estimated statewide cancer risk due to DPM is 460 per one million in 2014
[35] Based on Health Risk Assessments for sources under the Air Toxics "Hot Spots" Program
[36] Appendix 4 – Technical Assessment Monitoring Data
[37] Appendix 3a: Toxic Pollutants
[38] Appendix 3a: Toxic Pollutants
[39] Appendix 3a: Toxic Pollutants
[40] Appendix 3a: Toxic Pollutants
[41] Appendix 3a: Toxic Pollutants
[42] Appendix 3a: Toxic Pollutants

References

Stationary source emission inventories for permitted facilities within San Diego County are available at:
https://www.sandiegocounty.gov/content/sdc/apcd/en/engineering/Permits/Engineering_Emissions_Inventory/Engineering_Phase_2_Toxics_Facility_Emissions.html

CARB's Facility Search Engine provides information on District reported facility emissions:
https://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php

CARB's Pollution Mapping Tool presents facility-specific emissions of criteria, toxics and greenhouse gas emissions for large facilities subject to CARB's Cap and Trade Greenhouse Gas Emissions Mandatory Reporting Regulation. The tool allows users to visually locate, view and analyze emissions in any region across the state: https://ww3.arb.ca.gov/ei/tools/pollution_map/

CARB's Emission Inventory Website provides information and data on regional inventories used in State Implementation Plans (SIP), including historical as well as projections of anticipated future year emissions (CEPAM 2016 SIP), and descriptions of stationary, area and mobile source categories and the types of sources that are included in them:
https://ww2.arb.ca.gov/emission-inventory-data
CEPAM: 2016 SIP – Standard Emissions Tool (CEPAM v1.05):
https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php official 2016 SIP emission inventory

CARB's Area Source Methodologies webpage provides the most recent versions of District and/or CARB methodologies for estimating area source emissions: https://ww2.arb.ca.gov/index-methodologies-major-category

CARB's Speciation profiles website provides current particulate matter (PM) and total organic gas (TOG) speciation profiles. Speciation profiles provide estimates of the chemical composition of emissions and are used in the emissions inventory and air quality models. CARB maintains and updates estimates of the chemical composition and size fractions of PM, and the chemical composition and reactive fractions of TOG for a variety of emission source categories:
https://ww2.arb.ca.gov/speciation-profiles-used-carb-modeling

CARB's On-road mobile source webpage provides documentation and links to CARB's EMFAC model. EMFAC is the regulatory model for estimating emissions from on-road sources:
https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-documentation

CARB's Off-road mobile source webpage provides information on methodologies and models used to estimate off-road emissions: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-documentation-0

OEHHA's cancer risk values and reference exposure levels for TACs:
https://oehha.ca.gov/media/CPFs042909.pdf and https://oehha.ca.gov/air/general-info/oehha-

acute-8-hour-and-chronic-reference-exposure-level-rel-summary. CARB also posts this information at: https://ww2.arb.ca.gov/sites/default/files/classic//toxics/healtheval/contable.pdf.

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