

ABSTRACT

The California Environmental Quality Act (CEQA) review process requires projects to mitigate their significant impacts. The Sacramento Metropolitan Air Quality Management District (SMAQMD or District) recommends mitigation of nitrogen oxide (NOx) and particulate matter (PM) exhaust emissions from off-road construction equipment used to build land development and transportation projects that exceed the District’s construction thresholds of significance. The recommended mitigation includes reducing off-road equipment emissions of NOx and PM by 20% and 45%, respectively, compared to the State fleet average NOx and PM emissions. The mitigation, titled Enhanced Exhaust Control Practices, is included in chapter 3 of the SMAQMD’s *Guide to Air Quality Assessment in Sacramento County* (CEQA Guide) and in Appendix A.

The Enhanced Exhaust Control Practices were instituted in the late 1990s as a strategy to obtain emission reductions to support the 1994 Sacramento Regional Ozone Attainment Plan for the Federal 1-hour ozone standard. CEQA review provided the means to implement the strategy, which still exists today in the SMAQMD’s construction mitigation program.

The SMAQMD receives on average 35 plans each year from construction companies. The plans meet the Enhanced Exhaust Control Practice requirements, resulting in an average reduction of 0.39 tons of NOx/day. Construction companies are also required to provide monthly reports of equipment usage to show continued compliance with the mitigation. Figure 1 shows plan submittals and Figure 2 shows emission reductions over the past 10 years from the construction mitigation program.

Figure 1

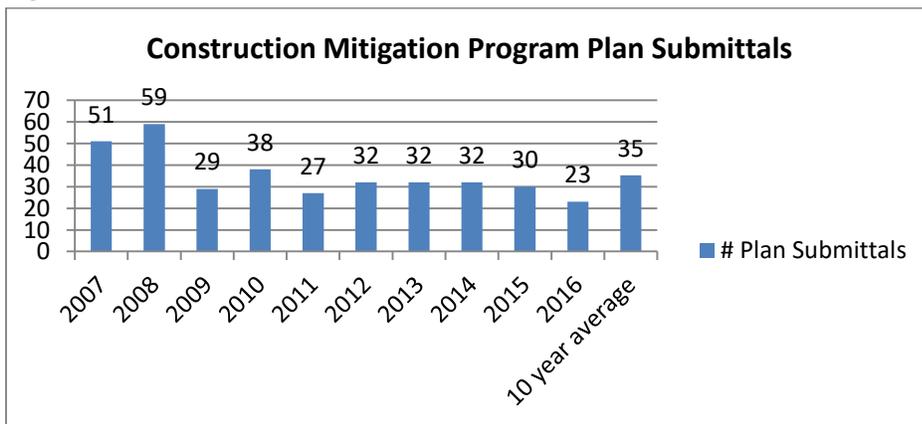
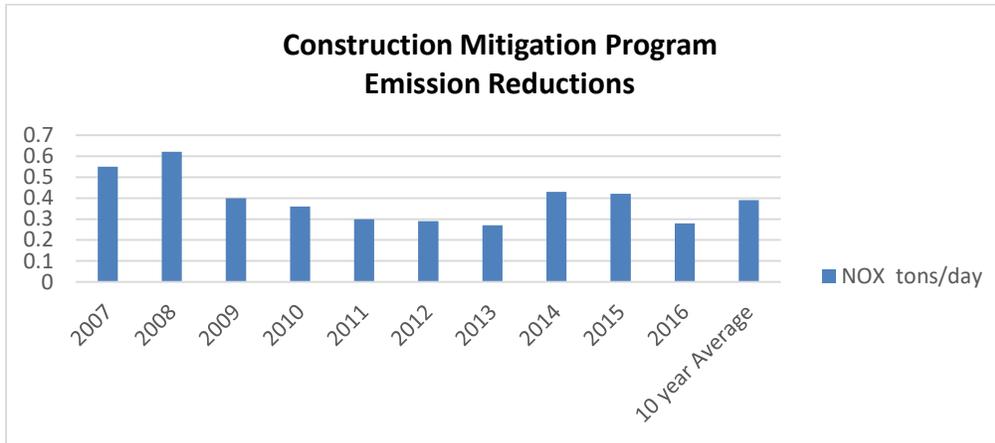


Figure 2



In 2017 construction industry representatives voiced two concerns regarding the Enhanced Exhaust Control Practices. First, that the mitigation program reductions will become unachievable due to the California Air Resources Board's (CARB) In-Use Off-Road Diesel Vehicles Regulation (Off-Road Regulation). The Off-Road Regulation requires emission reductions from construction fleets, which will lower the State fleet average NOx and PM emissions over time, and make it difficult for a company to demonstrate that equipment being used on a construction site is cleaner than the State fleet average emission levels. The second concern relates to the monthly reporting requirement, which they believe is burdensome. Construction companies are required to track hours of use for each piece of equipment, complete an equipment list, and submit the list to the SMAQMD by the 10th of each month for each construction project. Use of rental equipment and subcontractor equipment must also be included in the monthly reporting.

A change to SMAQMD's Enhanced Exhaust Control Practices can result in more alignment with the Off-Road Regulation, provide some streamlining to the industry, and continue to provide all feasible air quality mitigation for CEQA compliance.

CONSTRUCTION MITIGATION PROGRAM HISTORY

The 1994 Sacramento Regional Ozone Attainment Plan (SIP) for the Federal 1-hour standard included commitments to reduce 5 tons/year of NOx from mobile measures and 1 ton/year each of ROG and NOx from Transportation and Land Use Measures. As part of SIP implementation, in 1994, the SMAQMD published CEQA thresholds of significance, including 85 pounds/day of NOx from construction activity. On March 28, 2002, the Board of Directors formally adopted the CEQA thresholds of significance. The thresholds justification document included the goal of obtaining 0.89 tons/day of NOx emissions from construction projects to support the 1994 SIP commitment. Although the emission reductions from land

use measures were ultimately not approved by U.S. EPA for use in the SIP, emission reductions from implementing the construction mitigation program contribute to attainment efforts.

The goal of the construction mitigation program is to have construction companies increase the use of new equipment (greater than 50 horsepower) when building a project in the Sacramento Federal Ozone Non-Attainment area. In 1994, this meant construction companies moving from using engines with uncontrolled emissions (tier 0 engines) to emission controlled engines (tier 1 or higher engines as they became available).

Unlike 1994, when cleaner equipment had not penetrated the market, today there is an abundance of equipment with much cleaner engines, and CARB requires the phase out of older engines that do not meet the current standards. The off road engine emissions standards are presented in Table 1 below to show the timing of introduction of cleaner engines.

Table 1. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75			5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a									
11≤hp<25	See Table 2 footnote (a)					7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25≤hp<50	-					7.1 / 4.1 / 0.60			5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22			3.5 / 4.1 / 0.02						
50≤hp<75												3.5 / 3.7 / 0.22 ^c			3.5 / 3.7 / 0.02 ^c						
75≤hp<100						- / 6.9 / - / - ^b			5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.30			0.14 / 0.30 / 3.7 / 0.015 ^b						
100≤hp<175									4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22			0.14 / 2.5 / 3.7 / 0.015 ^{b,c}						
175≤hp<300									4.9 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^a			0.14 / 0.30 / 2.2 / 0.015 ^b						
300≤hp<600	-	1.0 / 6.9 / 8.5 / 0.40 ^b				4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^a			0.14 / 1.5 / 2.6 / 0.015 ^{b,c}			0.14 / 0.30 / 2.2 / 0.015 ^b						
600≤hp≤750															0.30 / 2.6 / 2.6 / 0.07 ^b						
Mobile Machines > 750hp															0.30 / 2.6 / 2.6 / 0.07 ^b						
750hp<GEN ≤1200hp	-	1.0 / 6.9 / 8.5 / 0.40 ^b				4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^a			0.14 / 0.50 / 2.6 / 0.015 ^b			0.14 / 0.30 / 2.2 / 0.015 ^b						
GEN>1200 hp															0.30 / 0.50 / 2.6 / 0.07 ^b						

The SMAQMD program applies to engines with 50 horsepower or greater

: Tier 1	: Tier 2	: Tier 3	: Tier 4 Interim / Final
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When SMAQMD staff review compliance with the Enhanced Exhaust Control Practices, they calculate emission reductions resulting from implementing the mitigation. Emission reduction information is

included in the SMAQMD's Annual Progress Report (for the California Clean Air Act). The last 10 years of reported reductions from the construction mitigation program averaged 0.39 tons/day NOX (shown in Table 2).

Some projects have also been required to pay a mitigation fee to reduce NOx emissions to 85 pounds/day. SMAQMD funds emission reduction projects with mitigation fees, achieving total reductions of 0.483 tons/day NOX over the past 6 years (shown in Table 3). Funds are currently being used to obtain emission reductions through SMAQMD's Wood Stove/Fireplace Change Out and Check Before Your Burn programs.

Table 2 – Reductions from Program

Calendar Year	NOX tons/day
2007	0.55
2008	0.62
2009	0.40
2010	0.36
2011	0.30
2012	0.29
2013	0.27
2014	0.43
2015	0.42
2016	0.28
Average	0.39

Table 3 – Reductions from Fees

NOX mitigation fee program	
Calendar year	Ton/day reduced
2011	0.068
2012	0.068
2013	0.068
2014	0.069
2015	0.069
2016	0.070
Total	0.483

THE ROLE OF CEQA

The California Environmental Quality Act (CEQA) requires that public agencies (e.g., local, county, regional, and state government) consider and disclose the environmental effects of their decisions to the public and agency decision makers. Emissions associated with construction of a land development or transportation project must be analyzed, quantified, and disclosed. CEQA also requires an agency to determine if the emissions may have a significant impact on the environment. The CEQA construction threshold of 85 pounds/day of NOx is used by the SMAQMD to determine which construction projects may result in significant adverse effects on the environment.

CEQA mandates that agencies implement feasible mitigation measures or alternatives that would mitigate significant adverse effects on the environment. When project construction emissions are expected to exceed 85 pounds/day of NOx, the Enhanced Exhaust Control Practices are recommended to reduce off-road equipment emissions of NOx and PM emissions by 20% and 45%, respectively,

compared to the State fleet average emissions. Emissions remaining above the 85 pounds/day NOx threshold after applying the Enhanced Exhaust Control Practices are often mitigated with payment of a fee to the SMAQMD. SMAQMD obtains emission reductions with those fees by funding emission reduction projects, which supports attainment efforts and reduces construction project emissions below the significance threshold. The use of newer model engines in construction equipment, cleaner fuels, and mitigation fees to reduce construction emissions impacts have been generally accepted as feasible mitigation for construction projects.

CARB IN-USE OFF-ROAD REGULATION

In July 2007, the CARB adopted the In-Use Off-Road Diesel Vehicles Regulation (Off-Road Regulation). In support of its Diesel Risk Reduction Program, the Off-Road Regulation aims to reduce PM and NOx emissions from the construction industry along with other off-road diesel vehicle sectors. During the following 4 years, CARB made amendments to the Off-Road Regulation due to the economic downturn, legislative action, and inventory updates.

The Off-Road Regulation limits idling, requires vehicles to be labeled and reported to CARB, restricts the addition of older vehicles into fleets, and requires fleets to reduce emissions by retiring, replacing, or repowering older engines, or installing exhaust retrofits.

Construction fleets are required to reduce emissions incrementally beginning in 2014 and 2017 for large and medium fleets respectively, through 2023. Small fleets must reduce emissions beginning in 2019 and ending in 2028. CARB provides fleets with an online reporting and tracking system, Diesel Off-road Online Reporting System (DOORS), to assist in compliance.

As expected, due to the Off-Road Regulation requiring cleaner equipment, the off-road equipment emissions inventory for Sacramento County shows a decline in emissions from the construction sector over time (see Table 4).

Table 4 – Sacramento County Off-Road Equipment Emissions Inventory

Inventory Year	NOX tons/day	PM tons/day
2000	9.85	0.64
2010	5.33	0.40
2015	4.79	0.35
2020	3.44	0.23
2030	2.55	0.18

COMPARING CONSTRUCTION MITIGATION PROGRAM TO THE OFF-ROAD REGULATION

It is important to note the SMAQMD's construction mitigation program focuses on emissions reductions from the fleet of vehicles working on a specific construction site, while the Off-Road Regulations governs emissions from the entire fleet a company owns, regardless of where it is used within the state. Consequently, absent the construction mitigation program, a company could meet the Off-Road Regulation, but still operate its older, more emissive equipment in the Sacramento region.

Due to the variability in job sites, construction fleet sizes, and fleet inventories, there is not one set of data available to the SMAQMD to easily demonstrate that fleets will not be able to meet the SMAQMD's 20% NO_x reduction requirement. This section utilizes fleet emissions information from the Diesel Off-road Online Reporting (DOORS) system, voluntarily provided by four construction companies that work regularly in Sacramento County to describe the case. Three of the companies are considered large fleets. One of the companies is considered a small fleet.

The SMAQMD's tool used in the construction mitigation program calculates the State fleet average as 4.57 g/bhp-hr (grams/brake horsepower-hour) of NO_x in 2017, then declines annually to 1.56 g/bhp-hr of NO_x in 2029 (remaining constant at 1.56 g/bhp-hr after 2029). The decline is due to fleet turnover, spurred by the implementation of the Off-Road Regulation, which is fully implemented in 2029, hence the 1.56 g/bhp-hr of NO_x staying constant.

The large fleets have fleet average targets assigned by the Off-road Regulation for calendar years 2018-2023, then maintain constant after 2023. Table 5 shows the three large fleets' average targets compared to the SMAQMD's 20% NO_x reduction mitigation requirement targets from 2018-2029. Fleet average targets apply to the entire construction fleet; therefore, the emissions from equipment working on one site may vary (higher or lower) from the entire fleet average.

Table 5

	State Large Fleet Targets(1)	SMAQMD Mitigation Targets(2)
Year	NOx (g/bhp-hr)	NOx (g/bhp-hr)
2018	4.17	3.18
2019	3.57	2.90
2020	2.97	2.67
2021	2.37	2.41
2022	1.83	2.09
2023	1.50	1.90
2024	1.50	1.78
2025	1.50	1.58
2026	1.50	1.47
2027	1.50	1.38
2028	1.50	1.31
2029	1.50	1.25

(1) Average of 3 large fleets in Sacramento

(2) 20% reduction from state fleet average

To meet the SMAQMD's 20% NOx reduction mitigation requirement, these projects would need to maximize the use of Tier 3 and 4 engines. Currently, while fleets are reportedly positioning their cleanest equipment on projects with the Enhanced Exhaust Control Practices to meet the requirements, more projects are being constructed with the mitigation requirement and fleets do not own enough Tier 3 and 4 equipment to meet the reduction targets at all the construction sites. Some of the larger fleets are also working in other air districts on projects that require Tier 4 engines be used, further compounding availability of the newest equipment.

As the Off-Road Regulation ramps up, by 2021 the Table 5 shows the fleet target will be cleaner than the SMAQMD's 20% NOx reduction target through 2025. Additionally, large fleets maintaining a 1.50 g/bhp-hr of NOx fleet average beyond 2023 won't be able to meet the SMAQMD's 20% NOx reduction mitigation requirement from 2026 through 2029, unless further engine standards are adopted and/or zero emission technologies become available and are introduced into the construction equipment fleet, providing further options for reducing fleet emissions.

The small fleet information obtained indicates the company's fleet average target is 6.3 g/bhp-hr of NOx in 2019, which would not meet the 2019 SMAQMD's 20% NOx reduction mitigation requirement of 2.90 g/bhp-hr. Even with a fleet average target of 1.4 g/bhp-hr of NOx in 2028, the fleet could not meet the SMAQMD's 20% NOx reduction mitigation requirement of 1.31 g/bhp-hr in that year. Already, the

District staff have observed that small fleets have not been able to comply with the SMAQMD's Enhanced Exhaust Control Practices. As a result, small fleets are generally not working on the construction projects that include the mitigation, or are working along with other larger fleets whose emission reductions can offset the small fleet's emissions. Some companies with small fleets have paid mitigation fees when they are not able to demonstrate compliance with the SMAQMD's mitigation.

The Off-Road Regulation and SMAQMD's Enhanced Exhaust Control Practices target the same emissions inventory category. The Off-Road Regulation requires reductions over time by entire fleets. SMAQMD's Enhanced Exhaust Control Practices requirements to reduce emissions from a particular project when compared to the State fleet average will be increasingly challenging as the Off-Road Regulation is implemented, because that regulation will be driving down the State fleet average emissions.

SUMMARY AND RECOMMENDATIONS

While there is no current SMAQMD commitment to obtain emission reductions from the construction sector for the SIP, continuing to obtain reductions from the CEQA construction mitigation program can support attainment efforts of the Federal and State air quality standards and provide public agencies an established means to demonstrate compliance with CEQA.

Because construction emissions must be considered, disclosed, and a significance determination made for CEQA, SMAQMD staff is recommending continuing the use of CEQA thresholds of significance for construction emissions.

The State Off-Road Regulation is achieving emission reductions from the off-road construction equipment sector of the inventory. Because construction fleets are subject to the Off-Road Regulation, State fleet averages are trending downward, making it increasingly difficult for projects to demonstrate an additional 20% NO_x and 45% PM reduction from the State fleet average from the fleet working on one construction site.

Staff recommends phasing out 20%/45% reduction requirement in the current Enhanced Exhaust Control Practices.

Since construction emissions will continue to be analyzed in CEQA review to identify potentially significant air quality impacts, projects that are expected to exceed the 85 pounds/day NO_x significance threshold will still be required to implement all feasible mitigation (use of the cleanest equipment and fuels and mitigation fees) to reduce emissions below the threshold. Requiring the use of the cleanest equipment is still necessary, because the fleets contain a mix of new and old engines and lifting the

requirement entirely would allow companies to use the dirtiest engines in Sacramento – which the Enhanced Exhaust Control Practices program was intended to prevent.

Staff recommends replacing the current Enhanced Exhaust Control Practices with alternative mitigation language that will include established feasible mitigation.

There are numerous projects already entitled by Lead agencies that require the Enhanced Exhaust Control Practices. SMAQMD staff is providing the following strategies as possible options for moving the CEQA construction mitigation program forward without the Enhanced Exhaust Control Practices:

Options for entitled projects that have the Enhanced Exhaust Control Practices mitigation but have not yet started construction.

1. Fleet demonstrates it can meet the 20% NO_x and 45% PM₁₀ reductions. EXISTING MITIGATION LANGUAGE IS ATTACHED IN APPENDIX A.
or
2. Fleet pays fees for excess emissions if 20% NO_x and 45% PM₁₀ reductions cannot be achieved.
or
3. Fleet provides CARB compliance certificate for In-Use Off-Road Regulation and pays mitigation fees for emissions exceeding 85 pounds/day NO_x.

Option for projects not yet entitled.

1. Continue to use the 85 pounds/day NO_x significance threshold and mitigate with all feasible measures, including a fee if needed to reduce actual construction equipment emissions below the 85 pounds/day threshold. Project proponents would submit an equipment list with emissions calculations at the beginning of the project to compare to the threshold. If emissions calculations showed a fee was needed, a down payment of fees would be calculated (5 or 10% of the total). The proponent would reconcile emissions at the end of the project by submitting a final equipment list with emissions calculations. The initial equipment submittal would also include a copy of the CARB compliance certificate for each contractor working on the project. EXAMPLE MITIGATION LANGUAGE IS ATTACHED IN APPENDIX B.

APPENDIX A

EXISTING MITIGATION LANGUAGE

ENHANCED EXHAUST CONTROL PRACTICES

1. The project representative shall submit to the lead agency and District a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 40 or more hours during any portion of the construction project.
 - The inventory shall include the horsepower rating, engine model year, and projected hours of use for each piece of equipment.
 - The project representative shall provide the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman.
 - This information shall be submitted at least 4 business days prior to the use of subject heavy-duty off-road equipment.
 - The District's [Equipment List](#) Form can be used to submit this information.
 - The inventory shall be updated and submitted monthly throughout the duration of the project, except that an inventory shall not be required for any 30-day period in which no construction activity occurs.
2. The project representative shall provide a plan for approval by the lead agency and District demonstrating that the heavy-duty off-road vehicles (50 horsepower or more) to be used in the construction project, including owned, leased, and subcontractor vehicles, will achieve a project wide fleet-average 20% NO_x reduction and 45% particulate reduction compared to the most recent California Air Resources Board (ARB) fleet average.
 - This plan shall be submitted in conjunction with the equipment inventory.
 - Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.
 - The District's [Construction Mitigation Calculator](#) can be used to identify an equipment fleet that achieves this reduction.
3. The project representative shall ensure that emissions from all off-road diesel powered equipment used on the project site do not exceed 40% opacity for more than three minutes in any one hour.

- Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately.
 - Non-compliant equipment will be documented and a summary provided to the lead agency and District monthly.
 - A visual survey of all in-operation equipment shall be made at least weekly.
 - A monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey.
- 4.** The District and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this mitigation shall supercede other District, state or federal rules or regulations.

APPENDIX B

EXAMPLE POSSIBLE MITIGATION LANGUAGE

ENHANCED CONSTRUCTION MITIGATION

The project representative shall submit to the lead agency and District a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 8 or more hours during any portion of the construction project. All fleets must include a copy of their CARB compliance certificate for the In-Use Off-Road Regulation as part of the submittal.

- The inventory shall include the horsepower rating, engine model year, and projected hours of use for each piece of equipment.
- The project representative shall provide the anticipated construction timeline including start date, and names and phone numbers of the project manager and on-site foreman.
- This information shall be submitted at least 4 business days prior to the use of subject heavy-duty off-road equipment.
- The District's [Construction Mitigation Tool](#) can be used to submit this information.
- The inventory shall be updated and submitted at the end of the job.

The project representative shall provide a plan for approval by the lead agency and District demonstrating that the heavy-duty off-road vehicles (50 horsepower or more) to be used in the construction project, including owned, leased, and subcontractor vehicles, will reduce emissions to 85 pounds/day of NO_x.

- This plan shall be submitted in conjunction with the equipment inventory.
- Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.
- The District's [Construction Mitigation Tool](#) can be used to identify the equipment fleet's emissions.
- Emissions that continue to exceed 85 pounds/day of NO_x will be mitigated by payment of a mitigation fee to the District.

The District and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this mitigation shall supercede other District, state or federal rules or regulations.