

The In-Use Off-Road Diesel Regulation and SOON and Moyer Incentive Funding



South Coast Air Quality Management District
&
California Air Resources Board

August 14, 2008

Off-Road Regulation Requirements



Elizabeth Yura
California Air Resources Board

Applicability

Regulation applies to any person, business, or government agency who owns or operates any diesel-fueled or alternative diesel fueled off-road vehicle horsepower within California

- Applies to vehicles \geq 25 horsepower
- Applies to the “drive” engine only
- Includes out-of-state vehicles brought into California
- Excludes vehicles primarily used ($> 50\%$ time) for agricultural operations
- Excludes vehicles used for personal use

Applicability Cont.

- What is considered an off-road vehicle?
 - Vehicles that were intended to be used off-road
 - Cannot be registered to drive safely on-road
 - A workover rig
- Excludes vehicles designed to operate on-road regardless of use
- Current proposal to add 2 engine cranes (both engines)

Requirements Vary by Fleet Size

Fleet Size Category	Description
Small	Fleet with $\leq 2,500$ hp, or Municipal fleet in low population county
Medium	Fleet with 2,501 to 5,000 hp
Large	Fleet with more than 5,000 hp, or State or Federal Government fleet

Current Requirements

Starting June 15, 2008:

- 5 Minute limit on idling
 - Exemptions listed in regulation
 - Can apply to ARB for idling exemption not listed
- Disclosure of regulation applicability:
 - Persons selling in California to California buyer
 - Must include disclosure on invoice or bill of sale
 - Disclosure records must be kept for 3 years

“When operated in California, any off-road diesel vehicle may be subject to the California Air Resources Board In-Use Off-road Diesel Vehicle Regulation. It therefore could be subject to retrofit or accelerated turnover requirements to reduce emissions of air pollutants. For more information, please visit the California Air Resources Board website at <http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm>”

Beginning March 1, 2009

- Written 5 minute idling policy should be established by fleet owner
 - Required for medium and large fleets
 - Must make idling policy available to all vehicle operators in fleet
- Can no longer add Tier 0 vehicles to fleet

Initial Reporting

- Initial reporting varies by fleet size
 - Fleets must report their fleet information as it was on March 1, 2009
 - Fleets must report their information to ARB by their designated reporting date
 - Reporting is free, no cost to fleets to register vehicles with ARB

Fleet Size Category	Initial Reporting Date
Large	April 1, 2009
Medium	June 1, 2009
Small	August 1, 2009

Vehicle Labeling

- All vehicles subject to the regulation must be labeled
 - ARB assigns Equipment Identification Number (EIN) after initial reporting period; label stays with vehicle for life
 - Fleets must label vehicles within 30 days of receiving EIN; labels not issued by ARB
 - Label dimensions/specifications found in section 2449(f)



Reporting Tool: DOORS

- Diesel Off-road On-line Reporting System
 - Gives fleets a tool to compile fleet information
 - Standardizes the way fleet information is submitted to ARB for review
 - Meets the reporting requirements stated in the regulation
 - Will include compliance planning tools in future
- Staff currently looking for fleets to test DOORS
 - Cory Parmer (pparmer@arb.ca.gov) for information
 - Will issue EINs to fleets who enter their fleet information into DOORS

Compliance Requirements

- Compliance requirements must be met by March 1 of each year

Fleet Size Category	Dates and Requirements
Large*	2010-2020 PM and NOx
Medium*	2013-2020 PM and NOx
Small	2015-2025 PM only

* Same requirements for large and medium fleets, only initial compliance date varies.

NOx Requirements

Two ways to meet the NOx requirements (the lesser of the two can be done):

- NOx fleet average targets requirements
 - Meet NOx emissions targets set in regulation by any means

or

- Best Available Control Technology (BACT) requirements:
 - Turn over engines at a rate of 8% of total fleet horsepower per year (after 2015, the 8% turnover rate increases to 10%)

NO_x Emission Factors*

NO _x Emissions Factors by Horsepower and Year (g/bhp-hr)								
	Horsepower Groups							
Year	25-49	50-74	75-99	100-174	175-299	300-599	600-750	750+
1900	7.2	14.8	14.8	15.9	15.9	15.2	15.2	15.2
1969	7.2	14.8	14.8	15.9	15.9	15.2	15.2	15.2
1970	7.2	14.8	14.8	14.8	14.8	14.1	14.1	14.1
1972	7.2	14.8	14.8	13.6	13.6	13.0	13.0	13.0
1980	7.2	14.8	14.8	12.5	12.5	11.9	11.9	11.9
1988	7.1	9.9	9.9	9.3	9.3	8.9	8.9	8.9
1989	7.1	9.9	9.9	9.3	9.3	8.9	8.9	8.9
1996	7.1	9.9	9.9	9.3	6.9	6.9	6.9	8.9
1997	7.1	9.9	9.9	6.9	6.9	6.9	6.9	8.9
1998	7.1	6.9	6.9	6.9	6.9	6.9	6.9	8.9
1999	6.2	6.9	6.9	6.9	6.9	6.9	6.9	8.9
2000	6.2	6.9	6.9	6.9	6.9	6.9	6.9	6.9
2001	6.2	6.9	6.9	6.9	6.9	4.2	6.9	6.9
2002	6.2	6.9	6.9	6.9	6.9	4.2	4.2	6.9

* Only partial chart shown

NOx Fleet Average Calculation Example

Example fleet of 3 vehicles:

Vehicle 1: 1996, 100 hp, NOx EF = 9.3

Vehicle 2: 2000, 200 hp, NOx EF = 6.9

Vehicle 3: 2002, 300 hp, NOx EF = 4.2

NOx Fleet Average

$$= [(9.3 \times 100) + (6.9 \times 200) + (4.2 \times 300)] / (100 + 200 + 300)$$

$$= 6.0$$

NOx Fleet Average Emission Targets

NOx Fleet Average Targets: MEDIUM AND LARGE FLEET											
Horsepower Group	2010*	2011*	2012*	2013	2014	2015	2016	2017	2018	2019	2020
25-49 hp	5.8	5.6	5.3	5.1	4.9	4.6	4.4	4.2	4.0	3.7	3.5
50-74 hp	6.5	6.2	5.8	5.5	5.1	4.8	4.4	4.1	3.7	3.4	3.2
75-99 hp	7.1	6.7	6.2	5.7	5.2	4.8	4.3	3.8	3.3	2.8	2.4
100-174 hp	6.4	6.0	5.5	5.1	4.7	4.3	3.8	3.4	3.0	2.6	2.2
175-299 hp	6.2	5.8	5.3	4.9	4.5	4.1	3.6	3.2	2.8	2.3	1.9
300-599 hp	5.9	5.5	5.1	4.7	4.3	3.9	3.5	3.1	2.7	2.3	1.9
600-750 hp	6.1	5.6	5.2	4.8	4.4	4.0	3.6	3.2	2.7	2.3	1.9
Greater than 750 hp	7.2	6.8	6.5	6.1	5.7	5.3	4.9	4.5	4.1	3.8	3.4

* Targets in 2010, 2011, and 2012 are for LARGE fleets only

Vehicle 1 = 100 hp, NOx 2010 target is 6.4

Vehicle 2 = 200 hp, NOx 2010 target is 6.2

Vehicle 3 = 300 hp, NOx 2010 target is 5.9

NOx Fleet Average Target Calculation Example

For 2010 compliance date:

Vehicle 1 (100 hp): NOx target = 6.4

Vehicle 2 (200 hp): NOx target = 6.2

Vehicle 3 (300 hp): NOx target = 5.9

NOx Fleet Average Target:

$$= [(6.4 \times 100) + (6.2 \times 200) + (5.9 \times 300)] / (100 + 200 + 300)$$

$$= 6.1$$

Compare Target with Average

NOx fleet average = 6.0

NOx fleet average 2010 target = 6.1

$$\underline{6.0 < 6.1}$$

Since NOx fleet average is less than the NOx fleet target set for 2010, the fleet is in compliance

NOx BACT Requirements

- Must turn over Tier 0 and Tier 1 (without PM standard) vehicles first
- Compliance options for NOx BACT turnover requirements:
 - Replace older vehicles with new or used vehicles
 - Replace diesel vehicles with electric or alternative fuel vehicles
 - Repower older engines with a Tier 2 or higher engines
 - Retire vehicles from fleet
 - Designate vehicles as low use (used < 100 hours per year)
 - Install NOx verified diesel emission control strategy (VDECS)

PM Requirements

Two ways to meet the PM requirements (the lesser of the two can be done):

- PM fleet average targets requirements
 - Meet PM emissions targets set in regulation by any means

or

- Best Available Control Technology (BACT) requirements:
 - Install verified diesel emission control strategy VDECS (also referred to as PM retrofits) on 20% of total fleet horsepower per year

PM Emission Factors*

PM Emissions Factors by Horsepower and Year (g/bhp-hr)								
	Horsepower Groups							
Year	25-49	50-74	75-99	100-174	175-299	300-599	600-750	750+
1900	0.950	1.200	1.200	1.100	1.100	0.950	0.950	0.950
1969	0.950	1.200	1.200	1.100	1.100	0.950	0.950	0.950
1970	0.950	1.200	1.200	0.940	0.940	0.810	0.810	0.810
1972	0.950	1.200	1.200	0.780	0.780	0.680	0.680	0.680
1988	0.950	0.980	0.980	0.540	0.540	0.490	0.490	0.490
1989	0.950	0.980	0.980	0.540	0.540	0.490	0.490	0.490
1996	0.950	0.980	0.980	0.540	0.40	0.40	0.40	0.500
1997	0.950	0.980	0.980	0.600	0.40	0.40	0.40	0.500
1998	0.950	1.090	1.090	0.600	0.40	0.40	0.40	0.500
1999	0.60	1.090	1.090	0.600	0.40	0.40	0.40	0.500
2000	0.60	1.090	1.090	0.600	0.40	0.40	0.40	0.40
2001	0.60	1.090	1.090	0.600	0.40	0.15	0.40	0.40
2002	0.60	1.090	1.090	0.600	0.40	0.15	0.15	0.40

* Only partial chart shown

PM Fleet Average Emission Targets

PM Fleet Average Targets: MEDIUM AND LARGE FLEETS**											
Horsepower Group	2010*	2011*	2012*	2013	2014	2015	2016	2017	2018	2019	2020
25-49 hp	0.46	0.46	0.39	0.39	0.29	0.29	0.21	0.21	0.12	0.12	0.08
50-74 hp	0.60	0.60	0.43	0.43	0.23	0.23	0.18	0.18	0.12	0.12	0.08
75-99 hp	0.62	0.62	0.46	0.46	0.24	0.24	0.19	0.19	0.13	0.13	0.07
100-174 hp	0.33	0.33	0.26	0.26	0.18	0.18	0.14	0.14	0.10	0.10	0.06
175-299 hp	0.23	0.23	0.16	0.16	0.11	0.11	0.08	0.08	0.06	0.06	0.03
300-599 hp	0.18	0.18	0.14	0.14	0.11	0.11	0.08	0.08	0.06	0.06	0.03
600-750 hp	0.20	0.20	0.14	0.14	0.11	0.11	0.08	0.08	0.06	0.06	0.03
Greater than 750 hp	0.30	0.30	0.24	0.24	0.18	0.18	0.11	0.11	0.08	0.08	0.06

* Targets in 2010, 2011, and 2012 are for LARGE fleets only

** Note: There is a separate table for SMALL fleet targets

PM BACT Requirements

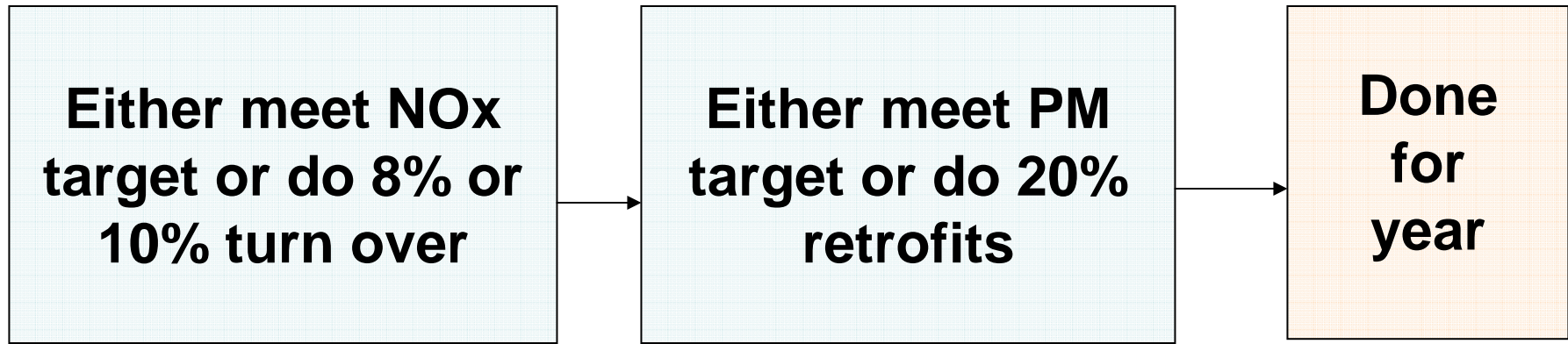
- Compliance options for PM BACT retrofit requirements:
 - Install PM VDECS
- Retirement of Tier 0s for a fleet decreasing in horsepower
 - If a fleet is “shrinking” from the previous year, the Tier 0 horsepower retired (and not replaced) from the fleet can count towards PM BACT compliance
 - Example: If a fleet retires 20% Tier 0 vehicles, both the PM and NOx BACT requirements are fulfilled

PM BACT Cont.

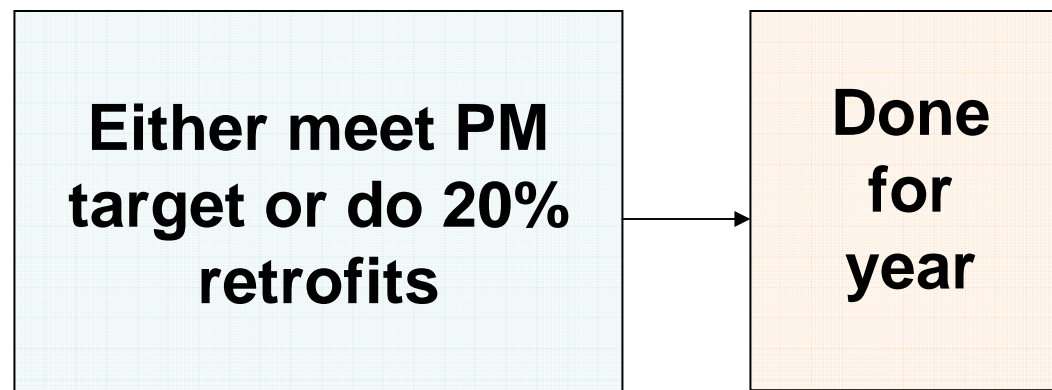
- Order of VDECS installation:
 - All vehicles accepting Level 3 VDECS must be retrofitted first
 - Then, install Level 2 VDECS only if:
 1. All vehicles that can accept Level 3 VDECS are already retrofitted, and
 2. A Level 2 VDEC is the highest verified device available at that time for that vehicle
 - Level 1 VDECS cannot be used to meet the PM BACT requirements

Annual Compliance Process

Large and Medium Fleets: NOx and PM Requirements



Small Fleets: PM Requirements ONLY



NOx Final Compliance

- As of March 1, 2020 (for medium and large fleets only):
 - If 2020 NOx fleet average target is not met, the fleet must do the required NOx BACT turnover until that 2020 target is met

PM Final Compliance

- As of March 1, 2021 (for medium and large fleets), and March 1, 2026 (for small fleets):
 - All vehicles must have the highest level VDECS installed; if not, the fleet is required to install the highest level VDECS at the required PM BACT retrofit rate
 - Fleets not meeting the NOx final compliance targets must do so first

Restrictions on Adding Vehicles

- Cannot add Tier 0 vehicles after March 1, 2009
- Fleet averages met in the previous year
 - Fleets may not add vehicles that cause them to exceed the most recent targets
 - If the targets are exceeded, the fleet has 3 months to bring the fleet back into compliance
- BACT requirements met in the previous year
 - Small fleets: The vehicle must be Tier 2 or higher

Adding Vehicles Cont.

- Large/Medium fleets: The vehicle must be Tier 2 or higher and have a NOx emission factor less than or equal to the current year NOx fleet average target

Horsepower Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
25-49 hp	T2					T4										
50-74 hp											T4I					
75-99 hp											T3				T4I	T4
100-174 hp															T4I	T4
175-299 hp															T4I	
300-599 hp															T4I	
600-750 hp															T4I	
Greater than 750 hp															T4I	

Annual Reporting

- Report any changes to the fleet from the previous year
 - Includes VDECS installed, vehicles replaced, etc.
- If final compliance target is not met, reporting must continue beyond last designated reporting date
- Reporting dates vary by fleet size:

Fleet Size Category	Reporting Date
Small	August 1 st : 2014-2026
Medium	June 1 st : 2012-2021
Large	April 1 st : 2010-2021

Annual Record keeping

- Records must be kept between reporting periods:
 - Changes in the fleet since last reported
 - Newly purchased vehicles
 - Rebuilt engines
 - VDECS that have failed
 - VDECS serial numbers
 - Manufacturer delays
 - Executive Officer approvals for extensions, approval of alternative fuels, idling exceptions, etc.
- Records must be kept until the vehicle is retired, or 2030 (whichever is earlier)

Early Credit Examples

- Early credit for actions taken before March 1, 2009
- Double credit for PM retrofits
 - A VDECS installed early on a 200 hp vehicle would provide 400 hp credit towards the PM BACT requirements
- Single credit for repowers
 - A repower completed on a 300 hp machine would provide a 300 hp credit towards the NOx BACT requirements
 - A repower from a Tier 0 to Tier 1 will receive NOx BACT credit only until March 1, 2009

Early Credit Examples

- Credit for replacement of Tier 0s in excess of an average 8%/year turnover rate between March 1, 2006 and March 1, 2009
 - If a fleet retired/replaced its Tier 0 machines at a rate of 10% per year between 2006 and 2009, the fleet would obtain a 6% early credit towards the NOx BACT requirements
- Double credit for electric vehicles until 2016
 - If an electric vehicle is replacing a 200 hp diesel vehicle, 400 hp with a 0 NOx and 0 PM emission factor should be included in the NOx and PM fleet averages

Exemptions from Engine Turnover Requirements

- Small fleets
- Captive area attainment fleets
- Vehicles less than 10 years old
- Specialty vehicles if certain criteria are met
- Vehicles retrofit in past 6 years
- Tier 4 or Tier 4 Interim vehicles

Exemptions from Retrofit Requirements

- Engines in vehicles less than 5 years old
- Engines for which there is no retrofit available or for which one cannot be safely installed
- New engines that come with an OEM diesel particulate filter
- Engines already retrofit with the highest level VDECS at time of installation

Other Exemptions and Compliance Extensions

- Exempt from all but recordkeeping/reporting
 - Low-use vehicles
 - Operated less than 100 hours/year
 - Emergency vehicles
 - Dedicated snow removal vehicles
- Compliance extensions
 - Manufacturer delays for retrofits or new engines
 - Delay of Tier 4 interim or final vehicles

Off-Road Compliance Examples



Getting Started

1. Determine which vehicles are subject to the regulation
 - Dedicated snow removal, emergency use, agricultural, and personal use vehicles are exempt
 - On-road vehicles and portable equipment are not covered
2. Gather vehicle data for applicable vehicles
 - Engine model year, vehicle model year, engine hp
 - Are any vehicles low use?

Getting Started Cont.

3. Determine fleet size

- Calculate total fleet hp: exclude any exempted vehicles from 1. above, also exclude low use vehicles

4. Determine compliance requirements

- Based on fleet size, determine whether the fleet must comply with the NOx requirements
- Is the fleet a captive area attainment fleet?
- Determine first compliance date, also based on fleet size

5. Calculate early credit

- Add up hp credit for any early repowers, exhaust retrofits, or replacements

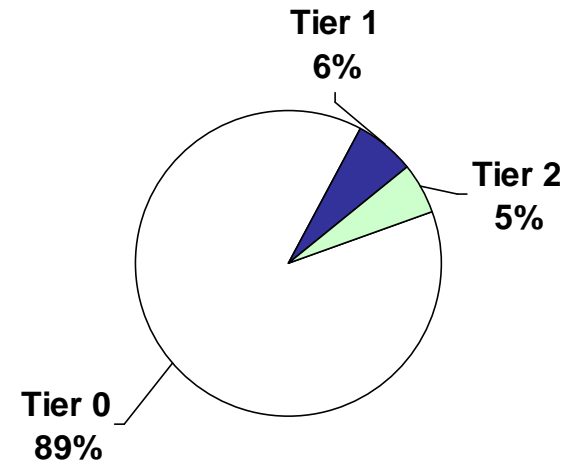
Getting Started Cont.

6. Calculate NOx and PM fleet averages and targets (can use Fleet Average Calculator for this, available on ARB website)
 - Determine if the fleet is currently meeting fleet targets
 - If fleet is meeting the NOx and/or PM targets, no turnover and/or exhaust retrofitting is required
 - If not meeting the targets, determine turnover and/or retrofits needed to meet targets
7. If not meeting the fleet targets, calculate the applicable turnover and retrofits required by BACT (Best Available Control Technology requirements)
8. Determine the minimum turnover/retrofit requirements for compliance: BACT or targets

Compliance Example

Fleet 1 - Older Earth Moving Fleet

- Fleet in 2008
 - 88 engines totaling 40,000 hp
 - Scrapers, tractors, and dozers
 - Average age of vehicles 21 yrs
 - Normal turnover 2% per year
 - Normally buys used

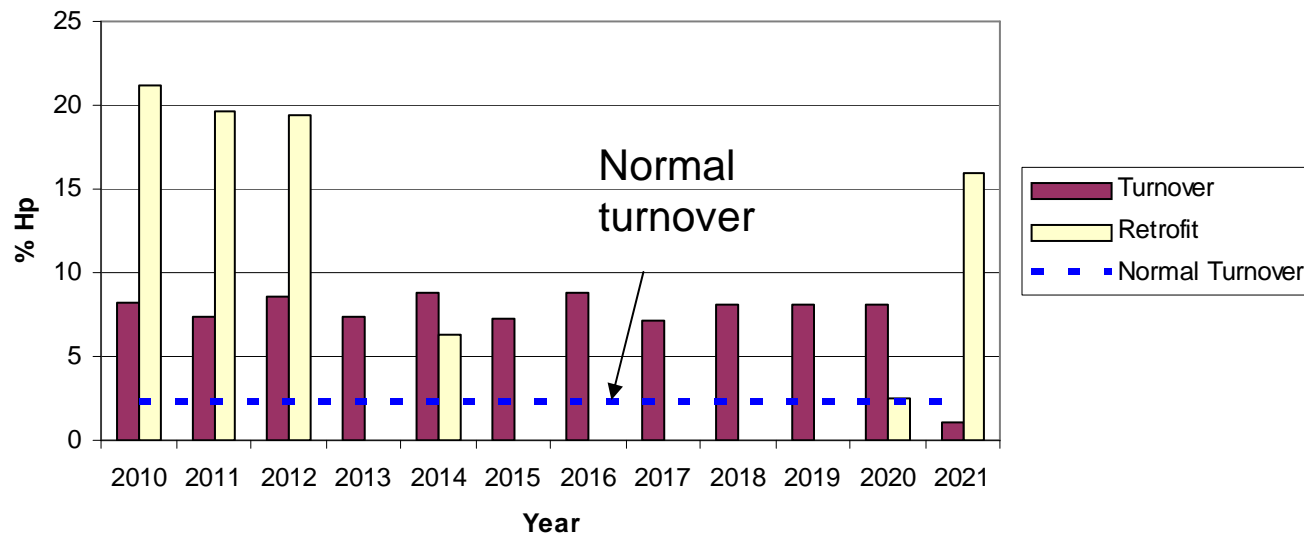


Tier Distribution in 2008

Fleet 1 Compliance Actions

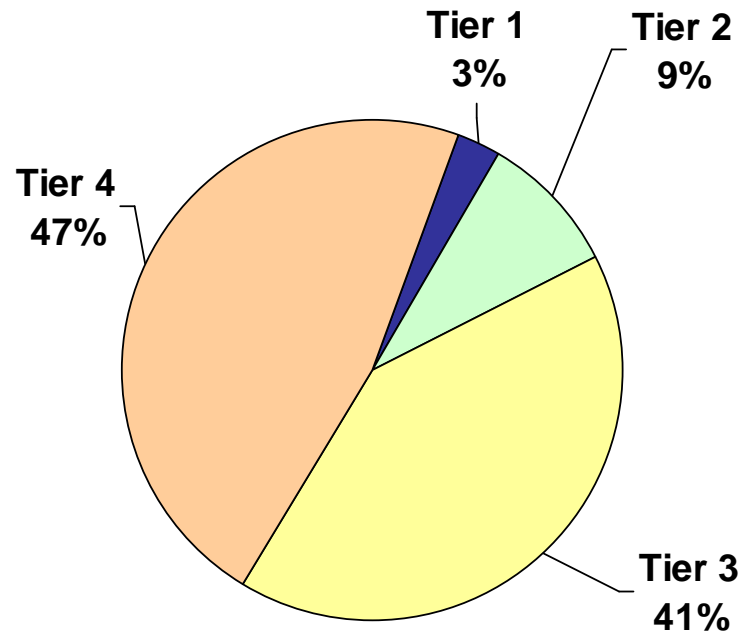
- Continues to buy used vehicles
- 8% turnover per year (safety valve)
- 20% retrofits in first 3 years; few thereafter

Older Example Fleet 1: Compliance Actions



Fleet 1

Engine Tier Distribution in 2020



- Majority of engines needed to comply with 2020 goals already available today

Carl Moyer and SOON Program



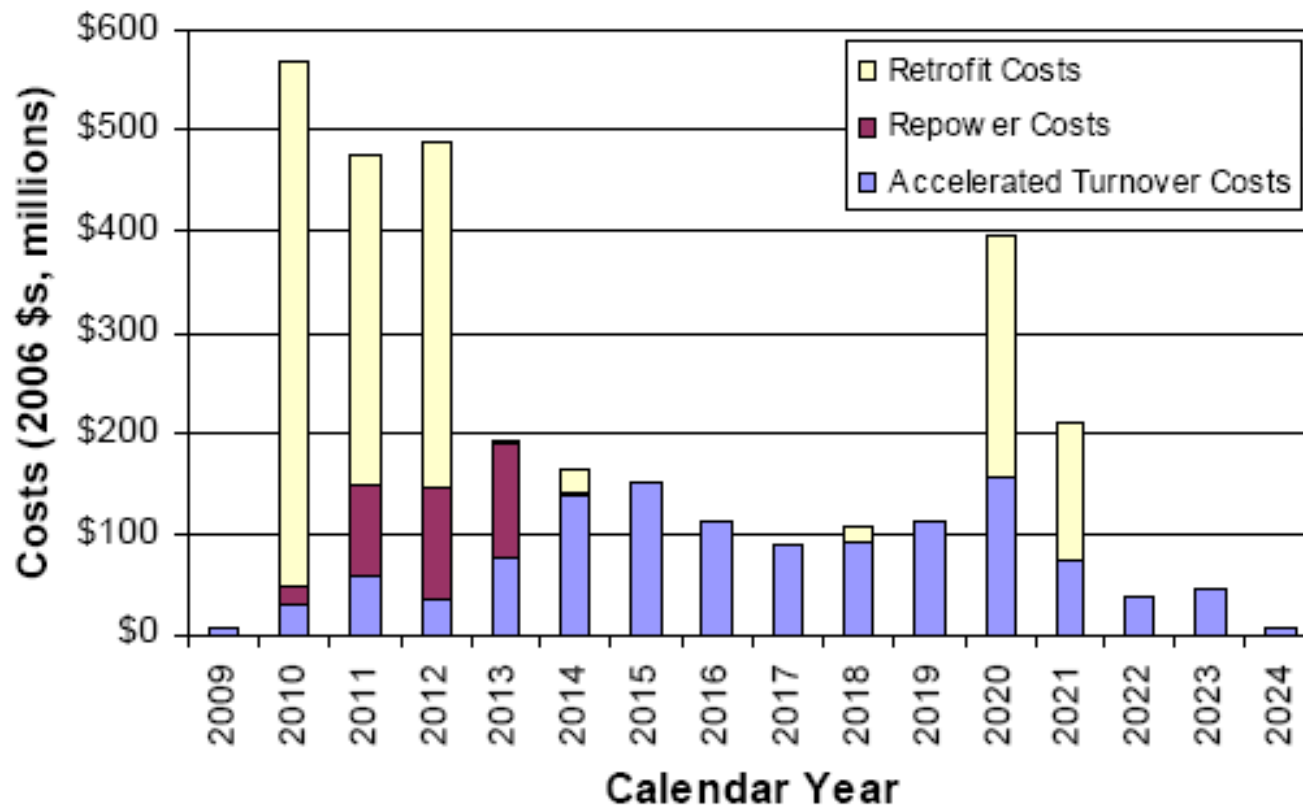
Randall Pasek
South Coast AQMD

Compliance Costs – How much?

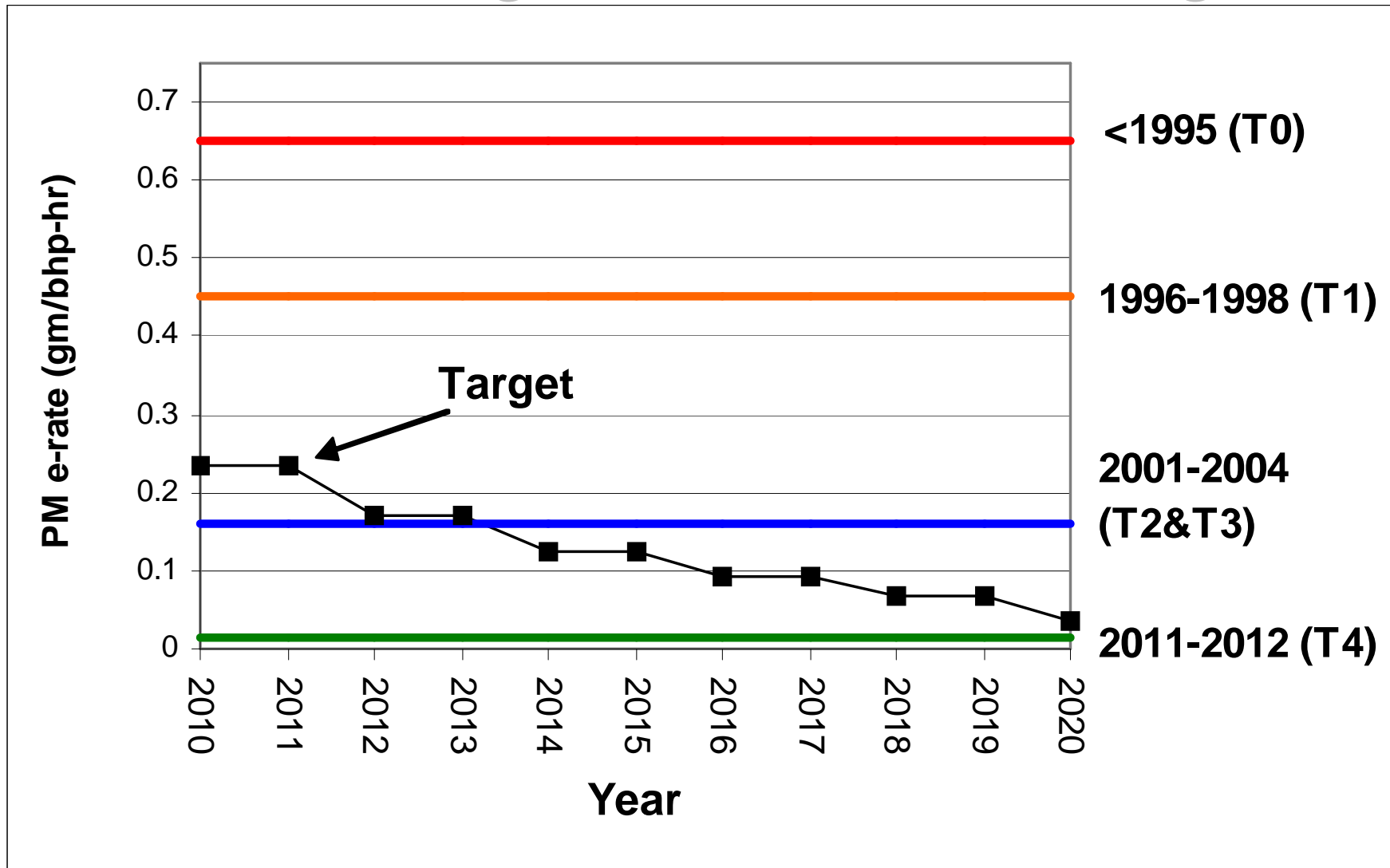
- Expensive – CARB estimates \$3 to \$4 billion through 2030
- Average fleet - \$8 to \$9 per hp per year (2009 – 2030)
 - Small – 1000 hp - \$8k to \$9k
 - Medium – 3000 hp - \$24k to \$27k
 - Large – 10,000 hp - \$80k to \$90k

Compliance Costs Timing

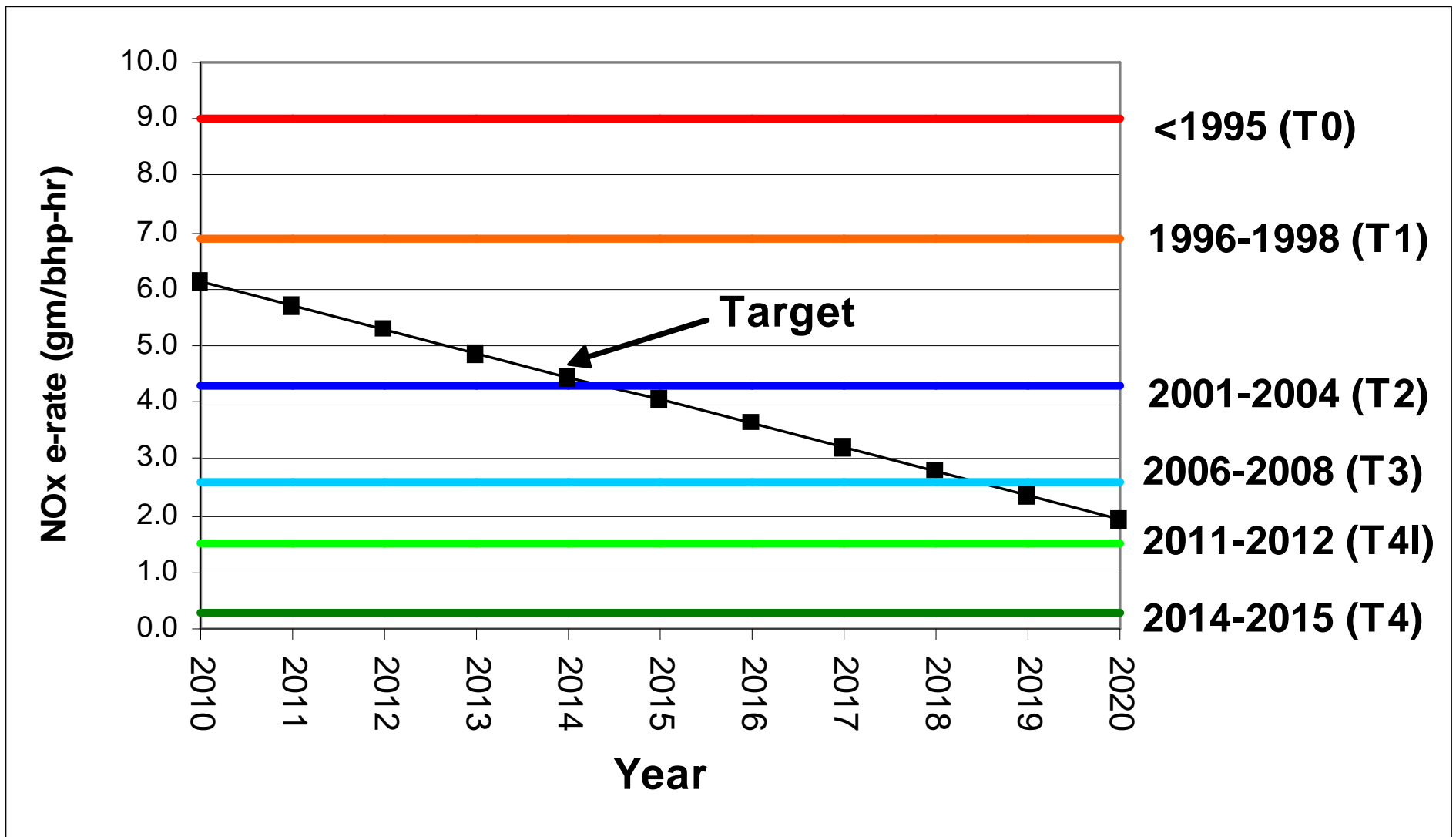
Statewide Annual Costs (2006 \$)



PM Targets and Fleet Age



NOx Targets and Fleet Age



Early Action Can Potentially Save Fleets Money

- Credit for early actions prior to March 1, 2009
 - Double credit for PM retrofits
 - Credit for repowers
 - Credit for replacement in excess of 8%/year
- Double credit for electric vehicles until 2016
- Early retrofits and repowers can help fleets spread out costs and lower annual costs in early years of implementation

Carl Moyer and SOON Grant Program

- Incentive funds for replacing older engines with new cleaner engines
- Will fund repower, replacement, and retrofit projects
- Funding awarded based on cost effectiveness
- Emission reductions must be surplus to those required by any rule or regulation
- Requires minimum number of hours of operation in South Coast District Boundaries

Traditional Moyer Program

- Surplus
 - At least 3 years in advance of regulation or rule compliance date
 - Large fleet – very limited opportunity
 - Medium fleet – until 2009
 - Small fleet – PM until 2011; NOx no time limit

Traditional Moyer Program

- PM retrofits required and funded by Program – funds up to 100% of cost of retrofit including maintenance
- Repowers – up to 85% of repower cost
- Replacement – up to 80% of cost
- Voluntary participation

SOON Program

- Participation in program mandatory for largest fleets
 - >20,000 HP statewide, operate vehicles in district, and >40% T0 and T1 vehicles
- Voluntary for all other fleets
- Largest fleets must apply for funding when funding is offered by District
- If awarded funding, fleet must implement project

SOON Program

- Compliance Plan required
 - Guarantees surplus emissions
- SOON funded vehicle assumed to emit at old emission rate for purposes of regulation compliance (until end of contract)
- PM retrofit not required nor funded

SOON Program

- Funds repower costs only (may be used for replacement or repower)
- Large Fleet – SOON only incentive funding available
- Medium Fleet - Traditional Moyer or SOON funding until 2009; SOON only after 2009
- Small Fleet - Traditional for PM until 2011; SOON or Traditional Moyer for NOx – no time limit

What Makes a Competitive Moyer/SOON project?

- Older equipment (pre-1996)
- Sufficient hours of operation in district (at least 750 to 1000 hrs/year)
- Larger engine (greater than 150 hp)

What can AQMD do to help?

- AQMD/CARB Fleet Calculator
- Compliance plan template
- AQMD assistance program
 - Meet with fleet

AQMD/CARB Fleet Calculator



Michael Geller
South Coast AQMD

Fleet Calculator

- Extension of CARB's fleet calculator
- Includes SOON specific calculations
- Integral part of Compliance plan development and submittal

Fleet Average Emission and Target Calculation Example

- NOx calculation as an example
- PM calculation is the same
- Fleet Average Emission based on engine age and horsepower
- Fleet Average Target based on compliance year and horsepower



Crawler Tractor/Dozer

Model year: 1991

400 HP

From Appendix A:

NOx = 8.9 g/bhp-hr

PM = 0.490 g/bhp-hr



Scraper

Model year: 1980

280 HP

From Appendix A:

NOx = 12.5 g/bhp-hr

PM = 0.780 g/bhp-hr



Wheel Loader

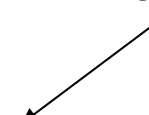
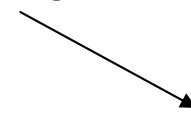
Model year: 2004

170 HP

From Appendix A:

NOx = 4.3 g/bhp-hr

PM = 0.22 g/bhp-hr



$$\text{NOx Index} = \frac{8.9 \text{ g/bhp-hr} \times 400 \text{ hp} + 12.5 \text{ g/bhp-hr} \times 280 \text{ hp} + 4.3 \text{ g/bhp-hr} \times 170 \text{ hp}}{(400 \text{ hp} + 280 \text{ hp} + 170 \text{ hp})}$$

NOx Index = 9.17 g/bhp-hr

Step 1: Input your equipment into the Fleet Calculator

		Hp Repowered		Percent Tier 0's + Tier 1's		Hp PM Retro =		Hp Turnover Credit for NOx Retro =		PM Fleet Average =		NOx Fleet Average =	
		0.0		#DIV/0!		0.0		0.0		#DIV/0!		#DIV/0!	
Baseline													
Equipment Name	Equipment Type	Is this vehicle in the SOON fleet? (Y/N)	Model Year	Has this Vehicle been Repowered with a New Engine? (Y/N)	Horsepower	Twin-engine vehicle? (NOT AUX.)	Does this Vehicle Have an On-Road Engine or Electric Motor? (Enter ON or E)	Engine Tier	PM Exhaust Retrofit Level (Enter 1, 2, 3, or NA)	NOx Exhaust Retrofit (Enter % Reduction or NA)	Fleet Average PM Factor (g/bhp-hr)	Fleet Average NOx Factor (g/bhp-hr)	
									NA	NA			07
									NA	NA			07
									NA	NA			07
									NA	NA			07
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Equipment Name	Equipment Type	Is this vehicle in the SOON fleet? (Y/N)	Model Year	Has this Vehicle been Repowered with a New Engine? (Y/N)	Horsepower								
Sample1	Crawler Tractors	Y	1991	N	400								
Sample2	Scrapers	Y	1980	N	280								
Sample3	Rubber Tired Loaders	Y	2004	N	170								

Fleet Calculator

Hp Repowered
0.0

Percent Tier
0's + Tier 1's
80.95%

Hp PM Retro =
0.0

Hp Turnover
Credit for NOx
Retro =
0.0

PM Fleet
Average =
0.54

NOx Fleet
Average =
9.2

Baseline												
Equipment Name	Equipment Type	Is this vehicle in the SOON fleet? (Y/N)	Model Year	Has this Vehicle been Repowered with a New Engine? (Y/N)	Horsepower	Twin-engine vehicle? (NOT AUX.)	Does this Vehicle Have an On-Road Engine or Electric Motor? (Enter ON or E)	Engine Tier	PM Exhaust Retrofit Level (Enter 1, 2, 3, or NA)	NOx Exhaust Retrofit (Enter % Reduction or NA)	Fleet Average PM Factor (g/bhp-hr)	Fleet Average NOx Factor (g/bhp-hr)
Sample1	Crawler Tractors	Y	1991	N	400	N	N	T0	NA	NA	0.490	8.900
Sample2	Scrapers	Y	1980	N	280	N	N	T0	NA	NA	0.780	12.500
Sample3	Rubber Tired Loaders	Y	2004	N	170	N	N	T2	NA	NA	0.220	4.300
Sample 4	Excavators	N	1986	N	250	M	N	T0	NA	NA	0.780	12.500
Sample5	Scrapers	Y	1984	N	550	Y	N	T0	NA	NA	0.680	11.900
Sample6	Crawler Tractors	N	1984	N	550	N	N	T0	NA	NA	0.680	11.900
Sample7	Scrapers	Y	1984	N	400	Y	N	T0	NA	NA	0.680	11.900
Sample8	Scrapers	Y	1990	N	400	Y	N	T0	NA	NA	0.490	8.900
Sample9	Scrapers	Y	1990	N	250	Y	N	T0	NA	NA	0.540	9.300
Sample10	Other Construction Equipment	N	1991	N	73	N	N	T0	NA	NA	0.980	9.900
Sample11	Other Construction	N	1991	N	73	N	N	T0	NA	NA	0.980	9.900
Sample12	Tractors/Loaders/Backhoes	Y	1993	N	320	N	N	T0	NA	NA	0.490	8.900
Sample13	Tractors/Loaders/Backhoes	Y	1993	N	320	N	N	T0	NA	NA	0.490	8.900
Sample14	Crawler Tractors	Y	1993	N	450	N	N	T0	NA	NA	0.490	8.900
Sample15	Off-Highway Trucks	N	1993	N	600	N	N	T0	NA	NA	0.490	8.900
Sample16	Rollers	Y	1994	N	175	N	N	T0	NA	NA	0.540	9.300
Sample17	Rollers	Y	1994	N	175	N	N	T0	NA	NA	0.540	9.300
Sample18	Other Construction Equipment	Y	1994	N	73	N	N	T0	NA	NA	0.980	9.900
Sample19	Other Construction Equipment	Y	2000	N	73	N	N	T1	NA	NA	1.090	6.900
Sample20	Other Construction Equipment	Y	2000	N	73	N	N	T1	NA	NA	1.090	6.900
Sample21	Other Construction	Y	2000	N	37	N	N	T1	NA	NA	0.600	6.200
Sample22	Rubber Tired Loaders	N	2004	N	275	N	N	T2	NA	NA	0.150	4.300
Sample23	Tractors/Loaders/Backhoes	Y	2004	N	340	N	N	T2	NA	NA	0.150	4.200
Sample24	Cranes	Y	2004	N	180	N	N	T2	NA	NA	0.150	4.300
									NA	NA		

OUT OF COMPLIANCE

Select actions to meet fleet target or BACT turnover requirements

2010
(Actions completed between March 1, 2009-March 1, 2010)

Previous Action	Select Action	Model Year	Horsepower	Is this vehicle in the SOON	Does this Vehicle Have an On-Road Engine or Electric	Engine Tier	PM Exhaust Retrofit Level (Enter 1, 2, 3)	NOx Exhaust Retrofit (Enter % Reduction)	Fleet Average PM Factor	Fleet Average NOx Factor (g/bhp-hr)
										900
										500
										300

Fleet Calculator calculates emission targets and emission indices for your fleet

2010
(Actions completed between March 1, 2009-March 1, 2010)

Previous Action	Select Action	Model Year	Horsepower	Is this vehicle in the SOON	Does this Vehicle Have an On-Road Engine or Electric	Engine Tier	PM Exhaust Retrofit Level (Enter 1, 2, 3, or NA)	NOx Exhaust Retrofit (Enter % Reduction or NA)	Fleet Average PM Factor (g/bhp-hr)	Fleet Average NOx Factor (g/bhp-hr)
		1991	4			T0	NA	NA	0.490	8.900
		1980	2			T0	NA	NA	0.780	12.500
		2004	1			T2	NA	NA	0.220	4.300
		1986	2			T0	NA	NA	0.780	12.500
		1984	5			T0	NA	NA	0.680	11.900
		1984	5			T0	NA	NA	0.680	11.900
		1984	4			T0	NA	NA	0.680	11.900

- Retire
- Repower
- PM Retro
- NOx Retro
- SOON
- New
- Rep+Retro
- New+Retro
- Retro+Retro
- SOON+Retro

OUT OF COMPLIANCE

NOx Requirements Fulfilled?				YES			
NOx Requirements (Comply with either Fleet Average or BACT)							
<u>Fleet Average</u>				<u>BACT</u>			
NOx Fleet Target =	6.0		Needed Hp Turnover =	519.0			
NOx Fleet Average =	8.7		Current Hp Turnover =	680.0			

PM Requirements Fulfilled?				NO			
PM Requirements (Comply with either Fleet Average or BACT)							
<u>Fleet Average</u>				<u>BACT</u>			
PM Fleet Target =	0.22		Needed Hp Retrofit =	1297.4			
PM Fleet Average =	0.51		Current Hp Retrofit =	280.0			

				fleet? (Y/N)	Motor? (Enter ON or E)		or NA)	or NA)	(g/bhp-hr)	(g/bhp-hr)	
09		Repower	2009	400	Y	N	T3	NA	NA	0.150	2.600
09		Retire	R		Y	N		NA	NA		
09			2004	170	Y	N	T2	NA	NA	0.220	4.300
09			1986	250	N	N	T0	NA	NA	0.780	12.500

Sample9	Scrapers	09		1990	250	Y	N	T0	NA	NA	0.540	9.300
Sample10	Other Construction Equipment	09		1991	73	N	N	T0	NA	NA	0.980	9.900
Sample11	Other Construction Tractors/Loaders/Backh	09		1991	73	N	N	T0	NA	NA	0.980	9.900

NOx requirement is satisfied, but fleet is out of compliance for PM!

Sample24	Cranes	09		2004	180	Y	N	T2	NA	NA	0.150	4.300
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IN COMPLIANCE											
NOx Requirements Fulfilled?				YES		PM Requirements Fulfilled?				YES	
NOx Requirements (Comply with either Fleet Average or BACT)						PM Requirements (Comply with either Fleet Average or BACT)					
Fleet Average			BACT			Fleet Average			BACT		
NOx Fleet Target =	6.0		Needed Hp Turnover =	519.8		PM Fleet Target =	0.22		Needed Hp Retrofit =	1299.4	
NOx Fleet Average =	8.6		Current Hp Turnover =	680.0		PM Fleet Average =	0.49		Current Hp Retrofit =	1305.0	

Previous Action	Select Action	Model Year	Horsepower	in the SOON fleet? (Y/N)	On-Road Engine or Electric Motor? (Enter ON or E)	Engine Tier	Retrofit Level (Enter 1, 2, 3, or NA)	Retrofit (Enter % Reduction or NA)	Fleet Average PM Factor (g/bhp-hr)	Fleet Average NOx Factor (g/bhp-hr)
	Rep+Retro	2009	400	Y	N	T3	3	NA	0.023	2.600
	Retire	R		Y	N		NA	NA		
		2004	170	Y	N	T2	NA	NA	0.220	4.300

Fleet is now in compliance with both NOx and PM requirements for 2010

Sample19	Equipment	2000	73	Y	N	T1	NA	NA	1.090	6.900
	Other Construction	2000	37	Y	N	T1	NA	NA	0.600	6.200
	PM Retro	2004	275	N	N	T2	3	NA	0.023	4.300
	PM Retro	2004	350	Y	N	T2	3	NA	0.023	4.200
		2004	180	Y	N	T2	NA	NA	0.150	4.300
							NA	NA		

		Year	Baseline		2010	2011	2012			Grand Total
		Fleet Size (HP)	6497		6217	6217	6217			
		NOx Fleet Average	9.2		8.6	6.8	5.7			
		NOx Fleet Target	NA		6.0	5.6	5.2			
		PM Fleet Average	0.54		0.49	0.35	0.27			
		PM Fleet Target	NA		0.22	0.22	0.17			
		Total Repowers			1	2	2			
		Total New Vehicles			0	0	0	2020	2021	
		Total PM Retrofits			3	4	1	5617	617	
		Total NOx Retrofits			0	0	0	2.4	2.0	
								2.0	2.0	
								0.02	0.02	
								0.03	0.03	
								0	1	8
								0	0	0
								0	0	8
								0	3	3
Equipment Name	Equipment Type	HP	Engine Tier		2010	2011	2012	2020	2021	No. of vehicle modifications
Sample1	Crawler Tractors	400	T0		Repow /T3+PM					1
Sample2	Scrapers	280	T0		Retire					1
Sample3	Rubber Tired Loaders	170	T2			PM Retro				1
Sample 4	Excavators	250	T0			New /T3+PM				1
Sample5	Scrapers	550	T0							1
Sample6	Crawler Tractors	550	T0	41		Repow /T3+PM				1
Sample7	Scrapers	400	T0			Repow /T3+PM				1
Sample8	Scrapers	400	T0							1
Sample9	Scrapers	400	T0				Repow /T4I			1
Sample10	Other Construction	250	T0				Repow /T4I			1
Sample11	Other Construction									1
Sample12	Tractors/Loaders/Backhoe	73	T0							1
Sample13	Tractors/Loaders/Backhoe	73	T0							1
Sample14	Crawler Tractors									1
Sample15	Off-Highway Tractors									1
Sample16	Rollers									1
Sample17	Rollers									1
Sample18	Other Construction									1
Sample19	Other Construction									1
Sample20	Other Construction									1
Sample21	Other Construction									1
Sample22	Rubber Tired Loaders	270	T2		PM Retro					2
Sample23	Tractors/Loaders/Backhoe	350	T2		PM Retro					2
Sample24	Cranes	180	T2				PM Retro			2

This sheet can be used to get an overall view of annual fleet actions and potential costs

Sample22	Rubber Tired Loaders	270	T2		PM Retro					
Sample23	Tractors/Loaders/Backhoe	350	T2		PM Retro					
Sample24	Cranes	180	T2				PM Retro			

Compliance Plan

- SOON funding applications require submission of a compliance plan
- Compliance plan helps CARB determine that fleet can comply with State Regulation when receiving SOON funding
- The AQMD Fleet Calculator can be used to generate a compliance plan for SOON funding applications
- Compliance plans show ***potential*** actions and may be updated as fleet changes

Incentive Funding Basics

<u>Moyer</u>	Small	Medium	Large
Min/Max Contract	3/5	3/3	**
Retrofit Required	Yes	Yes	Yes

<u>SOON</u>	Small	Medium	Large
Min/Max Contract	6/7	6/7	6/7
Retrofit Required	No	No	No

- AQMD is offering individual fleet assistance:
 - Explain incentive options
 - Compliance plan formulation and reporting

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Off-Road Regulation - www.arb.ca.gov/msprog/ordiesel/ordiesel.htm

Verified Devices - www.arb.ca.gov/diesel/verdev/verdev.htm

Carl Moyer Program - www.arb.ca.gov/msprog/moyer/moyer.htm