

Public Workshop to Consider Amendments to the Airborne Toxic Control Measure for Stationary Compression Ignition Engines



Sacramento, California
June 21, 2010

California Environmental Protection Agency

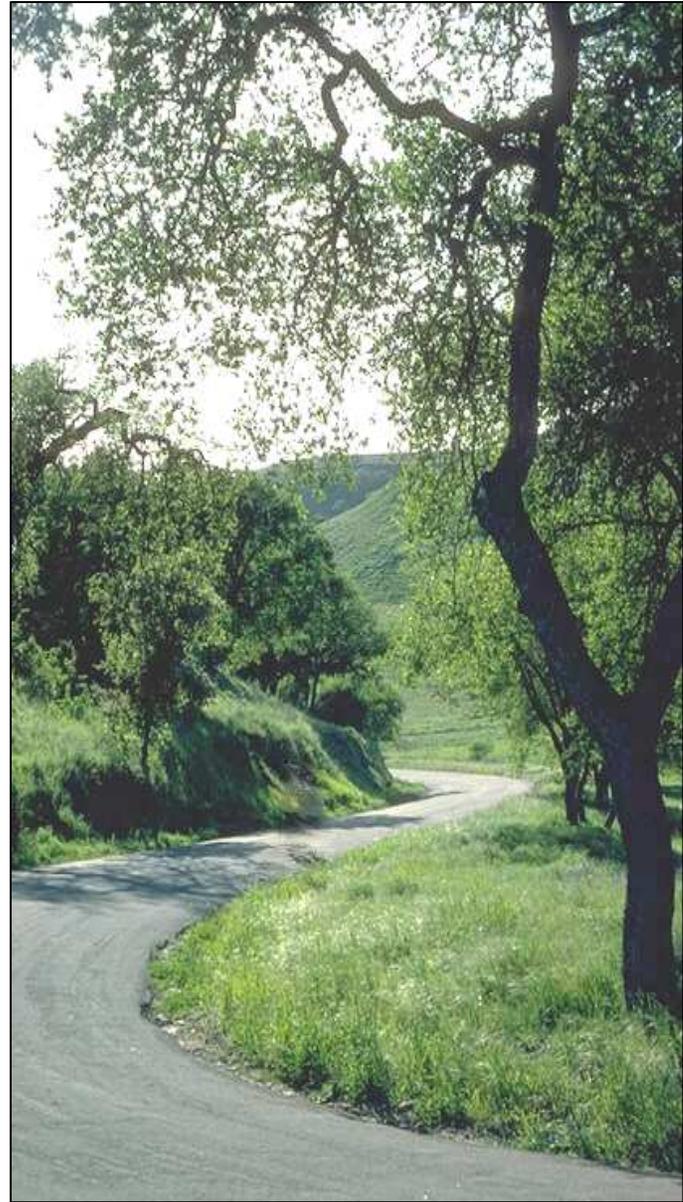


Air Resources Board

Overview

- Background
- Revised Emissions Inventory
- Cost Effectiveness of DPF Equipped Emergency Standby Engines
- Proposed Amendments
- Emissions Impacts
- Next Steps and Timelines

Background



Stationary Engine Airborne Toxic Control Measure

- Adopted by the ARB (2004) and implemented by the local air pollution control districts
- Applies to emergency standby engines and prime engines
- Establishes
 - Emission Standards and Operating Requirements
 - Fuel Use Requirements
 - Reporting Requirements
- Reduces diesel PM, NMHC, CO and NOx

ATCM Requirements for New Emergency Standby Stationary Diesel Engines

- Meet diesel PM emission limit of 0.15 g/bhp-hr or off-road engine standard, whichever is more stringent
- Meet NO_x, NMHC, CO off-road engine certification standards for model year of engine
- Limit M&T hours to 50/year, no limit on emergency hours
- Direct-drive diesel fire pump engines provided 3-year extension
- More stringent requirements for emergency standby engines used in demand response programs

Key Differences Between NSPS and ATCM for New Emergency Standby Engines

- ATCM requires new engines to meet Tier 4 standards when they are more stringent than the 0.15 g/bhp-hr limit
 - Requires after treatment for PM (diesel particulate traps) and NOx (selective catalytic reduction)
- NSPS doesn't require after treatment
 - New engines will meet applicable Tier 2 or Tier 3 for all pollutants
 - Requires certified engines for 2007 and later models

Engine Manufacturers Association Concerns & Request

- **Concerns**

- Meeting Tier 4 Nonroad Standards will generally require PM and NOx aftertreatment
- Addition of after treatment controls adversely affects emergency engine performance, creates installation/operation problems, and adds large costs
- Not feasible to maintain unique California product

- **Request**

- Align ATCM with NSPS approach of not requiring after treatment based standards for new emergency standby engines

ARB Actions

- Agreed to re-evaluate feasibility of Tier 4 engines for new emergency standby applications
 - Technical feasibility, emissions and costs impacts
- Formed ARB-District Workgroup
- First public workshop held March 1, 2010
 - Proposed going to Tier 4 interim for new emergency standby engines
 - Presented EPA's cost calculations
 - Agreed to collect additional cost information on OEM Tier 4 interim engines
- Based on further investigation, revised initial proposal to more closely align with NSPS requirements

Emissions Inventory



Revised Emission Inventory

- Adjusted stationary engine emission inventory
 - Account for current recession
 - Used non-agricultural employment factors created by UCLA
 - Update emission factors
- Resulted in ~2-8% change in forecasted inventory

Year	Percent Change in Forecasted Inventory
2008	-1.5%
2010	-7.8%
2015	-5.0%
2020	-3.7%
2025	-3.3%

Comparison of Emission Values

Stationary Commercial Engine Emissions (tons/day)

Prime and Emergency Standby Engines

Year	PM10			NOx		
	ATCM Inventory	Revised Inventory	Change in Emissions	ATCM Inventory	Revised Inventory	Change in Emissions
2002	0.65	0.65	0.00	16.15	16.15	0.00
2010	0.33	0.30	-0.03	11.80	10.88	-0.92
2015	0.22	0.21	-0.01	8.96	8.51	-0.45
2020	0.13	0.12	-0.01	6.41	6.17	-0.24

*Emergency standby engines account for approximately 40% of the total emissions in 2010 and 0.2 percent of the statewide diesel PM emissions

Current ATCM Requirements Mitigate Risks Associated with New Emergency Standby Engines Emissions

- Current requirements for emergency standby engines require 0.15 g/bhp-hr emission rate
- Conservative risk screening analysis shows
 - Risk <10/million provided hours of operation limited to 50 hr/year
 - ARB survey conducted previously showed average number of hours for all uses was 31 hrs/year

Cost Effectiveness of DPF Equipped Emergency Standby Engines



Compliance Paths

- Cost varies depending on path to compliance
 - Aftermarket retrofit of Tier 2/3 Engines
 - OEM manufacture of Tier 4 interim engines
 - OEM supplied retrofit of Tier 2/3 engines

Estimated Cost Effectiveness Comparison of DPF on Emergency Standby Engines

- U.S. EPA estimated cost effectiveness as part of NSPS development
 - Capital costs only
 - 50 hr/year operation
 - Assumes 100% load
 - 25 year DPF lifetime
- DPF cost effectiveness = \$50-350/lb PM*



* CE varies with horsepower range, values based on attributing all the costs to diesel PM reductions

OEM Cost Estimates

- ARB staff requested data from EMA to show cost increases from current Tier level
 - Cost to end user (R&D, assembly line, tooling, inventory, markup, etc)
- Provided cost data for current Tier 2/3 engines
- Provided estimated percent change in costs for Tier 4i and Tier 2/3 engines with an OEM DPF
- Manufacturers stated not feasible to maintain unique California product

OEM Cost Effectiveness

Average Percentage Cost Increases					
		Tier 4i		Tier 2/3 with OEM DPF	
HP Range	Cost of Tier 2/3 Engine	% Increase Range in Cost from Tier 2/3	PM Cost Effectiveness per pound	% Increase Range in Cost from Tier 2/3	PM Cost Effectiveness per pound
50-174	\$29,000	56%	\$610	66%	\$340
175-749	\$67,000	106%	\$400	53%	\$200
750-1206	\$141,000	97%	\$630	41%	\$150
1207-2000	\$309,000	74%	\$640	31%	\$150
>2000	\$523,000	58%	\$520	27%	\$140

*Cost data represents the estimated increase in costs for emergency stationary generators only.

**Assumptions: 25 year life, 50 hours use per year, 100% load

Cost Effectiveness Comparison of Alternative Compliance Paths

- Aftermarket DPF Retrofit
 - \$50-\$350 per pound of PM*
- OEM Tier 4 interim
 - \$400-\$640 per pound of PM
- OEM Supplied DPF
 - \$140-\$340 per pound of PM

* Taken from EPA's NSPS technical support cost analysis memorandums.

Actual Cost Effectiveness May Be Much Higher Based on Typical Operation

- EPA's retrofit numbers reflect "best case"
 - Assumptions 100% load, 0.15 g/bhp-hr, 50 hours per year, 25 year life
- Based on ARB survey data/emissions test data actual cost effectiveness likely much higher
 - 30% load, 0.11 g/bhp-hr, 31 hours per year, 25 year life
 - Cost effectiveness
 - ✓ \$1,100 per pound of PM

ARB Findings

- In consideration of the contribution of emergency standby engines to overall ambient PM levels, risk levels, and cost of controls:
 - Restriction of hours to 50 hours per year and a PM level of 0.15 g/bhp-hr represents BACT for emergency standby applications
 - May be some unique situations where additional controls may be necessary on site specific basis
- Propose to align emissions requirements for new emergency standby engines with NSPS requirements

Proposed Amendments



Primary Goals for Proposed Amendments

- Maintain health protective emission limits
- Align emissions standards with NSPS to extent feasible
- Ensure cost-effective emission reductions

Regulatory Sections Affected by Proposed Amendments

- §93115.3 Exemptions
- §93115.4 Definitions
- Emission Standards
 - § 93115.6 New and in-use emergency standby engines, direct-drive fire pump engines
 - § 93115.7 New prime engines
 - § 93115.9 New engines \leq 50bhp
- § 93115.10 Reporting requirements

Proposed Amendments – Exemptions and Definitions

- §93115.3 Exemptions
 - Delete the sell-through provision
- §93115.4 Definitions
 - Narrow definition of Emergency Standby Engine
 - Include space plane vehicle reentry landing as emergency use
 - Clarify that supported equipment includes uninterruptable power supply in maintenance and testing definition

Proposed Amendments to § 93115.6 Emission Standards for Emergency Standby Engines

- For new Emergency Standby Engines:
 - Require engines certified to the new engine standards after 12/31/08
 - Align with NSPS for new emergency standby engines, except require a PM emission limit of 0.15 g/bhp-hr for engines $50 < \text{hp} < 175$
 - ✓ End result is any new emergency standby engine will be a certified Tier 2 or 3 engine for all pollutants and must meet a 0.15 g/bhp-hr PM emission limit
 - Retain more stringent PM standard for engines operating > 50 hrs/yr for maintenance & testing

Proposed Amendments to § 93115.6 Emission Standards for Emergency Standby Engines (cont.)

- For both new and in-use emergency standby engines:
 - Include a new provision that would require high-use emergency standby engines to meet a more stringent PM emission standard
 - ✓ High use is any engine that operates more than 400 hours combined within two years for any purpose within a consecutive 3-year period
 - ✓ Must reduce diesel PM by 85% or meet 0.01 g/bhp-hr PM standard

Proposed Amendments to § 93115.6 Emission Standards for Emergency Standby Engines (cont.)

- For new direct-drive fire pump engines
 - Align emission standards and new engine certification requirements with NSPS
 - ✓ Manufacturers must certify new fire pump engines beginning with model year 2008 through 2011.
 - NSPS provides specific emission standards for all pollutants

Proposed Amendments to § 93115.7 Emission Standards for Prime Engines

- Align with NSPS for new prime engines, except where PM standard is less stringent than 0.02 g/bhp-hr
 - End result is any new prime engine will meet either 0.01 or 0.02 g/bhp-hr PM standard
- Include the NSPS “sell-through” that allows installation of a new prime engine from the preceding year

Proposed Amendments to § 93115.9 Emission Standards for New Stationary Diesel-Fueled Engines, ≤ 50 bhp

- This section prohibits the sale or installation on engines that do not meet the current Off-Road CI Engine Standards
- Proposed amendment exempts direct-drive fire pump engines from this requirement
 - Alignment with NSPS requirements for this subset of emergency standby engines requires this exemption to remove conflict

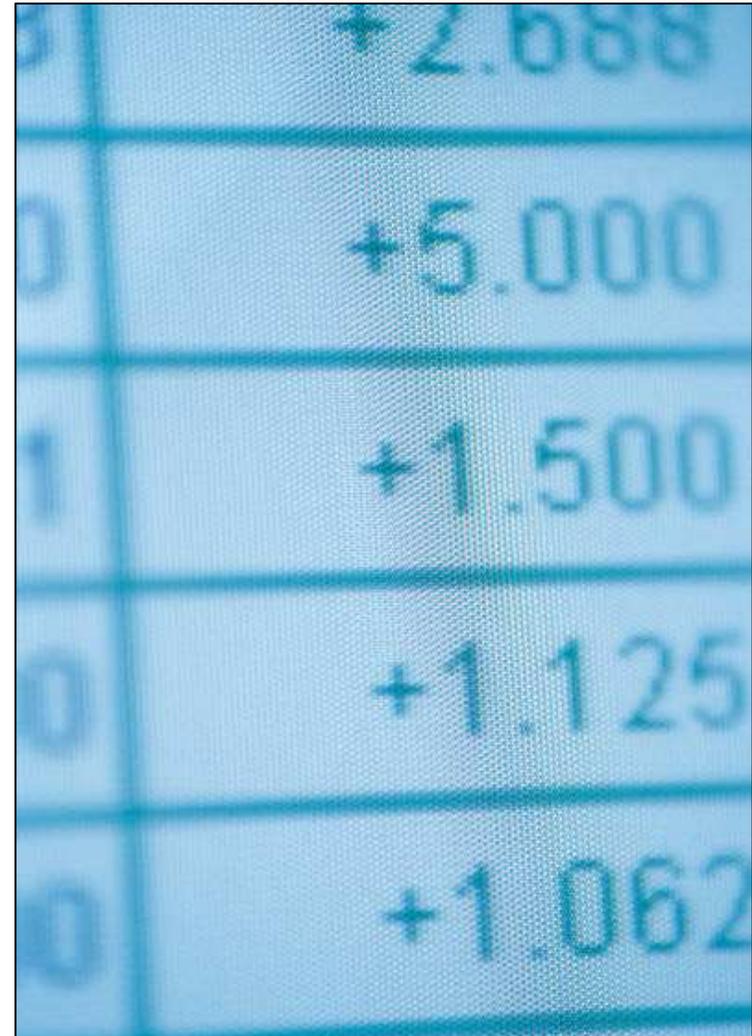
Proposed Amendments to § 93115.10 Reporting

- Require an annual report to update the inventory and track diesel-fueled CI engines operating in a DRP
- Report to be provided to both the ARB and the Districts

Other Minor Amendments

- Non-substantive changes
 - Reference to specific sections added
 - Delete compliance dates that have sunset
- Changed “Command Destruct” sites to “Command Transmitter” sites

Emissions Impacts

A close-up photograph of a blue grid, likely a financial or data table, with a grid of horizontal and vertical lines. The grid contains several rows of numbers, each preceded by a plus sign. The numbers are: +2.688, +5.000, +1.500, +1.125, and +1.062. The numbers are slightly out of focus, giving a sense of depth.

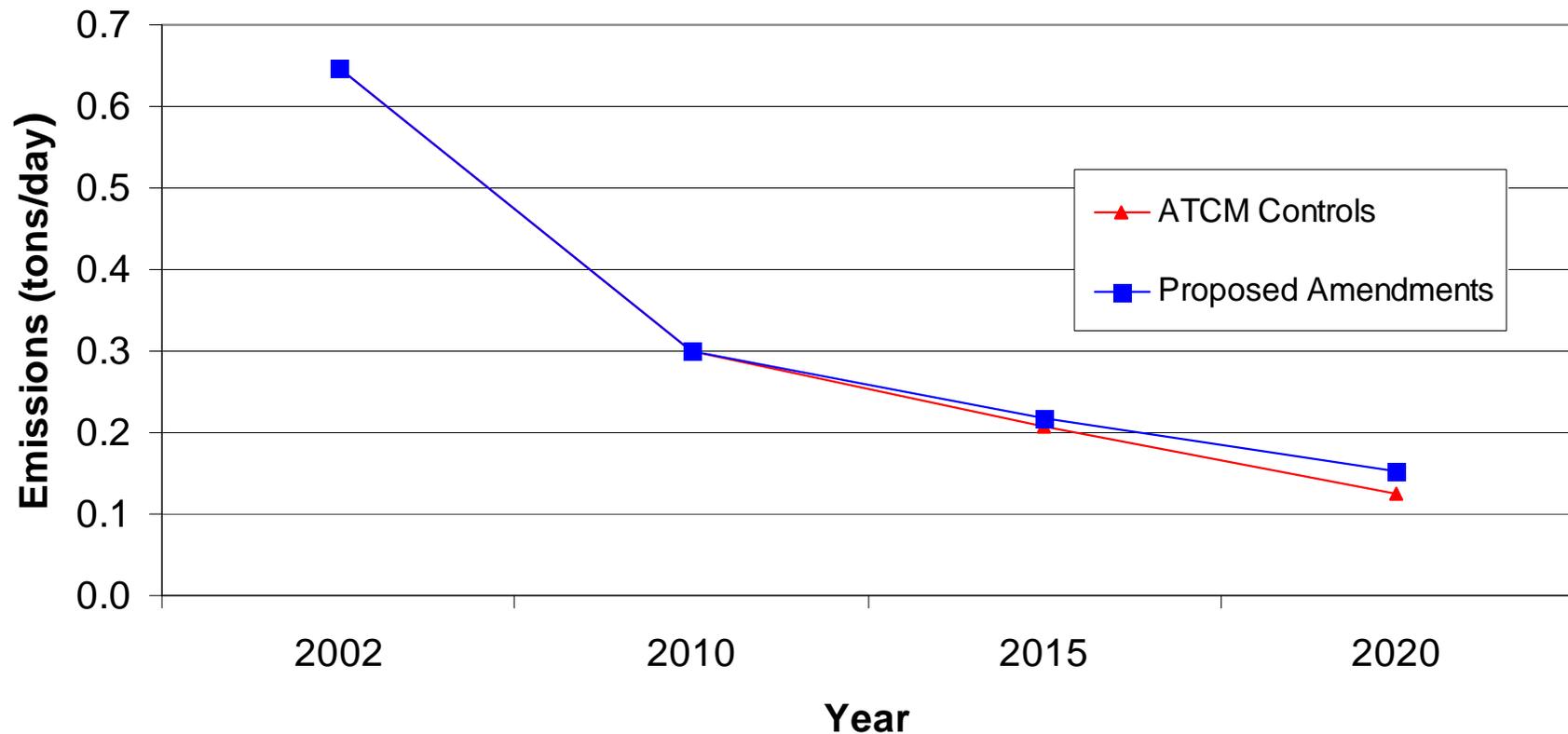
	+2.688
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Emissions Impacts from Proposed Amendments

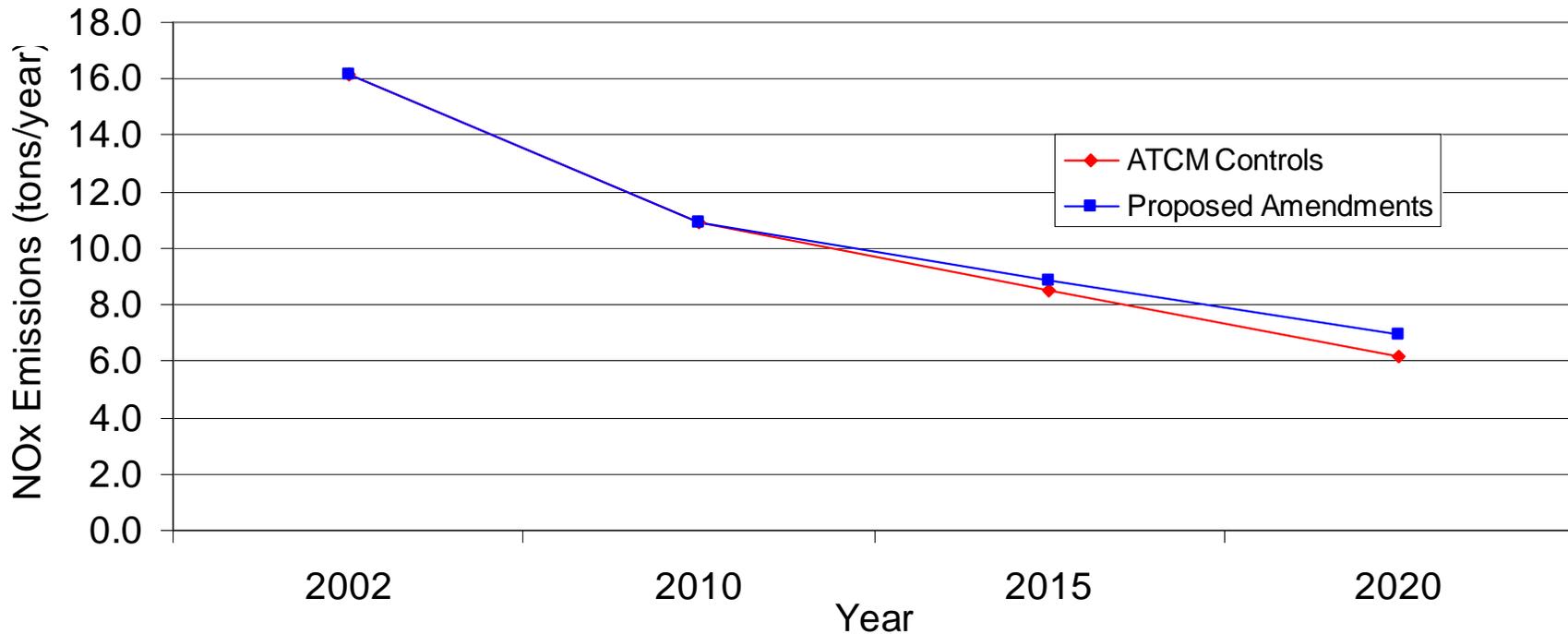
- Emissions continue to decline but reductions in future years are reduced by a small amount
 - 0.03 tons/day PM foregone in 2020
 - 0.78 tons/day NOx foregone in 2020

Comparison of Statewide Stationary Engine Emissions with the Current ATCM and the Proposed Amendments			
	Year	PM	NOx
Current ATCM	2002	0.65	16.15
	2010	0.30	10.88
	2015	0.21	8.51
	2020	0.12	6.17
Proposed Amendments	2002	0.65	16.15
	2010	0.30	10.88
	2015	0.22	8.85
	2020	0.15	6.95

Comparison of Statewide Stationary Engine Diesel PM Emissions with the Current ATCM and the Proposed Amendments



Comparison of Statewide Stationary Engine NOx Emissions with the Current ATCM and the Proposed Amendments



Impacts on Risk

- Public health continues to be protected
 - Emissions from stationary diesel engines continue to decline over time
 - Risks from majority of stationary emergency standby engines less than 10/million
 - ATCM includes provisions to allow districts to require additional controls on site specific basis
- Other regulatory programs in place to identify unique situations that may require additional controls
 - District New Source Review regulations require site specific evaluation of impacts
 - Hotspots Program

District Suggested Changes

- Clarify applicability to portable ag engines
- Consider remote location exemption for high use emergency standby engines

Next Steps and Timeline



Next Steps & Timeline

- Continue discussions with stakeholders
- Prepare initial statement of rulemaking package (staff report)
 - Public availability August 9, 2010
- ARB consideration of proposed amendments
 - October 21-22, 2010
 - Sacramento, CA



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<http://www.arb.ca.gov/diesel/statport.htm>