

California's Diesel Engine Airborne Toxics Regulation: Vandenberg AFB Compliance Strategies

Joerg Blischke

METCALF & EDDY | AECOM

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Overview

- Introduction – The BIG Picture
- CARB's Diesel PM RRP
- CARB's Stationary Diesel ATCM
- Compliance Strategies
for Vandenberg AFB's Engine Inventory
- Summary

Acronyms

- ATCM – Airborne Toxic Control Measure
- APCD – Air Pollution Control District
- BACT – Best Available Control Technology
- CARB – California Air Resources Board
- E/S – Emergency/Standby
- ICE – Internal Combustion Engine
- PM – Particulate Matter
- RRP – Risk Reduction Plan



Diesel PM in the Spotlight

- **1998: CalEPA's Air Resources Board identified diesel PM as a toxic air contaminant**
- **2000: Board approved Diesel Risk Reduction Plan; Established Goal:**
 - **Reduce PM emissions from ALL diesel-fueled engines**
 - *Reduce 75% diesel PM Risk by 2010*
 - *Reduce 85% diesel PM Risk by 2020*
- **Strategies:**
 - **Clean fuels**
 - **Technology forcing standards for new engines**
 - **Aggressive reductions from in-use engines**

Diesel Emissions a Concern? Health Impacts in California

➤ Every year exposure to diesel PM causes

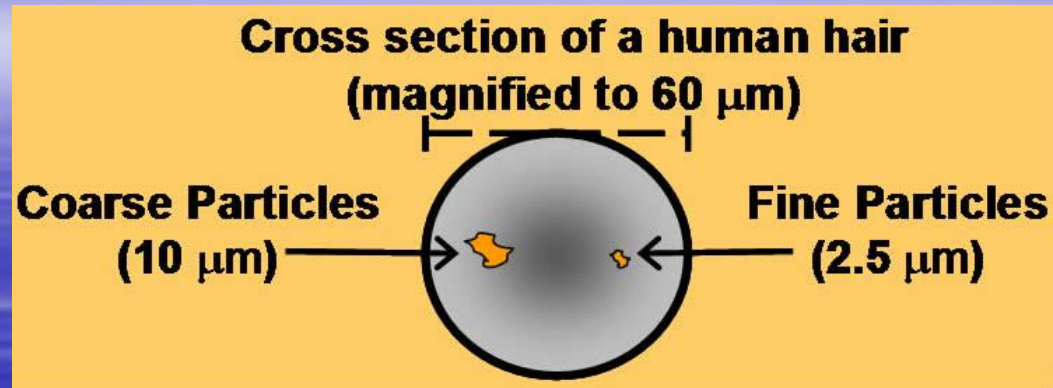
- 2,900 premature deaths**
- 3,600 hospital admissions**
- 240,000 asthma attacks**
- 420,000 respiratory symptoms**
- >600,000 lost days of work**



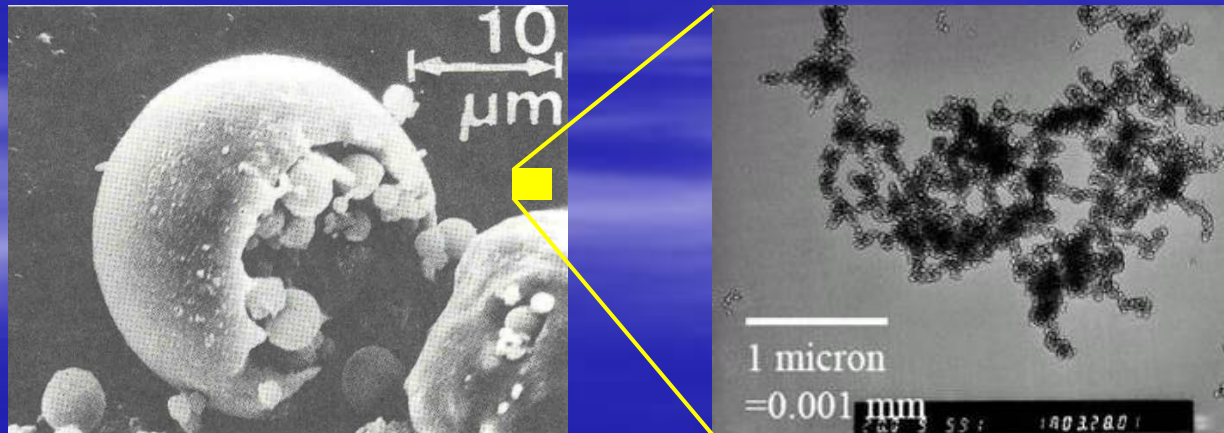
➤ In comparison

- 3,700 deaths from car accidents**
- 2,000 homicides**

PM Size Matters



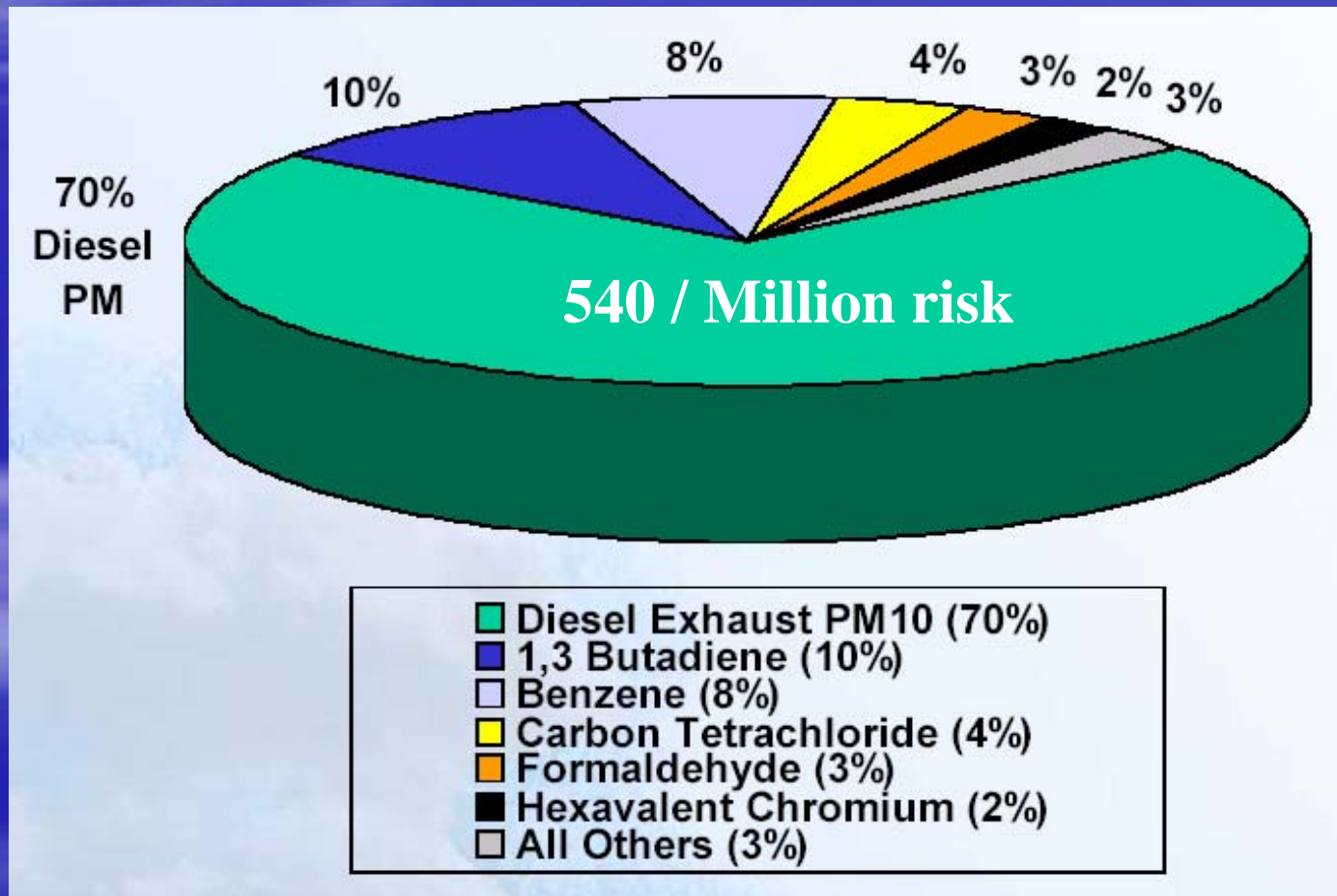
- 0.1 μm = Ultrafine Particulate (UFP) = PM0.1
- UFPs translocate through the blood to organs other than the lung
- 1 PM10 weighs same as one million UFPs (PM0.1)



PM - Coal Ash vs. Diesel Exhaust

Cancer Health Risk

- Potential ambient air cancer risks caused by toxic air contaminants (*CARB 2000*)



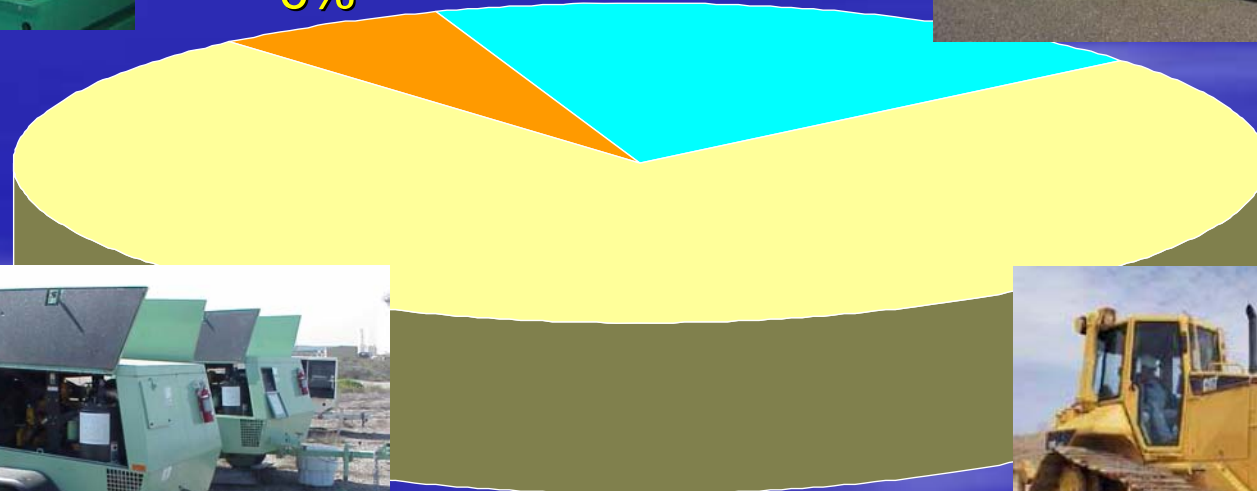
1.2 Million Diesel Engines PM Emissions by Category



Stationary /
Area Sources
6%



On-Road
20%



Off-Road
(portable and mobile)
74%



Diesel Regulation Targets

- **Cleaner burning fuels**
- **Engine idling**
- **On- and off-road engines**
(e.g. buses, trucks, ports, construction, industrial, airport, agriculture)
- **Transportation refrigeration units**
- **Portable equipment**
- **Stationary engines**

Stationary Diesel ATCM Regulation Statewide Engine Inventory

Category	Number of Engines	Diesel PM Emissions [tons per day]
Prime Engines	6,600	2.3
Emergency Standby Engines	19,700	0.3
Total	26,300	2.6

Stationary Diesel ATCM Regulation

- **Based on 10+ years of health risk studies**
- **Started in 2001: eight public workshops and stakeholder involvement**
- **Final regulation effective December 2004**
- **ATCM requirements can be met by applying Best Available Control Technologies (BACT)**

Stationary Diesel ATCM Regulation

- **BACT defined using the 4-Rs:**
 - **Restrict Operation:**
Maintenance and testing hours of emergency standby engines limited
 - **Retrofit:**
Diesel oxidation catalysts (DOCs) and/or diesel particulate matter filters (DPFs)
 - **Replace:**
New off-road EPA certified engines
 - **Retire:**
Non-diesel alternatives

Stationary Diesel ATCM Regulation

- **Air Quality Benefits:**
 - Reduction of diesel PM and criteria pollutant emissions (CO, NOx, HC)**
 - An 80% reduction in diesel PM by 2020
 - Avoids 121 premature deaths
 - Reduces cancer risk to all receptors

Stationary Diesel ATCM Applicability/Exemptions

- **Applies to stationary diesel-fueled ICE >50 hp**
- **Exemptions of federal interest:**
 - **Low-use prime ICEs operated < 20 hours per year**
 - **Direct-drive fire water pump engines**
 - **NASA owned engines used solely at manned-space flight facilities**
 - **Military training engines**
 - **Engines in parallel with grid power for initial missile launch tracking**

ATCM Emission Standards

- Different standards for New, In-use, Prime & E/S engines
- Focus - In-use E/S engines:

DIESEL PM STANDARDS (g/bhp-hr)	MAXIMUM ALLOWABLE ANNUAL HOURS OF OPERATION		
	Emergency Use	Non-Emergency Use	
		Emission Testing to show compliance	Maintenance & Testing (hours/year)
Not limited by ATCM*	Not Limited by ATCM*	Not Limited by ATCM*	20
≤ 0.40 and > 0.15	Not Limited by ATCM*	Not Limited by ATCM*	21 to 30
≤ 0.15 and > 0.01	Not Limited by ATCM*	Not Limited by ATCM*	31 to 50 (Upon approval by the District)
≤ 0.01	Not Limited by ATCM*	Not Limited by ATCM*	51 to 100 (Upon approval by the District)

Compliance

Vandenberg AFB - Challenges

➤ **Inventory**

- **Estimate: over 60 stationary diesel ICEs**
- **Accessibility (remote, wide-spread, security)**
- **9 different engine operators basewide**

➤ **Permitting**

- **ATCM implemented and enforced by aggressive Air Pollution Control District (APCD)**
- **Strenuous APCD permit conditions with tight application deadline**

Compliance

Vandenberg AFB - Strategies

➤ Inventory

- Comprehensive data collection through site survey (engine nameplate, stack, maintenance and testing schedule, etc.)

- Tools:

- *Customized site survey form & digital photos*
- *Data entry & management via database*

➤ Active participation in the regulation development process

- Workshops generated numerous comments; shared inventory knowledge with CARB staff
- Volunteered equipment for field testing

CE-CERT's HDD Mobile Lab



Compliance

Vandenberg AFB - Benefits

➤ Inventory database:

- Tool used for ATCM inventory report & permitting

➤ Participation in regulation development –

>\$600,000 estimated savings:

- In-use prime engines

- *5 turbine starters* ==> **exempt** ==> **Cost: \$0.00**
- *1 trainer* ==> **exempt** ==> **Cost: \$0.00**
- *1 initial launch tracking* ==> **exempt** ==> **Cost: \$0.00**

- In-use E/S engines

- *49 E/S engines* ==> **exempt** ==> **Cost: \$0.00**
- *9 fire water pumps* ==> **exempt** ==> **Cost: \$0.00**

Summary - What We Learned

- **ATCM benefits our health**
 - **Cancer risks mitigated through PM emission reductions**
- **Rule development and compliance**
 - **Early involvement proved effective with substantial savings and operational flexibility**
 - **Inventory management a powerful tool**
 - **Compliance through permits with local APCD**

Summary - What We Suggest

- Prepare for future PM regulations in your state
- Know your inventory in detail
- Play an active role in the regulation development process
 - Work with regulators early on
 - *Share your inventory information*
 - *Volunteer your engines for field testing*

Questions?

Contact:

Joerg Blischke, Metcalf & Eddy/AECOM
Santa Maria, CA; (805) 938-5395
joerg.blischke@m-e.aecom.com

Resources:

General - CARB's Diesel PM RRP:

www.arb.ca.gov/diesel/dieselrrp.htm

Specific - CARB's Stationary/Portable Program:

www.arb.ca.gov/diesel/statport.htm