

Diesel Health Effects

Presentation to the Mid-Atlantic Clean Diesel
Collaborative

November 18, 2010

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Outline

- EPA Diesel Health Assessment Document
- Request to update Diesel HAD
- Other assessments
- Actions to control emissions
- Diesel PM in NATA 2005
- Near road impacts

Health Assessment Document for Diesel Engine Exhaust

- Released May 2002
 - 13 years in preparation
- Conclusions
 - Diesel exhaust likely to be carcinogenic at environmental exposure levels
 - Data not sufficient to develop a cancer URE
 - Lifetime cancer risks could exceed one in a hundred thousand and could be as high as one in a thousand which would be a significant risk
 - Could be as low as zero

Health Assessment Document for Diesel Engine Exhaust

- Establishes a reference concentration for noncancer health effects of 5 ug/m³.
 - Based on adverse pulmonary effects in rats.
 - Does not consider allergenic effects.
 - Growing data that diesel exhaust can exacerbate these effects.
- Summarizes respiratory and cardiovascular health effects associated with ambient PM from all sources.
 - These effects are very large
 - Diesel PM an important contributor.
 - Benefits from reducing diesel PM below RfC because of contribution.

Health Assessment Document for Diesel Engine Exhaust

- Health data for diesels built prior to the mid-1990s.
- HAD states the conclusions though are applicable to engines currently in use
- Still, HAD states that we need to evaluate the applicability of these conclusions with newer diesels (such as those with diesel particulate filters).
 - Advanced Collaborative Emissions Study (ACES) designed to address composition of emissions from modern diesels and health effects on animals.
 - Animal studies in progress and to be completed in 2012.

Request to Update Diesel HAD

- Strong desire among many stakeholders to develop a cancer URE for diesel exhaust.
- Most recent request from National Environmental Justice Advisory Committee (NEJAC)
 - EPA Response: Data still inadequate to develop unit risk.
 - Issue is dose response relationships in epidemiology studies
 - However, EPA will continue to control emissions to the maximum extent possible.

Other Assessments

- California Office of Environmental Health Hazard Assessment
 - Diesel exhaust a toxic air contaminant that may pose a threat to human health
 - Includes a cancer unit risk
 - 3×10^{-4} per $\mu\text{g}/\text{m}^3$
 - Reference concentration same as U. S. EPA's.
 - NIOSH, IARC, WHO have made similar conclusions as U. S. EPA and California about potential health effects.

Actions

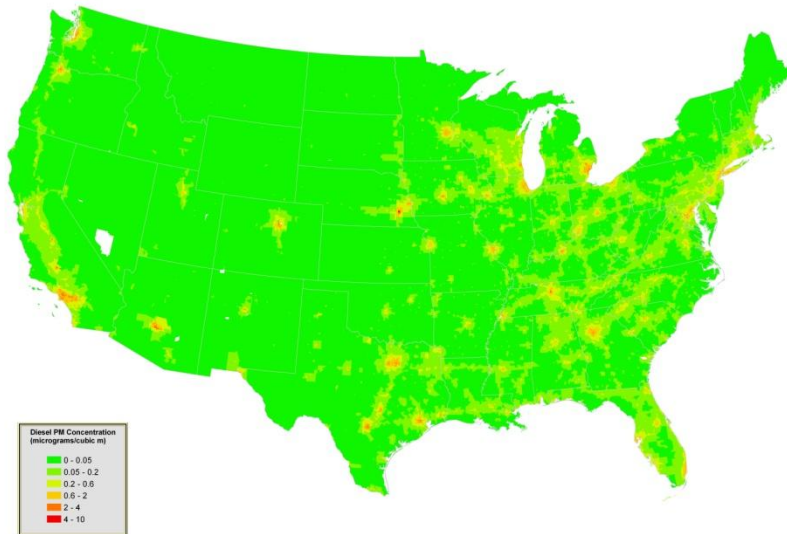
- Concerns about health effects from diesel exhaust and PM in general, and contribution of diesels to ambient PM have led to aggressive action.
 - Clean Air Nonroad Diesel Rule
 - Locomotive and Marine Engine Standards
 - Category 2 Commercial Marine Vessel Rule
 - 2007 and Later Heavy-duty Highway Engine and Vehicle Standards
 - National Clean Diesel Campaign
 - Clean School Bus USA

Diesel PM in NATA 2005

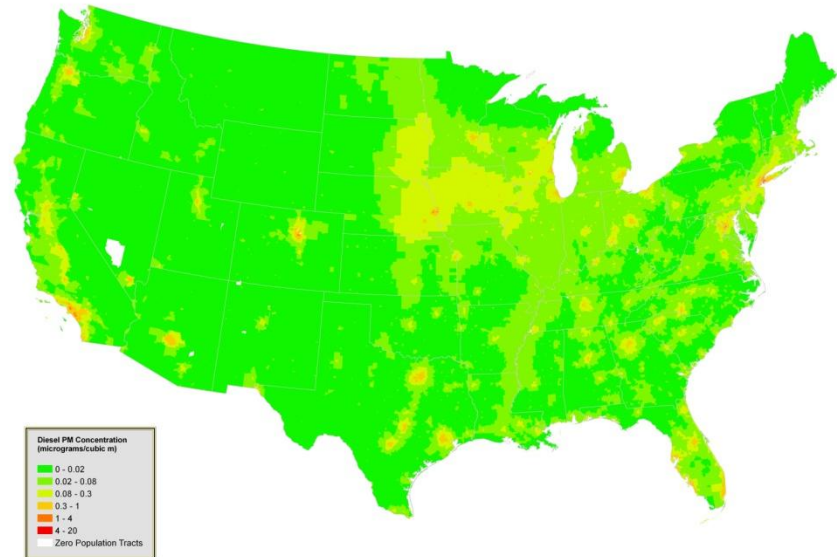
- “EPA has concluded that diesel exhaust is among the substances that the national-scale assessment suggests pose the greatest relative risk...Exposures in several epidemiology studies are in the same range as ambient exposures throughout the United States.”
- There is also significant potential for noncancer effects as well.
 - Diesel PM significant contributor to ambient PM which causes respiratory and cardiovascular effects.

Diesel PM in NATA 2005

2005 NATA Estimated Tract Level OnRoad Diesel PM Concentration

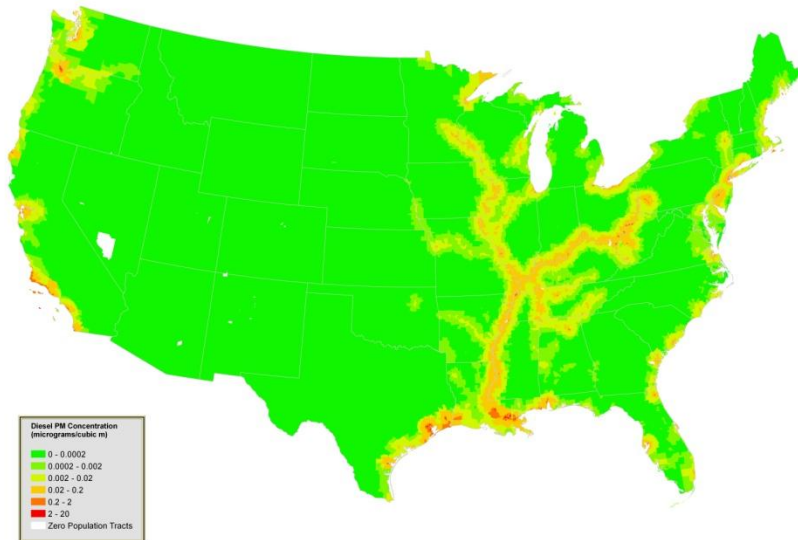


2005 NATA Estimated Diesel PM Concentration Non-Road Sources

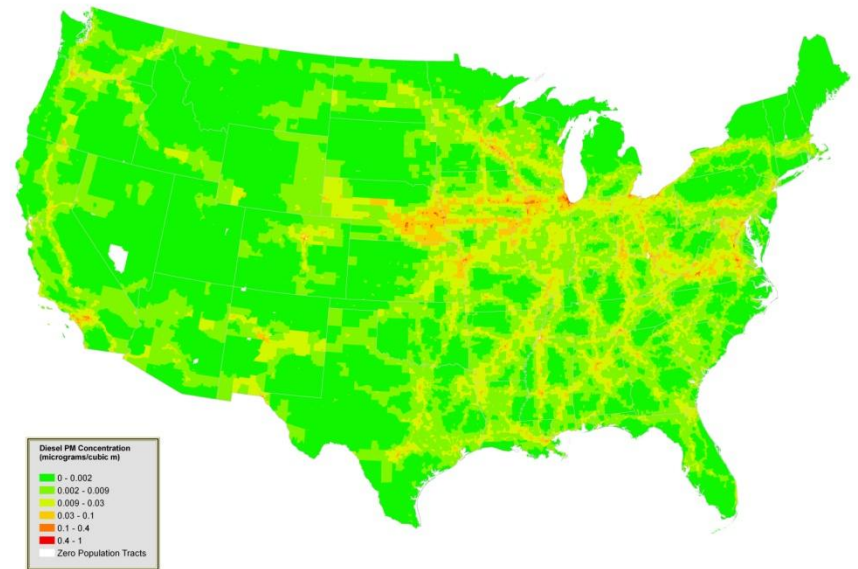


Diesel PM in NATA 2005

2005 NATA Estimated Diesel PM Concentration
Commercial Marine Vessels

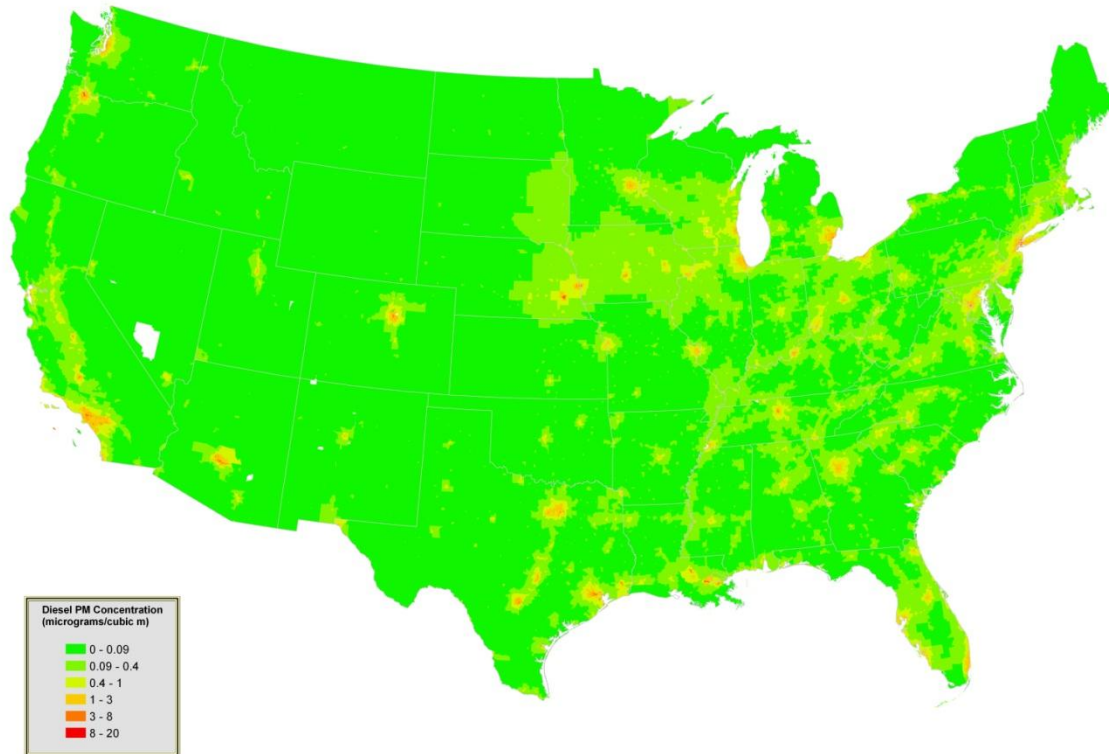


2005 NATA Estimated Diesel PM Concentration
Locomotives

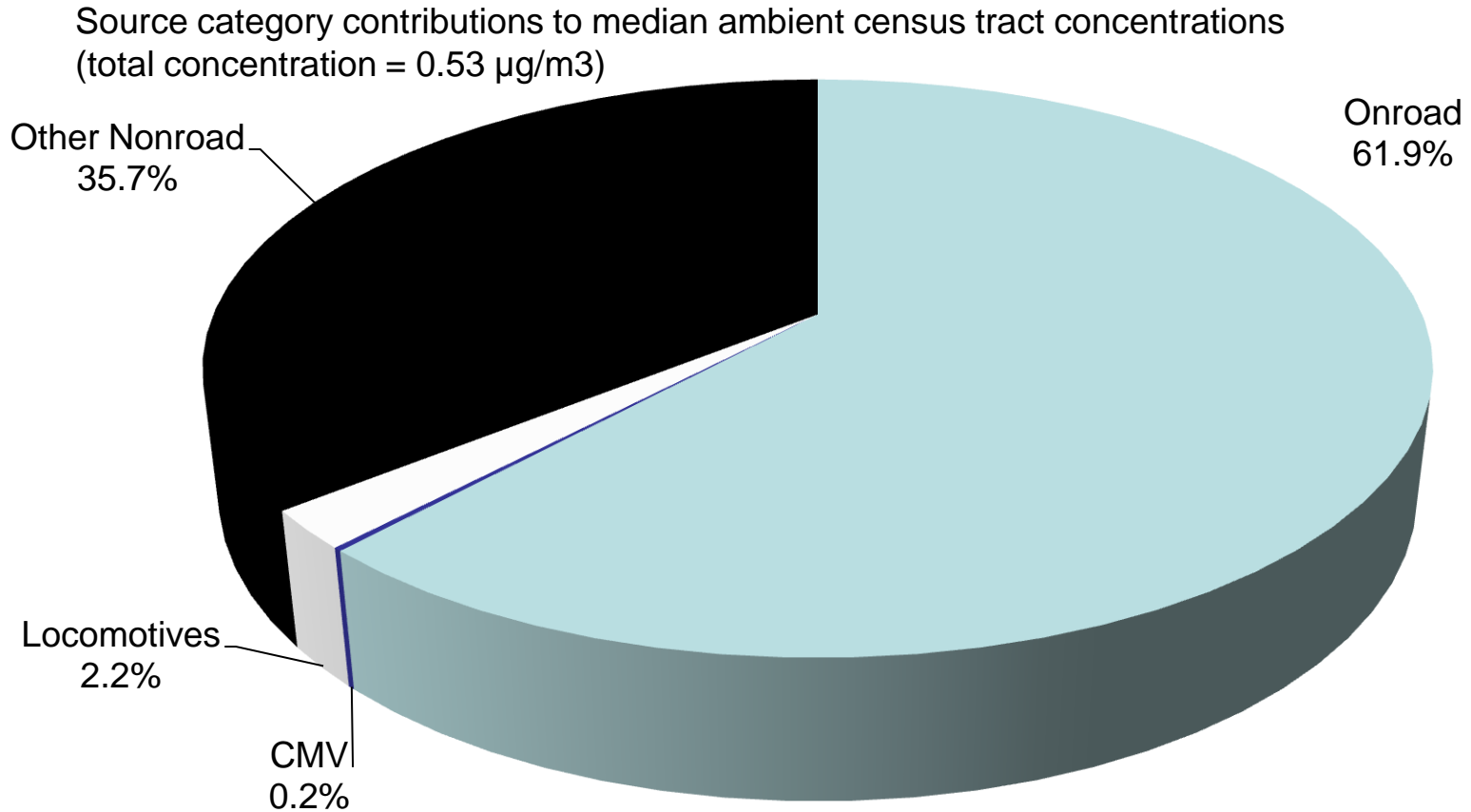


Diesel PM in NATA 2005

2005 NATA Estimated Tract Level Total Diesel PM Concentration



Diesel PM in NATA 2005



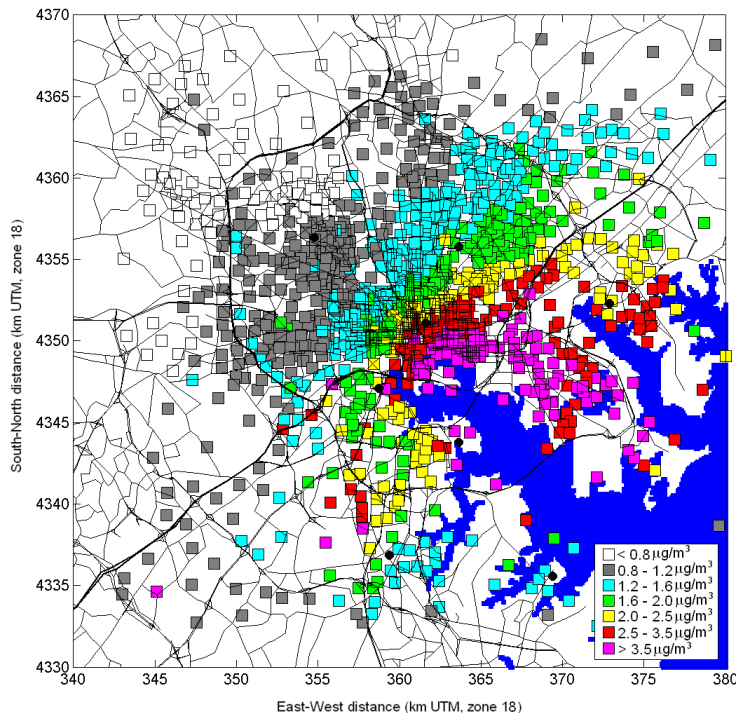
Diesel PM in NATA 2005

- Distribution of census tract concentrations for diesel PM

Percentile	Ambient Concentration ($\mu\text{g}/\text{m}^3$)
5	0.03
25	0.17
50	0.53
75	1.19
95	2.79

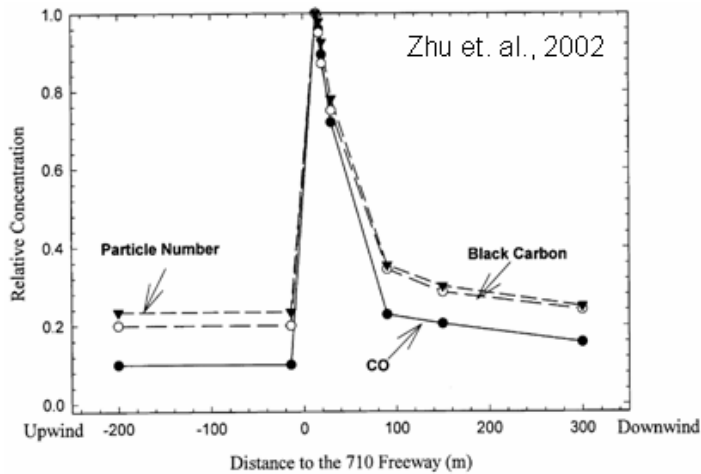
PM Near Roads

- Within urban areas, while there is a strong regional PM signal, there is also spatial heterogeneity due to emissions from vehicles and nonroad engines roads and ports. Diesel PM is a large contributor to this heterogeneity.

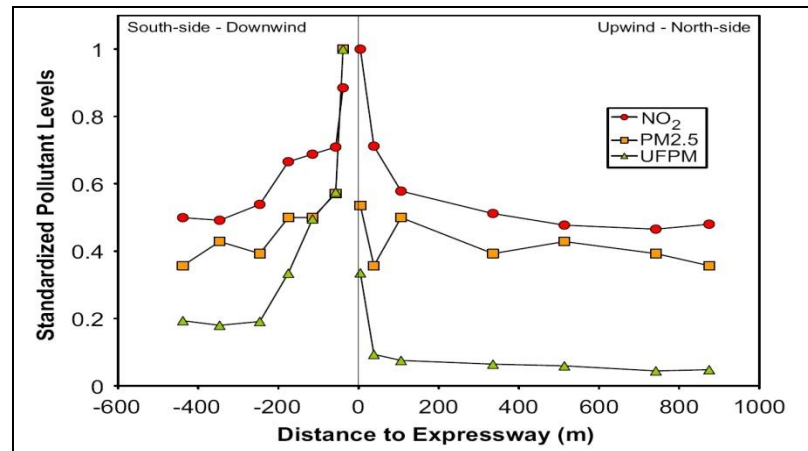


Distribution of PM in Baltimore from vehicle running emissions, ports, and industrial sources (EPA ORD modeling)

PM Near Roads



Measurements indicate strong spatial gradients downwind for mobile source emissions

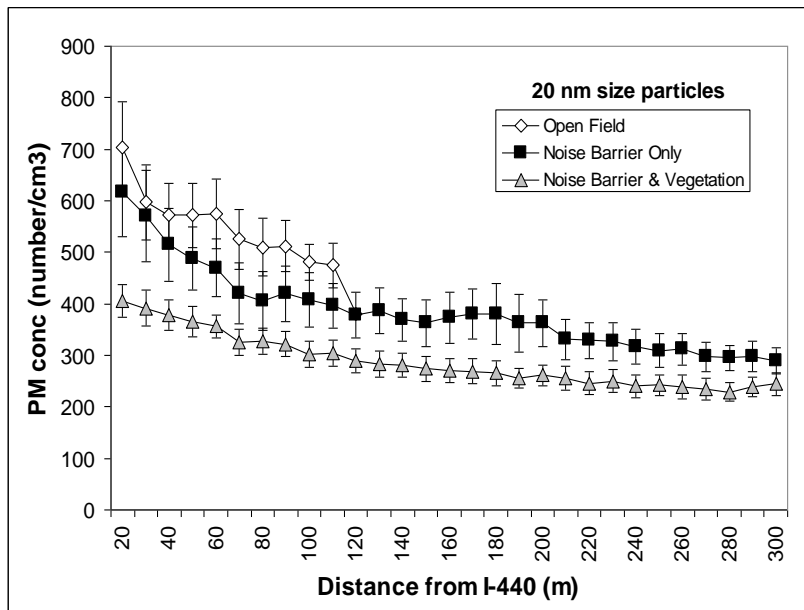


Near Road Impacts

- Over the last decade, hundreds of studies published on the health of populations living near major roads
 - Respiratory symptoms in asthmatic children
 - New onset asthma
 - Cardiovascular disease
 - Premature mortality
 - Neurodevelopmental delays
 - Birth outcomes
 - Cancer
- Over 35 million people live within 100 meters of a major transportation system including 4+ lane highways
- Role of diesel PM in contributing to these adverse health effects is a remaining question.

Near Road Impacts

- EPA ORD research shows road design features (barriers and vegetation) impact gradients.



Source: Baldauf, 2008