Reducing Heavy-Duty Diesel Emissions: Practical Experience, Future Goals

Diesel Engine Emissions Reduction Conference

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San Diego, CA

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Northeast States for Coordinated Air Use Management

NESCAUM Background

- The Northeast States for Coordinated Air Use Management
- A nonprofit organization founded in 1967 by the New England States to provide policy guidance and technical assistance in the development of their air pollution programs.
- New Jersey and New York State joined in the seventies.

Presentation Overview

- Ongoing diesel emission reduction projects.
- National NOx & PM inventory
- Regulatory structure
- Diesel occupational exposures.
- Conclusions.

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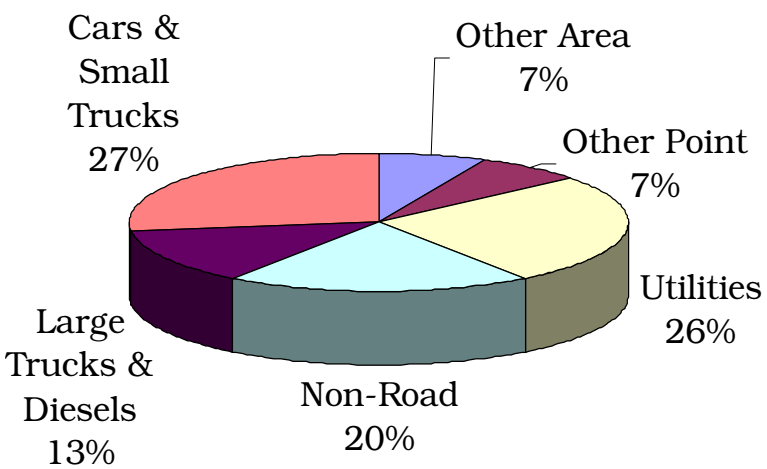
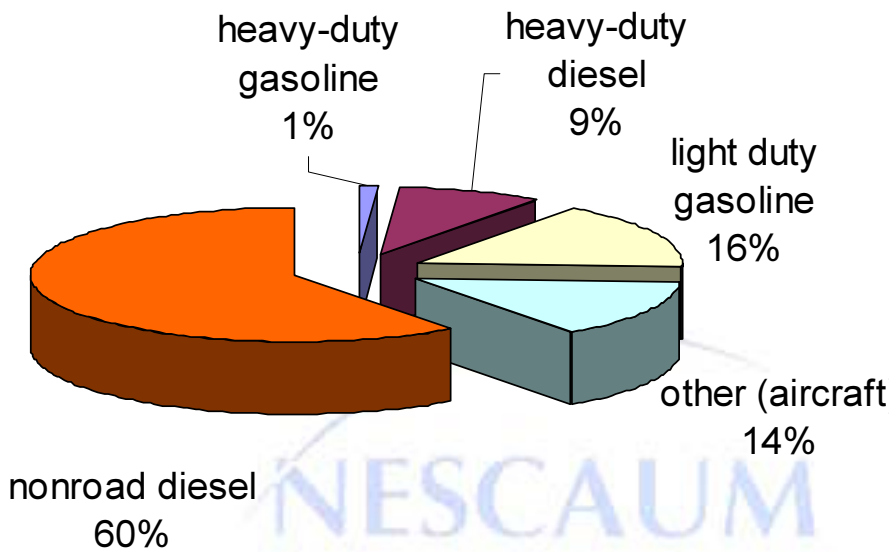
NESCAUM Diesel Emission Control Initiatives

- Diesel retrofits.
  - Clean Air Construction Initiatives
    - Boston's Big Dig
    - CT's I95 Corridor Improvement Project
    - Lower Manhattan Redevelopment
  - School bus retrofits (ULSD fuel, DOC & DPF)
  - Supplemental Environmental Projects
    - DOC, DPF, SCR & CNG technologies
- Truck Stop Electrification
  - Hunts Point Market, Bronx, NY
- Heavy-Duty I/M
  - Smoke Testing
  - Portable emission monitoring systems

Inventory Background- NOx & PM

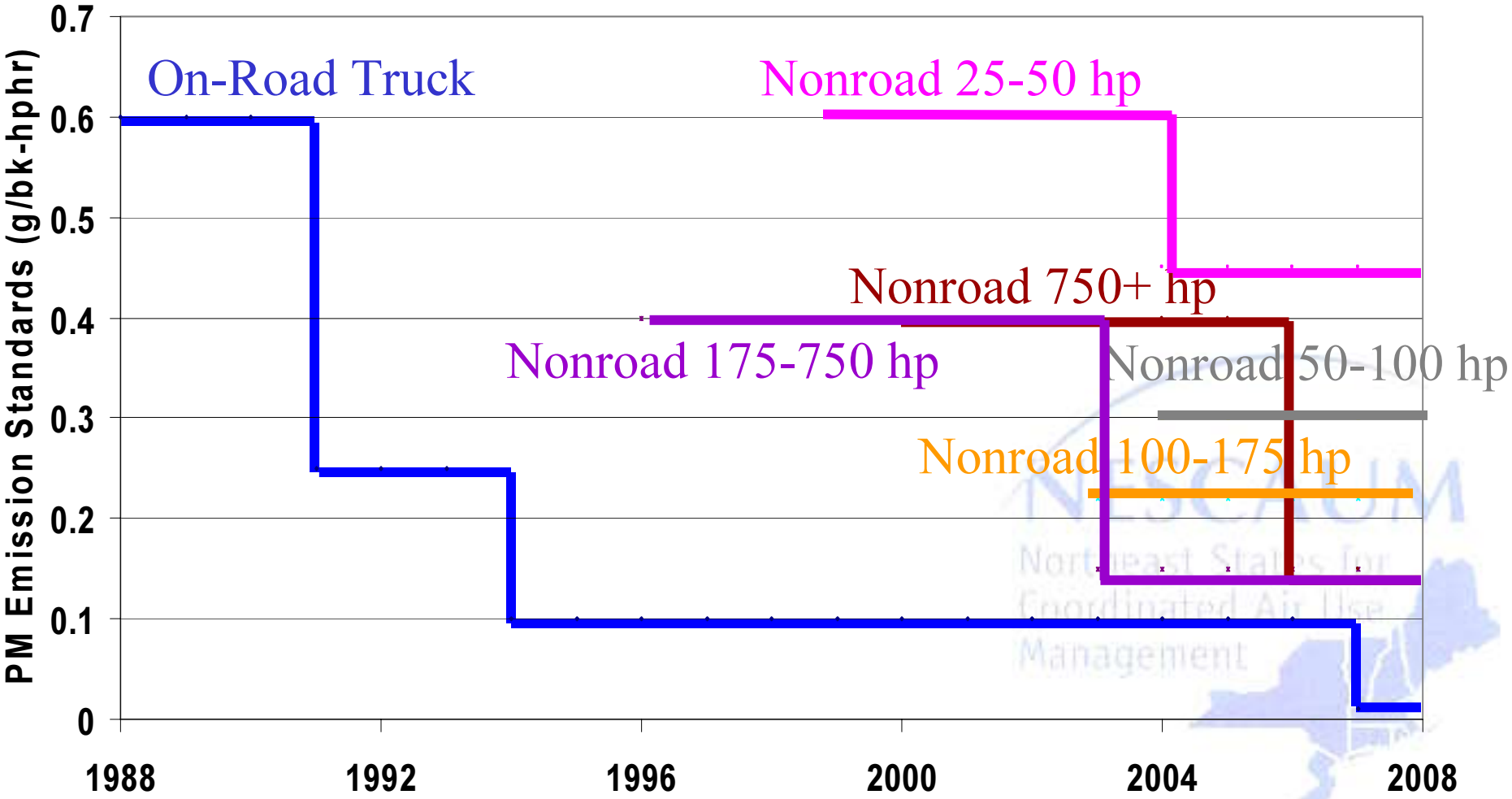


NOx Emissions all sources (1995 baseline)



Mobile Source PM Emissions Projected, 2010

EPA CI Engine Emission Standards



Keene State College Occupational Exposure Study

- Study to examine total worker exposure to hazardous air pollutants and respirable PM in agricultural and construction work environments.
- Heavy equipment operator breathing zone samples are collected in coordination with proximal area samples.

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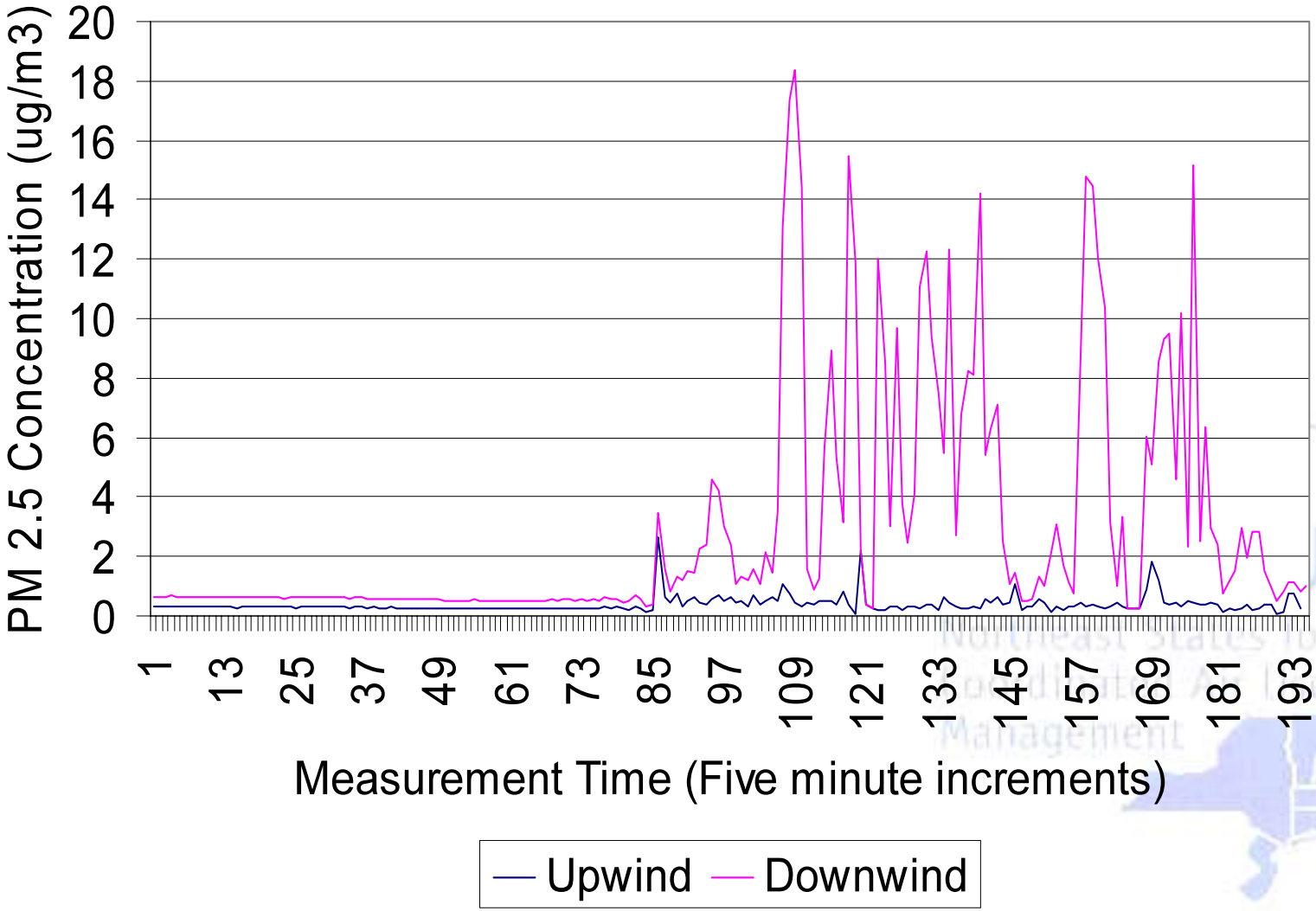
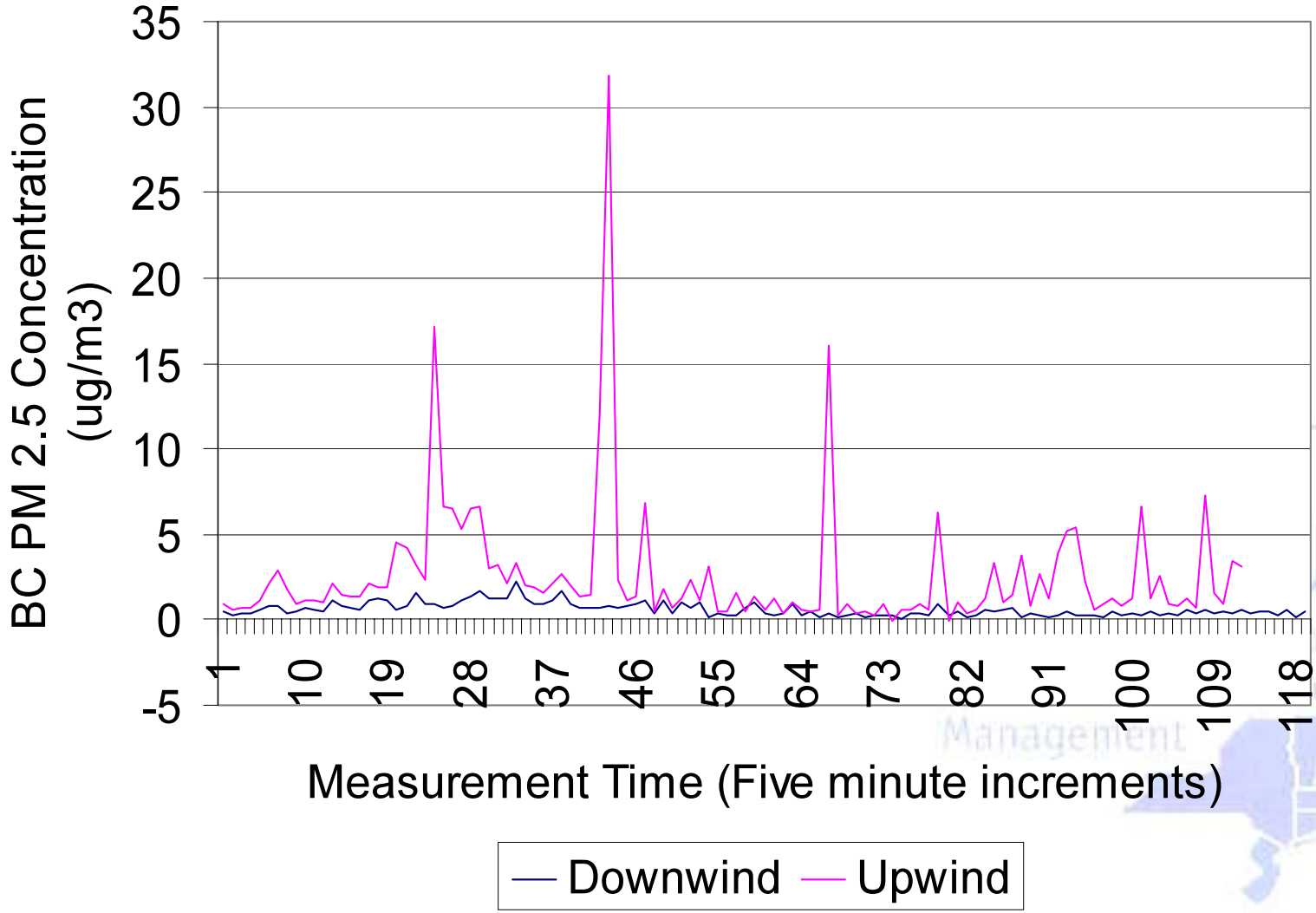
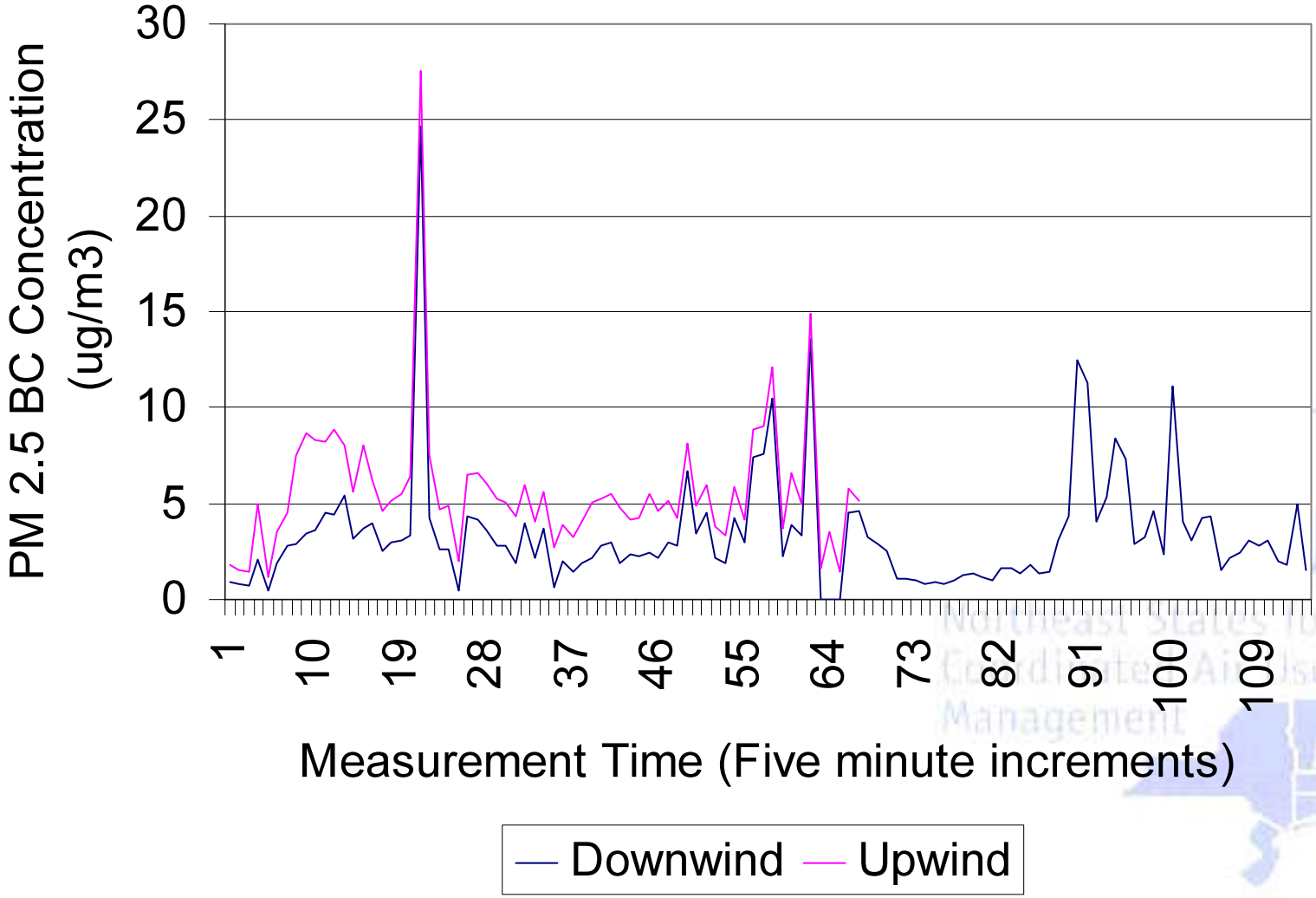
KSC Day1, Proximal Area Samples of Black Carbon



KSC, Day 2 , Proximal Area Samples of Black Carbon



KSC, Day 3, Proximal Area Samples of Black Carbon



$PM_{2.5}$ integrated mass-highlights 8 hour average concentrations ($\mu g/m^3$)

Date	Upwind $PM_{2.5}$ ($\mu g/m^3$)	Downwind $PM_{2.5}$ ($\mu g/m^3$)	Equipment 1: Variable Speed Lift 1 ($\mu g/m^3$)	Equipment 2: Variable Speed Lift 2 ($\mu g/m^3$)	Equipment 3: Loader ($\mu g/m^3$)	Equipment 4: Dozer ($\mu g/m^3$)
July 16, 2002	45	24	473	336	34	N/A
July 17, 2002	16	0	661	N/A	32	N/A
July 18, 2002	14	25	168	N/A	63	43

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KSC Measurement Site

KSC Monitoring Site

Ground Zero, January 30, 2002

Ground Zero , January 30, 2002

Ground Zero Emissions During Recovery

- The primary recover site is 16 acres.
- The recovery effort was a 24/7 operation
- Fuel use in the initial phase of recovery was in excess of 20,000 gallons of diesel fuel/day.
- The NESCAUM inventory of January 20, 2002 included 237 pieces of equipment.

Ground Zero Emissions: October 1 – December 31, 2001

October 1, 2001 - December 31, 2001	PM (Tons/ 3Months)	CO (Tons/ 3Months)	HC (Tons/ 3Months)	NOx (Tons/ 3Months)
Total Uncontrolled Emissions (baseline)	14.0	297.5	35.0	241.5
Emissions Post Ultra Low Sulfur Diesel (ULSD) Fuel Introduction	12.0	297.5	35.0	241.5
Emissions Post Diesel Oxidation Catalyst (DOC) Retrofit	8.4	148.7	17.5	241.5
Emissions Post Diesel Particulate Filter (DPF) Retrofit	2.1	148.7	17.5	241.5

HYPOTHETICAL CONTROL SCENARIOS
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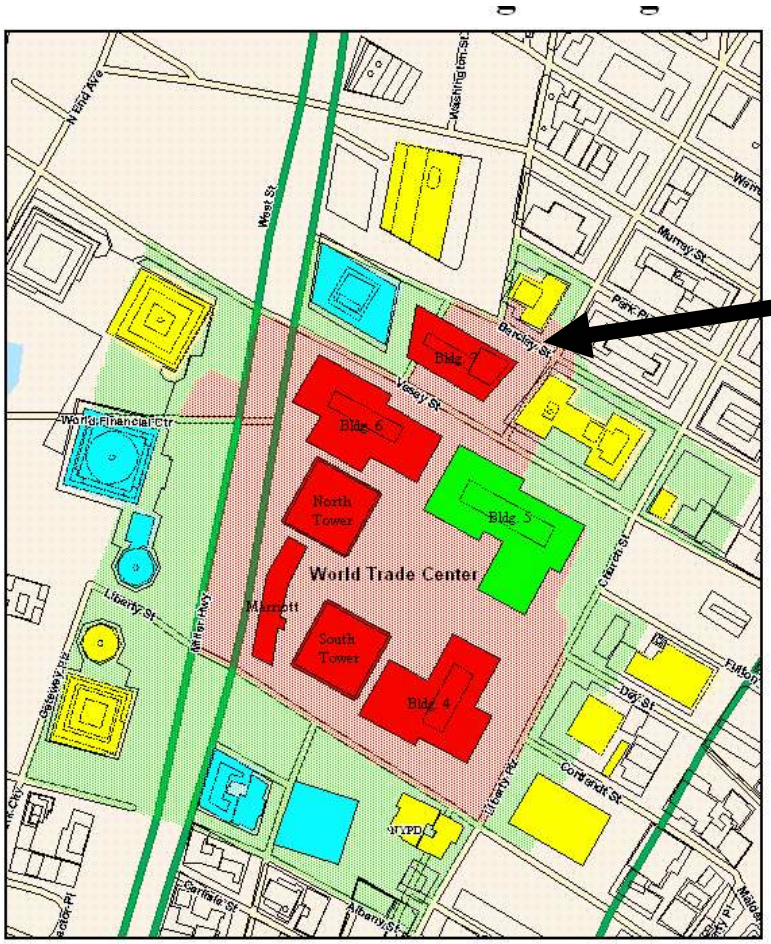
Lower Manhattan Redevelopment



Location Map

- NESCAUM is providing technical and financial assistance in the adoption of clean construction practices for 7WTC.
- NESCAUM is working with New York State and New York City towards the adoption of clean air construction practices in the redevelopment of Lower Manhattan.

Conclusions

- As heavy-duty onroad engines face more stringent emission standards, nonroad engines become a more dominant portion of the mobile source inventory.
- Eight hour occupational exposures, when averaged into the daily baseline may push certain populations above the 24 hour NAAQS threshold for $PM_{2.5}$.

Conclusions (Cont'd)

- The nonroad sector provides a excellent source of significant ozone precursor and PM reductions.
- Local regulation of fuel for nonroad vehicles is not preempted by the Clean Air Act, as is the case for highway vehicles.
- Nonroad engine standards are just beginning to tighten, but at best do not meet the 1994 onroad engine standards.
- Retrofit technology for nonroad engines is feasible today and can provide significant emission PM, HC and CO reductions.

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