Potential Mobile Source Reduction Measures

Lightering

Non-Road Idling

Port Measures–
Drayage Trucks

Coralie Cooper & Jesse Colman, NESCAUM

Ozone Transport Commission Meeting

March 16, 2010

Presentation Outline

- Background
- Potential Measures
  - Lightering Controls
  - Nonroad Idling Limitation
  - Drayage Emissions Reductions
- Methodology
- Emissions Estimates & Potential Reductions
- Considerations/Issues
- Conclusions

NESCAUM

Lightering—Background

- What is lightering?
  - Bulk product transfer from one marine vessel to another
- Why does lightering take place?
  - To reduce tanker draft
  - To expedite product shipment to multiple ports
- Where do lightering emissions come from?
- Controlled lightering employs vapor-balancing technology

NESCAUM

Lightering—Background

- Emission Factors

  Tons of VOC emitted per million barrels lightered

Product	Emission Factor
#2 Diesel	0.20
Crude	19.80
Naphtha	25.90
Gasoline	70.70

Source: US EPA's AP-42

NESCAUM

Lightering—Existing Measures

Delaware's SR1124 §46

- In 2008, DE imposed a percentage-based limit on uncontrolled lightering
- Steadily reduces the limit of allowable uncontrolled lightering
- Title V stationary source
  - "**any** fixed building, structure, facility, installation, equipment or any motor vehicle, **waterborne craft**, aircraft or diesel locomotive deposited, **parked, moored, or otherwise remaining temporarily in place**, which emits or may emit any air contaminant" (DE Admin Code, Title 7, Section 1101)
- Regulated entities: lightering service companies
- Enforcement activities
- Anticipated reductions: 1115 tpy VOCs (2012)

NESCAUM

Lightering—Emissions Estimates and Potential Reductions

Area	Product	Volume (million BBLs)	VOC Emissions (tons)	57% Reduction (tons)	95% Reduction (tons)
Narragansett Bay	Gasoline, Kerosene	0.2	4	2	4
Long Island Sound	Finished Products	1.4	99	56	94
New York Harbor	Gasoline, Fuel Oil, Other	48.3	889	506	844
Delaware Bay	Crude	98.8	1,956	1,115	1,858
Chesapeake Bay	Gasoline	0.3	11	6	10
		TOTAL	2,959	570*	1,695*

*Beginning May 1, 2012, Delaware's lightering regulation will reduce annual VOC emissions by 1,115 tons. This quantity is *excluded* from TOTAL potential reductions since these emissions reductions are anticipated to result from existing Delaware regulation.

These estimates assume that lightering can be controlled on 100% of ships.

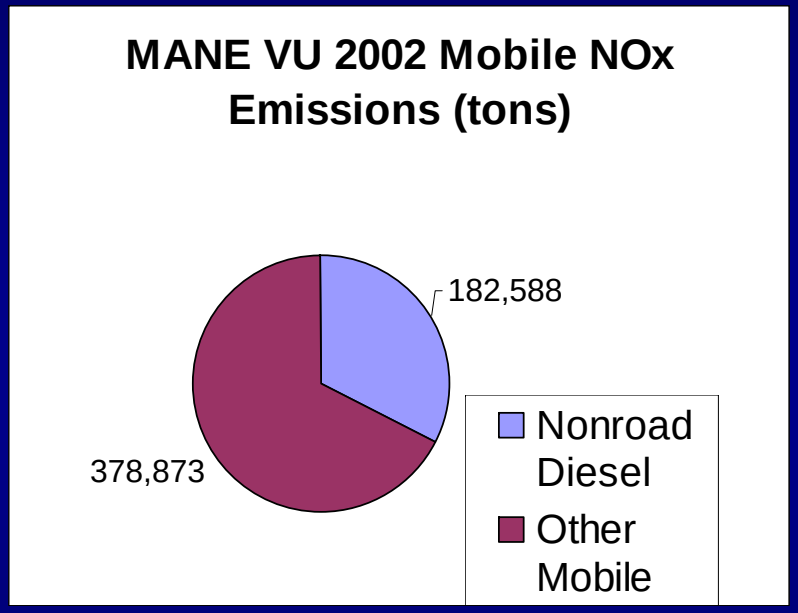
NESCAUM

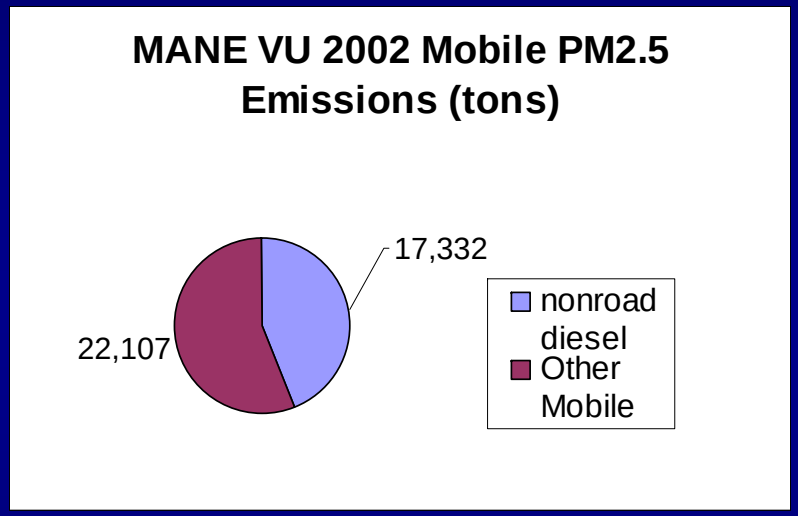
Lightering—Considerations/Conclusions

- Lack of up-to-date lightering data
- Few regulated entities
- Compliance cost—ship upgrades, lightering time, crew training
- Effect of Oil Pollution Act of 1990 on fleet
- OTC regional measure vs. EPA national measure
- Conclusion: Lightering controls will contribute significant VOC reductions, but reductions will vary from state to state

NESCAUM

Nonroad Diesel Emissions





Nonroad category excludes railroad equipment and marine vessels

NESCAUM

Nonroad Idling Activity and Emissions

- Three sources of data on activity:
  - CARB, John Deere, EPA
- CARB estimates nonroad equipment idles 7.2% of operating time
- John Deere data indicated machines idle 42% percent of time
- EPA data set very limited but was closer to John Deere than CARB
- Idling emission factors available from EPA

NESCAUM

Emissions Estimation (continued)

- NESCAUM used the NONROAD model to estimate populations of 65 nonroad engine types in each of the OTC states for 2009
- A spreadsheet was used to calculate annual activity (hours in operation) for each equipment type
- The spreadsheet allows the user to vary idling rates and the percent of idling eligible for reduction each year

NESCAUM

Potential Estimated Annual Emissions Reductions in the OTR

Idling rate assumption	NOx tons reduced	HC tons reduced	PM tons reduced
42% of time spent idling	8,188	4,172	803
7.2% of time spent idling	1,474	751	145

NESCAUM

Nonroad Idling Conclusions

- Estimates of idling vary widely, possibly due to method of gathering data on idling activity
- Assuming machines idle at the low end of estimates (7%), significant emissions reductions could be achieved if idling were restricted in the OTR
- California, Rhode Island, New Jersey, and Connecticut idling restrictions provide model policies for the region
- Relatively low cost
- Question: who will be the regulated entity?

NESCAUM

Reducing Emissions From Port-Related Truck Traffic

- Trucks carrying freight into and out of ports (drayage) have been estimated to contribute as much as one third of overall port-related emissions
- The Port of New York and New Jersey (PANYNJ) has evaluated several approaches to reduce drayage emissions
- These approaches if adopted region-wide could result in lower drayage-related emissions at OTR ports

NESCAUM

PANYNJ Analysis

- Contractors for PANYNJ evaluated several scenarios for reducing drayage emissions
- NESCAUM selected one approach to estimate potential OTR reductions:
- Replacement of pre-1994 drayage vehicles with 2004 vehicles in 2011
- Subsequent replacement of pre-2007 trucks in 2017 with 2007 trucks
- PANYNJ estimates the port would realize annual reductions of 10% in NOx and 9% in PM from drayage
- Annual benefits would continue for 24 years

NESCAUM

Potential NOx Reductions in the OTR

State	Annual freight (millions tons)	2006 Drayage Emissions (tpy)	Annual Benefit 10% (tpy)	Lifetime Benefit 24 years (tons)
NY/NJ	157	1,935	190	4,555
CT	17	212	21	499
DE	11	137	13	324
MA	26	320	31	755
MD	41	508	50	1,197
ME	26	320	31	755
NH	4	50	5	117
NJ	45	553	54	1,302
NY	10	125	12	295
PA	103	1,263	124	2,976
RI	9	114	11	268
VA	55	673	66	1,587
Total	**504**	**6,210**	**610**	**14,629**

NESCAUM

Potential $PM_{2.5}$ Reduction in the OTR

State	Annual freight (millions tons)	2006 Drayage Emissions (tpy)	Annual Benefit 9% (tpy)	Lifetime Benefit 24 years (tons)
NY/NJ	157	**54**	**5.0**	**131**
CT	17	6	0.5	13
DE	11	4	0.4	9
MA	26	9	0.8	20
MD	41	14	1.3	31
ME	26	9	0.8	20
NH	4	1	0.1	3
NJ	45	15	1.4	34
NY	10	3	0.3	8
PA	103	35	3.3	78
RI	9	3	0.3	7
VA	55	19	1.7	42
Total	**504**	**173**	**16.0**	**396**

NESCAUM

Potential Models and Issues

- The PANYNJ drayage program provides a potential model for the rest of the region
- PANYNJ estimates its program will cost $84 million for the two phases
- Port of LA, Long Beach, and Oakland gate fees provide a model of how the program might be paid for (where gate fees are feasible)
- Structure of regulation
- Trucking companies operate on very slim margins and there are numerous companies operating at Ports in the region
- A possible result of the regulation is that newer trucks would replace drayage trucks at ports, but the displaced drayage trucks would end up employed in other shipping activities

NESCAUM

Drayage Conclusions

- Potential emissions reductions at OTR ports are significant
- Emissions reductions would likely occur in environmental justice areas and in densely populated urban areas
- Assuming the trucks operate outside of the port, emissions reduction estimates presented here could be understated

NESCAUM