

Regulation of Air Emissions from Vessels and Port Operations

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USEPA

- 2002 USEPA classified diesel engine exhaust likely to be carcinogenic to humans by inhalation at environmental exposure
- Populations located proximate to marine ports and other concentrations of diesel engines emissions at greater health risk
- 40 US Ports located in areas designated by USEPA as not meeting NAAQSs for PM and ozone (NOx/VOC) - "Nonattainment Areas"
- 870,000 tons of NOx -- 8% of all mobile sources in the US
- 66,000 tons of PM-2.5 -- 15% of all mobile sources in US

USEPA

- Large contribution of foreign-flagged ships. MARAD 1999 data:
 - 90% of vessels entering US ports are foreign flagged
 - 7800 foreign flagged vessels entered US Ports
 - 12% of the vessels represented 50% of the entrances
 - 30% of the vessels represented 75% of the entrances
- Currently, Cat 3 engines subject to Tier I standards adopted by USEPA in 2003, effective in 2004, equivalent to MARPOL Annex VI NOx limits effective April 2006.
- USEPA Advanced Notice of Proposed Rulemaking Dec 2007
- US Proposal to MEPC 57 April 2007


USEPA – SO_x and PM

- Performance Standard
- 95% reduction in SO_x emissions by 2011
- Applies to new and existing vessels/engines
 - PM - 0.5g/kW-hr
 - SO_x - 0.4g/kW-hr
- Limited to specified geographic areas (e.g., NO_x special environmental control area)
- Technology: Wet scrubber or maximum sulfur in fuel = 1000 ppm

USEPA – SOx and PM

- Issues – Low Sulfur Fuel
 - Capacity of refiners/distribution system to supply sufficient quantities
 - Requires investment in the \$100s of billions USD
 - Increased fuel cost
 - Safety hazards associated with fuel switching
 - What do refiners do with residual/bunker fuel?

USEPA – SO_x and PM

- Exhaust gas scrubbers - retrofit control technology
 - A few demonstration projects -
 - 95% SO_x reduction and 50-60% PM reduction
 - Issues:
 - Limited experience in commercial use
 - Wastewater discharge
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USEPA – NO_x

Existing Engines

- Performance Standard
 - Reduce NO_x emissions by 20% from Tier O engines by 2012;
OR
 - Specific action - replace valves or fuel injection system
- Retrofit technology - compatible with engines mfr after mid-1980s
 - slide-valve fuel injectors
 - injection timing

USEPA – NO_x


New Engines

- Performance Standard Tier 2 by 2011

- Refine engine controls
 - common rail fuel system
 - turbo charge optimization
 - compression ratio changes
 - electronically controlled exhaust valves
and/or
 - Water based technologies
 - water emulsification
 - direct water injection
 - intake-air humidification
 - exhaust gas recirculation (EGR)

USEPA – NO_x

Existing Engines

- Performance Standard - Tier 3 by 2016
 - SCR - Selected Catalytic Reduction
 - USEPA says this is proven technology
 - Currently operated on 300 vessels, logged over 80,000 hours of operation over 10 year period
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USEPA

- Issues
 - Requires injection of urea, no shore-based storage/distribution system
 - Exhaust temperature may be too low at lower engine load/slower speeds

Congress – States – NGOs


- Congressional action
 - S-1499, Senator Boxer, Chair Senate EPW Committee

- States – CARB January 2007 - PMSA lawsuit
 - Requires Low Sulfur Fuel for Main/Aux Engines within 24nm of Coast

- NRDC Notice of Intent to Sue Port Operators under RCRA
 - Feb 6, 2008

- Legal Issues
 - Jurisdiction over foreign flagged vessels
 - UNCLOS
 - CAA and PWSA Preemption

IMO/MARPOL Annex VI

- BLG - February 5 2008 meeting – narrowed options for MEPC
 - MEPC - April 2008 meeting
 - IMO - October 2008 meeting
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Discussion

