Overview

- Vessel numbers and emissions
- Background information
- Regulatory concepts
- Costs
- Regulation timeline
- Other issues
Harbor Craft Emission Reductions Key to Multiple Plans

♦ Diesel Risk Reduction Plan
♦ Goods Movement Plan
  – Harbor craft goals:
    • 2010 -25% reduction
    • 2015 -30% reduction
    • 2020 -40% reduction
♦ San Pedro Bay Port Clean Air Action Plan
  – Third largest emissions impact after ocean going vessels and cargo handling equipment
♦ State Implementation Plan (SIP)

Estimated Harbor Craft Emissions Impact

- Diesel PM:
  - Off-road 77%
  - On-road 24%
  - Stationary 10%
  - 5 tpd

- NOx:
  - Off-road 25%
  - On-road 52%
  - Stationary 16%
  - Area-wide 3%

2005 CARB Almanac and On-Line Inventory
Harbor Craft Vessel & Engine Quantities

<table>
<thead>
<tr>
<th>Vessel Type</th>
<th>Number of Vessels</th>
<th>Number of Engines</th>
<th>Average Horsepower of Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Propulsion</td>
<td>Auxiliary</td>
</tr>
<tr>
<td>F/T/T Sub-Total/Average</td>
<td>579</td>
<td>1156</td>
<td>757</td>
</tr>
<tr>
<td>WCPO Sub-Total/Average</td>
<td>316</td>
<td>487</td>
<td>166</td>
</tr>
<tr>
<td>Non-Fishing Total/Average</td>
<td>895</td>
<td>1643</td>
<td>923</td>
</tr>
<tr>
<td>Fishing Vessel Total</td>
<td>3290</td>
<td>4050</td>
<td>1696</td>
</tr>
<tr>
<td>Total/Average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Commercial Harbor Craft</td>
<td>4185</td>
<td>5693</td>
<td>2619</td>
</tr>
</tbody>
</table>

Harbor Craft Main and Auxiliary Engine Inventory

- Total Other
- Non-Fish
- Ferries, Tug, and Tow
- All Fishing
Diesel PM and NOx Emission Sources

- Total: 100%
- Other Non-Fish: 3%
- All Fishing: 26%
- Ferries, Tug, and Tow: 71%

PM Emissions and Proximity to Shore

- Harbor
- 0-25
- >25

Vessel Type: 
- Ferry
- Tug
- Tow
- All Others, Non-Fishing
- Commercial Fishing
- Charter Fishing
Emissions By Air District (tons/year)

Non-Fishing Steady
Fishing Vessel Declining

Engine Age Distribution for Ferries and Tugs
Estimated Fleet Sizes

- **Ferry**
  - 8 or more vessels 40%
  - 4-7 vessels 20%
  - 2-3 vessels 15%
  - Single vessel owners 25%

- **Tug/Tow**
  - 8 or more vessels 55%
  - 4-7 vessels 20%
  - 2-3 vessels 20%
  - Single vessel owners 5%

Questions
U.S. EPA Marine Engine Standards

- Tier 0 Engines are unregulated (<2004)
  - Majority of the commercial harbor craft engines
- U.S. EPA has established Tiered Standards
  - Tier I (2004)
  - Tier II (2004-2007)
    - Vary by engine displacement and model year
- Tier III are not yet promulgated

Approximate Emission Reductions for Engine Repowers

<table>
<thead>
<tr>
<th>U.S. EPA Marine Tier</th>
<th>U.S. EPA Marine Tier</th>
<th>NOx Reductions</th>
<th>PM Reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 0</td>
<td>Tier I</td>
<td>40 %</td>
<td>25 %</td>
</tr>
<tr>
<td>Tier 0</td>
<td>Tier II</td>
<td>60 %</td>
<td>65 %</td>
</tr>
<tr>
<td>Tier 0</td>
<td>Tier III*</td>
<td>70 %</td>
<td>80 %</td>
</tr>
<tr>
<td>Tier I</td>
<td>Tier II</td>
<td>40 %</td>
<td>50 %</td>
</tr>
</tbody>
</table>

*ARB estimate
CARB Fuel Standard for Harbor Craft

- 15 ppm CARB low sulfur diesel fuel required for all harbor craft starting January 1, 2007
- Sold in South Coast District AQMD starting January 1, 2006.
- Sold statewide starting September 1, 2006.
- Reduction of
  - NOx 0.2 tons per day
  - SOx 1.5 tons per day
  - PM 0.5 tons per day

Additional Options to Reduce Emissions

- Repower engines to Tier II
- Diesel emission control retrofits
  - Currently no CARB verified strategies
Diesel Emission Control Retrofits for Harbor Craft

- No verified marine retrofits
- Blue and Gold Ferry Demonstration
  - Installing PM traps on main engines
  - Successful PM traps on aux. engines
- Navy Workboat Demonstration
  - Successful low emission engine rebuild and retrofit PM trap.
- Continue to work with vessel owners to get retrofits installed and tested.

Questions
Regulatory Approach

- **Ferries, tugs, and tow vessels**
  - Control largest emission source first
  - Rationale:
    • ~70% of NOx and ~70% of PM total harbor craft emissions
    • High near shore emissions

- **All other harbor craft**
  - Initial reporting and recordkeeping
  - Rationale:
    • Work further from shore
    • Declining commercial fishing fleet
  - Address emission reductions at a later date

All New Harbor Craft Vessels

- Require most current EPA engine
  - Sell through provisions
  - Most current engine available when vessel is designed.
All New Ferries

♦ Require most current EPA engine + combined PM and NOx reduction of 85%

In-Use Requirements for All Vessels

♦ Install non-resettable hour meter
♦ Reporting and recordkeeping requirements
In-Use Vessels Other Than Ferries, Tugs, and Tow

- Crew and supply boats
- Pilot boats
- Work boats
- Charter fishing vessels
- Commercial fishing vessels
- Other vessels

Reporting and Recordkeeping Opportunities

- Recordkeeping and reporting requirements possibly starting 2008
- Retain opportunity for Carl Moyer and other funds.
  - Reporting and recordkeeping may be required to receive certain funds.
  - Additional PM, NOx, and other emission reductions.
- Regulatory action possible in future
Phased Engine Replacement for In-Use Ferries, Tugs, and Tow

♦ Phase in schedule oldest high use engines first
♦ Additional time for fleets with multiple vessels.
♦ Investigating allowing engine replacement to coincide with rebuild schedule.

In-Use Compliance Options for Ferries, Tugs, and Tow

♦ Repower vessel engine certified to meet the current U.S. EPA Marine Emission Standards.
♦ Demonstrate the current engine meets the current U.S. EPA Marine Emission Standard
♦ Possible retrofit option
Alternative Compliance Plan

- Only harbor craft under direct control of the owner/operator per port
- Operators may comply using alternative emission control strategies.
- Must achieve equivalent or greater reductions
- Applications include a public review process

Regulatory Extensions with ARB Approval

- Vessel near retirement
- Use of a non-verified emission control strategy
- Changes in hours of operation, sales, and change of ownership.
- No suitable engine replacement.
Exempt Harbor Craft

♦ Low use <300 hour annual use
♦ Non-profit research vessels
♦ Temporary emergency rescue and recovery vessels.
♦ Registered historic vessels
♦ Military tactical support vessels
♦ Ocean-going and recreation vessels
♦ Engines using alternative fuels exclusively

Estimated Emission Reductions

California Statewide Commercial Harbor Craft NOx Emission Inventory

- Baseline
- Replace Engines at Age 20

Estimated Emission Reductions from 2004 to 2025, showing a decline in emissions per calendar year.
Questions

New Vessel Tug and Ferry Cost

- Ferry
  - 8 million+ per vessel
- Tug / Tow
  - 5 million per vessel
Ferry Engine Repower
Estimated Cost

♦ 2 Main / 1 Auxiliary Engine
  – $400K – based on $250/hp
  – $3,400/ton NOx and $40/lb of PM
  – $3,600 Carl Moyer cost effectiveness calculation

Tug Engine Repower
Estimated Cost

♦ 2 Main / 1 Auxiliary Engine
  – $670K – based on $250/hp
  – $3,700/ton NOx and $50/lb of PM
  – $4,200 Carl Moyer cost effectiveness calculation
**Estimated Total Cost**

♦ Replace all Ferry, Tug/Tow with Tier II engines
  – About $200 million
  – About 1600 engines at $250/hp

**Other Factors Impacting Repower**

♦ Obtaining dry dock time
♦ Sufficient engine installer capacity
♦ Design time
♦ Lead time for engine delivery
♦ Coast Guard approval
♦ Lost service time
Regulation Timeline

- Mid to late March 2007 - Next workshop
- May 2007 - Release Initial Statement of Reasons
  - Start 45 day comment period
- July 2007 - Present to Board for consideration
Outstanding Issues

- Vessels visiting CA
- Overlap with other regulations and ATCMs
- Compliance timelines
- Alternatives to meet emission reduction goals
- Useful economic life

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Questions