Overview of Updates

- Applied latest OFFROAD fuel correction factor
- Integrated proposed regulations into emission inventory
  - Reflect tier II emission factors
  - Working to estimate Tier III emission factors (not integrated in the inventory yet)
Methodology

- We used ARB 2002 CHC survey data to calculate ship type and region specific average emission rates
  - There are about 600 auxiliary & 1,300 main engines in the survey data
  - Roughly 20% of the statewide population
- We assumed survey data are representative of statewide population
- We calculated statewide emissions based on population & emission rates

Components of Methodology

- Population
  - Number of vessels
  - Vessel & engine specific data
  - Growth rate
  - Useful life/attrition
- Emission factors
  - Based on OFFROAD emission factors
    - Adjusted for marine cycles
    - Accounted for engine deterioration
    - Corrected for cleaner fuel
- Activity
  - Annual operating hours by engine
  - Vessel type specific load factor
Updated fuel correction factor

- Latest OFFROAD fuel correction factor
  - Fuel correction factor for HC 0.72
  - Other changes negligible impacts

Integrating Regulatory Strategy

- Regulatory strategy: engine repower based on compliance schedule
- Identify sample engines reaching compliance year in each calendar year
- Treat repowered engines as new engines
  - Apply most current emission factor
  - Apply deterioration & attrition using new model year (compliance year)
- Estimate vessel type, region and calendar year specific emission rates based on emission factors, activities & population of the sample engines
- Calculate emissions based on emission rates & population
## Compliance Dates

<table>
<thead>
<tr>
<th>Vessel Group</th>
<th>Annual Operating Hours</th>
<th>Model Year</th>
<th>Compliance Year</th>
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<td>pre 1975</td>
<td>2009</td>
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<td>1976-1989</td>
<td>2011</td>
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<td>1990-2003</td>
<td>2012</td>
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<td>2004-2006</td>
<td>2014</td>
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<td>&gt;=1500</td>
<td>pre 1975</td>
<td>2008</td>
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<td>2004-2006</td>
<td>2017</td>
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</table>

### Commercial Harbor Craft NOx Emissions

- **Baseline**
- **Controlled**

![Graph of Commercial Harbor Craft NOx Emissions](image)
Commercial Harbor Craft PM Emissions

Nonfishing Vessel NOx Emissions
Nonfishing Vessel PM Emissions

Fishing Vessel NOx Emissions
Ongoing Work

- Incorporating tier III emission factors
- Continuing QA Processes
- Refining spatial distribution
- Estimating SOx emissions
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Previous presentations on Commercial Harbor Craft Regulation can be found at:
http://www.arb.ca.gov/msprog/offroad/marinevess/harborcraft.htm