



**Public Workshop to Discuss
Reducing Emissions from
In-Use Commercial Harbor Craft**

Emissions Inventory Update

March 23, 2004

California Environmental Protection Agency



Air Resources Board

California's Emissions Inventory

- Includes emission estimates and forecasts for all anthropogenic and natural sources
- Collaborative effort to develop methodologies and collecting data
- Regularly updated to reflect the most recent information

Uses for the Emission Inventory

- Estimate emissions for specific locations or regions
- Monitor trends and project future emissions
- Use in air quality models to help assess potential impacts of emission reduction strategies
- Evaluate spatial characteristics

Current Emission Inventory for Commercial Boats (tons per day)

NOx	PM	CO	ROG	SOx
19.9	1.1	5.3	1.8	1.9

Existing Commercial Harbor Craft Inventory

- Developed primarily by the air pollution control and air quality management districts
- Methodology can vary from district to district

Goals for the Commercial Harbor Craft Inventory Update

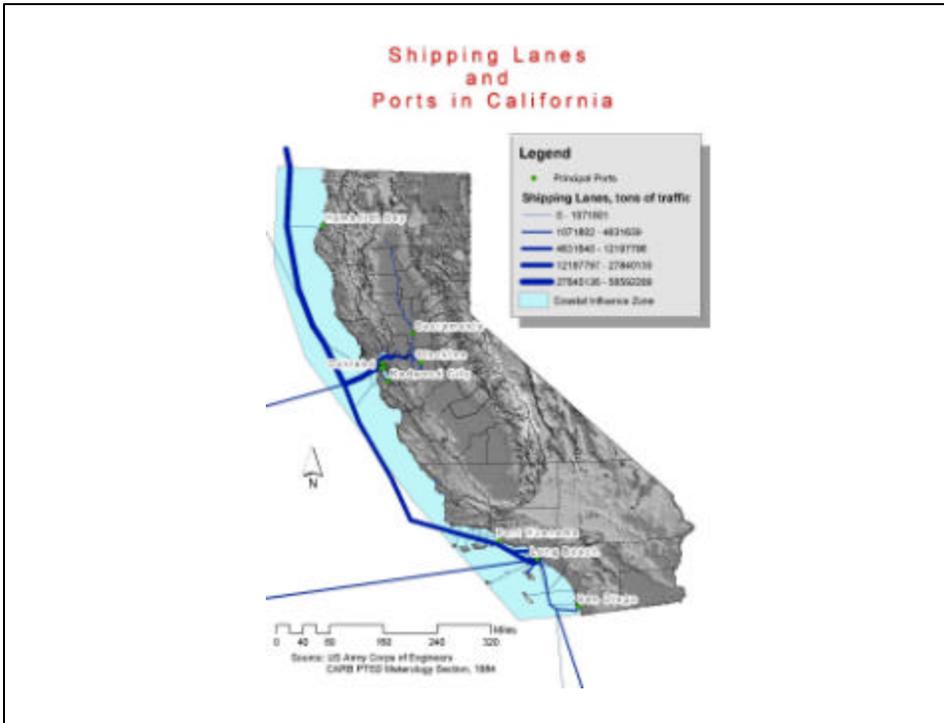
- Build into ARB OFFROAD model
- Develop consistent methodology
- Generate improved emission estimates for NO_x, PM, CO, HC, and SO_x
- Accurately reflect adopted regulations and other regulatory programs in the baseline inventory and forecasts

Emission Estimation Methodology

- “Bottom up” methodology based on survey of California’s ports, harbors, and marinas and harbor craft operations
- Emissions allocated to districts based on location of ports, harbors, and marinas
- Most core information used to develop the emission estimates will come from ARB’s Commercial Harbor Craft Survey and any follow-up done associated with the Survey

Emission Estimation Details

- 2003 will be the base year
- Emissions will be estimated based on power use emission factors (g/bhp-hr)
- Vessel profiles will be developed for nine vessel types
- Estimates emissions for propulsion and auxiliary engines
- Overwater emission inventory boundary includes California Coastal Waters



Emission Estimation Details (cont.)

- Vessel Types
 - ▶ Commercial fishing vessels
 - ▶ Charter fishing vessels
 - ▶ Ferries
 - ▶ Crew and supply boats
 - ▶ Pilot vessels
 - ▶ Tugs
 - ▶ Tow boats
 - ▶ Work boats
 - ▶ Others

Basic Methodology for Estimating Emissions from Harbor Craft

$$\text{Emissions} = \sum \left[\text{activity} \right] \times \left[\text{population} \right] \times \left[\text{emission factor} \right]$$

Vessel-specific Profiles

- Vessel-specific profiles will be developed for each vessel type and will include:
 - ▶ Activity (including loading factors)
 - ▶ Population
 - ▶ Emission factors (for NO_x, PM, CO, CO₂, HC, and SO_x)

Information Needed for Harbor Craft Vessel Emission Inventory

- **Vessel Activity Information**
 - ▶ time in mode
 - ▶ distance traveled (route characterization)
 - ▶ number of calls
- **Vessel Population Characteristics**
 - ▶ vessel type
 - ▶ engine load/horsepower
 - ▶ vessel speed
 - ▶ auxiliary engines
- **Emission Factors**
 - ▶ cruising, maneuvering, and hotelling
 - ▶ power-based

Data Sources for Information About Harbor Craft Vessels

- **Vessel Activity**
 - ▶ **In-port information - Information provided through port emission inventories**
 - ▶ **Vessel routes - Information from vessel operators**
 - ▶ **Information provided by the ARB's 2002 Commercial Harbor Craft Survey**
- **Vessel Populations in California's Ports - Information provided by ARB's 2003 Port/Harbor/Marina Survey**

Data Sources for Information About Harbor Craft Vessels (cont.)

- Vessel Population Characteristics
 - Vessel-specific data - Information provided by the ARB's 2002 Commercial Harbor Craft Survey
- Emission factors
 - U.S. rulemaking information
 - Information provided by engine manufacturers
 - ARB's OFFROAD Model
 - District source tests on commercial harbor craft

Emission Inventory Timeline

- March 2004: Present plan at March Workshop
- June/July 2004: First draft of the Statewide CHC emission inventory
 - Share with district staffs and stakeholders
- September 2004: Final version of the Statewide CHC emission inventory

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