

Regulation for Commercial Harbor Craft



Board Hearing

October 26, 2007



California Environmental Protection Agency

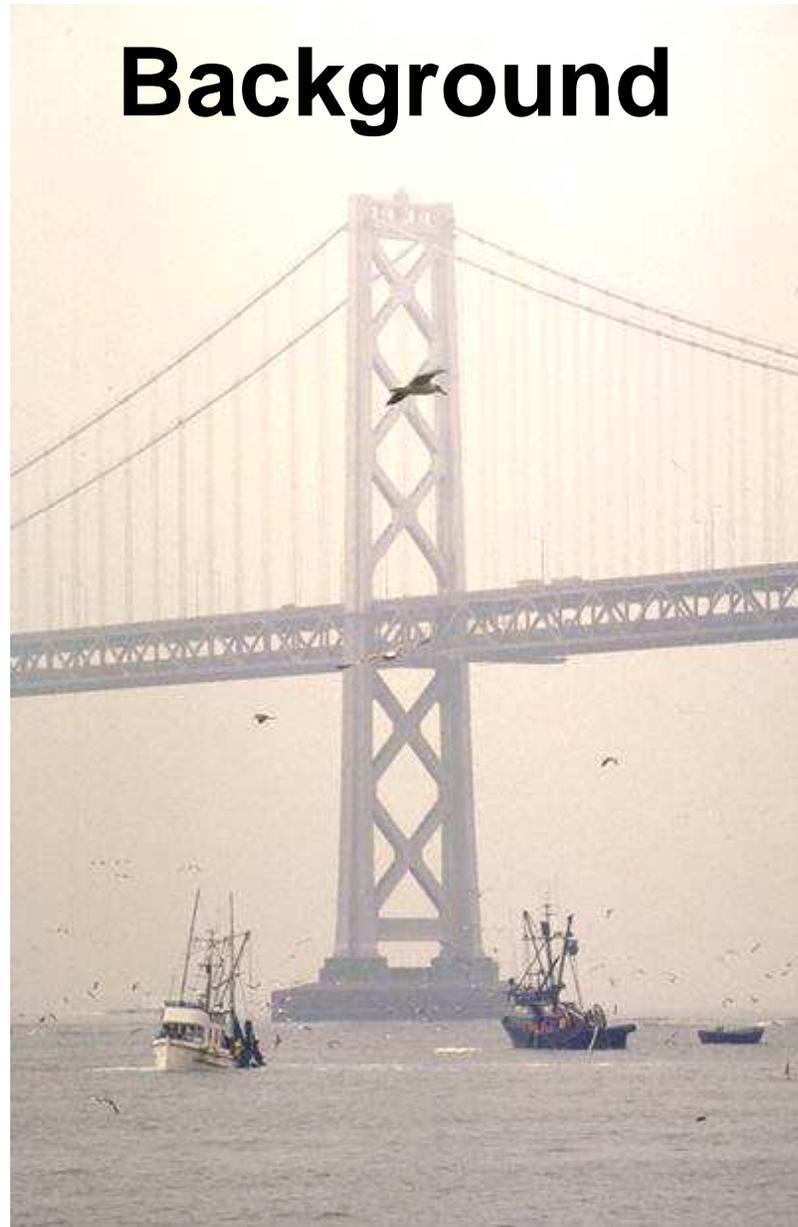
Air Resources Board

Overview

- ◆ Background
- ◆ Proposed Regulation
- ◆ Emissions and Risk Reductions
- ◆ Costs and Cost Effectiveness
- ◆ Summary and Recommendation



Background



What are Commercial Harbor Craft?

- ◆ Ferries and excursion vessels
- ◆ Tugboats and towboats
- ◆ Crew and supply vessels
- ◆ Commercial and charter fishing boats
- ◆ Pilot boats
- ◆ Work boats
- ◆ Other vessels

Vessel and Engine Population

- ◆ 4,200 vessels
- ◆ 8,300 diesel engines
- ◆ 75% of vessels are commercial and charter fishing boats
- ◆ Largest engines in ferries, excursion vessels, tugboats, and towboats

Location of Ferry, Excursion Vessels, Tugboats, and Towboats

- ◆ 38% in Bay Area
- ◆ 30% in South Coast Area
- ◆ 17% in San Diego
- ◆ 15% in the rest of the State



U.S. EPA Engine Standards

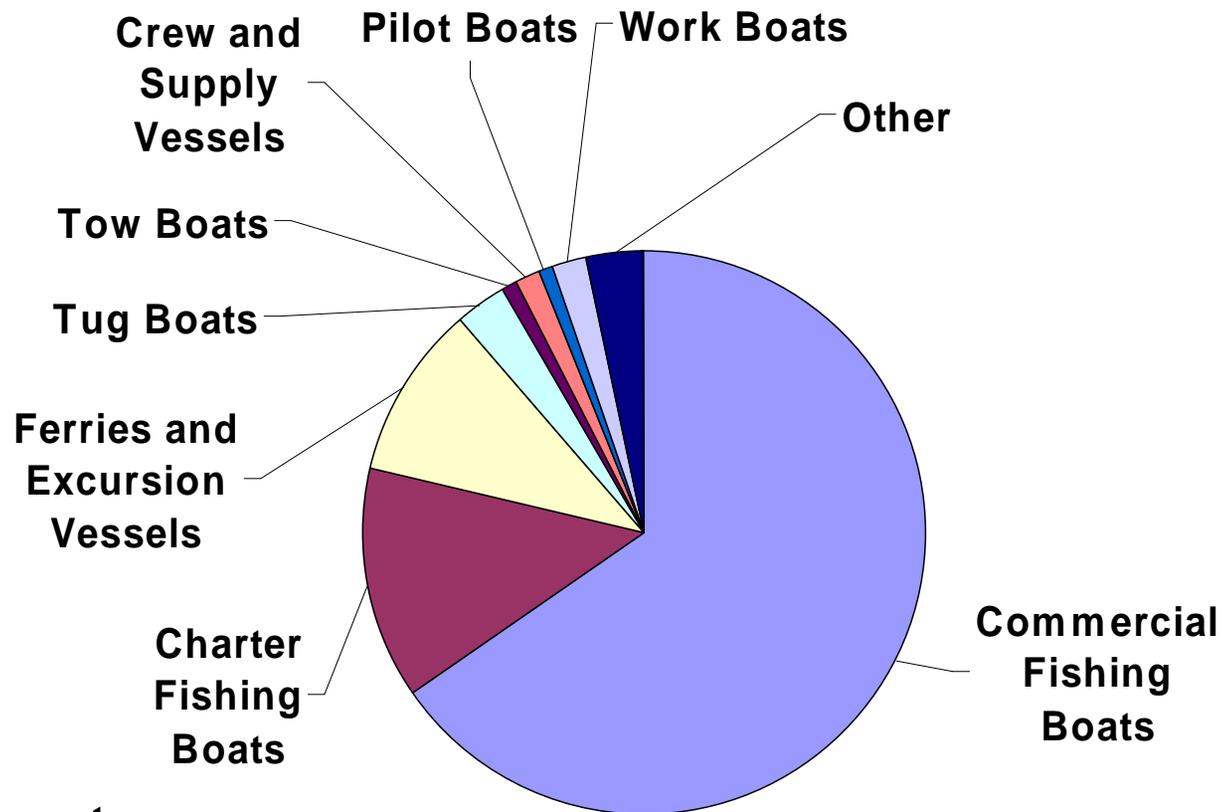
- ◆ Engines meeting Tier 1 standards became available in 2000
- ◆ Tier 2 standards became effective 2004 to 2007
- ◆ Tier 3 and Tier 4 standards proposed by U.S. EPA in April 2007, not yet adopted
- ◆ Tier 3 standards effective 2013 to 2014 and Tier 4 in 2016 to 2017

Emissions from Harbor Craft

- ◆ Large emission source
 - 3.3 tpd diesel PM
 - 73 tpd NOx
- ◆ 80% of in-use harbor craft engines are unregulated
- ◆ Vessel engines have long life

Over 75% of Vessels are Commercial and Charter Fishing Boats

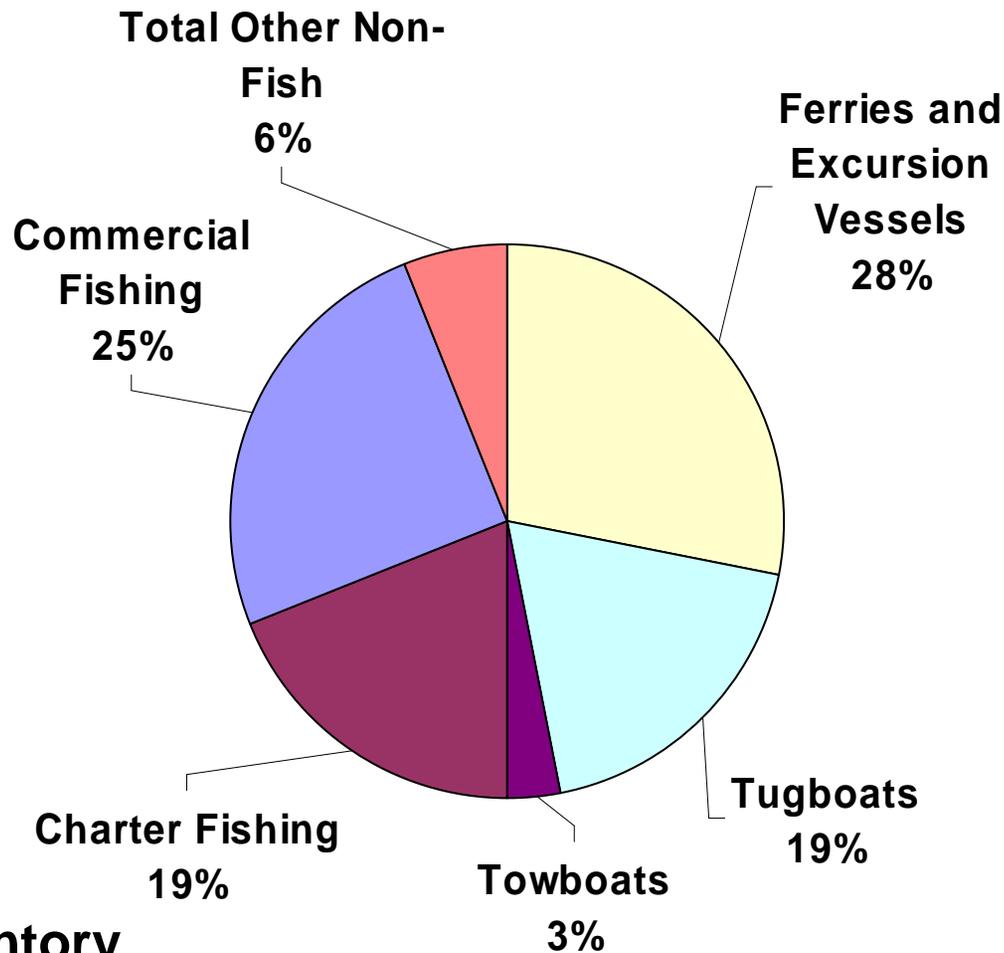
Vessel Population: ~4,200



2004 Inventory

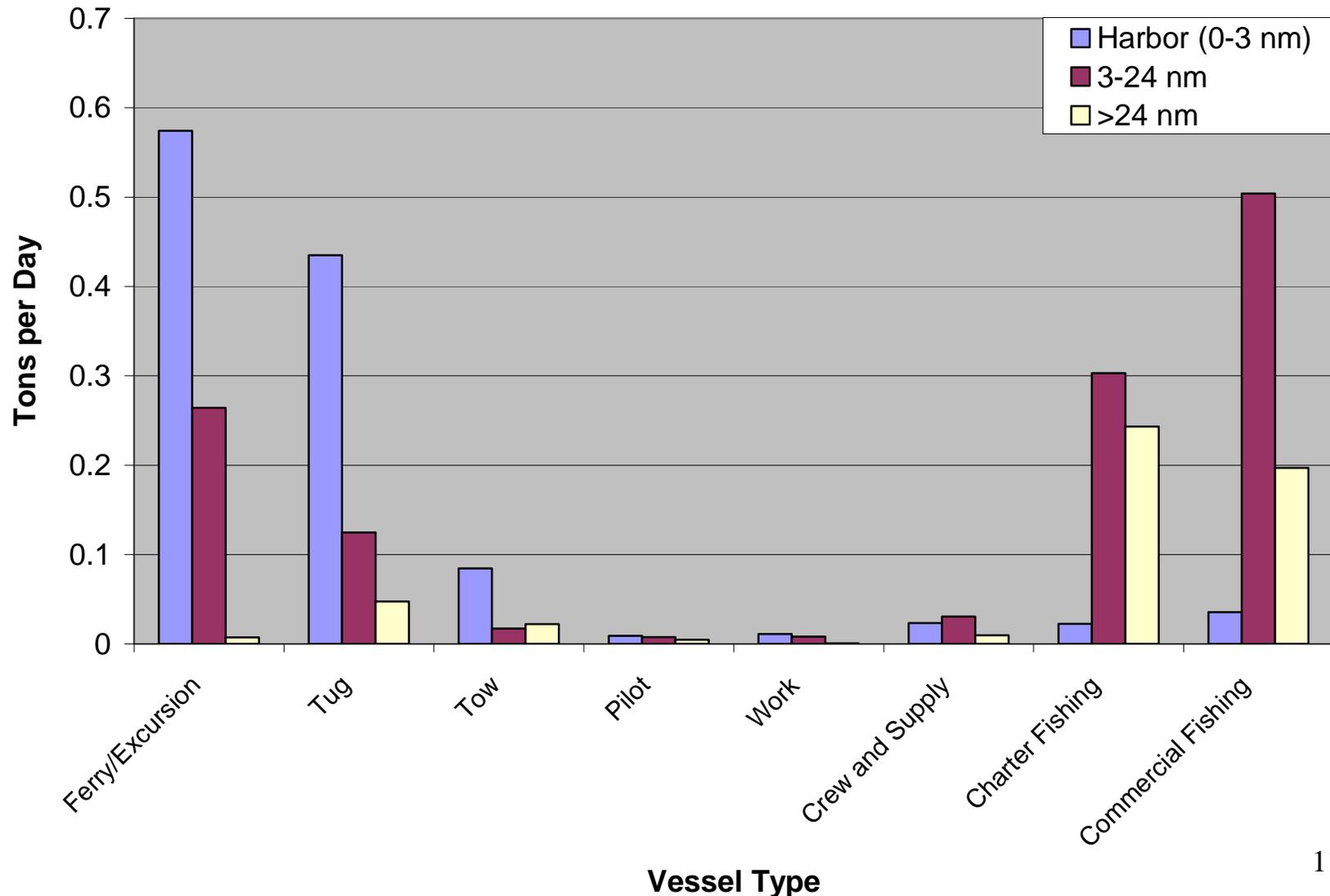
Ferries, Excursions, Tugs, and Tows Generate ~50% of Total Emissions

~3.3 tpd PM



2004 Inventory

Ferries, Excursion Vessels, Tugboats, and Towboats Generate Largest Share of In-Harbor PM Emissions



Health Impacts

- ◆ Elevated cancer risk near ports
- ◆ Non-Cancer annual impacts:
 - 90 Premature deaths
 - 20 Hospital admissions (respiratory)
 - 40 Hospital admissions (cardiovascular)
 - 2,400 Cases of asthma-related and lower respiratory symptoms
 - 200 Cases of acute bronchitis
 - 16,000 Work loss days
 - 90,000 Minor restricted activity days

Proposed Commercial Harbor Craft Regulation



Key Elements of Proposal

- ◆ Existing ferries, excursion vessels, tugboats, and towboats required to replace older engines with new certified engines
- ◆ New vessels and replacement engines must install new certified engines
- ◆ Monitoring, recordkeeping, and reporting requirements

Requirements for Ferries, Excursion Vessels, Tugboats, and Towboats



Required Replacement of Unregulated (Tier 0) and Tier 1 Engines

- ◆ Replace existing engines with new certified engines
- ◆ Replacement schedule based on engine model year and hours of operation
- ◆ Accelerated replacement schedule for South Coast

Engine Replacement Delivers 60% to 80% Emission Reductions Per Engine

Tiers	Emission Reductions per Engine
Tier 0 to Tier 2	60 to 65% NOx and PM
Tier 0 to Tier 3	80% PM 70% NOx
Tier 1 to Tier 3	70 to 80% PM 40 to 50% NOx

Replacement Compliance Schedule

- ◆ Statewide
 - Begin replacing engines by 2009
 - Replace all Tier 0 engines 2009-2016
 - Replace all Tier 1 engines 2017-2022
- ◆ Accelerated schedule for South Coast
 - Tier 0 replacements 3 years earlier
 - Tier 1 replacements 2 years earlier

Alternative Methods to Determine Compliance Model Year

- ◆ Pre-2004 engine rebuilt to Tier 1 prior to 1/1/08
 - Rebuild date can be used as compliance model year
- ◆ Emission control strategy applied
 - Decrease PM and/or NOx by $\geq 25\%$
 - Extends compliance date by 1 to 5 years

Alternative Compliance Options

- ◆ Demonstrate in-use engine meets the current U.S. EPA marine engine standard
- ◆ Demonstrate in-use engine is operating less than 300 annual hours

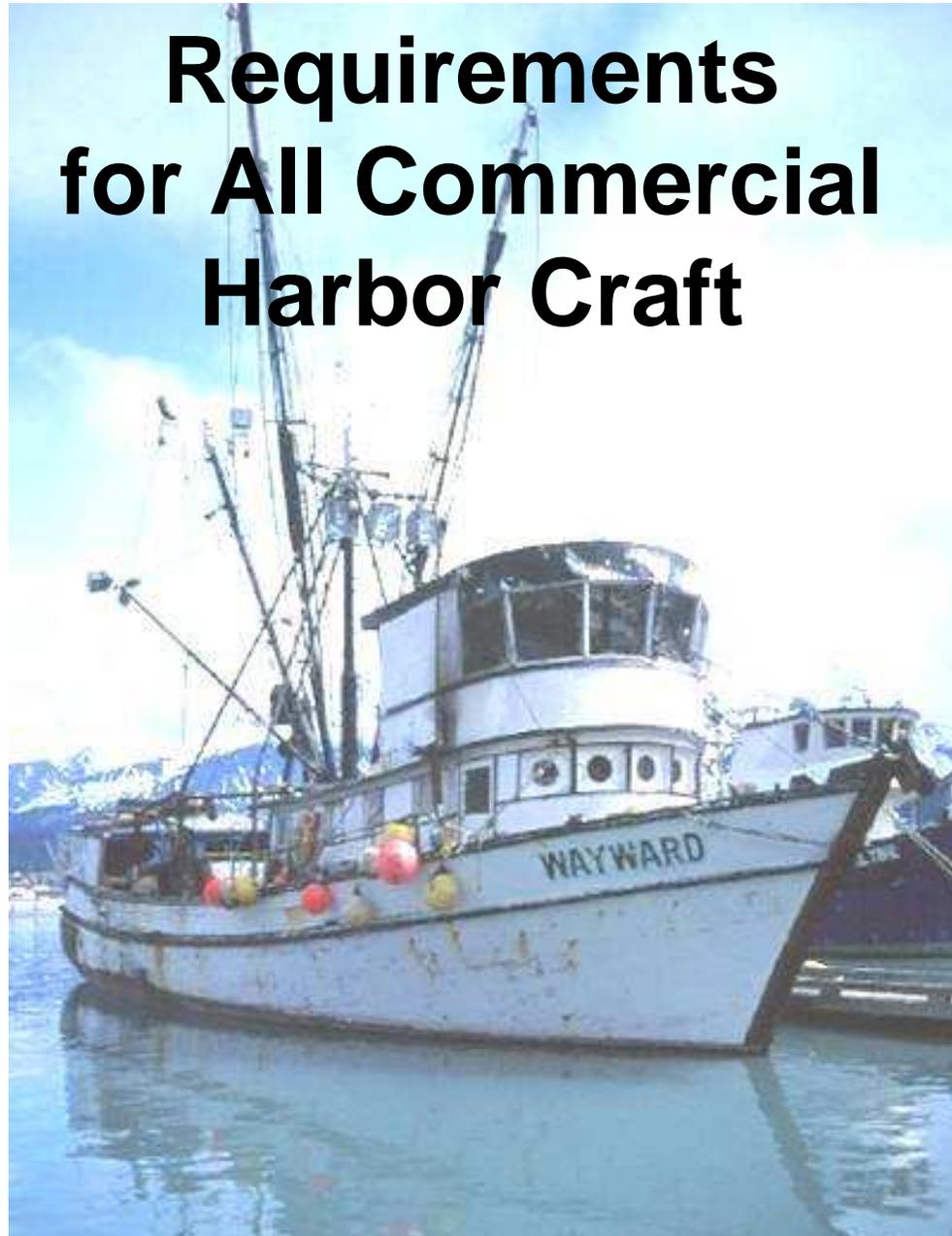
Compliance Date Extensions

- ◆ No suitable engine replacement
- ◆ Manufacturer delay or installation difficulties
- ◆ Engines on multiple vessels within fleet requiring compliance in one year
- ◆ Change in annual engine hours of operation

Alternative Control of Emissions

- ◆ Operators may comply using alternative emission control strategies
- ◆ Must achieve equivalent or greater reductions
- ◆ Application process includes public review process

Requirements for All Commercial Harbor Craft



New Harbor Craft Vessels

- ◆ Effective January 1, 2009
- ◆ All new harbor craft must install engines meet current U.S. EPA emission standards
 - Engine standard in effect when vessel is purchased, Tier 2, 3, or 4
- ◆ New ferries
 - Apply best available control technology (BACT) to propulsion engine or Tier 4

Replacement Engines for In-Use Harbor Craft Vessels

- ◆ Install engines meeting U.S. EPA marine new engine emission standards at time of engine acquisition
- ◆ Tier 4 engine required if engine being replaced was a Tier 4



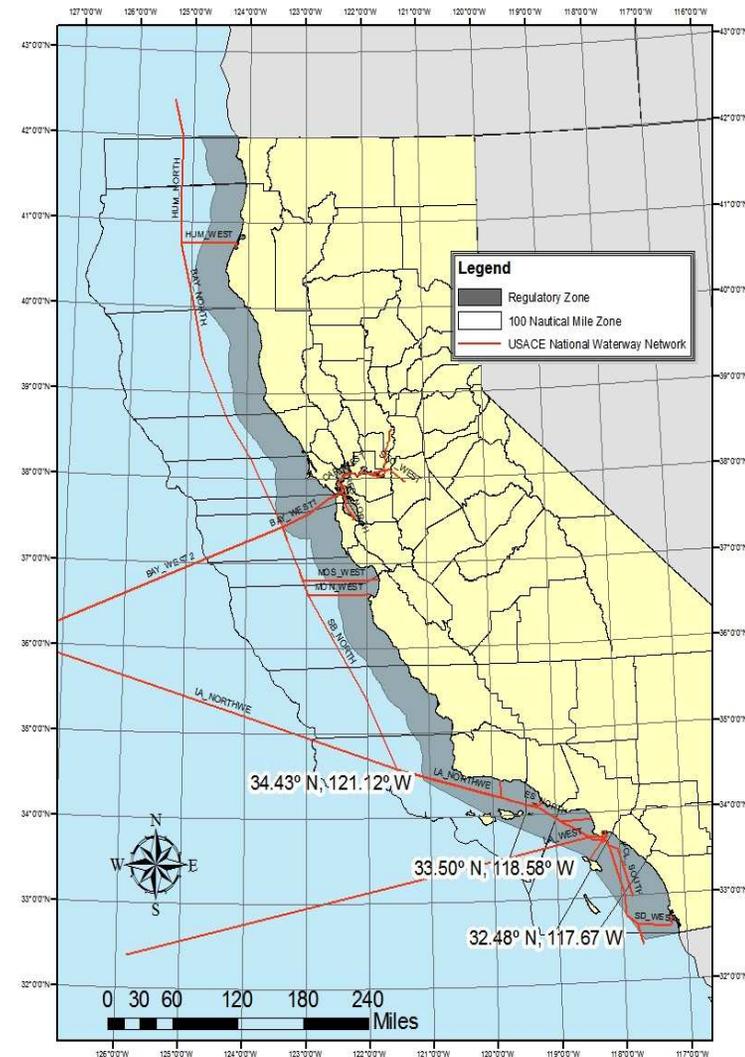
Monitoring, Recordkeeping, and Reporting Requirements

- ◆ Monitoring
 - non-resettable hour meters on all engines
- ◆ Recordkeeping
- ◆ Reporting
 - Initial
 - Compliance



Requirements Apply to Vessels Within Regulated California Waters

- ◆ All internal waters
- ◆ All estuarial waters
- ◆ All ports and terminal facilities
- ◆ All waters within 24 nautical miles of California baseline



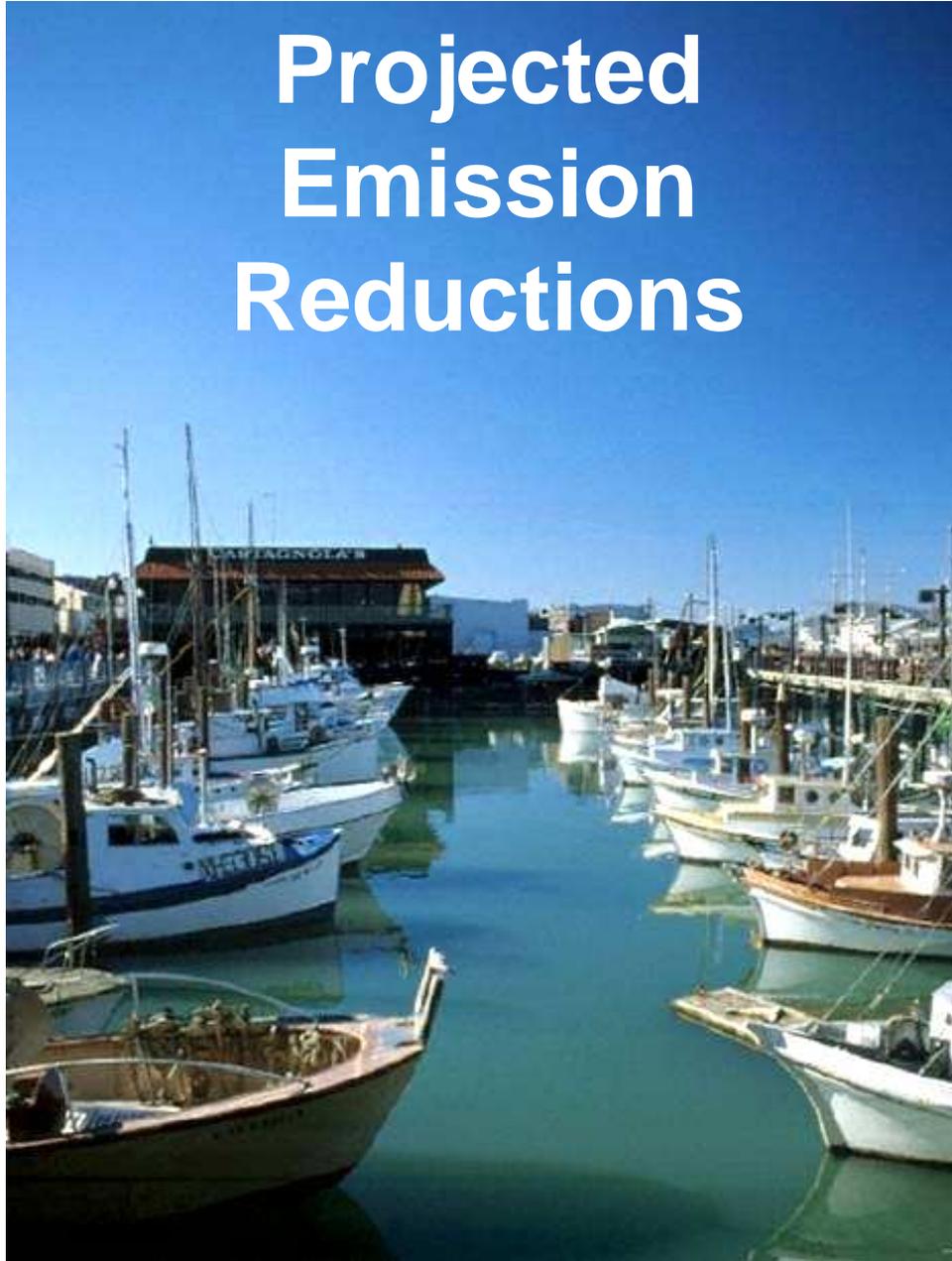
Exemptions from Entire Regulation

- ◆ Vessels traversing within 24 nautical miles of the California Coast without stopping
- ◆ Temporary emergency rescue/recovery vessels
- ◆ Recreational vessels
- ◆ Ocean-going vessels (except ocean-going tugs)
- ◆ Vessel engines registered with the Portable Engine Registration Program prior to January 1, 2009
- ◆ U.S. Coast Guard vessels
- ◆ Military tactical support vessels

Exemptions from Engine Replacement Requirements

- ◆ Temporary replacement vessels
- ◆ Registered historic vessels
- ◆ Engines rated at less than 50 horsepower
- ◆ Engines operated less than 300 hours per year
- ◆ Near-retirement vessels

Projected Emission Reductions

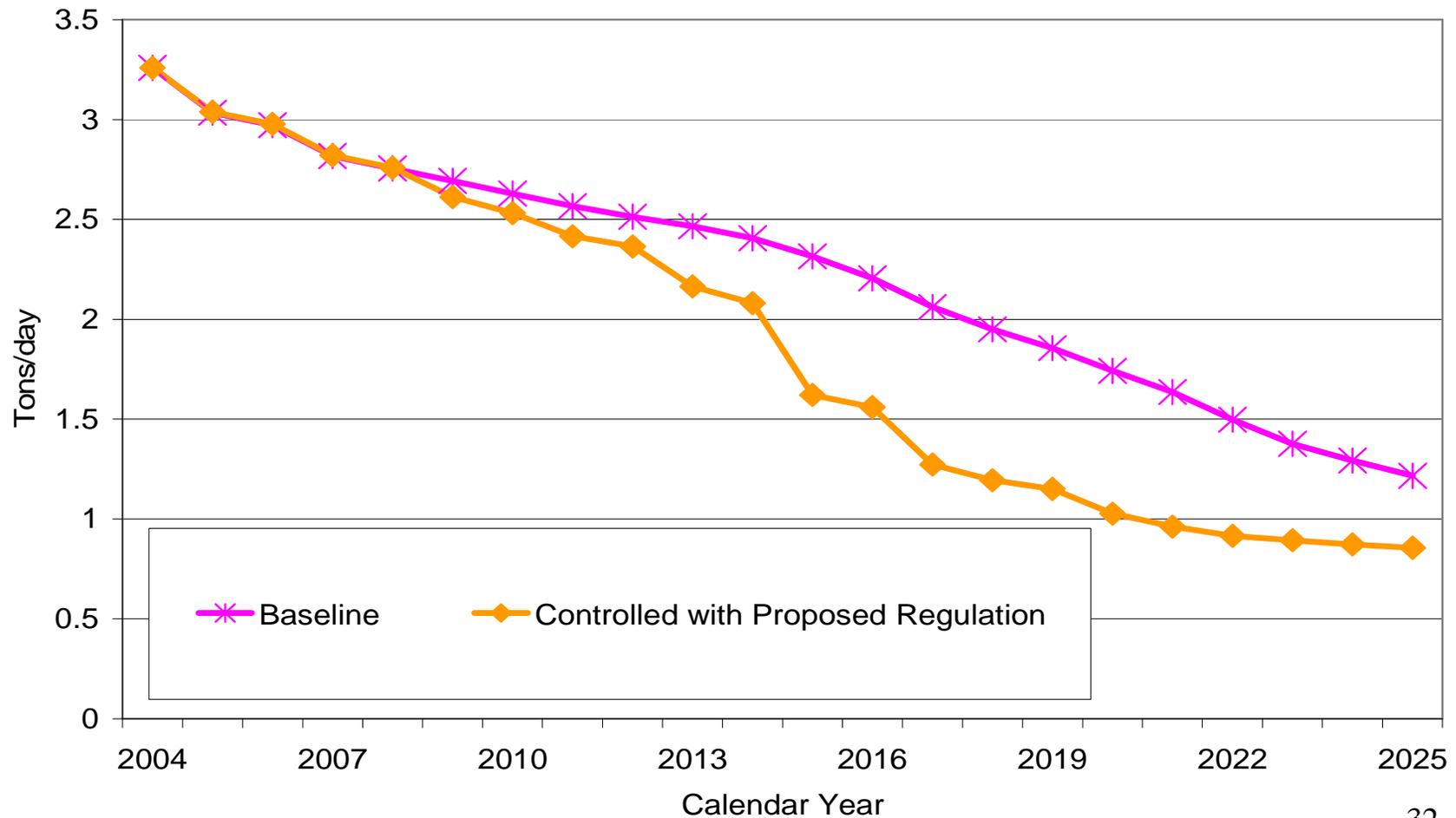


Regulation Benefits

- ◆ South Coast reductions in 2013
 - 0.2 tpd PM
 - 3.6 tpd NO_x
- ◆ Statewide reductions in 2020
 - 0.7 tpd PM
 - 10 tpd NO_x
- ◆ Achieves 2015 and 2020 Goods Movement Goals for harbor craft

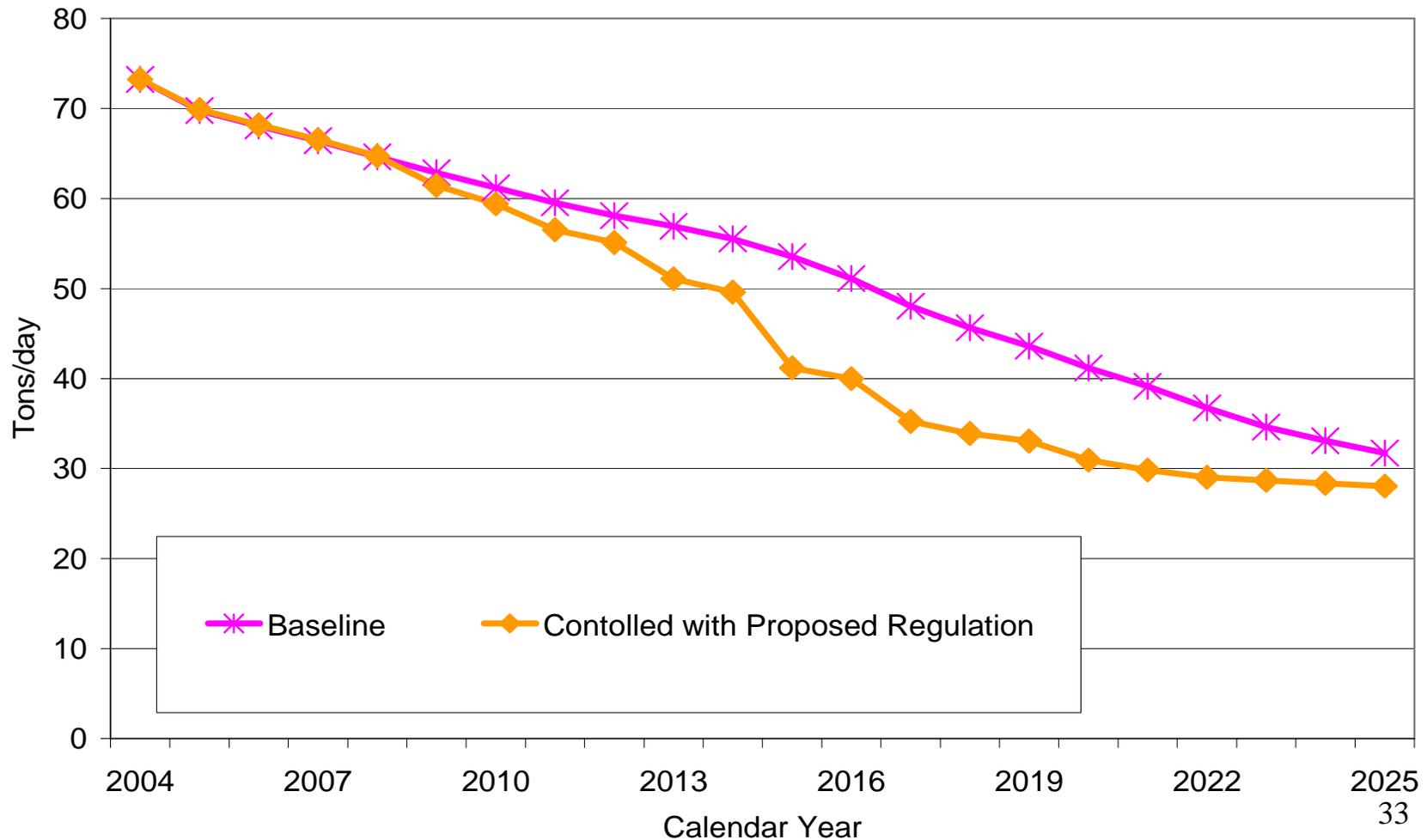
Projected Statewide PM Emission Reductions

Commercial Harbor Craft Statewide PM Emissions



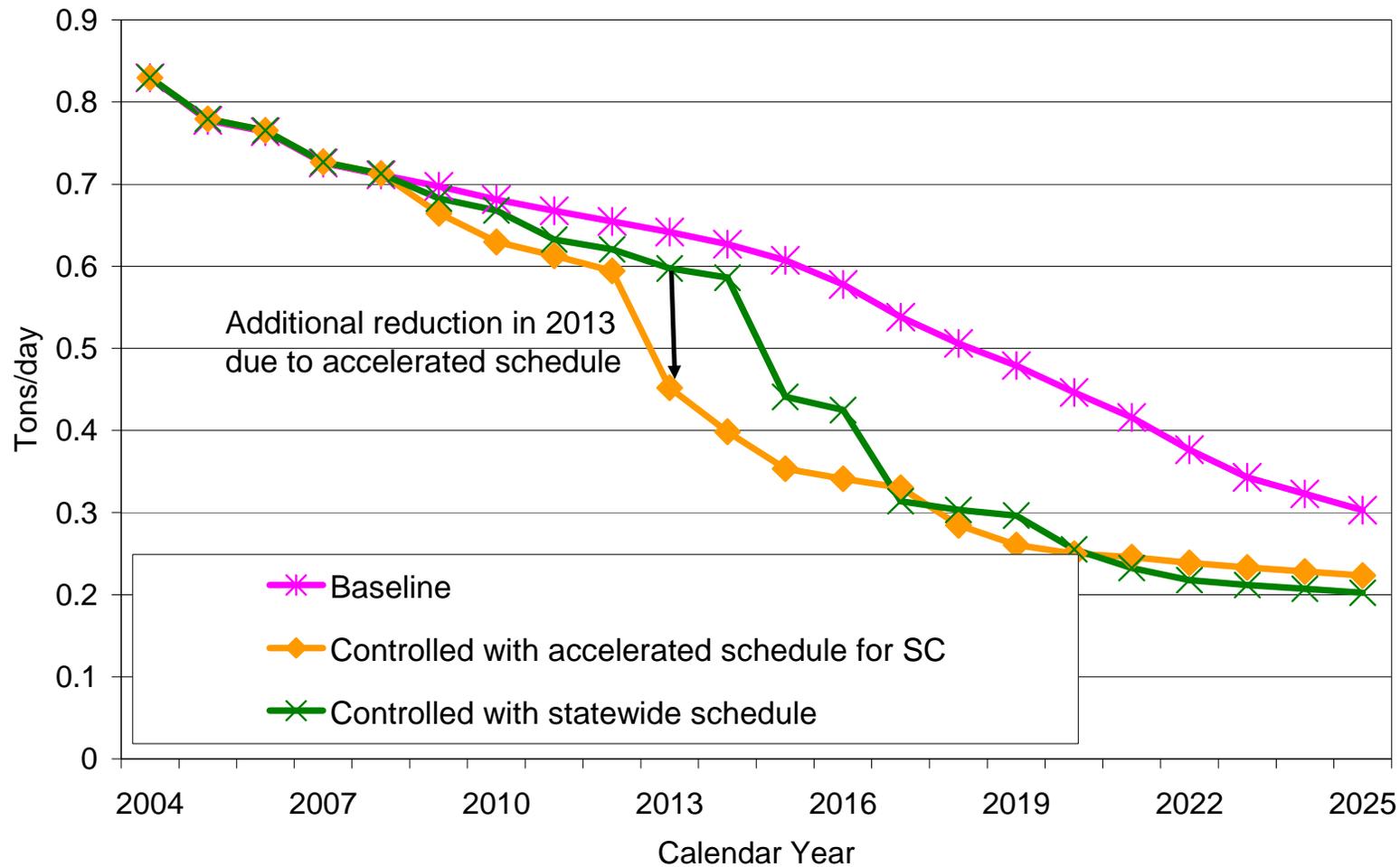
Projected Statewide NOx Emission Reductions

Commercial Harbor Craft Statewide NOx Emissions



Accelerated South Coast PM Emission Reductions

South Coast Commercial Harbor Craft PM Emissions



Health Benefits Due to Proposed Regulation

- ◆ Significant reduction in near source cancer risk:
- ◆ Avoided non-cancer health impacts by 2025:
 - 310 premature deaths
 - 70 hospital admissions due to respiratory causes
 - 120 hospital admissions due to cardiovascular causes
 - 8,100 cases of asthma-related and other lower respiratory symptoms
 - 670 cases of acute bronchitis
 - 53,000 work loss days
 - 300,000 minor restricted activity days
- ◆ \$1.3 to \$2 billion estimated non-cancer health benefits from proposed regulation

Overall Effect on Global Warming

- ◆ Reduction in greenhouse gas emissions:
 - Accelerated phase-in of newer engines with less polluting technologies
 - Reduction in black carbon
- ◆ Slight increase in CO₂ emissions:
 - Use of exhaust treatment technologies that increase vessel power usage

Estimated Costs

- ◆ Total cost of regulatory compliance \$140 million
- ◆ Industry cost for new equipment of \$460 million
- ◆ Impact on Return on Owners Equity (ROE) ranges from 0.5 to 3.5% decline



Summary of Cost-Effectiveness (2009-2022)

Emissions	Total Cost-Effectiveness
<i>All Costs Assigned to PM</i>	
PM	\$29/lb
<i>Divide Costs Equally Between PM and NOx</i>	
PM	\$14.50/lb
NOx	\$1,800/ton
<i>Combine PM and NOx Emissions</i>	
PM + NOx	\$1.70/lb

Diesel PM Cost-Effectiveness Compared to Other Regulations

Regulation or Airborne Toxic Control Measure	Diesel PM Cost-Effectiveness
	Dollars/ Pound PM
Commercial Harbor Craft	\$29
Cargo Handling Equipment	\$41
Solid Waste Collection Vehicle Rule	\$28
Stationary Diesel Engine ATCM	\$4 - \$26
Transport Refrigeration Unit ATCM	\$10 - \$20

Potential Incentive Funding

- ◆ Carl Moyer Funding
- ◆ California Goods Movement Bond Funds
- ◆ POLA Mitigation Funding
- ◆ Federal Transit Authority Grants



Funding Opportunities

- ◆ California Goods Movement Bond Funds
 - Tugboats, Towboats, Crew and Supply Vessels, and Commercial Fishing Vessels
 - \$60 million available
 - Eligible two years prior to compliance date
- ◆ Carl Moyer Funds
 - All vessel types
 - Funding totals varies by local Air District
 - Eligible three years prior to compliance date for regulated vessel types
 - No eligibility limitations for non-regulated vessel types

Proposed 15 Day Change

- ◆ Regulation Compliance Plan Reporting
 - Currently required at time of initial reporting

15 DAY CHANGE

 - Report compliance plan by Feb. 28 the year compliance is required
- ◆ Compliance Model Year Determination
 - Emission control strategy applied, extends engine compliance date 1-5 years

15 DAY CHANGE

 - This option would not apply to vessel located in the South Coast AQMD

Issues

- ◆ Extend accelerated engine replacement schedule to entire State
- ◆ Extend engine replacement requirements to crew and supply boats
- ◆ Remove emission control strategy model year compliance extension provision statewide
- ◆ Require Tier 4 replacement when available

Summary and Recommendation

- ◆ Meets Goods Movement 2015 and 2020 goals
- ◆ Early reductions for South Coast
- ◆ Cost effective
- ◆ Staff recommends the Board adopt the proposed regulation

