Reduction of Air Emissions in California’s Ports: Update on Ocean-Going Vessel At-Berth and Clean Fuel Regulations

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Marine Strategies Section
Discussion Items

I. CARB’s Mission and Programs for Freight Transport
II. Existing Programs for Ocean-Going Vessels
III. Future Measures
IV. Questions
I. CARB’s Mission and Programs for Freight Transport
About the California Air Resources Board
Existing CARB Strategies to Cut Freight Emissions and Health Risk

<table>
<thead>
<tr>
<th>Trucks</th>
<th>Ships</th>
<th>Locomotives</th>
<th>Equipment</th>
<th>Harbor Craft</th>
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<tbody>
<tr>
<td>• Idling and smoke limits</td>
<td>• Fuel standards</td>
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<tr>
<td>• International trucks</td>
<td>• At berth reductions</td>
<td>• Fleet emission limits for South Coast</td>
<td>• Port &amp; rail equipment</td>
<td>• Harbor craft</td>
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<td>• Drayage trucks</td>
<td>• Ship incineration ban</td>
<td>• Diesel soot reduction at rail yards</td>
<td>• Gas forklifts</td>
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<td>• All on-road trucks</td>
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<td>• Airport equipment</td>
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<td>• GHG limits for tractor-trailers</td>
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<td>• Transport refrigerators</td>
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Incentives for cleaner equipment

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Why Does California Need to do More?

- Cut air toxics health risk
- Attain air quality standards
- Mitigate climate change

Zero-emission technology/ renewable energy
II. Existing Programs for Ocean-Going Vessels
At-Berth Regulation Overview

- Ports of Los Angeles, Long Beach, Oakland, San Diego, Hueneme, and San Francisco
- Container, passenger, and refrigerated cargo (reefer) vessel fleets
  - Container/reefer fleets ≥ 25 annual visits
  - Passenger fleets ≥ 5 annual visits
- Emissions/power reduction requirement, currently at 70%, will increase to 80% in 2020
At-Berth Regulation Overview (Continued)

- 63 berths at 23 terminals shore power equipped
- Between 2014-2016, around 7000 shore power visits
- Two barge-based alternatives to shore power in commercial operation at Ports of Los Angeles and Long Beach
  - AMECS
  - METS-1
- Land-side project in development – ShoreKat at Port of LA
Expanded Vessel Controls: Goals?

- Address implementation issues of existing At-Berth Regulation
- Simplify requirements and increase enforceability
- Increase the community health benefits by including additional vessels, ports, and tanker auxiliary boilers
- Hold terminals and ports accountable for their roles to achieve reductions
- Meet March 2017 Board direction to capture more vessel visits
- Ensure opacity standards at berth and at anchor
# Overview of Changes

<table>
<thead>
<tr>
<th>Existing Rule</th>
<th>Draft Concepts</th>
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<tbody>
<tr>
<td>Vessel fleets</td>
<td>Vessel visits</td>
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<tr>
<td>Container, reefer and cruise</td>
<td>Additional vessel types</td>
</tr>
<tr>
<td>Implementation issues</td>
<td>Simplified requirements</td>
</tr>
<tr>
<td>Shore power or CARB approved alternative</td>
<td>Shore power or CARB approved alternative</td>
</tr>
<tr>
<td>Annual compliance reported</td>
<td>Clear, real time enforcement</td>
</tr>
<tr>
<td>Ports and terminals have limited responsibilities</td>
<td>Requirements for ports and terminals</td>
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<tr>
<td>Covers 6 named ports</td>
<td>Port and terminal thresholds</td>
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<tr>
<td>Reduces auxiliary engine emissions</td>
<td>Also reduces tanker boiler emissions</td>
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Expanded Vessel Controls: Which Vessels?

- Additional vessel types considered in rule:
  - Roll-On/Roll-Off, Tankers

- Room for innovation

- Potential control options may differ depending on:
  - Vessel specific emissions profiles
  - Safety requirements
  - Unique terminal layouts
  - Individual vessel design
Looking Beyond Auxiliary Engine Controls – Tanker Auxiliary Boilers

- A subset of tanker vessels utilize a large auxiliary boiler onboard to power steam-driven pumps to offload product at berth.
- Tanker boilers are the largest emitting category in CARB’s Emissions Inventory not subject to the original At-Berth Regulation.
- Boiler emissions profile differs from auxiliary engines.
  - PM emissions are not considered Diesel PM like emissions from internal combustion engines, but cancer and non-cancer health risks exist.
- Boilers are responsible for a significant portion of PM and CO$_2$ emissions and moderate NOx emissions at berth.
Need For Additional Reductions

2021 Projected Statewide NOx Emissions At Berth - Existing Rule (Total: 10.5 TPD)

- Aux Engine - Container, Cruise, and Reefer: 35%
- Aux Engine - Auto/Roro, Bulk, Gen. Cargo, and Tanker: 40%
- Boiler - Tanker: 17%
- Boiler - Non Tankers: 8%

*3825.1 TPY

NOx = Oxides of Nitrogen, TPD = Tons Per Day, TPY = Tons Per Year
Source: CARB Emissions Inventory, 2018
Need For Additional Reductions

2021 Projected Statewide PM2.5 Emissions At Berth - Existing Rule (Total: 109.5 TPY*)

- Aux Engine - Container, Cruise, and Reefer 7%
- Aux Engine - Auto/Roro, Bulk, Gen. Cargo, and Tanker 23%
- Boiler - Non Tankers 23%
- Boiler - Tanker 47%

*0.3 TPD

PM = Particulate Matter,
Source: CARB Emissions Inventory, 2018
Expanded Vessel Controls: How?

- Use an approved compliance strategy for each visit including:
  - Shore power
  - Technologies with a CARB Executive Order
- Future strategies might include:
  - Onboard controls
  - Cleaner vessels
Expanded Vessel Controls: Where?

All are in, or adjacent to, disadvantaged communities
*Complexes made up of geographically close marine emissions sources that impact surrounding community
## Expanded Vessel Controls: When?

<table>
<thead>
<tr>
<th>Vessel category</th>
<th>Controls for 100% of visits*</th>
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<tbody>
<tr>
<td>Container, Reefer, Cruise</td>
<td><img src="checkmark.png" alt="" /></td>
</tr>
<tr>
<td>Ro-Ro/Auto Carrier</td>
<td><img src="checkmark.png" alt="" /></td>
</tr>
<tr>
<td>Tanker (plus boilers for steam powered pumps)</td>
<td><img src="checkmark.png" alt="" /> <img src="checkmark.png" alt="" /> <img src="checkmark.png" alt="" /></td>
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* Above port and terminal thresholds

- Does not include control requirements for bulk and general cargo vessels (still subject to opacity and reporting)
Next Steps

- Fall meetings with community groups
- Evaluation of public comments, new data
- Updated regulatory concepts and analyses
- Fall/Winter meetings on revised concepts
- Issue formal regulatory proposal with draft environmental analysis for comment 45 days prior to Board Hearing
CA Vessel Fuel Regulation Overview

- 2008 CA rule for cleaner fuels within 24 nm zone
- Main & auxiliary engines, auxiliary boilers
- Now: 0.1% sulfur
- Practical experience supported IMO standards and North American ECA
- CA rule to sunset when Federal Rule achieves equivalent reductions
Lower Sulfur Ship Fuel = Lower Potential Cancer Risk Footprint

California cancer risk without low sulfur ship fuel*

California cancer risk with low sulfur ship fuel

*CALPUFF Diesel PM Numbers
Safety Exemption

- Used by master when use of distillate fuel would endanger vessel/crew/cargo
  - Must be beyond master’s reasonable control, such as mechanical problem, inclement weather, medical emergency
- Use exemption immediately
  - Notify CARB within 24 hours after use of exemption, and four days to provide documentation
Research Exemption

- Marine Notice 2017-1
  - The expedited research exemption process for scrubbers or low sulfur HFO* has been phased out, but the regular research exemption is still in place
- Research exemption requires:
  - Full research project, testing, progress reports, etc.
  - Exemption valid only during the period of the research project

*HFO: Heavy Fuel Oil
CA Vessel Speed Reduction (VSR)

- Through partnerships vessel speed reduction has proven successful
- U.S. Coast guard has established limit of 15 knots in the San Francisco Bay
- Ports of Los Angeles, Long Beach MOU* with industry in 2001 established VSR of 12 knots @ 20 nm
  - Offer dockage discounts for VSR @ 40 nm

*MOU: Memorandum of Understanding
III. Future Measures
Planned CARB Actions for Further Reductions of Air Emissions in CA Ports

- Develop new At Berth and At Anchor rule to capture additional vessels/reductions
- Commercial Harbor Craft rule amendments
- Cargo Handling Equipment rule amendments
- Advocate for tighter international emission standards, plus efficiency targets for existing vessels
- Define “Low-Emission Efficient Ship;” use incentives for advanced technologies
How Can We Collaborate?

- Well planned investments in the development of new technologies and major infrastructure upgrades
- Local air agencies offer expertise, on-ground presence, research & funding
- Communities raise political will
- Ports offer complementary programs
- Industry forms partnerships and implements emission controls
- Expand regulations beyond California
IV. Questions?
CARB Contacts

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Vessel Fuel Regulation:
https://www.arb.ca.gov/ports/marinevess/ogv.htm

Vessel At-Berth Regulation:
http://www.arb.ca.gov/ports/shorepower/shorepower.htm

Port Activities:
https://www.arb.ca.gov/ports/ports.htm