Public Workshop to Discuss Reducing Emissions from Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards

Draft Regulatory Proposal

August 24, 2005
Long Beach, California

California Environmental Protection Agency
Air Resources Board

Overview

♦ Background
♦ Applicability
♦ Regulatory Concepts
♦ Estimated Impacts
♦ Next Steps
Background

Goals

♦ Develop statewide control measure to address emissions from mobile cargo handling equipment
  – Achieve maximum emission reductions (both near term and long term) for PM and NOx
♦ Consideration by the Board in November 2005
Applicability

Ports

- San Diego
- Los Angeles
- Long Beach
- Port Hueneme
- Richmond
- San Francisco
- Oakland
- Stockton
- Sacramento
- Pittsburg
- Crockett
- Antioch, Benicia, Port Chicago (Concord)
- Port of Humboldt Bay
- Redwood City
- Port Hueneme
- Los Angeles
- Long Beach
- San Diego
Intermodal Rail Yards

Examples of Cargo Handling Equipment Types

- yard trucks
- top handlers
- side handlers
- reach stackers
- rubber-tired gantry cranes
- forklifts
- euclids
- skid steer loaders
- rubber-tired loaders
- sweepers
- dozers
- excavators
- mobile cranes
- railcar movers
Newly Purchased, Leased, or Rented Equipment

- DMV registered (onroad) equipment
  - meet current year onroad standard
- Non-registered (off-road) equipment
  a. meet current year onroad standard or Tier 4 off-road standard for model year and rated hp; or
  b. if (a) above is not available, meet highest level available off-road standard for model year and rated hp and apply highest level available VDECS within one year.
In-Use Yard Trucks
Performance Standards

♦ 2007 or current model year onroad engine standard
♦ Tier 4 off-road engine standard
♦ Engine with VDECS that meets or exceeds Tier 4 off-road standards

In-Use Yard Trucks
Compliance Table: Fleets of 3 or Less

<table>
<thead>
<tr>
<th>Engine Certification</th>
<th>Model Years</th>
<th>VDECS as of December 31, 2006</th>
<th>Compliance Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-road</td>
<td>Pre-2003</td>
<td>None</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td>Off-road</td>
<td>Pre-2003</td>
<td>Any Level</td>
<td>December 31, 2008</td>
</tr>
<tr>
<td>Off-road</td>
<td>2003-2006</td>
<td>None</td>
<td>Model Year + 7 Years</td>
</tr>
<tr>
<td>Off-road</td>
<td>2003-2006</td>
<td>Any Level</td>
<td>Model Year + 8 Years</td>
</tr>
<tr>
<td>Onroad</td>
<td>Pre-2007</td>
<td>None</td>
<td>Model Year + 8 Years</td>
</tr>
<tr>
<td>Onroad</td>
<td>Pre-2007</td>
<td>Any Level</td>
<td>Model Year + 9 Years</td>
</tr>
</tbody>
</table>
### In-Use Yard Trucks

#### Compliance Table: Fleets of 4 or More

<table>
<thead>
<tr>
<th>Engine Certification</th>
<th>Model Years</th>
<th>VDECS</th>
<th>Number of Yard Trucks for Each Model Year Group</th>
<th>Compliance Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-road</td>
<td>Pre-2003</td>
<td>None</td>
<td>The greater of 3 or 50%</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td></td>
<td>Pre-2003</td>
<td>Any Level</td>
<td>The greater of 3 or 50%</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td>Off-road</td>
<td>2003-2006</td>
<td>None</td>
<td>The greater of 3 or 25%</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td>Off-road</td>
<td>2003-2006</td>
<td>Any Level</td>
<td>The greater of 3 or 25%</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td>Off-road</td>
<td>2003-2006</td>
<td>Any Level</td>
<td>The greater of 3 or 25%</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td>Onroad</td>
<td>Pre-2007</td>
<td>None</td>
<td>The greater of 3 or 25%</td>
<td>December 31, 2007</td>
</tr>
<tr>
<td>Onroad</td>
<td>Pre-2007</td>
<td>Any Level</td>
<td>The greater of 3 or 25%</td>
<td>December 31, 2007</td>
</tr>
</tbody>
</table>

If the percentage of yard trucks in a fleet is not a whole number, conventional rounding practices apply (i.e., if less than 0.5, round down; if 0.5 or greater, round up).

### BACT Requirements for Basic Container Handling Equipment
In-Use Non-Yard Truck Equipment

Compliance Options – Basic Container Handling Equipment

Option A
2007 onroad or Tier 4 off-road engine

Level 1?
Yes
Replace to Tier 4 or install Level 3 VDECS by Dec. 31, 2015

No
Done

Option B
2004 onroad or Tier 2 or 3 off-road engine + highest level VDECS

Level 1 or 2?
Yes
Replace to Tier 4 or install Level 3 VDECS by Dec. 31, 2015

No
Done

Option C
Pre-Tier 1 MY or Tier 1 off-road engine + highest level VDECS

Option D
Alternative fuel or diesel pilot ignition engine

Done

BACT Requirements for Bulk Cargo Handling Equipment
**In-Use Non-Yard Truck Equipment**

**Compliance Options – Bulk Cargo Handling Equipment**

Option A
- 2007 onroad or Tier 4 off-road engine

Option B
- 2004 onroad or Tier 2 or 3 off-road engine + highest level VDECS

Option C
- pre Tier 1 MY or Tier 1 off-road engine + highest level VDECS

Option D
- alternative fuel or diesel pilot ignition engine

**Level 1?**
- Yes: Replace to Tier 4 or install Level 3 VDECS by Dec. 31, 2015
- No: Replace to Tier 4 or install Level 3 VDECS by Dec. 31, 2015

**Done**

**BACT Requirements for RTG Cranes**
**In-Use Non-Yard Truck Equipment**

**Compliance Options – RTG Cranes**

<table>
<thead>
<tr>
<th>Option A</th>
<th>Option B</th>
<th>Option C</th>
<th>Option D</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 onroad or Tier 4 off-road engine</td>
<td>2004 onroad or Tier 2 or 3 off-road engine + highest level VDECS</td>
<td>pre Tier 1 MY or Tier 1 off-road engine + highest level VDECS</td>
<td>alternative fuel or diesel pilot ignition engine</td>
</tr>
</tbody>
</table>

Replace to Tier 4 or install Level 3 VDECS by later of MY + 12 years or Dec. 31, 2015

**Done** **Done** **Done** **Done**

**In-Use Non-Yard Truck Equipment**

**Compliance Schedule**

<table>
<thead>
<tr>
<th>Engine Model Years</th>
<th>Non-Yard Truck Fleets of 3 or Fewer</th>
<th>Non-Yard Truck Fleets of 4 or More**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compliance Date*</td>
<td>First 3 or 25% (whichever is greater)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Compliance date refers to December 31st of the year indicated.
** If the percentage of non-yard truck equipment in a fleet is not a whole number, conventional rounding practices apply (i.e., if less than 0.5, round down; if 0.5 or greater, round up).
Identification & Demonstration of Emission Control Systems for RTG Cranes, Side Picks, and Top Picks

Goal: Identify and demonstrate high efficiency retrofit emission controls and collect data that will lead to verification

Task 1: Datalogging
Task 2: Solicitation of technology providers
Task 3: Solicitation of terminal operators/equipment
Task 4: Demonstration study and emissions testing

Timeline: June 2005 – March 2006

Preliminary Estimated Emission Reductions (Diesel PM)

Baseline and Regulation Diesel PM CHE
Emissions Tons per year

Timeline: June 2005 – March 2006
Preliminary Estimated Emission Reductions (NOx)

Baseline and Regulation NOx Emissions
Tons per Year

<table>
<thead>
<tr>
<th>Year</th>
<th>NOx Baseline</th>
<th>NOx Reg Influence</th>
<th>NOx No Voluntary</th>
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<tbody>
<tr>
<td>2004</td>
<td>6000</td>
<td>4000</td>
<td>2000</td>
</tr>
<tr>
<td>2007</td>
<td>5500</td>
<td>3500</td>
<td>1500</td>
</tr>
<tr>
<td>2010</td>
<td>5000</td>
<td>2500</td>
<td>1000</td>
</tr>
<tr>
<td>2015</td>
<td>4500</td>
<td>2000</td>
<td>500</td>
</tr>
<tr>
<td>2020</td>
<td>4000</td>
<td>1500</td>
<td>0</td>
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</table>

Preliminary Cost Assumptions

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>New Equipment Cost</th>
<th>Used Equipment Cost</th>
<th>Control Device</th>
<th>Control Device Average Cost</th>
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</thead>
<tbody>
<tr>
<td>Crane</td>
<td>$1,200,000</td>
<td></td>
<td>Passive DPF</td>
<td>$17,520</td>
</tr>
<tr>
<td>Excavator</td>
<td>$350,000</td>
<td>$50,000</td>
<td>DOC</td>
<td>$2,269</td>
</tr>
<tr>
<td>Forklift</td>
<td></td>
<td></td>
<td>Active DPF</td>
<td>$6,000</td>
</tr>
<tr>
<td>Basic Container Handling Equip</td>
<td>$400,000</td>
<td>$50,000</td>
<td>DOC</td>
<td>$2,269</td>
</tr>
<tr>
<td>Other</td>
<td>$400,000</td>
<td>$50,000</td>
<td>DOC</td>
<td>$2,269</td>
</tr>
<tr>
<td>Sweeper/Scrubber</td>
<td>$50,000</td>
<td>$5,000</td>
<td>DOC</td>
<td>$2,269</td>
</tr>
<tr>
<td>Tractor/Loader/Backhoe</td>
<td>$75,000</td>
<td>$10,000</td>
<td>DOC</td>
<td>$2,269</td>
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<tr>
<td>Yard Tractor</td>
<td>$60,000</td>
<td>$6,000</td>
<td>On-road Engine Option</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

Notes:
Assumed linear depreciation to determine the remaining value of the equipment that was retired early.
Reporting Costs: $10,000 for the first year and $500 per year thereafter.
Preliminary Cost Estimates

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Annual Cost (2004 $)</td>
<td>$3.8 million</td>
<td>$4.3 million</td>
<td>$2.8 million</td>
</tr>
<tr>
<td>PM Cost Effectiveness</td>
<td>$35 – $50 per pound PM reduced</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contacts

Cargo Handling Equipment:
- Lisa Williams (Staff)
e-mail: lwilliam@arb.ca.gov
phone: 916.327.1498

Oceangoing Ship Auxiliary Engines:
- Paul Milkey (Staff)
e-mail: pmilkey@arb.ca.gov
phone: 916.327.2957

- Peggy Taricco, Manager Technical Analysis Section
e-mail: ptaricco@arb.ca.gov
phone: 916.327.7213

- Dan Donohoue, Chief Emissions Assessment Branch
e-mail: ddonoho@arb.ca.gov
phone: 916.322.6023

Web Sites:
- Cargo Handling Equipment: www.arb.ca.gov/cargo
- Oceangoing Ship Auxiliary Engines: www.arb.ca.gov/marine