Reducing Emissions from
In-Use On-Road Diesel-Fueled Heavy-Duty
Drayage Trucks
at California Ports and Intermodal Rail Yards

Public Workshop
July 2007
Agenda

- Introductions
- Need for Emissions Reductions
- Draft Regulation Concept
- Implementation Concept
- Emissions Inventory
- Important Dates/Contact Information
- Discussion
ARB Outreach Efforts

- Initial staff report – April 2006
- Public consultation meetings
- Meetings with trade associations, interest groups, & stakeholders
- Local community groups
- Drayage trucker meetings
- Air Districts
- Port and rail yard site visits
- Surveys and flyers
- Regulatory development workshops
Need for Emission Reductions

Goods Movement
Need for Emission Reductions

○ Diesel particulate matter (PM):
  ● Diesel PM is associated with 70% of known cancer risk from all air toxics

○ Oxides of nitrogen (NO$_\text{x}$):
  ● NO$_\text{x}$ leads to the formation of ozone and secondary PM
Air Pollution Reduction Regulations

- Diesel Risk Reduction Plan:
  - 75% reduction in PM by 2010
  - 85% reduction in PM by 2020

- Goods Movement Action Plan

- State Implementation Plan

- Federal Clean Air Act:
  - Must attain ozone and PM standards
Commodity Flows - Rail

U.S. Department of Transportation
Federal Railroad Administration
Office of Policy

California
Total Rail Flows
(1999)
Statewide NOx and PM - Heavy Heavy Duty Trucks (Class 8)

- HHDT Represent:
  - ~30% of Statewide PM
  - ~25% of Statewide NO$_X$

- Without additional regulations, in 2014, pre-2004 trucks will represent 40% of NOx and 50% of PM emissions of HHDT operating in California.
## Population of Heavy-Duty Drayage Trucks

<table>
<thead>
<tr>
<th></th>
<th>Number of trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports of LA* and LB**</td>
<td>10,500</td>
</tr>
<tr>
<td>Port of Oakland</td>
<td>2,800</td>
</tr>
<tr>
<td>Rest of ports</td>
<td>1,000</td>
</tr>
<tr>
<td>Intermodal rail yards</td>
<td>3,600</td>
</tr>
<tr>
<td><strong>Total number of trucks in drayage service</strong></td>
<td><strong>17,900</strong></td>
</tr>
</tbody>
</table>

* LA: Los Angeles  **LB: Long Beach*
### 2007 Baseline Emissions – Drayage Trucks

<table>
<thead>
<tr>
<th></th>
<th>PM Emissions (tons/year)</th>
<th>NOx Emissions (tons/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports and Intermodal Rail yards*</td>
<td>330</td>
<td>7,450</td>
</tr>
</tbody>
</table>

*Drayage Fleet Total of ~50,000 trucks*
### Which Ports and Intermodal Rail yards

<table>
<thead>
<tr>
<th>CA Ports: 14-total</th>
<th>Benicia, Crockett, Hueneme, Humboldt Bay, Long Beach, Los Angeles, Oakland, Pittsburgh, Redwood City, Richmond, Sacramento, San Diego, San Francisco, and Stockton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermodal Rail yards: 11-total</td>
<td>Burlington, BNSF Oakland, Commerce Eastern BNSF, Commerce UP, ICTF UP, LATC Union Pacific, Lathrop Intermodal UP, Northern Santa Fe (BNSF) Hobart, Richmond BNSF, San Bernardino, Stockton Intermodal BNSF, and Union Pacific (UP) Oakland</td>
</tr>
</tbody>
</table>
Applicability / Exemptions

- Applies to:
  - Trucks
    - Diesel-fueled
    - Class 8
    - On-road
  - Motor carriers
  - Ports
  - Class I rail yards

- Exemptions:
  - Specialized use vehicles
  - Emergency vehicles
  - Military
  - 'Small' ports
Compliance Schedule – Major Milestones

- **By end of 2011**
  - Pre-2003 MY trucks would be retired and replaced with 2003+ MY trucks with level 3 VDECS
  - 2003 – 2006 MY trucks would be equipped with level 3 VDECS

- **By end of 2019**
  - Pre-2007 MY trucks would be retired and replaced with trucks that meet or exceed 2010 federal engine standards

- **Trucks Entering Service through 2009**
  - Meet or exceed 2003 federal engine standards with a Level 3 VDECS

- **Trucks Entering Service 2010 - 2014**
  - Meet or exceed 2007 federal engine standards

- **Trucks Entering Service 2015 and later**
  - Meet or exceed 2010 federal engine standards
Compliance Schedule - Phase 1

By end of 2011

- Pre-2003 MY trucks would be retired and replaced with 2003+ MY trucks with level 3 VDECS
- 2003 – 2006 MY trucks would be equipped with level 3 VDECS
Compliance Schedule - Phase 2

- **By end of 2019**
  Pre-2007 MY trucks would be retired and replaced with trucks that meet or exceed 2010 federal engine standards
Compliance Schedule - Non-Legacy Trucks

- **Trucks Entering Service through 2009**
  Meet or exceed 2003 federal engine standards with a level 3 VDECS

- **Trucks Entering Service 2010 - 2014**
  Meet or exceed 2007 federal engine standards

- **Trucks Entering Service 2015 and later**
  Meet or exceed 2010 federal engine standards
Truck Registry

- Drayage Truck Registry (DTR):
  - Help ensures compliance

- Register:
  - Prior to Jan. 1, 2009 - Legacy
  - After Jan. 1, 2009 - Non-Legacy

- Types of information collected:
  - Truck owner name, address, and contact info
  - Engine make, model, and year
  - VIN
  - Vehicle license number and state of issuance
  - Compliance information (e.g. Diesel Particulate Filter)

- Fines for non-compliance
Implementation: Truck Owner

- Truck owner responsibilities:
  - Register with the Drayage Truck Registry
  - Affix compliance sticker on truck
  - Ensure truck meets requirements of regulation
  - Maintain emission control device
  - Keep maintenance log
  - Fines issued for non-compliance

- Possible one-time extension
Strategies to Reduce Truck Emissions

- Retrofit technologies:
  - Must be ARB verified
  - Hardware diesel emission control strategies:
    - Diesel particulate filters (DPF)
      - Level 3 (85% reduction)

- Truck MY 2003 + DPF:
  - 2003 Federal engine standards
  - Must install ARB certified diesel PM filter
Implementation: Motor Carrier

- Motor carrier responsibilities:
  - Informing truck owners:
    - Regulatory provisions
    - Compliance deadlines
    - Truck owner requirements and penalties
  - Ensure trucks are in compliance with regulation before dispatching to the port or rail yard (DTR, Emission Standards etc.)
  - Bill of lading info requirement
  - Fines for dispatching non-compliant trucks
Implementation: Marine Terminals & Rail yards

- Marine terminals & rail yards responsibilities:
  - Deny entry for trucks not in compliance with regulation (DTR sticker)
Enforcement Responsibilities

- Enforcement entities:
  - Air Resources Board—primary
  - Law enforcement and local Air Districts—secondary
  - Port and rail yard authorities
ARB Enforcement

○ Field inspections:
  ● Compliance with regulation
  ● Proper installation and operation of emission control devices
  ● Emission control device maintenance records
  ● Terminal operators – only allow properly DTR stickered trucks

○ Primary motor carrier audits
Emissions Inventory Discussion
Overview

- Emissions Inventory Development
  - Heavy heavy-duty diesel trucks operating at California’s ports and intermodal rail yards

- Regulatory Benefits
  - Statewide
  - South Coast
  - Bay Area
  - San Diego
Emissions Inventory Status

- Developing model to estimate travel activity and emissions
  - Model based upon
    - Published reports/studies
    - Data provided to ARB by ports and rail yards
    - ARB surveys
  - Work in progress
    - On-going refinement with stakeholders
    - Updating with new information and data
- Proposed emissions inventory
  - Based on container movements
  - Port/Rail yard specific modeling in South Coast and Bay Area
  - Port of Oakland emissions scaled to smaller ports
Example of Container Flow

- Near-Dock & Off-Dock Rail Yards
- Local Distribution Centers
- Transloading Facilities
- Port Terminals
EM = \sum{\text{TripNum} \times \text{TripDist} \times \text{EmRate} \times \text{FutGrth}}

Where, EM = emissions (tons/yr)
    TripNum = number of trips
    TripDist = travel distance (mi)
    EmRate = emissions rate (g/mi)
    FutGrth = future growth
Number of Trips

- Estimated using container moves at ports / rail yards
  - Assume 1.8 TEU per container
  - Estimate trip fractions to each facility type
    - Rail yards, distribution centers, etc.

- Assumed additional 30% of trips are bobtails/chasses
  - Truck traffic survey at major southern California freeways (ARB, 2007)
  - Interview of southern California fleet owners (ARB, 2006)
  - Rail yard health risk assessments (ARB, 2007)
Travel Distance per Trip

- **Ports of LA/LB**
  - Rail yards: measured distance
  - Transloading facilities and local distribution centers: port truck travel demand model for South Coast (Tioga Group, 2002)

- **Port of Oakland**
  - Rail yards: measured distance
  - Transloading facilities and local distribution centers: measured distance based on Bay Area goods movement study (Cambridge Systematics, 2003)
## Estimated Travel Distance (Miles)

<table>
<thead>
<tr>
<th>Destination from Ports</th>
<th>Ports of LA / LB</th>
<th>Port of Oakland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near-Dock Rail yards</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>Off-Dock Rail yards</td>
<td>26</td>
<td>N/A</td>
</tr>
<tr>
<td>Transloading Facilities</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Local Distribution Centers</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Regional Distribution Centers</td>
<td>N/A***</td>
<td>80*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100**</td>
</tr>
</tbody>
</table>

*    To Modesto and Sacramento, CA
**   To Salinas, CA
*** Combined to local distribution centers
# Trips, Travel Miles, and VMT

<table>
<thead>
<tr>
<th>Ports*</th>
<th>Container Trips** (Millions)</th>
<th>Bobtail/Chassis Trips (Millions)</th>
<th>Travel Miles</th>
<th>VMT (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA / LB</td>
<td>7.4</td>
<td>3.8</td>
<td>19</td>
<td>213</td>
</tr>
<tr>
<td>Oakland</td>
<td>1.8</td>
<td>0.8</td>
<td>30</td>
<td>77</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<th>Container Trips** (Millions)</th>
<th>Bobtail/Chassis Trips (Millions)</th>
<th>Travel Miles</th>
<th>VMT (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA / LB</td>
<td>12.9</td>
<td>7.7</td>
<td>19</td>
<td>394</td>
</tr>
<tr>
<td>Oakland</td>
<td>3.3</td>
<td>1.4</td>
<td>33</td>
<td>157</td>
</tr>
</tbody>
</table>

* Include rail yards  
** Include street turn trips
Emissions Rate

- EMFAC2007
  - Baseline emissions rates and deterioration rates
  - Estimated life-time accrual
  - Port specific truck age distributions
    - Ports of Los Angeles and Long Beach
    - Port of Oakland
Future Growth

- Estimated growth in container throughput
  - Goods Movement Emissions Reduction Plan (ARB, 2006)
- Rail facility growth
- 5% annual growth rate
Drayage Truck Proposed Regulation

- Phase I (by 2012)
  - Replace pre-2003 model year engines with DPF
  - Retrofit 2003 to 2006 model year engines with DPF

- Phase II (by 2020)
  - Replace pre-2007 model year engines
Emissions Benefits
– Statewide NO\textsubscript{X}
Emissions Benefits
– Statewide PM

![Graph showing emissions benefits for Statewide PM with and without a rule. The graph compares PM (tons/yr) for the years 2010, 2011, 2012, and 2020. The data is presented with two bars for each year: one for 'Without Rule' and one for 'With Rule'. The 'Without Rule' bars are consistently higher than the 'With Rule' bars, indicating a benefit from implementing the rule.](image-url)
Emissions Benefits – South Coast NO$_X$
Emissions Benefits – South Coast PM

Without Rule

With Rule

Year

PM (tons/yr)

2010 2011 2012 2020

2010 2011 2012 2020
Emissions Benefits – Bay Area NOX

- NOX (tons/yr): 2,500
- NOX without Rule: Blue bars
- NOX with Rule: Red bars
- Data comparison:
  - 2010: NOX without Rule > NOX with Rule
  - 2011: NOX without Rule > NOX with Rule
  - 2012: NOX without Rule > NOX with Rule
  - 2020: NOX without Rule > NOX with Rule
Emissions Benefits
– Bay Area PM

<table>
<thead>
<tr>
<th>Year</th>
<th>Without Rule</th>
<th>With Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>2011</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>2012</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>2020</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>
Emissions Benefits – San Diego NOₓ
Emissions Benefits – San Diego PM

<table>
<thead>
<tr>
<th>Year</th>
<th>Without Rule</th>
<th>With Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>4.5</td>
<td>3.0</td>
</tr>
<tr>
<td>2011</td>
<td>4.7</td>
<td>3.2</td>
</tr>
<tr>
<td>2012</td>
<td>5.1</td>
<td>3.5</td>
</tr>
<tr>
<td>2020</td>
<td>1.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Contact Information

- **Seungju Yoon**
  - (916) 322-1718 / syoon@arb.ca.gov
  - Regulatory Support Section/Mobile Sources Analysis Branch

- **Todd Sax**, Manager
  - (916) 322-5474 / tsax@arb.ca.gov
  - Regulatory Support Section/Mobile Sources Analysis Branch

- **Michael Benjamin**, Chief
  - (916) 323-2915 / mbenjami@arb.ca.gov
  - Mobile Sources Analysis Branch
Action Items
Future Meetings/Contact Info

- Staff report including draft regulation – Sept. 2007
- Board consideration – November 2007
- Future public workshops:
  - To be determined
- Regulation contact information:
  Michael Miguel, Manager
  Phone: (916) 445-4236
  email: mmiguel@arb.ca.gov

Website:
http://www.arb.ca.gov/msprog/onroad/porttruckle/porttruckle.htm
Questions/Comments