Draft ARB Health Risk Assessment of the BNSF Richmond Railyard

June 13, 2007
California Environmental Protection Agency
Air Resources Board
Tonight’s Presentation

- Process
- Background
- Methodology and results
- Actions taken to reduce health risks
- Questions, comments, and next steps
Process to Review Risk Assessment and Plan Next Steps

Several Purposes for tonight’s meeting
- Present the draft and findings
- Discuss progress being made
- Answer questions
- Process for Review and Comments

After Tonight’s meeting There Will Be:
- Your written comments
- Next community meeting
- Your ideas on possible future emission reduction actions by either the ARB or the railroads
## Health Risk Assessment Timelines

<table>
<thead>
<tr>
<th>Draft Health Risk Assessments to be Completed by Spring 2007</th>
<th>Draft Health Risk Assessments to be Completed by the end of 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNSF Commerce/Eastern</td>
<td>BNSF Barstow</td>
</tr>
<tr>
<td>BNSF Hobart</td>
<td>BNSF San Bernardino</td>
</tr>
<tr>
<td>BNSF Richmond</td>
<td>BNSF San Diego</td>
</tr>
<tr>
<td>BNSF Stockton</td>
<td>UP Colton</td>
</tr>
<tr>
<td>BNSF Watson (Wilmington)</td>
<td>UP ICTF (port of L.A.)</td>
</tr>
<tr>
<td>UP Commerce</td>
<td>UP Industry</td>
</tr>
<tr>
<td>UP LATC (Los Angeles)</td>
<td>UP Oakland</td>
</tr>
<tr>
<td>UP Mira Loma</td>
<td></td>
</tr>
<tr>
<td>UP Stockton</td>
<td></td>
</tr>
</tbody>
</table>
Background

➢ Our commitment to address pollution impacts on communities

➢ The State’s goals
  – Reduce exposure to diesel PM as quickly as possible
  – Reduce risks at least 85 percent by 2020
  – Implement all possible emission reductions to attain air quality standards
Purpose of the Assessments

- Identify emission sources in the railyards
- Identify exposures
- Evaluate the health impacts
- Put the railyard risks into perspective with other sources
- Provide priority needed to reduce the risks
Scope of the Draft Assessments

- Two major components:
  - Health risk assessment for the railyard
  - Health risk assessment associated with significant diesel PM sources surrounding the community
- Focus on diesel PM and other toxic air contaminant (TAC) sources
Methodology of the Draft Assessment
Health Risk Assessment Methodology

- Prepare the best possible emissions inventory
- Conduct air dispersion modeling
- Evaluate the potential of health impacts
  - Diesel PM
  - Other TACs
On-site & Off-site Emission Boundaries
Railyard Emissions

Diesel PM Emission Inventory

- Locomotives (line-hauls, switchers, & maintenances)
- On-road trucks & vehicles
- Cargo handling equipment
- Off-road equipment
- Stationary sources (point & area)
Emission Estimates

- Fleet/Equipment population
- Operational activity
  - Operation types or modes
  - Load factor (if applicable)
  - Vehicle miles traveled (VMT)
  - Daily operation hours and temporal profile
- Emission factors (grams per unit activity)
- Fuel characteristics and adjustment
  - Fuel usage
  - Sulfur content
Example - Locomotive Emissions

- Number of locomotives by types
- Time operating at each throttle notch setting and idling mode
- Emission factors (appendix E in the report)
- Hours of operation in each mode
- Types and amount of fuel used
- Daily activity profiles
## Summary of Diesel PM Emissions at the BNSF Richmond Railyard

<table>
<thead>
<tr>
<th>Diesel PM Emission Sources</th>
<th>Richmond Railyard</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tons/year</td>
<td>percentage</td>
</tr>
<tr>
<td><strong>Locomotives</strong></td>
<td>3.3</td>
<td>70 %</td>
</tr>
<tr>
<td>Line Haul Locomotives</td>
<td>1.54</td>
<td>33%</td>
</tr>
<tr>
<td>Switch Locomotives</td>
<td>1.16</td>
<td>25%</td>
</tr>
<tr>
<td>Service/Maintenance</td>
<td>0.55</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Off-road Vehicles and Equipment</strong></td>
<td>0.6</td>
<td>12%</td>
</tr>
<tr>
<td><strong>On-road Trucks and Vehicles</strong></td>
<td>0.5</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Cargo Handling Equipment</strong></td>
<td>0.3</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Other Stationary Sources</strong></td>
<td>&lt; 0.01</td>
<td>&lt; 1 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4.6</td>
<td>100 %</td>
</tr>
</tbody>
</table>
Off-Site Non-Railyard Emissions

- Focus on diesel PM sources
- Identify the population of on-road trucks
- Apply specific emission factors to the trucks based on traffic flows and volumes
- Local Stationary Sources
- Calculate emissions
## Summary of Off-Site Non-Railyards Diesel PM Emission Inventory

<table>
<thead>
<tr>
<th>Sources</th>
<th>tons/year</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Sources</td>
<td>11.7</td>
<td>60%</td>
</tr>
<tr>
<td>Stationary Sources</td>
<td>8.1</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>
# Comparison of Diesel PM Emissions (tons per year in 2005)

<table>
<thead>
<tr>
<th>Sources</th>
<th>Locomotive</th>
<th>Cargo Handling Equipment</th>
<th>On-Road Trucks</th>
<th>Other (Refrigerator truck, Off-road, Trailers, etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.F. Bay Area Air Basin</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4,600</td>
</tr>
<tr>
<td>South Coast Air Basin</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7,800</td>
</tr>
<tr>
<td>BNSF Richmond</td>
<td>3.3</td>
<td>0.3</td>
<td>0.5</td>
<td>0.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Off-Site Roadways</td>
<td>-</td>
<td>-</td>
<td>11.7</td>
<td>-</td>
<td>11.7</td>
</tr>
</tbody>
</table>
Air Dispersion Modeling

- Use air dispersion model to estimate the air concentration distributions of diesel PM

Key inputs to the model:
- Emissions inventory (temporal & spatial allocation)
- Meteorological data (wind speed, wind direction, temperature, etc.)
Health Risk Evaluation

- Combine air dispersion modeling results with toxicity data to estimate health risks
- Toxicity data provided by the Office of Environmental Health Hazard Assessment, Cal/EPA (OEHHA Guidelines, 2003)

- Health effects:
  - cancer risks – as chances per million (e.g., 25 per million)
  - non-cancer impacts – as hazard indices (e.g., 0.2)

- No significant impacts on the communities identified for non-cancer effects
Results of the Draft Assessments
BNSF Richmond Railyard Estimated Potential Cancer Risks

- **Locations Nearest to Railyard**: 4-Commerce Rail
  - 26,700* Estimated Exposed Population

- **Within 1-mile from Railyard**: BNSF Richmond
  - 1,600* Added Risk
  - 26,700* Estimated Exposed Population

- **Chances Per Million**
  - **Added Risk**
  - **Regional Background**

*Estimated Exposed Population*
Estimated Potential Cancer Risks Associated with the BNSF Richmond Railyard Diesel PM Emissions (chances per million exposed population)
Estimated Potential Cancer Risks from Off-Site DPM Emissions
(chances per million exposed population)
Emission Reduction Measures
Approach to Reducing Emissions

- ARB regulations
  - Fuels
  - Cargo handling equipment (CHE)
  - Transport refrigeration units (TRUs)
  - Heavy-duty diesel on-road trucks and off-road vehicles
- U.S. EPA regulation
  - Locomotives
- Voluntary agreements
  - 1998 South Coast/2005 Statewide
- Railroad yard locomotive replacement program
- Funding programs
  - Carl Moyer Incentives
Benefits of California Railyard Diesel PM Emission Reduction Measures

- **2005-2007:**
  - CARB diesel fuel for intrastate locomotives
  - 2005 railyard agreement
  - Less cargo handling operation

- **2005-2010:**
  - Measures above plus:
  - Spilled-over benefits from 1998 NOx locomotive fleet average agreement (in South Coast)
  - ARB on-road heavy-duty truck regulation
  - ARB transport refrigeration unit regulation

≈25-30%
≈30-35%
## Existing Measures - Diesel Fuel Standards

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Maximum Sulfur Level (ppmw)</th>
<th>Aromatics Maximum (% by volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prior</td>
<td>2006-2007</td>
</tr>
<tr>
<td>CARB Diesel</td>
<td>500</td>
<td>15</td>
</tr>
<tr>
<td>EPA On-Road Diesel</td>
<td>500</td>
<td>15</td>
</tr>
<tr>
<td>EPA Non-road Diesel</td>
<td>5,000</td>
<td>500*</td>
</tr>
</tbody>
</table>

* Lower to 15 ppmw in 2012.
Existing Measures - Average Diesel Fuel Sulfur Levels Consumed by Locomotives in California

<table>
<thead>
<tr>
<th>Year</th>
<th>Sulfur Levels (ppmw)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1,100</td>
</tr>
<tr>
<td>2007</td>
<td>80</td>
</tr>
<tr>
<td>2012</td>
<td>10</td>
</tr>
</tbody>
</table>
Existing Measures - Richmond Railyard Diesel PM Emission Reductions: Line-Haul Locomotives

Diesel PM Emissions (tons per year) *

Year

Existing Measures

- Richmond
- Railyard

Diesel PM Emission Reductions: Line-Haul Locomotives
Existing Measures - Richmond Railyard Diesel PM Emission Reductions: New On-Road Trucks
Possible Additional Measures

- 2005-2020:
  - U.S. EPA locomotive rulemaking
  - California replacement of switch locomotives
  - ARB in-use truck measure

\[ \approx 55-65\% \]
Potential Measures - Richmond Railyard Diesel PM Emission Reductions: Switcher Locomotive Replacement by 2010
Potential Measures - Richmond Railyard Diesel PM Emission Reductions: In Use On-Road Trucks

➢ In addition to the existing on-road heavy-duty truck regulation.
In addition to the existing line-haul locomotive fleet average agreement.
Existing & Potential Measures - Total Benefits of the Emission Reductions Measures for Richmond Railyard

![Bar chart showing Diesel PM Emissions (tons per year) over years 2005 to 2020. The chart compares emissions reduced by implemented measures and additional potential measures.](chart.png)
Next Steps

- Feedbacks from the Public
- Written comments to ARB
- Next Community Meeting
- Evaluate any additional feasible mitigation measures
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ARB Railyard HRA Website:
- http://www.arb.ca.gov/railyard/hra/hra.htm