

**Kirk Marckwald**  
**Association of American Railroads**

**Overview of MOU & Rail Issues**  
**Faster Freight – Cleaner Air**

January 31, 2006

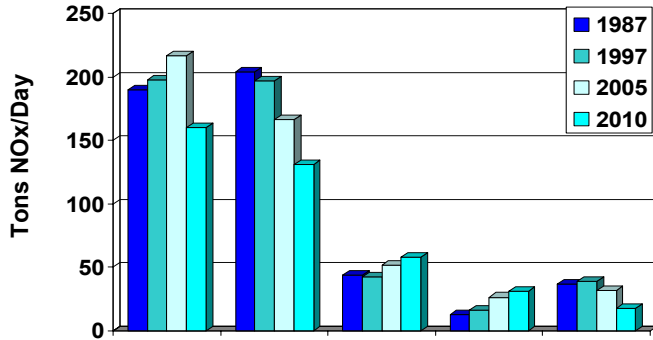


**US Railroad Intermodal Flows**  
**(car loads) for 2002**

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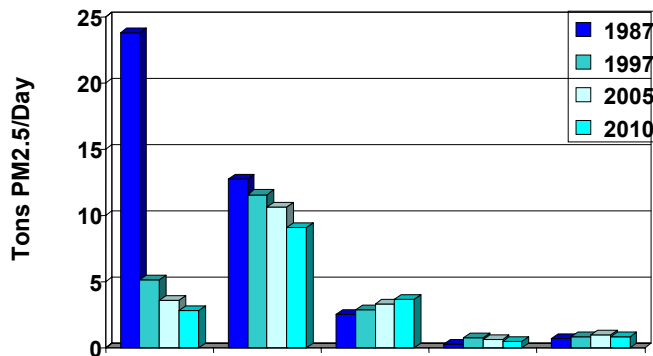
## Adopted SCAQMD NOx Inventories



	HDD Trucks	Offroad Equip	Ships	Aircraft	Trains
% SCAQMD NOx Inventory	21%	17%	7%	4%	2%

Data Sources: SCAQMD AQMPs & Other Materials

## Adopted SCAQMD PM 2.5 Inventories



	HDD Trucks	Offroad Equip	Ships	Aircraft	Trains
% SCAQMD PM2.5 Inventory	2.4%	7.9%	3.2%	0.4%	0.7%

Data Sources: SCAQMD AQMPs & Other Materials



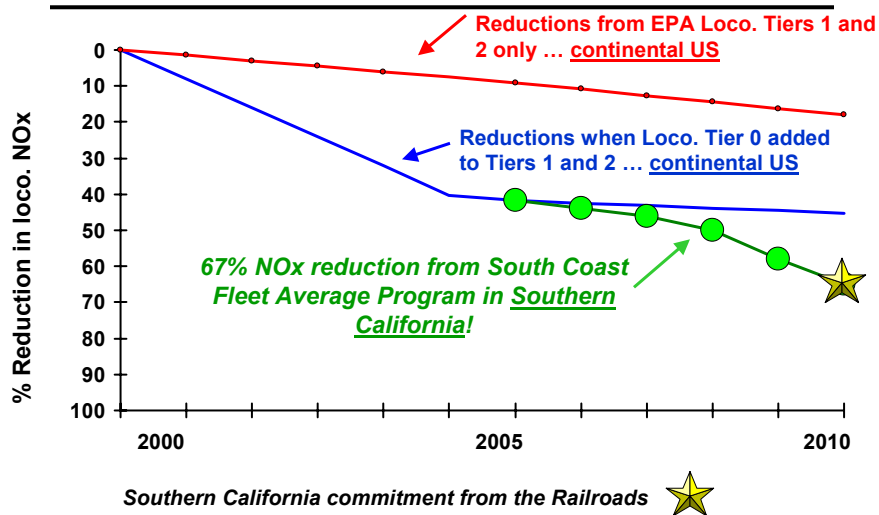
## **Freight Railroads' California Environmental Improvement Program**

- 1994 -- Supported the US EPA's standards for new and re-manufactured locomotives
- 1998 -- Developed enforceable MOU with ARB and US EPA to achieve accelerated reductions in Southern California
- 2000 -- Created an end-user research & development program for new technologies

## **Additional Railroad Emission Reduction Program Components**

- 2001 -- \$5 million in funding by the railroads for particulate trap research at Southwest Research Institute
- 2005 -- Concluded an MOU with the Air Resources Board to accelerate PM reductions in and around rail yards
- Ongoing -- Funding & demonstrating new locomotive technologies:
  - Spark ignited LNG technologies
  - Idle reduction devices
  - New switch engines using truck engine technologies
  - Hybrid locomotives

## South Coast Fleet Average from 1998 MOU



## How the ARB Described the 1998 MOU

“ This compliance requirement would be met by the use of only the cleanest engines within the SCAB non-attainment area by an aggressive phase-in of these engines over five years. In essence, this fleet average requirement represents the most aggressive scrappage and replacement program of any transportation source in the SCAB (in effect, 100 percent scrappage/replacement with the latest, low-emitting locomotives over 5 years from 2005-2010). It would lead to an overall emission reduction of 67 percent by 2010.” [Emphasis Added]

The California State Implementation Plan for Ozone, Vol. II: The Air Resources Board's Mobile Source and Consumer Products Elements, Appendix B, at B-20 (Nov. 15, 1994).

## **2005 CARB/Rail MOU – What It Does**

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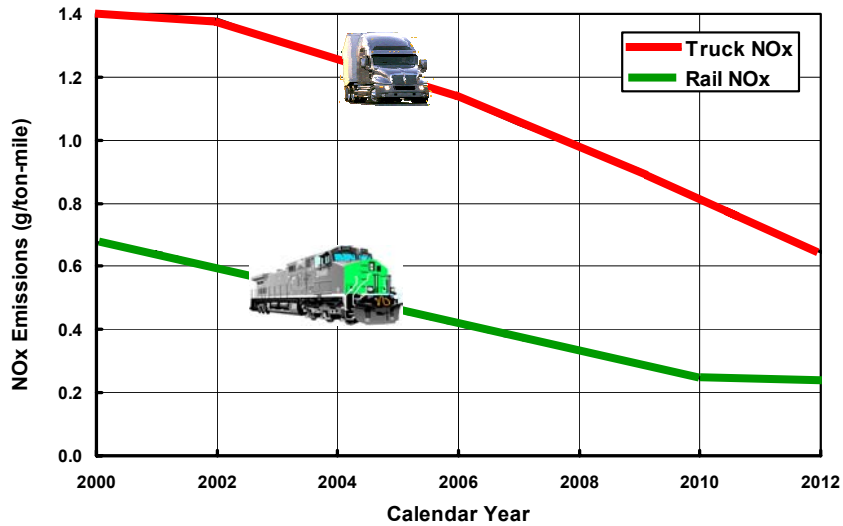
- Phase I: Brings about a 20% reduction in PM emissions from rail yards in California over the next three years
- Phase II: Invites all local air districts and community groups to discuss longer-term locomotive emission control strategies
- The reductions achieved by the MOU are larger and sooner than could have been required by any California regulatory or legislative body
- The only way the State could get reductions from preempted sources was through a voluntary agreement
- By using a cooperative approach, California has also avoided implementation delays due to disagreements over the State's legal authority

## **2005 CARB/Rail MOU – Outcomes**

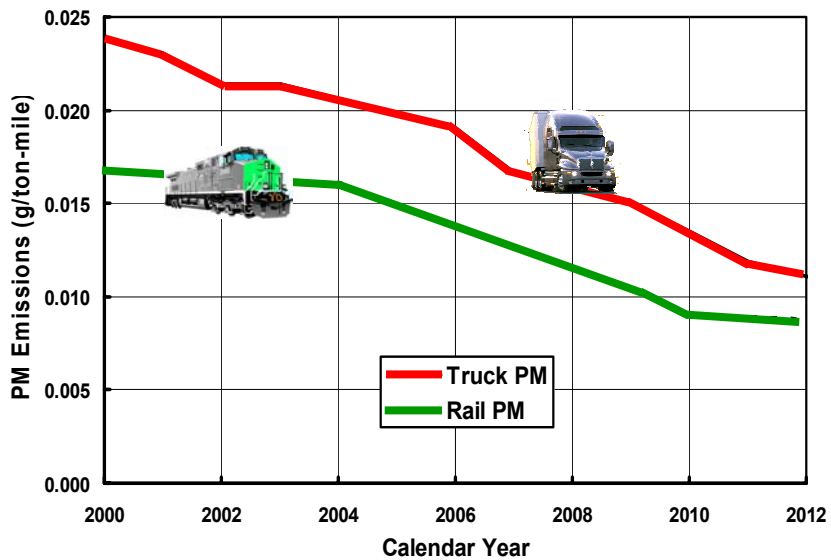
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- ~450 locomotives will be equipped with automatic shutdown devices with 15 minute triggers
- At least 80% of California fueling will be low-sulfur – six years earlier than required by federal regulation
- At least 99% of all locomotives will comply with stringent smoke regulations– a much higher rate than any other mobile source
- Health risk assessments will be carried out at the 16 major rail yards throughout California

## NOx Emissions per ton Mile of Freight South Coast Air Basin



## PM Emissions per ton Mile of Freight South Coast Air Basin



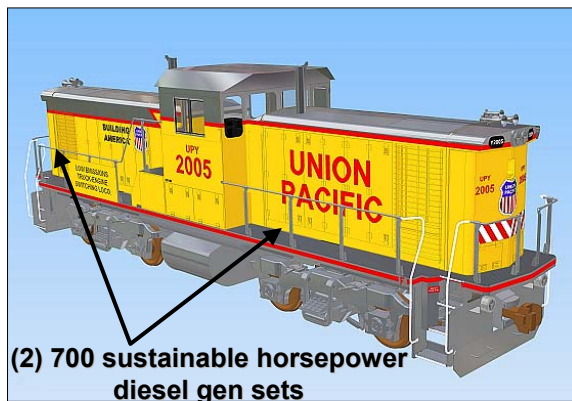
## Comparative Markets: Locomotives & Trucks

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- Diesel engine technology is driven by the US over-the-road truck market
  - 211 Class 8 trucks have been sold for every locomotive since 1972
- Engine technologies “cascade down” through normal marketplace forces
  - Automotive → Truck → Locomotive, Stationary, and Marine
  - Example: Electronic Fuel Injection
    - Introduced into the auto market in *early* 1980's
    - Entered truck market in *late* 1980's
    - Entered locomotive market in 1994
  - Engine technologies cannot be quickly and simply “scaled up”

## New Switch Locomotive Technology: Gen Set

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**“Gen Set” heavy-duty switcher**  
Powered by (2) EPA *off-road Tier 3* diesel gen sets  
Projected to exceed EPA locomotive Tier 2 requirements

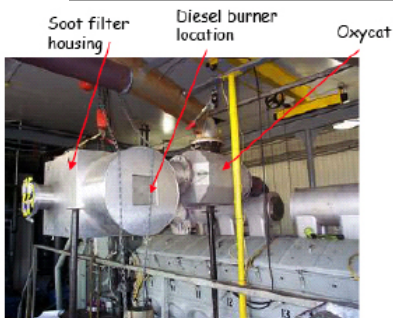
## New Switch Locomotive Technology: Hybrids

2000 peak horsepower from batteries



**“Hybrid” light-medium duty switcher**  
Batteries recharged by 290 HP EPA off-road Tier 2 diesel gen set  
Significantly exceeds EPA locomotive Tier 2 requirements

## Diesel Particulate Filter (DPF) R&D



- Two UP 1500 horsepower switchers will be equipped with DPF technology in 4Q '05
- Units will be tested for maintainability, durability and performance in California
- Railroads have been co-funding 5-year R&D project investigating performance, durability and applicability of DPF to older switching locomotives
- R&D work being performed by Southwest Research Institute (“SwRI”) through Association of American Railroads
- There is no technical precedent for this work

## **Evaluate Emissions Reduction Possibilities from a Systems Perspective**

- Must balance the needs of shippers, transporters, commuters, adjacent communities, regulators, and many other stakeholders
- Altering one part of the system can cause disruption to the entire goods movement system (ships, rail, and truck operations)
  - International port calls, labor opportunities, freeway traffic patterns, and even commuter rail operations
- Unintended economic and environmental consequences of various public policy choices must be squarely addressed
- This issue needs a statewide focus and management team (per the Governor's recommendation)

## **Extra slides**

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