

Strategies to Reduce Locomotive and Associated Railyard Emissions

The Air Resources Board (ARB) has developed a comprehensive approach to reduce locomotive and railyard emissions through a combination of voluntary agreements, ARB and United States Environmental Protection Agency (U.S. EPA) regulations, funding programs, and early replacement of California's line haul and yard locomotive fleets. The information presented below summarizes California's key locomotive and railyard air pollution control measures and strategies.

South Coast Locomotive NO_x Fleet Average Agreement: Signed in 1998 between ARB and both Union Pacific Railroad (UP) and BNSF Railway (BNSF), it requires the locomotive fleets that operate in the South Coast Air Quality Management District (SCAQMD) to meet, on average, U.S. EPA's Tier 2 locomotive emissions standards by 2010. Tier 2 locomotives became commercially available in 2005 and provide a 65 percent reduction in oxides of nitrogen (NO_x) and 50 percent reduction in diesel particulate matter (PM) emissions. This Agreement will provide locomotive fleet benefits in southern California 20 years earlier than the rest of the country.

Statewide Railroad Agreement: ARB and both UP and BNSF signed a voluntary statewide agreement in 2005 which does not change any federal, state, or local authorities to regulate railroads. The Agreement has resulted in measures that have achieved an almost 20 percent reduction in locomotive diesel PM emissions in and around railyards since its adoption in June 2005. The measures in the Agreement include:

- Phase-out of non-essential idling on all locomotives without idle reduction devices (60 minute limit – fully implemented);
- Install idling devices on 440 California-based locomotives by June 30, 2008 (15 minute limit – 70 percent implemented);
- Identify and expeditiously repair locomotives with excessive smoke and ensure that at least 99 percent of the locomotives operating in California pass smoke inspections (implemented);
- Require all locomotives that fuel in the state use at least 80 percent federal or California ultra low sulfur (15 parts per million) diesel fuel by January 1, 2007, (six years prior to federal requirement – implemented, estimate is over 95 percent of diesel fuel is low sulfur);
- Prepare new health risk assessments for 16 major railyards, based on the UP Roseville Rail Yard health risk assessment (completed in 2004) and Office of Environmental Health Hazard Assessment (OEHHA) guidelines; (9 of the 16 will be released in May/June 2007); and
- Identify and implement future feasible mitigation measures based on the results of the railyard health risk assessments (ongoing).

ARB Diesel Fuel Regulations Extended to Intrastate Locomotives: This regulation, approved in 2004, requires intrastate locomotives that operate 90 percent of the time in the state to use only California ultra low sulfur (15 parts per million) diesel fuel. This diesel fuel provides on average a six percent reduction in NO_x and 14 percent reduction in diesel PM emissions. The regulation took effect on January 1, 2007.

ARB Cargo Handling Equipment Regulations: This regulation, approved in 2005, requires the control of emissions from more than 4,000 pieces of mobile cargo handling equipment, such as yard trucks and forklifts that operate at ports and intermodal rail yards. This regulation is expected to reduce diesel PM and NO_x emissions by up to 80 percent by 2020. The regulation took effect on January 1, 2007.

Heavy Duty Diesel New Truck Regulations: ARB and the U.S. EPA both have adopted emission standards for 2007 and subsequent model year heavy-duty diesel engines. These standards represent a 90 percent reduction of NO_x emissions, 72 percent reduction of non-methane hydrocarbon emissions, and 90 percent reduction of PM emissions compared to the 2004 model year emission standards.

On-Road In-Use Truck Measure: The ARB is developing a control measure to reduce diesel PM and NO_x emissions from private fleets of on-road heavy-duty diesel-fueled vehicles. This measure will cover long and short haul truck-tractors, construction related trucks, wholesale and retail goods transport trucks, tanker trucks, package and household goods transport trucks, and any other diesel-powered trucks with a gross vehicle weight rating of 14,000 pounds or greater. The goals of this effort are: (a) by 2014, emissions are to be no higher than a 2004 model year engine with a diesel particulate filter, and (b) by 2020, emissions are to be no higher than a 2007 model year engine.

In-Use Port and Railyard Truck Mitigation Strategies: The ARB is developing a port truck fleet modernization program that will substantially reduce diesel PM and NO_x emissions by 2010, with additional reductions by 2020. There are an estimated 12,000 port trucks operating at the 3 major California ports which are a significant source of air pollution, about 7,000 tons per year of NO_x and 560 tons per day of diesel PM in 2005, and often operate in close proximity to communities. Strategies will include the retrofit or replacement of older trucks with the use of diesel particulate filters and a NO_x reduction catalyst system. ARB staff will propose regulatory strategies for ARB Board consideration by the end of 2007 or early 2008.

ARB Tier 4 Off-Road Diesel-Fueled New Engine Emission Standards: In 2004, the ARB and U.S. EPA adopted a fourth phase of emission standards (Tier 4). New off-road engines are now required to meet aftertreatment-based exhaust standards for particulate matter (PM) and NO_x starting in 2011 that are over 90 percent lower than current levels, putting off-road engines on a virtual emissions par with on-road heavy-duty diesel engines.

Transport Refrigeration Unit (TRU) Air Toxics Control Measure (ATCM): This ATCM is applicable to refrigeration systems powered by integral internal combustion engines used on trucks, trailers, railcars, and shipping containers. TRUs may be capable of both cooling and heating. Diesel PM emission factors for TRUs and TRU gen set engines will be reduced by approximately 65 percent in 2010 and 92 percent in 2020. California will also experience benefits from reduced NO_x and HC emissions. The new rule became effective on December 10, 2004.

U.S. EPA Locomotive Emission Standards: Under the Federal Clean Air Act, U.S. EPA has sole authority to adopt and enforce new locomotive emission standards. Under U.S. EPA's rules, this preemption also extends to the remanufacturing of existing locomotives. The ARB is relying on the U.S. EPA to expeditiously require the introduction of the next generation or Tier 4 locomotive emission standards. ARB supports the introduction of Tier 4 locomotives built with diesel particulate filters and selective catalytic reduction, which combined, are expected to provide up to a 90 percent reduction in NO_x and PM emissions. U.S. EPA released the draft Tier 4 rulemaking in March 2007. The final regulations are targeted for approval by the end of 2007.

ARB Goods Movement Emission Reduction Plan: Approved in 2006, this plan forecasts goods movement emissions growth and impacts. It contains a comprehensive list of proposed strategies to reduce emissions from ships, trains, and trucks and to maintain and improve upon air quality. The strategies in the plan, if fully implemented, would reduce locomotive NO_x and diesel PM emissions by up to 90 percent by 2020.

California Yard Locomotive Replacement Program: One locomotive strategy being pursued is to replace California's older yard locomotives that operate in and around rail yards statewide. Yard locomotives represent only five percent of the statewide locomotive NOx and diesel PM emissions, but often occur in railyards located in densely populated urban centers. Multiple nonroad engine (gen-set) and electric-hybrid yard locomotives have demonstrated they can reduce NOx and diesel PM emissions by up to 90 percent as compared to existing locomotives. In January 2006, UP ordered 60 gen-set and 10 electric hybrid yard locomotives for deployment in southern California beginning in 2007. BNSF has been operating four liquefied natural gas (LNG) yard locomotives in downtown Los Angeles since the mid-1990s.

For information on California's locomotive emission reduction strategies, and details on locomotive emission control technologies for line haul and yard locomotives, please visit:

<http://www.arb.ca.gov/railyard/railyard.htm> & <http://www.arb.ca.gov/msprog/offroad/loco/loco.htm>.

For information on the Goods Movement Emission Reduction Plan please visit:

<http://www.arb.ca.gov/gmp/gmp.htm>.

For information on the On-Road In-Use Truck Measure, please visit:

<http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm>.

For information on the In-Use Port and Railyard Truck Mitigation Strategies, please visit:

<http://www.arb.ca.gov/msprog/onroad/porttruck/porttruck.htm>.

For information on the Transport Refrigeration Unit Air Toxics Control Measure, please visit:

<http://www.arb.ca.gov/diesel/tru.htm>.

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