



Regulatory Announcement

Environmental Benefits of Emission Standards for Locomotives

The Environmental Protection Agency (EPA) has established emission standards for oxides of nitrogen (NO_x), hydrocarbons (HC), carbon monoxide (CO), particulate matter (PM) and smoke for newly manufactured and remanufactured locomotives and locomotive engines, which have previously been unregulated. The new standards will achieve approximately a two-third reduction in NO_x emissions, which is equivalent to removing over thirty million passenger cars from the road. In addition, HC and PM emissions will be reduced by 50 percent.

Overview of Rulemaking

EPA has finalized emission standards for locomotives that will provide significant emission reductions, beginning in the year 2000, to help states comply with National Ambient Air Quality Standards (NAAQS) for ozone and PM. Since locomotive emissions have not been regulated before, it was necessary for EPA to create a comprehensive program, including not only emission standards, but also test procedures and a full compliance program. There are three separate sets of emission standards, with applicability of the standards dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) apply to locomotives and locomotive engines originally manufactured from 1973 through 2001, any time they are remanufactured in calendar year 2000 or later. The second and third sets of standards (Tier 1 and Tier 2) apply to locomotives and locomotive engines originally manufactured on or after

January 1, 2002 (Tier 2 standards will take effect on January 1, 2005). These locomotives and locomotive engines will also be required to meet the same standards at each subsequent remanufacture. The Agency has also established a rigorous emission testing program to make sure that locomotives comply with these standards for the life of the locomotive.

Health and Environmental Concerns

Most locomotives in the U.S. are powered by diesel engines. Thus locomotives have significant NOx emissions, as well as HC and PM emissions, all of which have significant health and environmental effects. NOx is a major component of smog and acid rain. NOx emissions combine with HC in the atmosphere to form ground-level ozone, the primary constituent of smog. Ozone is a highly reactive pollutant that damages lung tissue, causes congestion, and reduces vital lung capacity, in addition to damaging vegetation. Acid rain damages buildings and crops, and degrades lakes and streams. NOx also contributes to the formation of secondary PM, which causes headaches, eye and nasal irritation, chest pain, and lung inflammation. Environmental impacts of PM include reduced visibility and deterioration of buildings.

Locomotive Emission Inventories

Locomotive NOx emissions are estimated to represent about 5.5 percent of NOx emissions from all mobile and stationary sources in the U.S. Locomotive PM and HC emissions are both estimated to represent less than one-quarter of one percent of total national emissions. Thus, the focus of EPA's regulation was on NOx emission reductions. It should be noted that in some urban areas that have very high rail traffic, such as Chicago or El Paso, NOx emissions can represent about one-tenth of the total NOx inventory.

Current National Locomotive Emission Inventories		
Pollutant	Metric Tons Per Year	Percent of Total Inventory (All Sources)
NOx	1,093,000	5.5
PM-10	27,000	0.1
HC	42,000	0.2

Environmental Benefits of New Standards

When fully phased-in, the new emission standards will reduce NO_x emissions from locomotives by nearly two-thirds, and HC and PM emissions by half. They will also achieve very significant emission reductions in the near term, however. These reductions, which are shown below, are being heavily relied upon by those areas that have very high rail traffic, as well as Southern California, which has moderately high rail traffic and very significant air quality needs. To put these national NO_x emission reductions into context, the 304,000 ton per year reduction expected in 2005 would be equivalent to removing nearly 20 million passenger cars from the road. In addition, NO_x emission reductions will also lead to reductions in ambient concentrations of secondary PM. It has been estimated that about 4 tons of nitrate particulate is formed from every 100 tons of NO_x emitted. Thus, the secondary PM reduction expected in 2005 is about 12,000 tons per year.

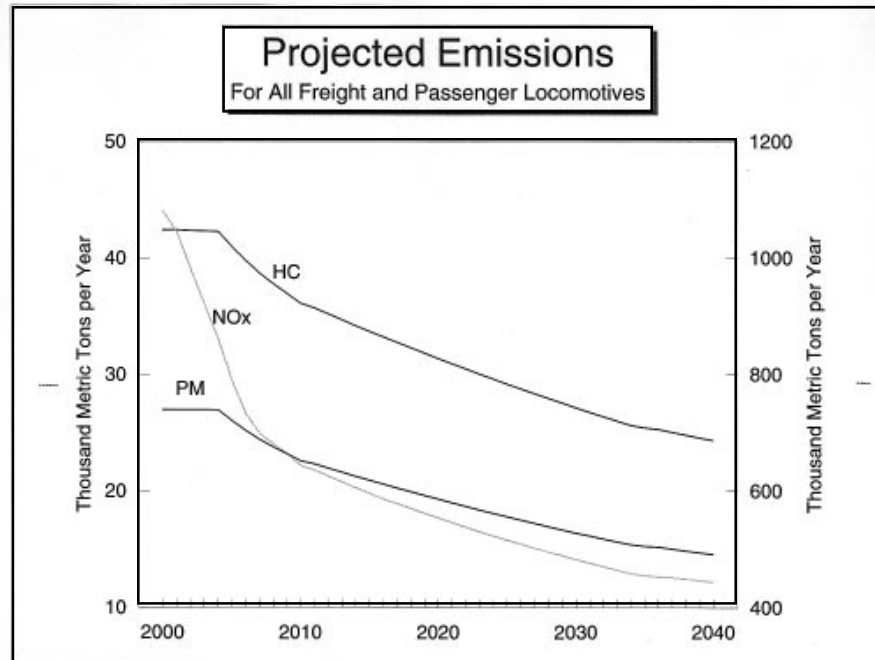
Projected National Emission Reductions (Metric Tons)				
Pollutant	Year			
	2005	2010	2015	2020
NO _x	304,000	449,000	496,000	538,000
PM	900	4,400	6,000	7,600
HC	1,400	6,300	8,700	11,000
Secondary PM*	12,000	18,000	20,000	21,000

* Assumes 4 tons of nitrate particulate formed for each 100 tons of NO_x emitted.

Reductions from Existing Locomotive Fleet

Much of the expected reduction in NO_x emissions will come early in the program due to the Tier 0 standards that apply to existing locomotives when they are remanufactured. These standards are a unique feature of this regulation, and represent the first time that EPA has regulated the remanufacturing of an existing fleet on such a large scale. Such regulation of the remanufacturing process is critical because locomotives are generally remanufactured five to ten times during their total service lives (typically 40 years or more). Standards that would only apply to loco-

motives originally manufactured after the effective date of the rule would not achieve significant emissions reductions until those future locomotives replaced a significant number locomotives in the existing fleet. For the first 10 years of the program, the majority of projected NOx emission reductions will be the result of the Tier 0 emission standards that apply to existing locomotives.



For More Information

The final rule and other documents on locomotives are available electronically from the EPA Internet server at:

<http://www.epa.gov/OMSWWW/locomotv.htm>

Document information is also available by contacting Russ Banush at:

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