

US EPA ARCHIVE DOCUMENT

**TESTIMONY OF  
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BEFORE THE  
SUBCOMMITTEE ON CLEAN AIR, WETLANDS  
AND NUCLEAR SAFETY  
OF THE  
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS  
UNITED STATES SENATE**

**June 15, 2000**

Thank you, Mr. Chairman and Members of the Subcommittee, for the invitation to appear here today to discuss our proposed program that addresses emission standards for heavy-duty trucks and buses and the accompanying low sulfur requirement for diesel fuel.

As you know, last year we established a new program to dramatically reduce emissions from cars and light-duty trucks. That program, often called the "Tier 2" program, will help to improve the nation's air quality by phasing in both cleaner engines and cleaner burning gasoline over the next decade, using flexible, market-driven mechanisms that minimize consumer costs while preserving vehicle choice.

We are now focusing much-needed attention on *heavy-duty* highway vehicles, applying the same general principles of addressing the vehicles and the fuel as a single system, and incorporating flexible compliance mechanisms for the affected industries.

This proposed program would protect the public health and the environment of all Americans by reducing the sulfur content in highway diesel fuel by 97 percent to provide for dramatically cleaner heavy-duty trucks and buses. By addressing diesel fuel and vehicles together as a single system, harmful emissions from heavy trucks and buses would be reduced up to 95 percent from today's levels -- the clean-air equivalent of eliminating the air pollution from 13 million of today's trucks.

## JUSTIFICATION FOR ACTION

Heavy-duty trucks and buses are largely powered by diesel engines, and the importance of diesel continues to grow with the steady increase in truck traffic on our roads, the continuing trend toward replacing heavy-duty gasoline-powered trucks with diesels, and the prospects for a resurgence in light-duty diesel vehicle sales, as evidenced by auto manufacturers' ambitious plans and investments in this area. Diesel engines are more durable and get higher fuel economy than gasoline engines, but they also pollute significantly more. Harmful emissions from these engines contribute greatly to a number of serious air pollution problems, and will continue to do so into the future absent further controls to reduce these emissions. The program we proposed would finally bring diesel emissions on par with those of new, cleaner cars.

In our proposal, published on June 2, we assessed the need for further reductions in emissions from heavy-duty trucks and buses beyond the reductions that will result from new diesel standards set to take effect in 2004. We based this assessment on projections of air quality trends in the U.S. and on the expected contribution of heavy-duty vehicles to these trends. Our conclusion is that if we do not act soon, despite several years of progress in reducing diesel emissions, pollution from heavy-duty trucks and buses will rise in the next 15 years, with serious repercussions for the nation's air quality.

Heavy-duty vehicles contribute to the health and welfare effects of ozone, as well as particulate matter (or "PM"), oxides of nitrogen (or "NOx"), oxides of sulfur, and volatile organic compounds that include toxic compounds such as formaldehyde. These adverse effects include premature mortality, aggravation of respiratory and cardiovascular disease, chronic bronchitis, and decreased lung function. Pollutants from these vehicles also contribute to crop and forestry losses; they contribute to visibility impairment in many parts of the U.S.; and to the acidification, nitrification and eutrophication of bodies of water.

Millions of Americans live in areas with unhealthy air quality that endangers public health and welfare. Forty-two metropolitan areas with a total population of 123 million people have recently violated or are close to violating the 1-hour ozone national ambient air quality standard (or "NAAQS"), and have ozone modeling or other factors which indicate a risk of future NAAQS violations. The emission reductions that would come from the proposed standards will reduce the number of future violations of the ozone NAAQS in these areas. Furthermore, our analysis shows that PM-10 concentrations in 10 areas with a combined population of 27 million people face a significant risk of exceeding the PM-10 NAAQS without significant additional controls in 2007 or thereafter. PM-10 is particulate matter that is 10 microns or less in size. Under the mandates of the Clean Air Act, government agencies at the federal, state, and local levels are working to bring pollutant levels into compliance with the 1-hour ozone and PM-10 NAAQS through their State Implementation Plans, and to ensure that future air quality continues to maintain these health-based standards. The reductions proposed in this rulemaking would play a critical part in these important efforts.

In addition to its contribution to PM-10 inventories, diesel exhaust particulate matter is of special concern because it has been implicated in increasing the risk of lung cancer and respiratory disease in human studies. The current EPA position is that diesel exhaust is a likely human carcinogen and that this cancer hazard applies to environmental levels of exposure.

Emissions from heavy-duty vehicles account for substantial portions of the country's ambient PM and NO<sub>x</sub> levels. NO<sub>x</sub> is a key precursor to ozone formation. By 2007, we estimate that heavy-duty vehicles will account for 29 percent of mobile source NO<sub>x</sub> emissions and 14 percent of mobile source PM emissions. These proportions are even higher in some urban areas, such as in Albuquerque, where heavy-duty vehicles contribute 38 percent of the mobile source NO<sub>x</sub> emissions and 21 percent of the mobile source PM emissions. A number of urban areas

have begun to examine the potential for even greater emission “hot spots” caused by such factors as frequent bus and truck routes.

The proposed program would have a substantial impact on these emissions. By 2030, NOx emissions from heavy-duty vehicles under the proposed program would be reduced by 2.8 million tons, and PM emissions would decline by about 110,000 tons, dramatically reducing this source of NOx and PM emissions. Urban areas, which include many poorer neighborhoods, can be disproportionately impacted by diesel emissions, and these neighborhoods would thus receive a relatively larger portion of the benefits expected from new emissions controls.

## **PROCESS**

Our proposal is the culmination of a year-and-a-half long deliberative process during which we worked closely with a wide range of stakeholders. Following a number of meetings with the manufacturers of engines and emissions controls, the oil refining industry, states, public health and environmental organizations, we published an advance notice of our intent to propose this program in May of last year. That notice defined the challenges and opportunities involved, and yielded further helpful information and discussion during a public comment period that in turn informed a new round of stakeholder meetings over the past year. These meetings included extensive discussions with small refiners and small businesses that market and distribute diesel fuel, under the process created by the Small Business Regulatory Enforcement Fairness Act (SBREFA). EPA has spent many hours in meetings with individual companies, trade associations, state organizations, environmental groups, and other parts of the Federal government, to understand their issues and ensure that they are fairly addressed in the proposal.

In the end, we believe we developed a proposal that addresses the many issues people raised with us, and that can achieve dramatic emission reductions in a cost effective manner, without placing large burdens on small businesses and consumers. On the few issues for which a

clear answer did not emerge at this stage, the proposal contains detailed discussion of viable solutions that have been put forward and asks for comment to help us determine the best approach.

## **PRINCIPLES**

There are a number of overarching principles reflected in the proposal that we feel will make this an effective program:

- *First*, address the heavy-duty vehicle and its fuel as a single system to achieve cost-effective emissions control that is dramatically better than what we could get with separate fuel and vehicle programs;
- *Second*, set consistent standards for vehicles and fuel that apply nationwide;
- *Third*, set performance standards and provide flexible provisions for engine designers and diesel fuel refiners, including small refiners, to demonstrate compliance;
- *Fourth*, minimize costly requirements for people who sell and distribute diesel fuel;
- And *fifth*, design the clean highway diesel fuel program to also enable the use of advanced emission controls for all on-highway diesel vehicles.

## **VEHICLE PROGRAM**

In the past, diesel manufacturers primarily controlled emissions through the design of the engine itself, rather than relying on exhaust emission control devices like the catalytic converter used in automobiles. However, new advanced technologies for diesel exhaust treatment are now being developed and tested and they are proving to be extremely effective. Particulate matter traps, or “soot filters,” that replace a truck’s muffler, are already used in several thousand heavy-duty vehicles in Europe where the right fuel is available, and they work very well, achieving reductions in soot and toxic hydrocarbons of 95 percent and better.

Emissions of the other major diesel pollutant, NO<sub>x</sub>, can be dramatically reduced by putting devices called NO<sub>x</sub> adsorbers in the exhaust system. NO<sub>x</sub> adsorbers have proven effective in stationary source applications in making dramatic reductions in emissions. Although, in mobile sources adsorbers have not yet developed to the point where they are being used in demonstration fleets, NO<sub>x</sub> adsorbers have proven control efficiencies of 90 percent and better in laboratory testing, and rapid progress continues to be made in improving this technology.

These soot filters and NO<sub>x</sub> adsorbers can be designed into a new diesel vehicle at a total projected cost of one thousand to sixteen hundred dollars in the long term, depending on the size of the engine. For comparison, new vehicle prices today can range up to \$250,000 for larger heavy duty vehicles. With the use of these new technologies, and by optimizing existing engine controls, these standards can be met without increasing fuel consumption beyond today's levels.

Our proposed emission standards envision the use of these or similar technologies beginning in the 2007 model year, although we are proposing to phase in the NO<sub>x</sub> standard over 4 years, from 2007 to 2010, to provide flexibility in introducing the newly developed NO<sub>x</sub> adsorbers. We are not proposing to retrofit older engines.

Specifically, the standards we are proposing are 0.2 grams per brake horsepower-hour for NO<sub>x</sub>, and 0.01 grams per brake horsepower-hour for particulate matter. These levels are an order of magnitude lower than the standards set to take effect in 2004, which are based only on engine technologies. In addition, because soot filters are extremely effective at removing emissions of toxic hydrocarbons, these emissions will be likewise reduced to a tiny fraction of current levels.

Heavy-duty gasoline vehicles would also be required to meet stringent standards, and would likely meet these standards through use of control technologies similar to those being developed for cars and light-duty trucks under the Tier 2 standards. We are also proposing to cut evaporative emissions from gasoline-powered trucks by half through improvements in vehicle design.

## **DIESEL FUEL PROGRAM**

There is one major technical barrier to the introduction of the new diesel exhaust emission control technologies, which brings me to why we are proposing to address diesel engines and diesel fuel as a single system. Soot filters and NOx adsorbers are very sensitive to sulfur in the fuel, even more so than gasoline engine catalytic converters. Sulfur ruins these devices by poisoning catalyst sites within them; it also causes the devices to emit harmful sulfate emissions; further, it causes greater fuel consumption. This situation is not unlike the move to catalytic converters on cars in the 1970s. Those were also revolutionary technologies that required a change in the fuel, in that case taking the lead out of gasoline, to achieve their remarkable emissions reduction potential. To make the new diesel technologies work we are proposing to take most of the sulfur out of highway diesel fuel, by mid-2006 when the cleaner, model year 2007 trucks will begin showing up on our nation's roadways.

Specifically, we are proposing that sulfur levels in diesel fuel produced and sold for use in highway vehicles be limited to 15 parts per million. This is a 97 percent cut from the current highway diesel fuel sulfur limit of 500 parts per million, set by EPA ten years ago. Our analyses show that the 15 parts per million level is sufficiently low to enable the high-efficiency exhaust emissions control technologies, and still feasible to produce with existing refinery technologies.

In our proposal, we also analyze the cost and feasibility of requiring a larger sulfur reduction of 99%, sought by some engine manufacturers, and a smaller reduction of 90% sought by some refiners. Our analysis results show that a larger sulfur reduction would cost significantly more and does not appear to be needed to make the exhaust emissions control technologies work, and that smaller reductions in sulfur, although cheaper, would likely cause these devices to fail on the road, thus enabling only "next best" technologies with 20 percent reduction efficiencies and sizeable fuel economy losses. Although we believe that we have



proposed the right sulfur level, we have asked for comment on these higher and lower levels, and also on levels in between.

It is interesting to note that diesel fuel with sulfur levels below this level has been in widespread production in Sweden for many years, and ARCO is producing diesel fuel in California with sulfur levels well below the proposed level.

The investments that the oil industry will need to make to support this proposed program, and the resulting costs to consumers, have been, and will continue to be, a major focus of the rulemaking process. We estimated that the cost to produce and distribute the low sulfur diesel fuel would typically be about four and a half cents per gallon. We estimate that this cost would be offset by a penny or so per gallon savings because the cleaner fuel makes a diesel engine run better, reducing oil change intervals and the like. This maintenance benefit would occur not just for the new model trucks and buses equipped with the new technology emissions controls, but for the existing fleet as well.

We designed this proposed program to include significant lead time for the introduction of new cleaner fuel into the marketplace. The proposal also discusses various flexible phase-in approaches for the diesel fuel industry to facilitate the complete transition to new clean diesel fuel and to reduce costs further. We explored a number of concepts aimed at providing voluntary compliance flexibility for refiners while still meeting our primary goal of widespread availability of low-sulfur diesel fuel when needed by the new technology trucks. These concepts recognize the fact that many older trucks that do not need the lower sulfur fuel will be on the road for several years into the proposed program. One such concept would allow each refiner to produce some highway diesel fuel at the current 500 parts per million sulfur limit, with provisions to bank and trade these allowances for greater flexibility.

The ability of small refiners and farmers' cooperative refiners to comply with the proposed program has been of special concern through the process to develop this proposal, and

several added flexibility concepts that were developed by the SBREFA Small Business Advocacy Review Panel are discussed in the proposal, with the goal of designing a workable program for them in the final regulation.

## **PUBLIC HEARINGS**

To gather reaction to our proposal, we are holding five public hearings over the next two weeks: In New York, Chicago, Atlanta, Los Angeles, and Denver. We expect that all of the hearings will be well-attended and many people and groups representing a variety of viewpoints have already told us that they plan to testify. We will be accepting written comments through August 14<sup>th</sup>. We are also continuing to meet with stakeholders on an individual basis to better understand their concerns and suggested solutions. Our plan is to complete this process and issue final requirements by the end of this year.

## **CONCLUSION**

In conclusion, I would like to say that this historic proposal would be a major milestone in our nation's drive toward clean air, comparable to the advent of catalytic converters on cars in the 70s. Diesel trucks would be 95 percent cleaner than today's cleanest models, cleaner even than today's natural gas vehicles. This proposal has received support across the country from people in various sectors affected by it. This support has given us confidence that we are on the right track in developing a nationwide program that is sensible, balanced, and cost-effective.

Thank you again for giving me this opportunity to discuss our program with you. I would be happy to answer any questions that you may have.