

**Testimony of Michael P. Walsh**  
**On Behalf of the American Lung Association**  
**Regarding the US EPA Proposal Concerning Emissions**  
**From Heavy Duty Vehicles and Engines**  
**and Low Sulfur Diesel Fuel**

June 27, 2000

Good Morning! My name is Michael Walsh. I am an independent consultant who focuses on motor vehicle pollution control and energy issues. I am speaking today on behalf of the American Lung Association.

The American Lung Association strongly supports EPA's effort to reduce emissions from large diesel and gasoline trucks and buses. We also strongly support reducing sulfur in diesel fuel both because we believe it is necessary to enable the clean up of new vehicles and engines but also because it will facilitate state and local efforts to retrofit existing diesel vehicles, many of which will remain on the nation's highways for many years after this Rule is promulgated. The emissions reductions from these initiatives are long overdue and are necessary if we are ever to achieve healthy air across the country.

Air quality in many areas of the United States exceeds healthy levels far too often and some of these areas are expected to still violate federal health-based ambient air quality standards for ground level ozone and particulate matter during the period after this rule takes effect. In addition, some studies have found public health and welfare effects from ozone and fine PM at concentrations that do not constitute a violation of their respective NAAQS. Other studies have established that exposure to diesel exhaust increases risks from a variety of cancer and noncancer health effects. Of particular concern is human epidemiological evidence linking diesel exhaust to an increased risk of lung cancer. Emissions from heavy-duty vehicles also contribute to a variety of environmental and public welfare effects such as impairment of visibility/ regional haze, acid deposition, eutrophication/ nitrification, and POM deposition.

### **The Ozone Problem**

Over the last decade, emissions have declined and national air quality has improved for all six criteria pollutants, including ozone. However, when ozone trends are normalized for annual weather variations between 1989 and 1998, they reveal a downward trend in the early 1990's followed by a leveling off, or an upturn in ozone levels, over the past several years in many urban areas.<sup>1</sup> Thirty-six metropolitan areas with a total population of 111 million people have recently violated or are currently violating the 1-hour ozone NAAQS. Another six areas with 11 million people have recently experienced ozone concentrations within 10 percent of exceeding

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<sup>1</sup> Trends in Daily Maximum 1-hour Ozone in Selected Urban Areas, 1989-1998.

the NAAQS between 1996 and 1998. Further, in 1998, almost 62 million people lived in areas with 2 or more days with concentrations of 0.09 ppm or higher, excluding areas currently violating the 1-hour NAAQS.

Short-term exposures (1-3 hours) to high ambient ozone concentrations have been linked to increased hospital admissions and emergency room visits for respiratory problems. For example, studies conducted in the northeastern U.S. and Canada show that ozone air pollution is associated with 10-20 percent of all of the summertime respiratory-related hospital admissions. Repeated exposure to ozone can make people more susceptible to respiratory infection and lung inflammation and can aggravate preexisting respiratory diseases, such as asthma. Prolonged, repeated exposure to ozone can cause inflammation of the lung, impairment of lung defense mechanisms, and possibly irreversible changes in lung structure, which over time could lead to premature aging of the lungs and/or chronic respiratory illnesses such as emphysema, chronic bronchitis and chronic asthma.

Children are most at risk from ozone exposure because they typically are active outside, playing and exercising, during the summer when ozone levels are highest. For example, summer camp studies in the eastern U.S. and southeastern Canada have reported significant reductions in lung function in children who are active outdoors. Further, children are more at risk than adults from ozone exposure because their respiratory systems are still developing. Adults who are outdoors and moderately active during the summer months, such as construction workers and other outdoor workers, also are among those most at risk. These individuals, as well as people with respiratory illnesses such as asthma, especially asthmatic children, can experience reduced lung function and increased respiratory symptoms, such as chest pain and cough, when exposed to relatively low ozone levels during prolonged periods of moderate exertion.

## **The PM Problem**

The most recent PM<sub>10</sub> monitoring data indicates that 12 designated PM<sub>10</sub> nonattainment areas, with a population of 19 million in 1990, violated the PM<sub>10</sub> NAAQS in the period 1996-1998. In addition to these designated nonattainment areas, there are 15 unclassified counties, with a 1996 population of 4.2 million, which have reported PM<sub>10</sub> NAAQS violations. The Agency's recent PM modeling analysis performed for the Tier 2 rulemaking predicts that a significant number of areas across the nation are at risk of failing to meet the PM<sub>10</sub> NAAQS even with Tier 2 and other controls currently in place.

Adverse health effects associated with particulate include premature death; aggravation of respiratory and cardiovascular disease, as indicated by increased hospital admissions and emergency room visits, school absences, work loss days, and restricted activity days; changes in lung function and increased respiratory symptoms; changes to lung tissues and structure; and altered respiratory defense mechanisms. Most of these effects have been consistently associated with ambient PM concentrations, which have been used as a measure

of population exposure, in a large number of community epidemiological studies.

### **Diesel Particulate is Especially Hazardous**

In 1998, California concluded that particulate emissions from diesel-fueled vehicles and engines are toxic. EPA has concluded that diesel particulate is a probable human carcinogen.<sup>2</sup> WHO reached a similar conclusion over a decade ago and most recently, the National Toxicology Program's 9<sup>th</sup> Report on Carcinogens classified diesel exhaust particulates as "reasonably anticipated to be a human carcinogen." The most compelling evidence is the consistent association that has been observed between increased lung cancer and diesel exhaust exposure in occupationally exposed workers. Approximately 30 individual epidemiological studies show increased lung cancer risks of 20 to 89 percent within the study populations depending on the study. Analytical results of pooling the positive study results show that on average the lung cancer risks were increased by 33 to 47 percent.

### **The Importance Of Cleaning Up Heavy Duty Vehicles**

Without the anticipated reductions from these proposed heavy duty standards, there is a significant risk that an appreciable number of the current nonattainment areas would continue to violate the ozone and PM<sub>10</sub> standards over the longer term. Under the mandates and authorities in the Clean Air Act, federal, State, and local governments are working to bring ozone and particulate levels into compliance with the 1-hour ozone and PM<sub>10</sub> NAAQS through SIP attainment and maintenance plans, and to ensure that future air quality continues to achieve these health-based standards. Because heavy duty vehicles are such a large emissions source, they must play a critical role in achieving the necessary emissions reductions. The proposed new standards for heavy-duty vehicles would benefit public health and welfare through reductions in direct diesel particles and NO<sub>x</sub>, VOCs, and SO<sub>x</sub> which contribute to secondary formation of particulate matter and (in the case of the NO<sub>x</sub> and VOCs) to ozone.

Heavy-duty vehicle emissions of VOC, CO, NO<sub>x</sub>, SO<sub>x</sub>, and PM contribute a substantial percentage to ambient concentrations of ozone, PM, sulfur and nitrogen compounds, aldehydes, and substances known or considered likely to be carcinogens.

By 2007, EPA estimates that heavy-duty vehicles would 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 urban areas. Urban areas, which include many poorer neighborhoods, can be disproportionately impacted by HDV emissions because of heavy traffic in and out of densely populated areas. And as EPA freely admits, this analysis understates the heavy duty contribution to these problems because it underestimates emissions due to engine deterioration in-use. The current modeling only represents properly maintained engines and

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<sup>2</sup> EPA is revising this draft document in response to comments by the CASAC.

is not representative of in-use malmaintenance or tampering. For example, one recent study which was carried out for EPA <sup>3</sup> shows large deterioration rates for HDDEs. In spite of this, the current EPA analysis doesn't include deterioration factors for controlled engines.<sup>4</sup>

Finally, emissions from heavy duty vehicles and other vehicles can have a disproportionate effect on public health because vehicle emissions are emitted in close proximity to the breathing zones of people.

The proposed heavy-duty vehicle and engine emission standards, along with the diesel fuel sulfur standard which was proposed, would have a dramatic impact in reducing the large contribution of HDVs to air pollution. Emissions of NOx, PM, NMHC, carbon monoxide, sulfur dioxide, and air toxics would be substantially lower. For example, the EPA analysis projects a 2 million ton reduction in NOx emissions from HD vehicles in 2020, which would increase to 2.8 million tons in 2030 when the current HD vehicle fleet is completely replaced with newer HD vehicles that comply with these proposed emission standards. When coupled with the emission reductions projected to result from the Phase 1 (model year 2004) HDV standards, the emission reductions from heavy-duty vehicles are projected to be as large as the substantial reductions the Agency expects from light-duty vehicles as a result of its recently promulgated Tier 2 rulemaking.

### **The Potential Complication of Global Warming**

The science of ozone formation, transport, and accumulation is complex. Ground-level ozone is produced and destroyed in a cyclical set of chemical reactions involving NOx, VOC, heat, and sunlight.<sup>5</sup> As a result, differences in NOx and VOC emissions and weather patterns contribute to daily, seasonal, and yearly differences in ozone concentrations and differences from city to city. Many of the chemical reactions that are part of the ozone-forming cycle are sensitive to temperature and sunlight. When ambient temperatures and sunlight levels remain high for several days and the air is relatively stagnant, ozone and its precursors can build up and produce more ozone than typically would occur on a single high temperature day.

According to a recently released, Congressionally mandated study, warming of the global climate is likely to have substantial consequences around the United States in coming years

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<sup>3</sup>"Modeling Deterioration in Heavy-Duty Diesel Particulate Emissions," Engine, Fuel, and Emissions Engineering, Incorporated, prepared for the U.S. Environmental Protection Agency, September 30, 1998.

<sup>4</sup>EPA has indicated that it will correct this problem before issuing the final rule.

<sup>5</sup> Carbon monoxide also participates in the production of ozone, albeit at a much slower rate than most VOC and NOx compounds.

including much higher temperatures especially in the Northeast.<sup>6</sup>

Temperatures nationwide rose about one degree in the 20th century, and the report estimated that under a "business as usual" assumption, in which carbon dioxide levels continued to grow at the rate of recent years, the average temperature in the country would rise 5 to 10 degrees in the next century. The report forecasts some profound changes, with many regions of the country seeing conditions shift to those of their present-day neighbors to the south. One of the most likely of all consequences from continued warming would be a rise in the summer heat index, combining humidity and temperature, such that as New York City takes on Southern steaminess, Atlanta will see hot spells more typical of Houston. These higher temperatures could have a significant impact on ozone formation, making further reductions in NOx and VOCs even more critical.

I would like to conclude this testimony by emphasizing five key points:

### **1. The Control of Emissions Mandated By This Rule is Necessary If The Diesel Engine Is To Be Saved**

Here in Southern California we saw last week a significant move away from the use of diesel engines in response to the serious toxics risk which diesel engines cause. New York City buses moved in the same direction a short time earlier.

Increased repudiation of the diesel is not limited to this country. The Governor of Tokyo has initiated efforts to completely ban certain diesel vehicles from his city. Beijing China has just recently replaced 800 diesel buses with CNG buses. The Supreme Court of India has issued an order requiring all diesel buses in Delhi to be replaced by CNG buses. I could go on.

The point is that current diesel engines here in the US and around the world are increasingly considered hazardous and only substantial control along the lines of the EPA proposal will enable us to reap the full advantages of diesel technology, especially with regard to fuel economy without the many disadvantages which currently exist. Unless we have clean diesels, I expect we will have fewer diesels.

### **2. The US Has Become the Laggard with regard to Control of Emissions From Heavy Duty Trucks and Buses, Not The Leader We Have Traditionally Been**

The US has traditionally been the leader of the world in cleaning up motor vehicle emissions. EPA and California have pioneered catalyst technology, reformulated gasoline, onboard diagnostics and many other improvements that have subsequently spread around the world.

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<sup>6</sup>“Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change”, A Report of the National Assessment Synthesis Team, June 2000.

However, Europe is now well ahead of us with regard to control of emissions from heavy duty vehicles. The Euro 4 and Euro 5 standards which were adopted last year will result in the installation of advanced NOx and particulate exhaust control technology systems in the 2005-2008 time frame, if not earlier. Sweden has relied on diesel fuel for several years which has less than 10 ppm sulfur and Germany will have such fuel in 2003. I expect when the European Parliament has an opportunity to amend the fuel provisions later this year, 10 PPM maximum will be the norm for all of Europe as Germany has already requested.

As a result of the availability of these low sulfur fuels, Sweden has successfully mandated the retrofit of existing trucks and buses and off road vehicles with sophisticated particulate filter systems that dramatically lower emissions.

The mandatory introduction of fuel with sulfur levels of 10 PPM or less and advanced PM and NOx controls are necessary if we are to regain our preeminent role. EPA's proposed 15 PPM sulfur cap is expected to result in a less than 10 PPM sulfur average.

### **3. Unless Low Sulfur Fuels of 15 PPM Sulfur or Less Are Mandated Nationally By EPA, We Will See a Wave of "Boutique" Fuels in Various Jurisdictions Across The Country As State and Local Governments Attempt To Deal With The Existing Diesel Problem**

Using a methodology similar to that used in the South Coast MATES II Study, STAPPA/ALAPCO recently estimated that over 100,000 people are at cancer risk because of diesel vehicle emissions. Unless EPA mandates a national fuel sufficiently clean to enable these states and cities to tackle this existing problem, I am sure that many areas will mandate these fuels on their own, creating a helter skelter of fuels across the country which will be much more difficult for fuel distributors.

### **4. More Than Sufficient Lead Time Exists For Technology To Be Available To Achieve These Proposed Emissions Levels**

The Manufacturers of Emissions Controls Association (MECA) has stated that they "believe the emission standards proposed for highway diesel-powered heavy-duty engines standards can be achieved in a cost-effective manner within the lead-time provided, if very low sulfur diesel fuel is available." This organization and the companies it represents has a long track record of reliable experience with regard to the types of technologies which will need to be incorporated by engine manufacturers to comply with the proposed standards. EPA, Congress and the California Air Resources Board have successfully relied on their sound forecasts in the past and should continue to do so.

In addition, as noted earlier, some of the necessary technologies especially for PM control are already being retrofitted on vehicles here in the US and in Europe, where supplies of low sulfur diesel are available and Europe has mandated similar controls for all heavy duty vehicles in

the 2005-2008 time frame.

I particularly applaud several of the diesel engine manufacturers who have stepped up to the challenge that this proposed rule presents and have committed to, in the words of the Engine Manufacturers Association, “dramatically reduce the emissions of the most fuel efficient, reliable and durable source of motive power available today and the backbone of our nation’s transportation and delivery system.” International Truck and Engine Corporation is to be especially commended for committing to commercialize their “green diesel” technology next year that with clean fuel has already demonstrated the capabilities to reduce hydrocarbon and PM emissions to levels that are at or below EPA’s proposed standards. This is especially encouraging in light of the timidity of other companies such as Cummins which insist upon “certainty” before a final rule should be put in place.

#### **5. 15 PPM sulfur is the maximum that should be allowed as it is technologically feasible and necessary**

Low sulfur diesel fuel is already available in Europe and in some locations across the United States. The issue is not whether the fuel can be produced but whether it is worth the cost. The engine manufacturers are willing to require their products to use a slightly more expensive fuel because they know that this fuel is necessary for them to be able to provide their customers with the high performance, efficient and clean engines that they want. The trucking industry supports low sulfur fuel for both on and off road vehicles and engines because they know that the public is opposed to smoke belching trucks on our highways. Further, they know that their drivers are as much if not more at risk from dirty diesels than anyone else. And the public expressed its view in a nationwide public opinion survey conducted earlier this month in which 85 percent of survey respondents believe that up to 4 cents a gallon is a reasonable price to pay for cleaner diesel fuel that would significantly reduce pollution.

The oil industry argues that 50 ppm is sufficient and that the European experience demonstrates this. However, that is not the view from Europe. As stated by the German government in its recent petition to the European Commission in support of low sulfur fuel, “A sulphur content of 10 ppm compared to 50 ppm increases the performance and durability of oxidizing catalytic converters, DeNox catalytic converters and particulate filters and therefore decreases fuel consumption. There are also lower particulate emissions (due to lower sulphate emissions) with oxidizing catalytic converters. For certain continuously regenerating particulate filters, a sulphur content of 10 ppm is required for the simple reason that otherwise the sulphate particles alone (without any soot) would overstep the future [European] particulate value of 0.02 g/kWh.”

In conclusion, then, I would like to congratulate the EPA for a balanced but tough proposal which when enacted and implemented will enable us to take full advantage of the environmental and performance advantages of clean diesels.

