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Air and Radiation
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Office of Transportation and Air Quality

Regulatory Announcement

Public Health and Environmental Benefits of EPA's Proposed Program for Low-Emission Nonroad Diesel Engines and Fuel

The U.S. Environmental Protection Agency (EPA) has proposed emission standards for nonroad diesel engines and fuel. This fact sheet summarizes the estimated benefits of the proposal to public health and the environment.

Background

EPA has proposed a comprehensive national program to reduce emissions from future nonroad diesel engines and fuel. The proposed exhaust emission standards would apply to new diesel engines used in most kinds of construction, agricultural, industrial, and airport equipment. To meet the proposed emission standards, engine manufacturers will produce new engines with advanced systems for controlling emissions. These emission control devices would be damaged by sulfur, so the proposal also aims to dramatically reduce the level of sulfur in nonroad diesel fuel used by this equipment, and the fuel used by locomotive and marine engines.

Air Quality Impact of Nonroad Diesel Engines

EPA estimates that the nonroad engines covered by this proposal contribute over 44 percent of diesel particulate matter (PM) emissions nationally and over 12 percent of nitrogen oxides (NOx) emissions from mobile sources. In some urban areas the contribution is greater. Without this proposed control program, these percentages would continue to increase.

Air quality problems are widespread in the United States. Hundreds of millions of Americans currently live in counties with unhealthy air. This proposal would help reduce harmful pollution. For more information about air quality where you live, see the web page: http://www.epa.gov/air/data/geosel.html.

Human Health and Environmental Impacts of These Air Pollutants

The engines covered by the proposed standards contribute to formation of fine particles and ozone. In addition, these engines emit Mobile Source Air Toxics such as diesel exhaust, benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and other substances.

Particulate Matter

Particulate matter represents a broad class of chemically and physically diverse substances. "Fine particulate matter" includes liquid and solid particles with a diameter of 2.5 microns or less (also known as $PM_{2.5}$). Fine particles are produced any time fuels such as coal, oil, diesel fuel, gasoline, or wood are burned. Power plants, various industries, cars and trucks, buses, nonroad diesel and gasoline engines, wood stoves, forest fires, agricultural burning, and marine engines are all sources of fine particles. Fine particles are directly emitted or formed in the atmosphere from precursors such as NOx and Sulfur Oxides.

Particulate matter has been linked to a range of serious respiratory and cardiac health problems, including premature mortality, and hospital admissions or emergency room visits for lung and heart diseases. Particles can aggravate lung diseases such as asthma and bronchitis, causing increased medication use, doctors visits, and restriction in activity or missed days of work and school. Particles can aggravate heart diseases such as congestive heart failure and coronary artery disease. Particles have also been associated with cardiac arrhythmias (heartbeat irregularities) and heart attacks. There is emerging evidence suggesting increased blood markers of inflammation (indicators of cardiac risk) are associated with ambient PM. These effects have been associated with both short-term (usually over a 24-hour period, but possibly as short as 1-hour) and long-term exposures (years).

Groups of people considered to be the most sensitive to particles include people with heart or lung diseases; older adults – possibly because they are more likely to have undiagnosed heart or lung diseases; and children – whose bodies are still developing and who are more likely to be active outdoors and to have asthma.

Diesel Exhaust

In addition to its contribution to ambient PM inventories, diesel exhaust is of specific concern because it has been judged to pose a lung cancer hazard for humans as well as a hazard from noncancer respiratory effects. In EPA's final "Health Assessment Document for Diesel Engine Exhaust," which received extensive scientific peer review, EPA classified diesel exhaust as likely to be carcinogenic to humans by inhalation at environmental exposures. Several other agencies have made similar classifications, including the National Institute for Occupational Safety and Health, the International Agency for Research on Cancer, the World Health Organization, California EPA, and the U.S. Department of Health and Human Services. EPA also recently assessed air toxic emissions and their associated risk and concluded that diesel exhaust ranks with other substances that the national-scale assessment suggests pose the greatest relative risk.

Air Toxics

Emissions from the engines covered by this proposal also contain several Mobile Source Air Toxics, including benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and acrolein, which cause a variety of health-related problems. Users of these engines may experience high levels of personal exposure to these substances.

Ozone

Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of NOx and volatile organic compounds in the presence of heat and sunlight. Ozone forms readily in the lower atmosphere, usually during hot summer weather. Volatile organic compounds come from some natural sources (such as vegetation), but mostly come from mobile sources (such as nonroad engines, cars, and trucks), chemical plants, refineries, factories, consumer and commercial products, and other industrial sources. NOx emissions come largely from motor vehicles, nonroad equipment, power plants, and other sources of combustion.

Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or uncomfortable sensations in the chest. Ozone can reduce lung function and make it more difficult to breathe deeply; breathing may become more rapid and shallow than normal, thereby limiting a person's normal activity. Ozone can also aggravate asthma and other respiratory diseases, leading to more asthma attacks, use of additional medication, more severe symptoms that require a doctor's attention, more visits to the emergency room, and increased hospitalizations. In addition, ozone can inflame and damage the lining of the lungs, which may lead to permanent

changes in lung tissue, irreversible reductions in lung function if the inflammation occurs repeatedly over a long time period and a lower quality of life. People who are particularly susceptible to the effects of ozone include healthy children and adults who are active outdoors, people with respiratory disease, such as asthma, and people with unusual sensitivity to ozone.

Visibility

Visibility is important because it directly affects people's enjoyment of daily activities in all parts of the country. Visibility is highly valued in significant natural areas such as national parks and wilderness areas because of the special emphasis given to protecting these lands now and for future generations. Fine particles from sources such as power plants using fossil fuels, motor vehicles, and nonroad engines are the major cause of reduced visibility.

Other Environmental Effects

Emissions from nonroad diesel engines contribute to other effects including ecosystem damage, acid deposition, odor, production of organic matter in water bodies that leads to nuisance algal blooms, crop damage, soiling, and material damage.

Air Quality Benefits of This Proposal

When fully implemented, this proposal would reduce nonroad diesel $PM_{2.5}$ and NOx emissions by over 90 percent. It will reduce NOx emissions nationwide by over 825,000 tons annually and PM emissions by over 125,000 tons. It will also virtually eliminate SOx emissions from nonroad diesel engines, which amount to nearly 300,000 tons per year, and reduce air toxic emissions by about 30 percent.

These dramatic emission reductions are a critical part of the effort by federal, state, local, and tribal governments to reduce the health related impacts of air pollution. The reductions will help areas to reach attainment of the National Ambient Air Quality Standard (NAAQS) for PM and ozone. These reductions are also needed to help our national parks and wilderness areas, which have particular needs for reducing haze to protect scenic vistas.

These controls will help reduce ambient concentrations of fine PM, ozone, and air toxics. EPA modeling projections show that this proposal will substantially reduce exposures nationwide, including improvements that allow several areas to attain air quality standards. Specifically, EPA

projects that the number of people living in counties with $PM_{2.5}$ levels above the NAAQS in 2020 would be reduced from 66 million to 60 million. That represents a reduction of 9 percent in exposed population and 15 percent in the number of counties. In 2030, there would be a reduction from 85 million people to 71 million exposed to high PM levels, which represents an even greater improvement than projected for 2020 because of the increased turnover of nonroad equipment. This corresponds to a 16 percent reduction in exposed population and a 21 percent reduction in the number of counties. In addition, those areas that continue to have high PM levels would be closer to meeting air quality standards and areas that already meet air quality standards for PM would be better able to remain in attainment. The proposed program would also reduce ozone and toxics nationally.

Health Benefits of the New Standards

The PM air quality improvements expected from this proposal produce major benefits to human health and welfare. By the year 2030, this proposed rule would annually prevent all of the following:

- 9,600 premature deaths
- 16,000 nonfatal heart attacks
- 5,700 cases of chronic bronchitis
- 8,300 hospital admissions
- 14,000 acute bronchitis attacks in children
- 260,000 respiratory symptoms in children (related to PM)
- nearly 1 million lost work days among adults
- 6 million days where adults have to restrict their activities due to respiratory symptoms

In monetary terms, EPA estimates annual benefits in 2030 to be about $81 billion when the program is fully phased in. The proposed program will reduce personal exposure for people who operate or are otherwise close to these engines. There are additional health and welfare benefits, such as those related to reduced levels of ozone, carbon monoxide, and air toxics, that are not included in the above estimate.

Where Can I Get More Information?

For more information on the environmental and health impacts of these proposed emission standards, see the Draft Regulatory Impact Analysis (especially Chapter 2—Air Quality, Health, and Welfare Effects). You can access that document and others related to the rulemaking on EPA's Web site at:

www.epa.gov/nonroad

You can also contact us at:

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