

# Reducing Emissions from Construction Equipment

## What can Construction Fleet Operators Do?

Although new federal emissions standards and advanced pollution control technology for the diesel and gasoline vehicles of the future will dramatically reduce the health risks posed by exposure to diesel exhaust, diesel equipment is durable and lasts for many years. Fortunately, there are three steps that construction fleet managers can take to help make the diesel equipment that is currently in use cleaner.

### Reduce Engine Idling

Idling engines waste fuel and contribute to noise and air pollution. A large diesel engine can waste up to one gallon of fuel for each hour that it idles. In planning day-to-day activities on a construction site, fleet managers can save on fuel costs by taking steps to maximize equipment use and minimize idling time. Equipment operators can help improve the air quality in their work environment by turning off engines when they are not in use.

### Use Cleaner Fuels

Burning cleaner diesel fuel, or alternative fuels such as biodiesel, helps reduce air pollution. Some examples of cleaner fuels available for construction fleets in the Boston metropolitan area include:

#### Low Sulfur Diesel

► Low Sulfur Diesel fuel (LSD), or highway diesel fuel, is readily available and currently used by diesel-powered highway vehicles. LSD



Advanced pollution control devices can dramatically reduce air pollution.

has a sulfur content of 300 to 500 parts per million (ppm) and reduces particulate matter (PM) by 10 to 20 percent compared to non-road diesel fuel which has a sulfur content of 3,000 to 5,000 ppm. The cost of highway diesel fuel is approximately 1 to 3 cents more per gallon than non-road diesel fuel.

#### Ultra Low Sulfur Diesel Fuel

► Ultra Low Sulfur Diesel Fuel (ULSD) will be available nationwide for highway vehicles in October 2006. It is currently available in certain parts of the country, including the Boston area. ULSD reduces fine particle emissions between 5 and 9 percent. The combination of ULSD with advanced pollution control technology, such as a diesel particulate matter filter (DPF), reduces fine particle emissions between 60 and 90 percent. ULSD currently costs between 5 and 20 cents more per gallon than LSD. In 2006, when ULSD is available nationwide, the cost differential will disappear.

#### Biodiesel

► Biodiesel is a domestically produced, renewable fuel that can be manufactured

from new and used vegetable oils and animal fats. Biodiesel is safe, biodegradable, and reduces air pollutants such as PM, carbon monoxide, hydrocarbons, and air toxics. However, emissions of nitrogen oxides (NOx) increase with the concentration of biodiesel in the fuel. Some biodiesel produces more NOx than others, and some additives have shown promise in modifying the increases.

► Blends of biodiesel with petroleum diesel can be used in unmodified diesel engines. Biodiesel can be used in its pure form (B100), but may require certain engine modifications to avoid maintenance and performance problems. Pure blends of biodiesel may not be suitable for cold climates. A blend of 20% biodiesel

In New England, the air pollution that comes from non-road diesel engines accounts for 20 percent of the emissions of nitrogen oxides (NOx) and 40 percent of particulate matter (PM) emissions from mobile sources.



Diesel oxidation catalyst

(called B20) and 80% regular diesel reduces emissions of PM by about 10%, but increases NOx emissions by about 2%.

► B20 costs about 15 to 30 cents more per gallon than LSD. B100 reduces emissions of PM by roughly 40 percent and costs about 75 cents to \$1.50 more than LSD.

#### Emulsified Diesel

► Emulsified diesel is a blended mixture of diesel fuel, water, and other additives that

reduces both fine particle and NOx emissions. Emulsified diesel can be used in any diesel engine, but the addition of water reduces the energy content of the fuel, so some reduction in power and fuel economy can be expected. Emulsified diesel can reduce emissions of smog-causing NOx between 10 and 20 percent and fine particles between 50 and 60 percent. Emulsified diesel costs approximately 20 cents more per gallon than LSD.

## Install Pollution Control Equipment

Adding advanced pollution control equipment such as a diesel oxidation catalyst or a particulate matter filter will also reduce emissions from construction vehicles. These devices are installed in the exhaust system of an existing diesel engine.

#### Diesel Oxidation Catalysts

► Diesel oxidation catalysts are similar to the catalytic converter in your car and can reduce emissions of PM between 20 and 50 percent (in certain types of vehicles), hydrocarbons (HC) by 50 percent and carbon monoxide (CO) by approximately 40 percent. Oxidation catalysts cost between \$1,000 and \$3,000 and can be installed on any new or used engine and run on any type of diesel fuel.

#### Diesel Particulate Matter Filters

► Diesel particulate matter filters are ceramic devices that collect PM in the exhaust stream. The high temperature of the exhaust heats the ceramic structure and allows the particles inside to break down (or oxidize) into less harmful components. They cost between \$5,000 and \$10,000, and can be installed on certain vehicles with engines built after 1995. To ensure that the filter will work properly, it is necessary to use ULSD fuel with a sulfur content of less than 15 parts per million.

## EPA's Voluntary Diesel Retrofit Program

EPA's Voluntary Diesel Retrofit Program is designed to address pollution from diesel construction equipment and heavy-duty vehicles currently in use. Numerous agencies in the Boston area are taking steps to reduce diesel exhaust from construction equipment.

Massachusetts Executive Office of Environmental Affairs (EOEA) and Highway Department (MHD):

With \$120,000 in grant funds from EPA's 2005 National Voluntary Diesel Retrofit Program, the MA EOEA and MHD will develop and implement a subgrant program to provide funding assistance to add advanced pollution control technology to paving equipment such as pavers, millers and rollers. This program will make it easier for businesses to comply with the MHD retrofit requirements.

#### Massport:

With grant funds from EPA's 2004 National Voluntary Diesel Retrofit Program, Massport is equipping 36 land-based vehicles used at Conley Terminal with diesel oxidation catalysts.

Other agencies in Massachusetts taking steps to reduce diesel exhaust from construction equipment include:

- City of Cambridge
- Massachusetts Bay Transportation Authority (MBTA)
- Massachusetts Division of Capital Asset Management (DCAM)
- Massachusetts Institute of Technology (MIT)

#### State and Local Programs:

Through construction contracts, many public agencies in the Northeast are requiring construction vehicles to be retrofitted. Examples of organizations that have included retrofit requirements in construction contracts include:

- Connecticut Department of Transportation
- Massachusetts Highway Department
- Massachusetts Bay Transportation Authority
- The Massachusetts Turnpike Authority

**For More Information:**  
[www.epa.gov/ne/eco/gb3](http://www.epa.gov/ne/eco/gb3)