

In-Use Diesel Retrofit Plan

A Program to Reduce Particulate Matter Emissions from In-Use Diesel Engines in California

1. In-Use Diesel Retrofit Plan Mission Statement:

“To protect the health of Californians by retrofitting existing diesel engines in California to reduce diesel particulate emissions to near zero, in the shortest time possible.”

2. Background:

Heavy-duty diesel engines are a significant source of diesel particulate matter (PM) in California. These tiny particles are responsible for about 70 percent of the total toxic risk to Californians from air pollution. Diesel PM is linked to an increased incidence of lung cancer and non-cancer symptoms of respiratory illnesses such as asthma. The Air Resources Board (ARB) identified diesel PM as a toxic air contaminant in August 1998. This action led to development of a plan to reduce the risk from diesel PM emissions, which was approved by the ARB in September 2000.

Identified in the Plan, called the “Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles,” are measures to dramatically reduce emission levels of diesel PM. The measures fall into three broad categories: more stringent engine exhaust emission standards for new on- and off-road vehicles and equipment, continuing the trend towards near-zero PM emissions begun in the late 1980s; retrofitting existing on- and off-road engines with devices that will reduce diesel PM by 85 percent or more; and improving and implementing programs that will maintain mandated exhaust emission levels throughout the life of the vehicle or equipment.

The Plan emphasizes retrofit and in-use controls for existing diesel engines because these engines typically have useful lifetimes in excess of 400,000 miles. An engine is rebuilt, rather than replaced, when it reaches the end of its useful lifetime. Current regulations, except those applying to urban transit buses, allow the engine to be rebuilt to standards in effect at the time of manufacture rather than at the time of rebuild. To address this problem, the report recommends a large-scale program to retrofit diesel particulate filters, and other feasible technologies, on existing diesel engines.

The ARB took the first step towards implementing a retrofit program in its February 2000 regulation to reduce urban transit bus emissions. The rule includes more stringent emission standards for new urban bus engines and a fleet rule that requires retrofits for PM control. In addition, for fiscal year 2000/2001, the Governor budgeted \$50 million for a program aimed at replacing old school buses and retrofitting existing buses with diesel particulate filters.

Thousands of diesel particulate filters and other control devices have been successfully installed and operated on diesel engines worldwide. Programs designed to demonstrate the feasibility of diesel retrofit technologies on an expanded array of applications are currently underway in California and other U.S. states, and worldwide. For specific applications for which there is little or no practical experience additional demonstrations will be needed.

3. In-Use Diesel Retrofit Plan

The goal of retrofitting or otherwise reducing diesel PM emissions from nearly every existing diesel engine in California is a lofty one. The range of engine uses is broad, from trucks and buses to construction machines and generators. Similarly, there are hundreds of different engine models in the field. The emissions of some engines may not be controllable by California because of federal preemption and interstate commerce law, notably new locomotives, farm and construction equipment with engines under 175 hp (130 kW), and line-haul trucks registered outside of California. Coordination with federal agencies will be necessary.

There are three basic elements to this plan: 1) Identification of engines and vehicles that are capable of being retrofitted; 2) verification and demonstration of the capabilities of retrofit devices; and 3) implementation of retrofits on specific engines.

- **Identification of key engine models and applications.** Staff will gather information on the various diesel engine models used in California, along with vehicle and equipment applications. A matrix of existing engines and applications will include the number of engines for a given application, engine emission levels, horsepower ratings, mileage accumulation data, and ownership, including public versus private, and fleet size per owner. Surveys are underway for transit buses, school buses, and refuse haulers.
- **Verification and demonstration of capabilities of retrofit devices.** This element can be further divided in demonstration programs, the purpose of which is the gain experience with PM retrofits for specific engines and applications; and verification that specific retrofit devices will achieve the specified reduction (85 percent or greater) in diesel PM emissions. Data gathered will be analyzed to determine which engines and applications are capable of being retrofitted.
- **Implementation of retrofit on specific engines.** Based on the information, ARB will initiate programs to retrofit on- and

off-road diesel engines. These programs may be based on regulatory requirements, incentives, or voluntary participation. Public transit agencies are already required to implement a phased retrofit if all their diesel buses. As previously mentioned, \$50 million has been allocated to help clean up school buses, a portion of which will be available to defray the cost of PM retrofits of existing buses.

4. International Retrofit Advisory Committee

To help assess technical issues and identify opportunities to implement a successful California diesel retrofit program, the ARB has formed an International Retrofit Advisory Committee. The members of the committee have expertise in diesel engines, particulate emission controls, and diesel fleet operations. Members will include representatives from engine manufacturers, control device manufacturers, fleet operators, diesel fuel suppliers, construction and agriculture, academia, environmental organizations, and governments with experience managing or evaluating diesel particulate filter demonstrations and applications.

5. Outreach:

ARB and its International Retrofit Advisory Committee will facilitate the exchange of information, provide for input from the public, and offer the opportunity for recognition of the efforts made by participants who equip their diesel vehicles with ARB-verified PM retrofit devices.