

The standards for diesel engines below 50 hp being proposed in this action are likely to require PM filters or diesel oxidation catalysts on many or all engines, and transferring this technology to the marine diesel engines of any size raises unique issues. For example, many marine diesel engines have water-jacketed exhaust which may result in different exhaust temperatures and which could affect aftertreatment efficiency. The modified marine engine designs would also have to meet Coast Guard requirements. These and other conditions may require separate design efforts for marine diesel engines. Therefore, we believe it is more appropriate to consider more stringent standards for marine diesel engines below 50 hp in a future action. It should be noted, however, that the existing Tier 2 standards will continue to apply to marine diesel engines under 50 hp until that future action is completed.

2. Crankcase Emissions Control

Crankcase emissions are the pollutants that are emitted in the gases that are vented from an engine's crankcase. These gases are also referred to as "blowby gases" because they result from engine exhaust from the combustion chamber "blowing by" the piston rings into the crankcase. These gases are often vented to prevent high pressures from occurring in the crankcase. Our existing emission standards require control of crankcase emissions from all nonroad diesel engines except turbocharged engines. The most common way to eliminate crankcase emissions has been to vent the blowby gases into the engine air intake system, so that the gases can be recombusted. Following the precedent we set for heavy-duty highway diesel engines in an earlier rulemaking, we made the exception for turbocharged nonroad diesel engines because of concerns about fouling that could occur by routing the diesel particulates (including engine oil) into the turbocharger and aftercooler. Our concerns are now alleviated by newly developed closed crankcase filtration systems, specifically designed for turbocharged diesel engines. These new systems are already required in parts of Europe for new highway diesel engines under the EURO III emission standards, and are expected to be used in meeting new U.S. EPA crankcase emission control standards for heavy-duty highway diesel engines beginning in 2007 (*see* section III.C.1.c of the preamble to the 2007 heavy-duty highway final rule).

We are therefore proposing to eliminate the exception for

turbocharged nonroad diesel engines starting in the same model year that Tier 4 exhaust emission standards first apply in each power category. This is 2008 for engines below 75 hp, except for 50–75 hp engines for which a manufacturer opts to skip the 2008 PM standard. The crankcase requirement applies to "phase-in" engines above 750 hp under the 50% phase-in requirement for 2011–2013, but not to the "phase-out" engines in that power category during those years. This is an environmentally significant proposal since many nonroad machine models use turbocharged engines, and a single engine can emit over 100 pounds of NO_x, NMHC, and PM from the crankcase over the lifetime of the engine. We also note that the cost of control is small (*see* section V).

Our existing regulatory requirement for controlling crankcase emissions from naturally-aspirated nonroad engines allows manufacturers to route the crankcase gases into the exhaust stream instead of the engine air intake system, provided they keep the combined total of the crankcase emissions and the exhaust emissions below the applicable exhaust emission standards. We are proposing to extend this allowance to the turbocharged engines as well. We are also proposing to give manufacturers the option to measure crankcase emissions instead of completely eliminating them, and adding the measured emissions to exhaust emissions in assessing compliance with exhaust emissions standards. This allowance was adopted for highway HDDEs in 2001 (*see* section VI.A.3 of the preamble to the 2007 heavy-duty highway final rule). As in the highway program, manufacturers choosing to use this allowance rather than to seal the crankcase would need to modify their exhaust deterioration factors or to develop separate deterioration factors to account for increases in crankcase emissions as the engine ages. Manufacturers would also be responsible for ensuring that crankcase emissions would be readily measurable in use.

C. What Test Procedure Changes Are Being Proposed?

We are proposing a number of changes to the certification test procedures by which compliance with emission standards is determined. Two of these are particularly significant: The addition of a supplemental transient emissions test and the addition of a cold start testing component to the proposed transient emissions test. These are discussed briefly in this section, and in more detail in section VII.F. Other

proposed changes are also discussed in section VII.F and deal with:

- Adoption of an improved smoke testing procedure, with associated standards levels and exemptions.
- Addition of a steady-state test cycle for transportation refrigeration units.
- Test procedure changes intended to improve testing precision, especially with regards to sampling methods.
- A clarification to existing EPA defeat device regulations.

1. Supplemental Transient Test

In the 1998 final rule that set new emission standards for nonroad diesel engines, we expressed a concern that the steady-state test cycles used to demonstrate compliance with emission standards did not adequately reflect transient operation, and, because most nonroad engines are used in applications that are largely transient in nature, would therefore not yield adequate control in use (63 FR 56984, October 23, 1998). Although we were not prepared to adopt a transient test at that time, we announced our intention in that final rule to move forward with the development of such a test. This development has progressed steadily since that time, and has resulted in the creation of a Nonroad Transient Composite (NRTC) test cycle, which we are now proposing to adopt in our nonroad diesel program, to supplement the existing steady-state tests. We expect that this proposed requirement will significantly reduce real world emissions from nonroad diesel equipment. Instead of sampling engine operation at the few isolated operating points of steady-state emission tests, proper transient testing can capture emissions from the broad range of engine speed and load combinations that the engine may attain in use, as well as emissions resulting from the change in speed or load itself, such as those induced by turbocharger lag.

The proposed NRTC cycle will capture transient emissions over much of the typical nonroad engine operating range, and thus help ensure effective control of all regulated pollutants. In keeping with our goal to maximize the harmonization of emissions control programs as much as possible, we have developed this cycle in collaboration with nonroad engine manufacturers and regulatory bodies in the United States, Europe, and Japan over the last several years.¹²³ Further, the NRTC cycle has been introduced as a work item for

¹²³ Letter from Jed Mandel of the Engine Manufacturers Association to Chet France of U.S. EPA, Office of Transportation and Air Quality, Docket A–2001–28.