

possible adoption as a potential global technical regulation under the 1998 Agreement for Working Party 29 at the United Nations.¹²⁴

The Agency is proposing that emission standards be met on both the current steady-state duty cycles and the new transient duty cycles. The transient testing would begin in the model year that the trap-based Tier 4 PM standards and/or adsorber-based Tier 4 NO_x standards first apply. This would be 2011 for engines at or above 175 hp, 2012 for 75–175 hp engines (2012 for 50–75 hp engines made by a manufacturer choosing the optional approach described in footnote b of Figure III.B–1), and 2013 for engines under 75 hp. *See also* Table VII.F.–1. In addition, any engines for which a manufacturer claims credit under the incentive program for early-introduction engines (*see* section VII.E) would have to be certified to that program's standards under the NRTC cycle and, in turn, the 2011 or later model year engines that use these engine count-based credits would not need to demonstrate compliance under the NRTC cycle.

Although we intend that transient emissions control be an integral part of Tier 4 design considerations, we do not believe it appropriate to mandate compliance with the transient test for the engines under 75 hp subject to proposed PM standards in 2008. We recognize that transient emissions testing, though routine in highway engine programs, involves a fair amount of new laboratory equipment and expertise in the nonroad engine certification process. As with the transfer of advanced emission control technology itself, we believe that the transient test requirement should be implemented first for larger engines more likely to be made by engine manufacturers who also have highway engine markets. We do not believe that the smaller engines should be the lead power categories in implementing the new transient test, especially because many manufacturers of these engines do not make highway engines and are not as experienced or well-equipped as their large-engine counterparts for conducting transient cycle testing.

Engines below 25 hp involve an additional consideration for timing of the transient test requirement because we are not proposing PM-filter based standards for them. We propose that testing on the NRTC cycle not be

required for these engines until the 2013 model year, the last year in which engines in higher power categories are required to use this test. We are concerned that manufacturers not view this proposed deferral of the transient test requirement as a structured second level of required control for these engines. To address this concern and because we wish to encourage the demonstration of transient emission control as early as possible, we are proposing to allow manufacturers to optionally certify engines below 25 hp under the NRTC cycle beginning in the 2008 model year, and to extend this option to 25–75 hp engines subject to engines meeting the transitional PM standard in 2008. (*See also* the discussion in section VII.F.1 on this issue.) We request comment on this proposed approach and on whether it would be better to deal with this concern by requiring compliance under the transient test when the Tier 4 standards begin in 2008.

In applying the NRTC test requirement coincident with the start of PM filter-based standards, we do not mean to imply that control of PM from filter-equipped engines is the only or even the primary concern being addressed by transient testing. In fact, we believe that advanced NO_x emission controls may be more sensitive to transient operation than PM filters. It is, however, our intent that the control of emissions during transient operation be an integral part of Tier 4 engine design considerations, and we therefore have proposed that transient testing be applied with the PM filter-based Tier 4 PM standards, because these standards precede or accompany the earliest Tier 4 NO_x or NMHC standards in every power category. Even so, we request comment on whether the “phase-out” engines above 75 hp (those engines for which compliance with the Tier 4 NO_x standard is not required during the phase-in period) should be exempted from the requirement to meet the applicable NMHC+NO_x standard using the transient test. Although our interest in ensuring transient emissions control as quickly as possible in the Tier 4 program, and in avoiding test program complexity, would argue against this approach, we are also interested in not diverting engine designers from the challenging task of redesigning engines to meet the proposed 0.30 g/bhp-hr Tier 4 NO_x standard before and during the phase-in years by having to deal with transient control under an NMHC+NO_x standard that is being phased out.

We are in fact not proposing to apply the transient test to phase-out engines above 750 hp that are carried over from

pre-2011 Tier 2 engine designs. Unlike phase-out engines at or below 750 hp, these engines are not subject to a Tier 4 PM standard in 2011. They would thus be Tier 2 engine designs and we do not believe that subjecting them to transient testing would be appropriate. On the other hand, engines in any power category certified to an average NO_x standard under the “split family” provision described in section VII.A would all be subject to the transient test requirement, as they would clearly have to be substantially redesigned to achieve Tier 4 compliance, regardless of whether or not they use high-efficiency exhaust emission controls.

The Agency is proposing that engine manufacturers may certify constant-speed engines using EPA's Constant Speed Variable Load (CSVL) transient duty cycle¹²⁵ as an alternative to testing these engines under the NRTC provisions. The CSVL transient cycle more closely matches the speed and load operating characteristics of many constant-speed nonroad diesel applications than EPA's proposed NRTC cycle.¹²⁶ However, the manufacturer would be obligated to ensure that such engines would be used only in constant-speed applications. A more detailed discussion of the proposed NRTC and CSVL supplemental transient test cycles and associated provisions is contained in section VII.F of this preamble and in chapter 4 of the Draft RIA.

2. Cold Start Testing

In the field, the typical nonroad diesel machine will be started and will warm to a point of heat-stable operation at least once a workday. Such “cold start” conditions may also occur at other times over the course of the workday, after a lunch break for example. During these periods of cold start operation, the engine may be emitting at a higher rate than when the engine is running efficiently at its stabilized operating temperature. This may be especially the case for emission control designs employing catalytic devices in the exhaust system, which require heating to a “light-off” temperature to begin working. EPA's highway engine and vehicle programs, which have resulted in increasingly widespread use of such catalytic devices, have recognized and dealt with this concern for several years,

¹²⁵ Memoranda from Kent Helmer to Cleophas Jackson, “Speed and Load Operating Schedule for the Constant Speed Variable Load (CSVL) transient test cycle” and “CSVL Cycle Construction”; and Southwest Research Institute—Final Report, all in Docket A–2001–28.

¹²⁶ Memorandum from Kent Helmer to Cleophas Jackson, “Brake-specific Emissions Impact of Nonroad Diesel Engine Testing Over the NRTC, AWQ, and AW1 duty cycles”, Docket A–2001–28.

¹²⁴ Informal Document No. 2, ISO—45th GRPE, “Proposal for a Charter for the Working Group on a New Test Protocol for Exhaust Emissions from Nonroad Mobile Machinery,” 13–17 January 2003, Docket A–2001–28.