

relatively small, less than one percent or about \$3 billion more than the proposed program.²⁹⁵

Even though 15 ppm fuel would be available beginning June 1, 2008 under this one-step approach, we do not believe it would be feasible to propose an aggressive turnover of new engines to trap-equipped versions in 2009. Nor would it be possible to introduce NO_x controls any earlier than we are already proposing, model year 2011. The proposed standards need to be coordinated with Tier 3 standards, and with the heavy duty highway diesel standards. The coordination of Tier 4 standards with Tier 3 standards and with the development of emissions control technology for highway diesel engines is of critical importance to successful implementation of the Tier 4 standards. Even those manufacturers who do not make highway engines are expected to gain substantially from the highway PM and NO_x control development work, provided they can plan for standards set at a similar level of stringency and timed in a way to allow for the orderly migration of highway engine technology to nonroad applications.

Thus, although the application of high-efficiency exhaust PM emission controls to nonroad diesels would be enabled with the introduction of 15 ppm sulfur nonroad fuel in 2008 under a one-step program, we believe that to require the application of PM controls across the wide spectrum of nonroad engines shortly thereafter would raise serious feasibility concerns that could only be resolved, if at all, through a very large additional R&D effort undertaken roughly in parallel with the similarly large highway R&D effort, a duplication of effort we wish to avoid for reasons discussed in Section III. Nonroad engine designers would need to accomplish much of this development well before the diesel experience begins to accumulate in earnest in 2007, in order to be ready for a 2009 first introduction date. Waiting until 2007 before initiating 2009 model year design work would risk the possibility of product failures, limited product availability and

major market disruptions. At the same time, for those engine manufacturers who participate in both the highway and nonroad diesel engine markets, attempting to have concurrent engine product developments for highway and nonroad, could result in the possibility of product failures, limited product availability and major disruptions for the highway market as well. Thus, in balancing their costs and burden, many manufacturers may be forced to choose which products would be available for 2009 and which products would be delayed for release. Manufacturers would also incur large additional costs to redesign hundreds of engine models and thousand of machine types to meet Tier 4 standards only one to three years after Tier 3 standards take effect in 2006–2008. These cost impacts are reflected in Table VI–1 and their derivation is explained in chapter 12 of the draft RIA. This extra expenditure could only be modestly mitigated by phasing in the standards, since a crash R&D effort with limited benefit from highway experience would still be necessary.

Moreover, with respect to NO_x, it would be impractical or simply infeasible to pull the standards ahead on the same schedule. This is because EPA's highway diesel program allows manufacturers to phase in NO_x technology over 2007–2010. As a result, we do not expect that the high-efficiency NO_x control technology could reasonably be applied to nonroad engines any earlier under a one-step program than under a two-step program (*i.e.*, beginning in 2011).

In summary, this option would lead us to apply PM and NO_x standards in two different model years, or else forgo any opportunity to apply PM traps in 2009. Redesigning engines and emission controls for early PM control and then again a couple of years later for NO_x control, on top of shortened Tier 3 stability periods, would likely add substantial costs to the program. As manufacturers attempt to avoid these costs and optimize their development they may simply have to restrict product offerings for some period, leading to price spikes and shortages due to lack of product availability. Having the NO_x and PM standards phase in simultaneously under our proposed approach avoids cost and design stability issues for both engine and equipment manufacturers. In addition, the longer leadtime for the engine standards under our proposed program will allow greater economic efficiencies for engine manufacturers as they transfer highway emission reduction technology to nonroad engines.

3. Fuel Impacts

In addition to the challenges associated with pulling ahead the PM standards described above, there are also some concerns regarding the practicality of an early 15 ppm nonroad diesel sulfur standard. A one-step approach may result in several economic inefficiencies that would increase the cost of the program. For example, refiners will have little opportunity to take advantage of the newer desulfurization technologies currently being developed. As described in sections IV and V, refiners will only begin to be able to take advantage of these new technologies in 2008. By 2010, the ability to incorporate them into their refinery modifications is expected to double. If refiners have to take steps to reduce the sulfur content of nonroad diesel fuel earlier, they will likely have to use more expensive current technology. The cost impacts of this decision will persist, since the choice of technology is a long term decision. If a refiner is forced by the effective date of the standards to employ a more expensive technology, that choice will affect that refiner's output indefinitely, since the cost of upgrading to the new technologies will be prohibitive. As presented in section 5.2 of the Draft RIA, we estimate that the costs of achieving a 15 ppm standard in 2008 is approximately 0.4 c/gal greater than for the proposal. While difficult to quantify there are also considerable advantages to allowing refiners some operating time in producing 15 ppm diesel fuel for the highway program prior to requiring them to solidify their designs for producing nonroad diesel fuel to 15 ppm. The primary advantage is that the design of desulfurization equipment used to produce 15 ppm nonroad diesel fuel can reflect the operating experience of the equipment used to produce 15 ppm highway diesel fuel starting in 2006. This extra time would also provide current refiners of high sulfur diesel fuel with highly confident estimates of the cost of producing 15 ppm diesel fuel, reducing uncertainty and increasing their likelihood of investing to produce this fuel. With a start date of June 1, 2008 refiners would have to solidify their designs and start construction prior to getting any data on the performance of their highway technology. This would increase the cost of producing 15 ppm nonroad diesel fuel for the life of the new desulfurization equipment, as well as potentially delaying some refiners' decision to invest in new desulfurization equipment due to uncertainties in cost, performance, etc.

²⁹⁵ A variation on this one-step approach would be to also require the sulfur content of locomotive and marine fuel to meet the 15 ppm standard in 2008. The decision of whether or not to require the sulfur content of locomotive and marine fuel to also be reduced to 15 ppm, however, is not unique to the one step approach, and, as discussed below is an alternative also being evaluated under our proposed 2-step program. Were we to require locomotive and marine diesel fuel to also meet the 15 ppm standard in 2008 under a one-step approach, there would be additional inventory reductions of about 10,000 tons of PM and 128,000 tons of SO₃ (NPV 3% through 2030).