9/13/96

NONROAD COMPRESSION-IGNITION ENGINE STATEMENT OF PRINCIPLES

Members of the nonroad compression-ignition (CI) engine and equipment industry, the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) (collectively, the Signatories) recognize the importance of preserving the environment while maintaining a strong industry. This Statement of Principles (SOP) increases certainty and stability for the nonroad CI engine and equipment industry which is vital for their business planning. It also ensures cleaner air in a manner which is both realistic for industry and responds to environmental needs. With this SOP the nonroad CI engine and equipment industry has stepped forward to become a leader in environmental protection, and industry and government will work as partners to bring about cleaner air.

EPA and ARB have recently established programs to control emissions from nonroad engines. EPA and ARB recognize these engines are sources of ozone-forming oxides of nitrogen (NOx) and hydrocarbons (HC), as well as of particulate matter (PM) and other pollutants, all of which raise concerns for public health and the environment. The current Tier 1 regulations for large CI nonroad engines are primarily focused on achieving significant NOx reductions as early as possible and are being phased in by horsepower level beginning in 1996. At the time of finalizing the Tier 1 regulations, EPA and ARB recognized that more stringent standards for these engines, and further evaluation of the test procedure by which compliance with the standards is measured, would likely be needed in the future to help meet air quality goals. These agencies also recognized the need to control emissions from spark-ignited (SI) and other CI nonroad engines as well.

Although recent progress in improving the nation's air quality has been encouraging, EPA and ARB believe there is strong evidence that currently adopted measures are insufficient to offset such factors as the growth in vehicle and equipment sales and usage. The states and others have strongly urged EPA to undertake new programs to achieve further cost-effective emission reductions in a time frame consistent with the Clean Air Act attainment goals. In response, among other initiatives, EPA and ARB have initiated a program to further reduce emissions from heavy-duty on-highway vehicles and nonroad engines.

The industries that produce these engines have also stepped forward, expressing a desire to develop and use cost-effective emission control technologies to help meet the nation's air quality goals. EPA and ARB have consulted with these industries to help craft proposals that provide the needed air quality benefit. The

effectiveness of this approach is evidenced by the issuance of a joint Statement of Principles (SOP) on July 11, 1995, outlining a proposal for stringent new nationwide standards for on-highway heavy-duty engines. EPA followed up that SOP with an Advanced Notice of Proposed Rulemaking (ANPRM) and a Notice of Proposed Rulemaking (NPRM). The 1995 SOP expressed an intent by the Signatories to pursue a similar SOP for heavy-duty nonroad engines.

After considerable discussion between EPA, ARB, and the nonroad engine and equipment industries, this SOP has been completed. The Signatories expect major reductions in emissions from the standards set forth in this SOP. For nonroad CI engines rated at 50 hp (37 kW) and higher, the Tier 2 and Tier 3 standards together will achieve about a 75 percent reduction in NOx from uncontrolled levels. The Tier 2 standards for PM represent about a 40 percent reduction from current levels. For nonroad CI engines rated at less than 50 hp, the Tier 2 standards are expected to result in NOx and PM reductions similar to those from the Tier 2 standards for engines rated at 50 hp and higher.

The Signatories agree that EPA should issue an ANPRM in 1996 and an NPRM in 1997 consistent with the points outlined in this document. A final rule would follow by February 1998. However, this SOP does not change the importance of EPA demonstrating the need for the standards described below and EPA's obligation to meet the criteria of the Clean Air Act in finalizing any rule, including complying with all applicable rulemaking procedures.

1. Scope

This SOP concerns CI nonroad engines as defined in 40 CFR 89.2, and the nonroad equipment powered by these engines, with the exception of engines used in aircraft, underground mining equipment, locomotives, and marine vessels. However, propulsion and auxiliary marine CI engines rated at less than 50 hp (37 kW) are included.[1/] EPA is addressing marine CI engines rated at 50 hp and higher separately from this SOP.

Although EPA and ARB have made significant progress in SOP discussions with the manufacturers of nonroad SI engines rated at above 25 hp (19 kW) (as well as the manufacturers of equipment using these engines), these discussions have not yet reached a stage that would allow inclusion of these engines in this SOP. EPA and

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[1/] Currently, EPA is required under a court order to take final action on proposed regulations for CI marine engines by December 18, 1996. EPA will seek appropriate changes to this order regarding final action on CI marine engines less than 50 hp (37 kW) to conform to this SOP.

ARB will pursue the development of an SOP for nonroad SI engines above 25 hp by the end of 1996. Such an SOP would assist the nonroad engine and equipment manufacturers in their product planning. The Signatories recognize the possible competitive effects of regulating CI and SI engines separately, and EPA and ARB will take those effects into account in the development of an SI engine SOP.

2. National Standards for CI Nonroad Engines

This SOP seeks to establish a nationwide program that, in real-world operating experience, achieves the emission control levels indicated below. Recognizing that real-world control is closely linked to the test procedure by which conformance with standards is measured, the following discussion of standards should be read in the context of the test procedure discussion that follows it. The Signatories' goal is a combination of emission standards and test procedures that achieves real-world emission reductions corresponding to these standards, provided that such standards are technologically feasible and cost effective, taking into consideration both engine and equipment manufacturer costs.

a. NMHC, NOx, CO and PM Standards

EPA will propose combined standards for nonmethane hydrocarbons (NMHC) and NOx, and separate standards for carbon monoxide (CO) and PM. These standards would apply to any affected engine that is newly manufactured on or after January 1 of the year indicated in the following table, except as provided in Section 5, Implementation Flexibility, below. While this SOP does not specify PM standards in Tier 3, the Signatories acknowledge that there is, in general, an inverse relationship in controlling certain pollutants (e.g., NOx and PM). The Signatories recognize that the manufacturer signatories have agreed to the Tier 3 NMHC+NOx standards set forth below on the condition that there would be no further reduction in PM or CO from Tier 2 levels. If such reductions should be proposed, EPA will take the reductions into account in its review of the feasibility of the proposed Tier 3 NMHC+NOx standards (see Section 4, Feasibility Review, below). The Signatories recognize the role that direct injection engine technology plays in the less than 50 hp nonroad engine market and expect the standards set forth in this SOP to allow for the continued existence of that technology. As part of the feasibility review (see Section 4 below), EPA will assess the progress in meeting Tier 2 standards for those engines using direct injection technology.

b. Smoke

The Signatories support the completion and worldwide adoption of the new smoke test being developed by the International Standards Organization (ISO 8178-9). EPA intends to propose to replace its current smoke test with the ISO test procedure for the sake of harmonization and improved control of smoke, provided that it provides for a level of smoke control at least as adequate as the current test. EPA will also propose to extend the smoke standards that were adopted in the Tier 1 rule to the under 50 hp engine category, and will evaluate the appropriateness of any changes to the smoke standards for all engine size categories in formulating the proposal.

c. Crankcase Emissions

For several years, emission regulations for on-highway engines have required that crankcase emissions be eliminated, except in the case of turbocharged diesel engines, which present special difficulties in designing for closed crankcase. EPA will propose to extend this requirement to covered nonroad engines (including the provision for excepting turbocharged diesel engines).

NMHC+NOx / CO / PM in g/hp-hr (g/kW-hr)										
hp (kW)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	Tier 1						Tier 2*			
<11 (8)		7.8 (10.5) 6.0 (8.0) 0.74 (1.0)					5.6 (7.5) 6.0 (8.0) 0.60 (0.80)			
≥11 (8) <25 (19)		7.0 (9.5) 4.9 (6.6) 0.60 (0.80)					5.6 (7.5) 4.9 (6.6) 0.60 (0.80)			
≥25 (19) <50 (37)	7.0 (9.5) 4.1 (5.5) 0.60 (0.80)					5.6 (7.5) 4.1 (5.5) 0.44 (0.60)				
			Tier 2					Tier 3*		
≥50 (37) <100 (75)						5.6 (7.5) 3.7 (5.0) 0.30 (0.40)				3.5 (4.7) 3.7 (5.0) **
≥100 (75) <175 (130)					4.9 (6.6) 3.7 (5.0) 0.22 (0.30)				3.0 (4.0) 3.7 (5.0) **	
≥175 (130) <300 (225)					4.9 (6.6) 2.6 (3.5) 0.15 (0.20)			3.0 (4.0) 2.6 (3.5) **		
≥300 (225) <600 (450)			4.8 (6.4) 2.6 (3.5) 0.15 (0.20)					3.0 (4.0) 2.6 (3.5) **		
≥600 (450) <750 (560)				4.8 (6.4) 2.6 (3.5) 0.15 (0.20)				3.0 (4.0) 2.6 (3.5) **		
≥750 (560)								4.8 (6.4) 2.6 (3.5) 0.15 (0.20)		

* These standards are subject to a feasibility review as discussed in Section 4.

** See above discussion on PM standards.

3. Test Procedures

In adopting a steady-state test cycle for its Tier 1 final rule, EPA stated that further study will be required to better characterize the nature and level of transient operation experienced by nonroad engines in actual use. The Signatories recognize that additional data would be beneficial in assessing the adequacy of the steady-state test in achieving control of regulated emissions, especially PM, in use. Other test parameters, such as the composition of the test fuel, may also impact the program's success in controlling in-use emissions.

The Signatories further recognize: (1) the crucial role that the test procedure plays in ensuring real emissions control in use, (2) the critical importance of in-use emission reductions in improving air quality and in determining state implementation plan credits under the Clean Air Act, (3) the effect that changes to test procedures could have on industry's ability to design, test and produce engines that comply with the applicable standards in the time periods contemplated by the SOP, (4) the need for a well-planned and well-coordinated test program to settle the issue of test procedure adequacy, (5) the value of proceeding in concert with international standard setting organizations in adopting a harmonized test procedure, and (6) the potential for this to be a lengthy process.

In order to achieve major NOx reductions as early as possible, EPA will propose that the current steady-state test be retained in the adoption of this SOP's standards. In addition, the Signatories will initiate a comprehensive test program, coordinated by EPA and cooperatively executed, to evaluate the adequacy of the current test procedure for achieving in-use emissions control. The test program will be initiated within six months of signing this SOP and will be completed by December 1998. The Signatories will also engage interested parties in the European Union (EU) in this comprehensive test program with the goal of gaining their participation as partners, if possible. Should the results of the testing program indicate that the test procedure does not achieve adequate control of emissions in use, EPA will initiate action to revise the test procedure if another test procedure is expected to provide significantly better control.

It is recognized that the standards in the SOP are based on the current steady-state test procedure. Further, all Signatories recognize that any test cycle changes or additions would likely complicate and delay industry's ability to research, design, test, and produce engines that comply with the standards contained in the SOP. As a result, any proposal to revise the current test procedure would propose that the revision not be implemented before Tier 3. Any changes in the test procedure will be taken into consideration as part of the Tier 3 feasibility review outlined below.

Engines rated at under 50 hp are not subject to the current Tier 1 standards and test procedure. The Signatories recognize that the manufacturer signatories' agreement to the standards for these engines set forth in Section 2 of this SOP is

based on the assumption that the following test cycles are adopted:

Land-based CI engines	
Variable- and constant-speed <25 hp (19 kW)	ISO 8178 G2
Variable-speed 25-50 hp (19-37 kW)	ISO 8178 C1
Constant-speed 25-50 hp (19-37 kW)	ISO 8178 D2
Auxiliary marine CI engines	
Variable- and constant-speed <25 hp (19 kW)	ISO 8178 G2
Variable-speed 25-50 hp (19-37) kW	ISO 8178 C1
Constant-speed 25-50 hp (19-37) kW	ISO 8178 D2
Propulsion marine CI engines <50 hp (37 kW)	ISO 8178 E3

In addition, the Signatories recognize that the manufacturer signatories' agreement to the application of the standards set forth in Section 2 of this SOP to land-based constant-speed engines rated at over 50 hp is based on the assumption that the ISO 8178 D2 test cycle is adopted for these engines as an optional alternative to the current steady-state test. EPA will assess the adequacy of the above cycles for the indicated engines and propose appropriate cycles in the NPRM. If EPA should propose different cycles, then EPA will reassess the feasibility of the standards in light of the proposed cycles.

4. Feasibility Review

In order to assess the progress of the industry in meeting the Tier 3 standards and effect dates for over 50 hp engines and Tier 2 standards and effect dates for under 50 hp engines (hereafter collectively, the "Later Standards"), and to ensure the lowest appropriate standard levels at the earliest appropriate time, EPA shall conduct a review of any rule adopting the Later Standards set forth in this SOP. This review will conclude in 2001 and will commence with a notice providing opportunity for public comment on whether or not the standards are technologically feasible and otherwise appropriate under the Clean Air Act. After the public comment period, EPA will take final action on the review under Section 307 of the Clean Air Act. Should the Agency conclude as a result of this review that these standards are not technologically feasible, or are otherwise not appropriate under the Clean Air Act, it shall revise the rule as appropriate. In any such revision, the NMHC+NOx standards are not expected to be raised more than 1.0 g/hp-hr (1.3 g/kW-hr), assuming no change in the PM and CO standards.

In reviewing the rulemaking as set forth above, EPA shall review the need for and feasibility and cost of the Later Standards, including, but not limited to: (1) the need to provide engine and equipment manufacturers an adequate period in which to recoup the capital investment required to achieve the previous standards; (2) the need to

provide engine and equipment manufacturers no less than four full years of leadtime[2/] between the time the feasibility review is finalized and the Later Standards become effective (while maintaining the engine category phase-in set forth in Section 2 above); (3) the need to assess the suitability, effectiveness and cost of transferring on-highway engine technology to nonroad engines and equipment; and (4) the need to assess the costs associated with redesigning equipment to accommodate the Later Standards.

The Signatories acknowledge that the standards set forth in this SOP will require a substantial investment for nonroad engine and equipment manufacturers, and their customers, and that the affected nonroad industry ordinarily requires a substantial period of stability in which to recoup such an investment. The period of stability between the previous and Later Standards ordinarily would be too short a time in which to reasonably recoup the investment needed to comply with the previous standards before imposing additional costs to comply with the Later Standards. Thus, the Signatories agree that the Later Standards in this SOP are based on the premise that no significant equipment redesign beyond that required to accommodate engines meeting the previous standards will be required to accommodate engines meeting the Later Standards.

As part of the review discussed in this Section, EPA will solicit information as to whether equipment redesign will be required as a result of changes to engines that will be required to meet the Later Standards. Should such equipment redesign be required, EPA will assess its significance, taking into account the cost and technical difficulty of such redesign, the need for a period of stability to reasonably recoup the investment in equipment redesign to meet the previous standards, the number of equipment models affected, and other relevant factors. If significant equipment redesign is required to accommodate engines meeting the Later Standards, EPA will propose appropriate measures to address the burden of such redesign. Such measures would include flexibilities similar to those set forth in Section 5 below, a minimum two-year[3/] adjustment of the time between the previous standards and Later Standards for all engine families in each affected power category, an adjustment to the Later Standards to address the need for the redesign, or some combination thereof. EPA also may propose additional measures as appropriate under the Clean Air Act. EPA and ARB acknowledge that this SOP will require the industry to make a commitment to meet the Later Standards that will require a substantial period of stability.

EPA's review and assessment of the feasibility and cost of the Later Standards will include a review of the costs associated with the Later Standards on a marginal

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[/] In the case of engines rated at less than 50 hp, no less than two full years of leadtime.

[/] Minimum three years and one year for engines in the 175-300 hp and 300-600 hp categories, respectively.

cost basis, taking into consideration total equipment production and operating costs, not just engine costs. If this assessment shows that the nonroad equipment industry will experience significant adverse impacts from changes in standards that are too frequent, rapid, or costly, EPA further commits to propose relaxing the standards and/or delaying the effective date of the standards, consistent with relevant provisions of the Clean Air Act.

The Signatories shall meet periodically to provide updates on their efforts and progress in complying with this SOP.

5. Implementation Flexibility

The Signatories recognize that new emission standards may create challenges for engine and equipment manufacturers beyond simply developing low-emission technologies. The nonroad industry is characterized by a diversity in engine models and equipment applications, many of which have small markets, making it difficult to rapidly and frequently implement design changes across wide product lines. Even small changes in engine designs can create major difficulties for equipment makers with low volume models, diverse product lines, or inadequate leadtime to respond to the changes. If engine makers were to discontinue engine models made in small volumes, this could cause market disruptions, especially for small manufacturers of equipment who buy these engines, and their customers.

Problems of this sort could be dealt with by phasing new standards in very gradually. However, in order to gain the desired air quality benefits as early as possible, this SOP instead aims to resolve the problem by broadening the flexibility granted to equipment manufacturers by providing them implementation options. Thus, EPA will propose programs whereby, on an annual basis, an equipment manufacturer would be allowed to install engines not meeting the otherwise applicable Tier 2 or 3 standards for engines 50 hp or higher in some of its equipment (Tier 1 standards for engines less than 50 hp). The following subsection describes two such programs that will be proposed, based on a percent-of-sales approach. The Signatories agree to work together in developing alternative flexibility proposals, with the understanding that these alternatives will not involve a projected loss in overall emission benefits over that entailed in the below-described program. One alternative approach under consideration would exempt equipment on an application-specific basis; EPA will, at a minimum, seek comment on such an approach in the NPRM.

a. Equipment Manufacturer Phase-in

Engines 50 hp or higher. For engines rated at 50 hp or higher, EPA will propose to allow each equipment manufacturer to install engines certified to the Tier 1 standards in a maximum of 15 percent of the equipment produced for sale in the United States during the first year that a new Tier 2 standard applies, and in a maximum of 5 percent during each of the six years thereafter. This allowance would

continue for a total of seven years after Tier 2 standards become effective for each engine category. At the end of this allowance period, equipment manufacturers would be required to install Tier 3 engines (or Tier 2 engines in any engine categories without Tier 3 standards) in all new equipment using engines in the category. However, if the effective dates of Tier 3 standards in any engine category are delayed beyond those set forth in Section 2, the allowance period for that engine category would be extended by the same period of time. For manufacturers electing to take advantage of the special flexibility provision for farm and logging equipment described below, the above-described flexibility provision would apply to just the non-farm/logging equipment the manufacturer sells.

To avoid disadvantaging smaller companies with limited product offerings, manufacturers would be allowed to exceed the above percent of production allowances during the same years affected by the above allowance program, provided they limit the installation of Tier 1 engines to a single equipment model with an annual production level (for U.S. sales) of 100 pieces or less.

In addition to the above general flexibility allowances, EPA will propose that manufacturers of farming or logging equipment will be allowed to install Tier 1 engines in a maximum of 30 percent of this equipment (produced for sale in the United States) during the first year that a new Tier 2 standard applies, and in a maximum of 15 percent for each of the seven years thereafter. This allowance would continue for a total of eight years after Tier 2 standards become effective for each engine category. At the end of this allowance period, equipment manufacturers would be required to install Tier 3 engines (or Tier 2 engines in any engine categories without Tier 3 standards) in all new farm or logging equipment using engines in the category. However, if the effective dates of Tier 3 standards in any engine category are delayed beyond those set forth in Section 2, the allowance period for that engine category would be extended by the same period of time.

Nothing set forth above would change the rules established in the Tier 1 standards which allow equipment manufacturers to use up existing stocks of noncomplying engines at the time a new standard takes effect.

Engines less than 50 hp. EPA will propose flexibilities as described above for equipment manufacturers who install <50 hp engines into their equipment, except as follows:

(1) Equipment manufacturers will be allowed to install unregulated engines instead of Tier 1 engines.

(2) The flexibilities will expire after a total of four years. When they expire manufacturers must install certified engines in all equipment.

(3) A delay of the effective date for the <50 hp Tier 2 standards does not affect the

expiration date of the flexibilities.

b. Engine Manufacturer ABT and Continued Sales of Previous-Standard Engines

EPA finalized an averaging, banking, and trading (ABT) program in its Tier 1 rule to help engine manufacturers meet the new standards. Consistent with the NPRM for heavy-duty on-highway engines, EPA will propose to modify the existing ABT program to eliminate any limit on credit life, to eliminate any discounts in the way credits are calculated, and to make ABT available for NMHC+NOx and PM. These provisions will apply to all of the standards set forth in Section 2 except as discussed below. In recognition of the role ABT plays in facilitating the introduction of new standards, EPA will reassess the appropriateness of these provisions as part of the feasibility review discussed in Section 4. The Signatories recognize that the manufacturers have agreed to the standards set forth in this SOP on the condition that the changes that EPA will propose in the ABT program are finalized and made a part of these standards.

EPA will also propose three special provisions for the ABT program for engines rated at less than 25 hp. First, no credits generated from the sale of these engines would be allowed to be used to demonstrate compliance for engines rated above 25 hp. Second, all credits generated from the sale of Tier 1 under 25 hp engines would expire at the end of 2007. Finally, credits from the sale of Tier 1 under 25 hp engines would only be generated by engine families with family emission limits of less than 5.6 g/hp-hr (7.5 g/kW-hr) for NMHC+NOx credits and 0.60 g/hp-hr (0.80 g/kW-hr) for PM credits, and these credits would be calculated against these baseline levels rather than against the actual Tier 1 standard levels.

In addition to these ABT provisions, EPA will propose that engine manufacturers be allowed to continue to build and sell the engines needed to meet the market demand created by the equipment manufacturer flexibility program set forth above. To avoid the creation of unfair business advantages, the engine manufacturer Signatories agree that, if they decide to continue the production of such engines, they will make them available for sale at reasonable prices to all interested buyers.

Finally, EPA also will propose to allow engine manufacturers to produce unregulated, Tier 1, or Tier 2 engines, as the case may be, to meet customer needs for replacement engines, so long as manufacturers comply with the replacement engine regulations that EPA is developing.

6. Harmonization

The participants in this SOP recognize the value that harmonizing standards within the United States would have on the cost of producing engines and equipment. EPA and the California Air Resources Board will pursue harmonized standards and test procedures for nonroad engines covered by this SOP such that an engine family

tested and certified by EPA could be sold in California and, similarly, an engine family tested and certified in California could be sold in the rest of the country. California acknowledges that the emission standards set forth in this SOP meet its needs for emission reductions for the engines covered by this SOP. However, if these standards should not be implemented as proposed, California's obligations to comply with State and Federal law, including its State Implementation Plan, take precedence over this SOP.

Furthermore, the global nature of the nonroad equipment and engine markets argues for maximum harmonization between the U.S. standards and test procedures and those of other nations. In particular, the European Union has developed standards very similar to EPA's Tier 1 standards and has proposed its own Tier 2 standards. The Signatories support the goal of continued harmonization and intend to work with the EU, Japan, and other regulatory bodies in developing harmonized future standards, including provisions for implementation flexibility. Harmonized standards and test procedures will be pursued in the program developed under this SOP to the maximum extent possible, provided that these measures do not compromise the other provisions of this SOP or the primary purpose of the program, which is to meet the air quality needs of the United States.

7. Fuels and Lower Emitting Alternatives

The standards set forth above contemplate the possibility of transferring on-highway technology to nonroad engines. The Signatories recognize that: (1) on-highway engines currently are operated on higher quality fuel than nonroad engines, (2) fuel composition has a significant impact on emission performance, (3) changes in the composition and improvements in the quality of nonroad fuels may be needed to make the Tier 3 standards technologically feasible and otherwise appropriate under the Act.

A number of states and other interested parties have expressed strong interest in programs to reduce emissions from nonroad engines beyond the levels established in this SOP. These parties believe that if a program were in place to certify low emitting engines (both diesel and alternative fuel engines), a market for these engines could be created through a variety of incentives including, but not limited to, marketable emission credits and the prominent labeling of low-polluting equipment as such. This certification program would be dependent on the establishment of a test procedure which reasonably evaluates the effectiveness of these engines in achieving real in-use emissions reductions.

Therefore, EPA shall propose an optional program for the certification of very low-emitting engines. This program would include, as needed, optional test procedures and standards that would encourage the sale of engines providing benefits beyond those corresponding to the program described elsewhere in this SOP. In addition, EPA will consider other programs to encourage the use of low-emitting

engines and emission-reducing fuels.

8. Durability

All Signatories recognize that it is important that emissions control be maintained throughout the life of the engine. The Signatories will work together to develop appropriate measures which ensure that emission improvements are maintained in use.

9. Certification and Compliance

All Signatories recognize that it is important to minimize the costs associated with certification and they commit to working together to streamline and simplify the certification process. Further, the Signatories acknowledge that the standards set forth in Section 2 of this SOP are based on the assumption that there will be no changes to the enforcement program adopted as part of the Tier 1 rule, except as specifically set forth in this SOP. Finally, the Signatories also recognize that engine manufacturers will be required to undertake significant engineering challenges in relatively short time frames in order to meet the Tier 2 and Tier 3 standards including the challenge of stabilizing initial production variability. Therefore, EPA will only impose selective enforcement audits (SEA's) during the first year in which a standard is in effect for those engine families where strong evidence exists that SEA failure would be likely.

10. Research Agreement

The Signatories recognize the benefits of a joint industry/government research program with the goal of developing engine technologies which can meet and exceed the standards for nonroad engines outlined in this SOP. The Signatories will undertake development of a separate research agreement with goals of reducing NOx emissions to 1.5 g/hp-hr (2.0 g/kW-hr) and PM emissions to 0.05 g/hp-hr (0.07 g/kW-hr), while maintaining attributes of current nonroad diesel engines such as performance, reliability, durability, safety, efficiency, and compatibility with nonroad equipment. These characteristics have allowed current nonroad diesel engines to serve as the pillar of the international nonroad equipment industry. This research agreement would include certain of the industry signatories below, EPA, ARB, and other organizations, such as the U.S. Department of Energy, as are approved by the participants.