engine is installed in a way that obscures the label on the engine. We are proposing to clarify this requirement for duplicate labels to ensure that labels are accessible without creating a supply of duplicate labels that are not authentic or are not used appropriately. Specifically, we are proposing to require engine manufacturers to supply duplicate labels to equipment manufacturers that request them and keep records to show how many labels they supply. Similarly, we are proposing that equipment manufacturers must request from engine manufacturers a specific number of duplicate labels, with a description of which engine and equipment models are involved and why the duplicate labels are necessary. Equipment manufacturers would need to destroy any excess labels and keep records to show the disposition of all the labels they receive. This would make it easier for us to verify that engines are meeting requirements and it would be easier for U.S. Customs to clear imported equipment with certified engines.

(3) What requirements apply to auxiliary emission control devices?

Clean Air Act section 203(a) and existing regulations prohibit the use of a defeat device (see 40 CFR 90.111 and 91.111). The defeat device prohibition is intended to ensure that engine manufacturers do not use auxiliary emission control devices (AECD) in a regulatory test procedure that reduce the effectiveness of the emission control system during operation that is not substantially included in the regulatory test procedure.[94] We are proposing to require manufacturers to describe their AECDs and explain why these are not defeat devices.

Under the current regulations, there has been limited use of AECDs. However, with the proposed new emission standards and the corresponding engine technologies, we expect manufacturers to increase their use of engine designs that rely on AECDs. Disclosure of the presence and purpose of an AECD is essential in allowing us to evaluate the AECD and determine whether it represents a defeat device.

[94] Auxiliary emission control device is defined at 40 CFR 90.2 and 91.2 as "any element of design that senses temperature, vehicle speed, engine RPM, transmission gear, or any other parameter for the purpose of activating, modulating, delaying or deactivating the operation of any part of the emission control system."

(4) What warranty requirements apply to engines or other products that are subject to emission standards?

Consistent with our current emission control programs, we are proposing that manufacturers provide a design and defect warranty covering emission-related components. If the manufacturer offers a longer mechanical warranty for the engine or any of its components without an additional charge, the proposed regulations would require that the emission-related warranty period must be at least as long as the commercial warranty for the engine or the applicable components. Extended warranties that are available for an extra price would not trigger a need for a longer emission-related warranty. See the proposed regulation language for a description of which components are emission-related.

If an operator makes a valid warranty claim for an emission-related component during the warranty period, the engine manufacturer is generally obligated to replace the component at no charge to the operator. The engine manufacturer may deny warranty claims if the operator failed to do prescribed maintenance that contributed to the warranty claim.

We are also proposing a defect reporting requirement that applies separately from the emission-related warranty (see Section VIII.F). In general, defect reporting applies when a manufacturer discovers a pattern of component failures whether that information comes from warranty claims, voluntary investigation of product quality, or other sources.

(5) Can I meet standards with emission credits?

We are proposing a new emission-credit program for sterndrive and inboard marine engines and for evaporative emissions. We are also proposing to revise the existing emission-credit provisions for outboard and personal-watercraft engines and for Small SI engines. An emission-credit program is an important factor we take into consideration in setting emission standards that are appropriate under Clean Air Act section 213. An emission-credit program can reduce the cost and improve the technological feasibility of achieving standards, helping to ensure the standards achieve the greatest achievable reductions, considering cost and other relevant factors, in a time frame that is earlier than might otherwise be possible. Manufacturers gain flexibility in product planning and the opportunity for a more cost-effective introduction of product lines meeting a new standard. Emission-credit programs also create an incentive for the early introduction of new technology, which allows certain emission families to act as trailblazers for new technology. This can help provide valuable information to manufacturers on the technology before they apply the technology throughout their product line. This early introduction of clean technology improves the feasibility of achieving the standards and can provide valuable information for use in other regulatory programs that may benefit from similar technologies.

Emission-credit programs generally involve averaging, banking, or trading. Averaging would allow a manufacturer to certify one or more emission families at emission levels above the applicable emission standards as long as the increased emissions are offset by one or more emission families certified below the applicable standards. The over-complying families generate credits that are used by the under-complying families. Compliance is determined on a total mass emissions basis to account for differences in production volume, power, and useful life among emission families. The average of all emissions for a particular manufacturer's production must be at or below the level of the applicable emission standards. This calculation generally factors in sales-weighted average power, production volume, useful life, and load factor. Banking and trading would allow a manufacturer to generate emission credits and bank them for future use in its own averaging program in later years or sell them to another company.

A manufacturer choosing to participate in an emission-credit program would certify each participating emission family to a Family Emission Limit (FEL). In its certification application, a manufacturer would determine a separate FEL for each pollutant included in the emission-credit program. The FEL selected by the manufacturer becomes the emission standard for that emission family. Emission credits are based on the difference between the emission standard that applies and the FEL. The engines have to meet the FEL for all emission testing. At the end of the model year, manufacturers would generally need to show that the net effect of all their emission families participating in the emission-credit program is a zero balance or a net positive balance of credits. A manufacturer could generally choose to include only a single pollutant from an emission family in the emission-credit program or, alternatively, to establish an FEL for each of the regulated pollutants.

Refer to the program discussions in Sections III through VI for more information about emission-credit provisions for individual engine or equipment categories. We request comment on all aspects of the emission-credit programs discussed in this proposal. In particular, we request comment on the structure of the proposed emission-credit programs and how the various provisions may affect manufacturers' ability to utilize averaging, banking, or trading to achieve the desired emission-reductions in the most efficient and economical way.

(6) How does EPA define maximum engine power?

Maximum engine power is used to calculate the value of emission credits. For Small SI engines, it is also used to determine whether the standards apply; for example engines above 1000 cc are subject to Small SI standards only if maximum engine power is at or below 19 kW. For Marine SI engines, maximum engine power is also used to determine the emission standard that applies to a particular engine and to calculate emission credits. The regulations give no specific direction for defining maximum power for determining whether part 90 applies. Marine SI engine manufactures declare a rated power based on a procedure specified in a voluntary consensus standard, while credit calculations are based on sales-weighted average power for an engine family. We are concerned that these terms and specifications are not objective enough to ensure consistent application of regulatory requirements to all manufacturers. To the extent that manufacturers can determine different values of rated power or maximum engine power, they could be subject to different emission standards and calculate emission credits differently for otherwise identical engines. We believe it is important that a single power value be determined objectively according to a specific regulatory definition. Note that maximum engine power is not used during engine testing.

We are proposing to standardize the determination of maximum engine power by relying primarily on the manufacturer's design specifications and the maximum torque curve that the manufacturer expects will represent the actual production engines. Under this approach the manufacturer would take the torque curve that is projected for an engine configuration, based on the manufacturer's design and production specifications, and convert it into a ''nominal power curve'' that would relate the maximum expected power to engine speed when a production engine is mapped according to our specified mapping procedures. The maximum engine power is the maximum power point on that nominal power curve. This has become the standard approach for all our emission control programs.

Manufacturers would report the maximum engine power of each configuration in the application for certification. As with other engine parameters, manufacturers would ensure that the engines they produce under the certificate have maximum engine power consistent with those described in their applications. However, since we recognize that variability is a normal part of engine production, we allow a tolerance around the nominal value. We would instead require only that the power specified in the application be within the normal power range for production engines (see § 1045.140 and § 1054.140). We would typically expect the specified power to be within one standard deviation of the mean power of the production engines. If a manufacturer determines that the specified power is outside of the normal range for production engines, we may require the manufacturer to amend the application for certification. Manufacturer could alternatively change their engines to conform to the parameters detailed in the application for certification. In deciding whether to require a change to the application for certification, we would consider the degree to which the specified power differed from that of the production engines, the normal power variability for those engines, whether the engine used or generated emission credits, and whether the error affects which standards apply to the engine.

(7) What are the proposed production-line testing requirements?

We are proposing to modify production-line testing requirements for engines already subject to exhaust emission standards and to extend these requirements to sterndrive and inboard marine engines. According to these requirements, manufacturers would routinely test production-line engines to help ensure that newly assembled engines control emissions at least as well as the emission-data engines tested for certification. Production-line testing serves as a quality-control step, providing information to allow early detection of any problems with the design or assembly of freshly manufactured engines. This is different than selective enforcement auditing where we would give a test order for more rigorous testing for production-line engines in a particular emission family (see Section VIII.E).

If an engine fails to meet an emission standard, the manufacturer must modify it to bring that specific engine into compliance. If too many engines exceed emission standards, the manufacturer will need to correct the problem for the engine family. This correction may involve changes to assembly procedures or engine design, but the manufacturer must, in any case, do sufficient testing to show that the emission family complies with emission standards.

The proposed production-line testing programs would depend on the Cumulative Sum (CumSum) statistical process for determining the number of engines a manufacturer needs to test. We have used CumSum procedures for production-line testing with several other engine categories. Each manufacturer selects engines randomly at the beginning of a new sampling period. If engines must be tested at a facility where final assembly is not yet completed, manufacturers must randomly select engine components and assemble the test engine according to their established assembly instructions. The sampling period is a calendar quarter for engine families over 1,600 units. The minimum testing rate for these families is five engines per year. For engine families with projected sales at or below 1,600 units, the sampling period is a calendar year and the minimum testing rate is two engines. We may waive testing requirements for Marine SI engine families with projected sales below 150 units per year and for Small SI engine families with projected sales below 5,000 units per year. The CumSum program uses the emission results to calculate the number of tests required for the remainder of the sampling period to reach a pass or fail determination. If tested engines have relatively high emissions, the statistical sampling method calls for an increased number of tests to show that the emission family meets emission standards. The remaining number of tests is recalculated after the manufacturer tests each engine. Engines selected should cover the broadest range of production configurations possible. Tests should also be distributed evenly throughout the sampling period to the extent possible.

Under the CumSum approach, a limited number of individual engines can exceed the emission standards before the Action Limit is met and the engine family itself fails under the production-line testing program. If an engine family fails, we may suspend the certificate. The manufacturer would then need to take steps to address the nonconformity, which may involve amending the application for certification. This could involve corrected production procedures, a modified engine design. This may also involve changing the Family Emission Limit if there is no defect and the original Family Emission Limit was established using good engineering judgment. Note, however, that we propose to require manufacturers to adjust or repair every failing engine and retest it to show that it meets the emission standards. Note also that all production-line emission measurements must be included in the periodic reports to us. This includes any type of screening or surveillance tests (including ppm measurements), all data points for evaluating whether an engine controls emissions ''off-cycle,'' and any engine tests that exceed the minimum required level of testing.

While the proposed requirements may involve somewhat more testing than is currently required under 40 CFR part 90 or 91, there are several factors that limit the additional burden. First, the testing regulations in 40 CFR part 1065 specify that manufacturers may use field-testing equipment and procedures to measure emissions from production-line engines. This may substantially reduce the cost of testing individual engines by allowing much lower-cost equipment for measuring engines following assembly.

Second, we are proposing to reduce the testing requirements for emission families that consistently meet emission standards. The manufacturer may request a reduced testing rate for emission families with no production-line tests exceeding emission standards for two consecutive years. The minimum testing rate is one test per emission family for one year. Our approval for a reduced testing rate would apply for a single model year.

Third, as we have concluded in other engine programs, some manufacturers may have unique circumstances that call for different methods to show that production engines comply with emission standards. We therefore propose to allow a manufacturer to suggest an alternate plan for testing production-line engines as long as the alternate program is as effective at ensuring that the engines will comply. A manufacturer's petition to use an alternate plan should address the need for the alternative and should justify any changes from the regular testing program. The petition must also describe in detail the equivalent thresholds and failure rates for the alternate plan. If we approve the plan, we would use these criteria to determine when an emission family would become noncompliant. It is important to note that this allowance is intended only to provide flexibility and is not intended to affect the stringency of the standards or the production-line testing program.

Refer to the specific program discussions in Sections III, IV, and V for additional information about production-line testing for different types of engines.

D. Other Concepts

(1) What are the proposed emission-related installation instructions?

For manufacturers selling loose engines to equipment manufacturers, we are proposing to require that the engine manufacturer develop a set of emission-related installation instructions. This would include anything that the installer would need to know to ensure that the engine operates within its certified design configuration. For example, the installation instructions could specify a total capacity needed from the engine cooling system, placement of catalysts after final assembly, or specification of parts needed to control evaporative emissions. If equipment manufacturers fail to follow the established emission-related installation instructions, we would consider this tampering, which could subject them to significant civil penalties. Refer to the proposed regulations for more information about specific provisions related to installation instructions (see § 1045.130 and § 1054.130).

(2) What is an agent for service?

We are proposing to require that manufacturers identify an agent for service in the United States in their application for certification. The named person should generally be available within a reasonable time to respond to our attempts to make contact, either by telephone, e-mail, or in person. The person should also be capable of communicating about matters related to emission program requirements in English. (See § 1045.205 and § 1054.205).

(3) Are there special provisions for small manufacturers of these engines, equipment, and vessels?

The scope of this proposal includes many engine, equipment, and vessel manufacturers that have not been subject to our regulations or certification process. Many of these manufacturers are small businesses. The sections describing the proposed emission control program include discussion of proposed special compliance provisions designed to address small business issues for the different types of engines and other products covered by the rule. Section XIV.B gives an overview of the inter-agency process in which we developed these small-volume provisions.

VIII. General Nonroad Compliance Provisions

This section describes a wide range of compliance provisions that apply generally to all the engines and equipment that would be subject to the proposed standards. Several of these provisions apply not only to engine manufacturers but also to equipment manufacturers installing certified engines, remanufacturing facilities, operators, and others.

For standards that apply to equipment or fuel-system components, the provisions generally applicable to engine manufacturers would also apply to the equipment or component manufacturers. While this preamble section is written as if it would apply to engine exhaust standards, the same provisions would apply for equipment or component evaporative standards. We are proposing extensive revisions to the regulations to more carefully make these distinctions.

As described in Section VII, we are proposing to migrate these general compliance provisions from 40 CFR parts 90 and 91 to the established regulatory text in 40 CFR part 1068. The provisions in part 1068 already apply to other engine categories and we believe they can be applied to Small SI engines and Marine SI engines with minimal modification. Note that Section XI.C describes a variety of proposed changes and updates to the regulatory provisions in part 1068. We request comment on all aspects of part 1068 for these engines. The following discussion follows the sequence of the existing regulatory text in part 1068.[95]

A. Miscellaneous Provisions (Part 1068, Subpart A)

This regulation contains some general provisions, including general applicability and the definitions that apply to part 1068. Other provisions concern good engineering judgment, how we would handle confidential information, how the EPA Administrator delegates decision-

[95] The regulatory text in the proposal does not republish the provisions of part 1068 that we are not proposing to change. For the latest full-text version of part 1068, see *http://www.gpoaccess.gov/ecfr/index.html.* Note that part 1068 is in Title 40, Protection of Environment.

making authority, and when we may inspect facilities, engines, or records.

The process of testing engines and preparing an application for certification requires the manufacturer to make a variety of judgments. This includes, for example, selecting test engines, operating engines between tests, and developing deterioration factors. EPA has the authority to evaluate whether a manufacturer's use of engineering judgment is reasonable. The regulations describe the methodology we use to address any concerns related to a manufacturer's use of good engineering judgment in cases where the manufacturer has such discretion (see 40 CFR 1068.5). We will take into account the degree to which any error in judgment was deliberate or in bad faith. This subpart is consistent with provisions already adopted for light-duty highway vehicles and various other nonroad engines.

B. Prohibited Acts and Related Requirements (Part 1068, Subpart B)

The proposed provisions in this subpart lay out a set of prohibitions for engine manufacturers, equipment manufacturers, operators, and engine rebuilders to ensure that engines comply with the emission standards. These provisions are summarized below but readers are encouraged to review the regulatory text. These provisions are intended to help ensure that each new engine sold or otherwise entered into commerce in the United States is certified to the relevant standards, that it remains in its certified configuration throughout its lifetime, and that only certified engines are used in the appropriate nonroad equipment.

(1) General Prohibitions (§ 1068.101)

This proposed regulation contains several prohibitions consistent with the Clean Air Act. We generally prohibit selling a new engine in the United States without a valid certificate of conformity issued by EPA, deny us access to relevant records, or keep us from entering a facility to test or inspect engines. In addition, no one may manufacture any device that will make emission controls ineffective or remove or disable a device or design element that may affect an engine's emission levels, which we would consider tampering. We have generally applied the existing policies developed for tampering with highway engines and vehicles to nonroad engines.[96] Other prohibitions reinforce manufacturers' obligations to meet various certification requirements. We also prohibit selling engine parts that prevent emission control systems from working properly. Finally, for engines that are excluded from regulation based on their use in certain applications, we generally prohibit using these engines in applications for which emission standards apply.

Each prohibited act has a corresponding maximum penalty as specified in Clean Air Act section 205. As provided for in the Federal Civil Penalties Inflation Adjustment Act of 1990, Pub. L. 10–410, these maximum penalties are in 1970 dollars and should be periodically adjusted by regulation to account for inflation. The current penalty amount for most violations is $32,500.[97]

(2) Equipment Manufacturer Provisions (§ 1068.105)

The provisions of § 1068.105 require equipment manufacturers to use certified engines in their new equipment once the emission standards begin to apply. We would allow a grace period for equipment manufacturers to deplete their supply of uncertified engines if they follow their normal inventory practices for buying engines, rather than stockpiling noncompliant (or previous-tier) engines to circumvent the new standards.

We require equipment manufacturers to observe the engine manufacturers' emission-related installation instructions to ensure that the engines remain consistent with the application for certification. This may include such things as radiator specifications, diagnostic signals and interfaces, and placement of catalytic converters.

If equipment manufacturers install a certified engine in a way that obscures the engine label, we propose to require that they add a duplicate label on the equipment. The equipment manufacturer would need to request from the engine manufacturer a specific number of duplicate labels, describe which engine and equipment models are involved, and explain why the duplicate labels are necessary. Equipment manufacturers would need to destroy any excess labels and keep records to show the disposition of all the labels they receive. This would make it easier for us to verify that engines are meeting requirements and it would be easier for U.S. Customs to clear imported equipment with certified engines.

Equipment manufacturers not fulfilling the responsibilities we describe in this section would be in violation of one or more of the prohibited acts described above.

(3) In-Service Engines (§ 1068.110)

The regulations generally prevent manufacturers from requiring owners to use any certain brand of aftermarket parts as well as give the manufacturers responsibility for engine servicing for emission-related warranty issues, leaving the responsibility for all other maintenance with the owner. This proposed regulation would also reserve our right to do testing (or require testing), for example, to investigate potential defeat devices or in-use noncompliance, as authorized by the Clean Air Act.

(4) Engine Rebuilding (§ 1068.120)

We are proposing to apply rebuild provisions for all the nonroad engines subject to the proposed emission standards. This approach is similar to what applies to heavy-duty highway engines and most other nonroad engines. This is necessary to prevent an engine rebuilder from rebuilding engines in a way that disables the engine's emission controls or compromises the effectiveness of the emission control system. We are proposing minimal recordkeeping requirements for businesses involved in commercial engine rebuilding to show that they comply with the regulations.

In general, anyone who rebuilds a certified engine must restore it to its original (or a lower-emitting) configuration. Rebuilders must also replace some critical emission control components such as fuel injectors and oxygen sensors in all rebuilds for engines that use those technologies. Rebuilders must replace an existing catalyst if there is evidence that it is not functional; for example, if rattling pieces inside a catalyst show that it has lost its physical integrity, it would need to be replaced. See § 1068.120 for more detailed information.

These rebuilding provisions define good maintenance and rebuilding practices to help someone avoid violating the prohibition on ''removing or disabling'' emission control systems. These provisions therefore apply also to individuals who rebuild their own engines. However, we do not require such individuals to keep records to document compliance.

We request comment on applying these proposed requirements for engine rebuilding and maintenance to the engines and vehicles subject to this rulemaking. In addition, we request

[96] ''Interim Tampering Enforcement Policy,'' EPA memorandum from Norman D. Shutler, Office of General Counsel, June 25, 1974 (Docket A–2000–01; document II–B–20).

[97] EPA acted to adjust the maximum penalty amount in 1996 (61 FR 69364, December 31, 1996). See also 40 CFR part 19.

comment on the associated recordkeeping requirements.

C. Exemptions (Part 1068, Subpart C)

We are proposing to apply several exemptions for certain specific situations, consistent with previous rulemakings. In general, exempted engines would need to comply with the requirements only in the sections related to the exemption. Note that additional restrictions could apply to importing exempted engines (see Section VIII.D). We may also require manufacturers (or importers) to add a permanent label describing that the engine is exempt from emission standards for a specific purpose. In addition to helping us enforce emission standards, this would help ensure that imported engines clear Customs without difficulty.

(1) Testing

Anyone would be allowed to request an exemption for engines used only for research or other investigative purposes.

(2) Manufacturer-Owned Engines

Engines that are used by engine manufacturers for development or marketing purposes could be exempted from regulation if they are maintained in the manufacturers' possession and are not used for any revenue-generating service. In contrast with the testing exemption, only certificate holders would be able to use this exemption.

(3) Display Engines

Anyone may request an exemption for an engine if it is for display only.

(4) National Security

Engine manufacturers could receive an exemption for engines they can show are needed by an agency of the federal government responsible for national defense. For cases where the engines will not be used on combat applications, the manufacturer would have to request the exemption with the endorsement of the procuring government agency.

(5) Exported Engines

Engines that will be exported to countries that do not have the same emission standards as those that apply in the United States would be exempted without need for a request. This exemption would not be available if the destination country has the same emission standards as those in the United States.

(6) Competition Engines

New engines that are used solely for competition are excluded from regulations applicable to nonroad engines. For purposes of our certification requirements, a manufacturer would receive an exemption if it can show that it produces the engine specifically for use solely in competition (see Sections III through V for specific provisions). In addition, engines that have been modified for use in competition would be exempt from the prohibition against tampering described above (without need for request). The literal meaning of the term ''used solely for competition'' would apply for these modifications. We would therefore not allow the engine to be used for anything other than competition once it has been modified. This also applies to someone who would later buy the engine, so we would require the person modifying the engine to remove or deface the original engine label and inform a subsequent buyer in writing of the conditions of the exemption.

(7) Replacement Engines

An exemption would be available to engine manufacturers without request if that is the only way to replace an engine from the field that was produced before the current emission standards took effect. If less stringent standards applied to the old engine when it was new, the replacement engine would also have to meet those standards.

(8) Unusual Circumstance Hardship Provision

Under the unusual circumstances hardship provision, any manufacturer subject to the proposed standards would be able to apply for hardship relief if circumstances outside their control cause the failure to comply and if failure to sell the subject engines or equipment or fuel system component would have a major impact on the company's solvency (see § 1068.245). An example of an unusual circumstance outside a manufacturer's control may be an ''Act of God,'' a fire at the manufacturing plant, or the unforeseen shutdown of a supplier with no alternative available. The terms and time frame of the relief would depend on the specific circumstances of the company and the situation involved. As part of its application for hardship, a company would be required to provide a compliance plan detailing when and how it would achieve compliance with the standards. This hardship provision would be available to all manufacturers of engines, equipment, boats, and fuel system components subject to the proposed standards, regardless of business size.

(9) Economic Hardship Provision for Small Businesses

An economic hardship provision would allow small businesses subject to the proposed standards to petition EPA for limited additional lead time to comply with the standards (see § 1068.250). A small business would have to make the case that it has taken all possible business, technical, and economic steps to comply, but the burden of compliance costs would have a significant impact on the company's solvency. Hardship relief could include requirements for interim emission reductions and/or the purchase and use of emission credits. The length of the hardship relief decided during review of the hardship application would be up to one year, with the potential to extend the relief as needed. We anticipate that one to two years would normally be sufficient. As part of its application for hardship, a company would be required to provide a compliance plan detailing when and how it would achieve compliance with the standards. This hardship provision would be available only to small manufacturers of engines, equipment, boats, and fuel system components subject to the standards. For the purpose of determining which manufacturers qualify as a small business, EPA is proposing criteria based on either a production cut-off or the number of employees. The proposed criteria for determining which companies qualify as a small business are contained in Section III.F.2 for SD/I engines, Section IV.G for OB/PWC engines, Sections V.F.2 for nonhandheld engines, V.F.3 for nonhandheld equipment, and Section VI.G.2.f for handheld equipment, boats, and fuel system components.

(10) Hardship for Equipment Manufacturers, Vessel Manufacturers, and Secondary Engine Manufacturers

Equipment manufacturers and boat builders in many cases will depend on engine manufacturers and fuel system component manufacturers to supply certified engines and fuel system components in time to produce complying equipment or boats by the date emission standards begin to apply. We are aware of other regulatory control programs where certified engines have been available too late for equipment manufacturers to adequately accommodate changing engine size or performance characteristics. To address this concern, we are proposing to allow Small SI equipment manufacturers and Marine SI boat builders to request up to one extra year before using certified engines or fuel system components if they are unable to obtain certified product and they are not at fault and would face serious economic hardship without an extension. See § 1068.255 for the proposed regulatory text related to this hardship.

In addition, we are aware that some manufacturers of nonroad engines are dependent on another engine manufacturer to supply base engines that are then modified for the final application. Similar to equipment or vessel manufacturers, these ''secondary engine manufacturers'' may face difficulty in producing certified engines if the manufacturer selling the base engine makes an engine model unavailable with short notice. These secondary engine manufacturers generally each buy a relatively small number of engines and would therefore not necessarily be able to influence the marketing or sales practices of the engine manufacturer selling the base engine. As a result, we are proposing that secondary engine manufacturers could apply for this hardship as well. However, because these secondary engine manufacturers control the final design of their modified engine and could benefit in the market if they are allowed to produce a product certified to less stringent standards than their competitors, we would generally not approve an exemption unless the secondary engine manufacturer committed to a plan to make for any calculated loss in environmental benefit. Provisions similar to this hardship were already adopted for Large SI engines and recreational vehicles. See the existing regulatory text in § 1068.255(c).

(11) Delegated Final Assembly

The regulations in 40 CFR 1068.260 allow for flexible manufacturing for companies that produce engines that rely on aftertreatment. These regulations allow for equipment manufacturers to receive separate shipment of aftertreatment devices with the obligation resting on the equipment manufacturer to correctly install the aftertreatment on the engine when installing the engine in the equipment. Allowing for this practice requires an exemption from provisions which prohibit an engine from being introduced into commerce in its uncertified configuration. The provisions in § 1068.260 to prevent improper use of this exemption include requirements to (1) Have contractual arrangements with equipment manufacturers; (2) submit affidavits to EPA regarding the use of the exemption; (3) include the price of the aftertreatment in the cost of the engine (to avoid giving equipment manufacturers an incentive to reduce costs inappropriately); and (4) periodically audit the affected equipment manufacturers.

These provisions are not likely to be necessary for most Marine SI engine manufacturers. We do not expect outboard or personal watercraft engine manufacturers to use aftertreatment technology. For sterndrive/inboard engines, we expect catalyst designs generally to be so integral to the exhaust manifold that engine manufacturers will include them with their engines. However, their may be some less common designs, such as engines on large vessels or airboats, where engine manufacturers may want to use the provisions allowing for separate shipment of aftertreatment. We are therefore proposing to adopt the provisions of § 1068.260 without change for Marine SI engines.

Manufacturers of handheld Small SI engines typically build both the engine and the equipment so we are proposing not to allow for delegated assembly with these engines.

In contrast, nonhandheld engines (especially Class II) are built by engine manufacturers and sold to equipment manufacturers, often without complete fuel or exhaust systems. Ensuring that consumers get only engines that are in a certified configuration therefore requires a carefully crafted program. As described in Section V.E.2, we are proposing special provisions to accommodate the unique circumstances related to nonhandheld Small SI engines.

(12) Uncertified Engines Subject to Emission Standards

In some cases we require manufacturers to meet certain emission standards without requiring certification, most commonly for replacement engines. In 40 CFR 1068.265 we spell out manufacturers obligations for these compliant but uncertified engines. Manufacturers must have test data showing that their engines meet the applicable emission standards and are liable for the emission performance of their engines, much like for certified engines, but are not required to submit an application for certification and get EPA approval before selling the engine. We propose to apply these provisions without modification for Small SI engines and Marine SI engines.

D. Imports (Part 1068, Subpart D)

In general, the same certification requirements would apply to engines and equipment whether they are produced in the United States or are imported. The regulations in part 1068 also include some additional provisions that would apply if someone wants to import an exempted or excluded engine.

All the proposed exemptions described above for new engines would also apply to importation, though some of these exemptions apply only on a temporary basis. An approved temporary exemption would be available only for a defined period. We could require the importer to post bond while the engine is in the United States. There are several additional proposed exemptions that would apply only to imported engines.

- *Identical configuration:* This is a permanent exemption to allow individuals to import engines that were designed and produced to meet applicable emission standards. These engines may be different than certified engines only in the fact that the emission label is missing because they were not intended for sale in the United States.
- *Ancient engines:* We would generally treat used engines as new if they are imported without a certificate of conformity. However, this permanent exemption would allow for importation of uncertified engines if they are more than 20 years old and remain in their original configuration.
- *Repairs or alterations:* This is a temporary exemption to allow companies to repair or modify engines. This exemption does not allow for operating the engine except as needed to do the intended work. This exemption would also apply for the practice for retiring bigger engines; noncompliant engines may be imported under this exemption for the purpose of recovering the engine block.
- *Diplomatic or military:* This is a temporary exemption to allow diplomatic or military personnel to use uncertified engines during their term of service in the U.S.

We request comment on all these exemptions for domestically produced and imported engines and vehicles.

E. Selective Enforcement Audit (Part 1068, Subpart E)

Clean Air Act section 206(b) gives us the discretion in any program with vehicle or engine emission standards to do selective enforcement auditing of production engines. We would do a selective enforcement audit by choosing an engine family and giving the manufacturer a test order that details a testing program to show that production-line engines meet emission standards. The regulation text describes the audit procedures in greater detail.

We intend generally to rely on manufacturers' testing of production-line engines to show that they are consistently building products that conform to the standards. However, we reserve our right to do selective enforcement auditing if we have reason to question the emission testing conducted and reported by the manufacturer or for other reasons.

F. Defect Reporting and Recall (Part 1068, Subpart F)

We are proposing to apply the defect reporting requirements of § 1068.501 to replace the provisions of 40 CFR part 85 for nonroad engines. The requirements obligate manufacturers to tell us when they learn that emission control components or systems are defective and to conduct investigations under certain circumstances to determine if an emission-related defect is present. We are also proposing a requirement that manufacturers initiate these investigations when warranty claims and other available information indicate that a defect investigation may be fruitful. For this purpose, we consider defective any part or system that does not function as originally designed for the regulatory useful life of the engine or the scheduled replacement interval specified in the manufacturer's maintenance instructions.

We believe the investigation requirement proposed in this rule will allow both EPA and the engine manufacturers to fully understand the significance of any unusually high rates of warranty claims that may have an impact on emissions. We believe prudent engine manufacturers already conduct a thorough investigation when available data indicate recurring parts failures as part of their normal practice to ensure product quality. Such data are valuable and readily available to most manufacturers and, under this proposal, must be considered to determine whether or not there is a possible defect of an emission-related part.

Defect reports submitted in compliance with the current regulations are based on a single threshold applicable to engine families of all production volumes. No affirmative requirement for gathering information about the full extent of the problem applies. Many Small SI engine families have very high sales volumes. The proposed approach may therefore result in fewer total defect reports that should be submitted compared with the traditional approach because the number of defects triggering the submission requirement generally rises in proportion to the engine family size. Under the existing regulations, very small engine families would likely never report even a prominent defect because a relatively high proportion of such engines would have to be known to be defective before reporting is required under a scheme with fixed thresholds. The proposed threshold for reporting for the smallest engine families is therefore lower than under the current regulations.

We are aware that accumulation of warranty claims will likely include many claims and parts that do not represent defects, so we are establishing a relatively high threshold for triggering the manufacturer's responsibility to investigate whether there is, in fact, a real occurrence of an emission-related defect.

This proposal is intended to require manufacturers to use information we would expect them to keep in the normal course of business. We believe in most cases manufacturers would not be required to institute new programs or activities to monitor product quality or performance. A manufacturer that does not keep warranty information may ask for our approval to use an alternate defect-reporting methodology that is at least as effective in identifying and tracking potential emission-related defects as the proposed requirements. However, until we approve such a request, the proposed thresholds and procedures continue to apply.

The proposed investigation thresholds are ten percent of total production to date up to a total production of 50,000 engines, but never fewer than 50 for any single engine family in one model year. For production between 50,000 and 550,000 units, the investigation threshold would increase at a marginal rate of four percent. For all production above 550,000 an investigation threshold of 25,000 engines would apply. For example, for an engine family with a sales volume of 20,000 units in a given model year, the manufacturer would have to investigate potential emission-related defects after identifying 2,000 possible defects. For an engine family with a sales volume of 450,000 units in a given model year, the manufacturer would have to investigate potential emission-related defects after identifying 21,000 possible defects. These thresholds reflect the relevant characteristics of nonroad engines, such as the varying sales volumes, engine technologies, and warranty and maintenance practices.

To carry out an investigation to determine if there is an emission-related defect, manufacturers would have to use available information such as preexisting assessments of warranted parts. Manufacturers would also have to gather information by assessing previously unexamined parts submitted with warranty claims and replacement parts which are available or become available for examination and analysis. If available parts are deemed too voluminous to conduct a timely investigation, manufacturers would be permitted to employ appropriate statistical analyses of representative data to help draw timely conclusions regarding the existence of a defect. These investigative activities should be summarized in the periodic reports of recently opened or closed investigations, as discussed below. It is important to note that EPA does not regard having reached the investigation thresholds as conclusive proof of the existence of a defect, only that initiation of an appropriate investigation is merited to determine whether a defect exists.

The second threshold in this proposal specifies when a manufacturer must report that an emission-related defect exists. This threshold involves a smaller number of engines because each potential defect has been screened to confirm that it is an emission-related defect. In counting engines to compare with the defect-reporting threshold, the manufacturer would consider a single engine family and model year. However, when a defect report is required, the manufacturer would report all occurrences of the same defect in all engine families and all model years that use the same part. The threshold for reporting a defect is two percent of total production for any single engine family for production up to 50,000 units, but never fewer than 20 for any single engine family in one model year. For production between 50,000 and 550,000 units, the investigation threshold would increase at a marginal rate of one percent. For all production above 550,000 an investigation threshold of 6,000 engines would apply.

It is important to note that while EPA regards occurrence of the defect threshold as proof of the existence of a reportable defect, it does not regard that occurrence as conclusive proof that recall or other action is merited.

If the number of engines with a specific defect is found to be less than the threshold for submitting a defect report, but warranty claims or other information later indicate additional potentially defective engines, under this proposal the information must be aggregated for the purpose of determining whether the threshold for submitting a defect report has been met. If a manufacturer has knowledge from any source that the threshold for submitting a defect report has been met, a defect report would have to be submitted even if the trigger for investigating has not yet been met. For example, if manufacturers receive information from their dealers, technical staff, or other field personnel showing conclusively that a recurring emission-related defect exists, they would have to submit a defect report if the submission threshold is reached.

At specified times, the manufacturer would have to report open investigations as well as recently closed investigations that did not require a defect report. We are not proposing a fixed time limit for manufacturers to complete their investigations. However, the periodic reports required by the regulations will allow us to monitor these investigations and determine if it is necessary or appropriate for us to take further action.

We request comment on all aspects of this approach to defect reporting. We also request comment on whether these reporting requirements should also apply to the current Phase 2 compliance program and if so, when these provisions should be applied.

Under Clean Air Act section 207, if we determine that a substantial number of engines within an engine family, although properly used and maintained, do not conform to the appropriate emission standards, the manufacturer must remedy the problem and conduct a recall of the noncomplying engine family. However, we recognize that in some cases recalling noncomplying nonroad engines may not achieve sufficient environmental protection, so instead of making a determination of a substantial number of nonconforming engines (and thereby triggering a recall responsibility), we may allow manufacturers in some cases to nominate alternative remedial measures to address most potential noncompliance situations.

G. Hearings (Part 1068, Subpart G)

According to this regulation, manufacturers would have the opportunity to challenge our decision to deny an application for certification or to suspend, revoke, or void an engine family's certificate. This also applies to our decision to reject the manufacturer's use of good engineering judgment (see § 1068.5), and to our decisions related to emission-credit programs. Part 1068, subpart G, references the proposed procedures for a hearing to resolve such disputes.

IX. General Test Procedures

The regulatory text in part 1065 is written with the intent to apply broadly to EPA engine programs. Part 1065 was originally adopted on November 8, 2002 (67 FR 68242) and currently applies for nonroad diesel engines, large nonroad spark-ignition engines and recreational vehicles under 40 CFR parts 1039, 1048 and 1051, respectively. The regulatory text was substantially revised in a recent rulemaking to make a variety of corrections and improvements (70 FR 40420, July 13, 2005).

This proposal applies to anyone who tests engines to show that they meet the emission standards for Small SI engines or Marine SI engines. This includes certification testing as well as all production-line and in-use testing. See the program descriptions above for testing provisions that are unique to each category of engines.

We are proposing to apply the existing test provisions in part 1065 for all Small SI engines and Marine SI engines. See Sections III through V for testing issues that are specific to the particular engine categories. In addition, we are proposing to allow manufacturers to use the provisions of part 1065 even before the proposed new standards take effect. This would allow manufacturers to migrate to the new test procedures sooner. This may involve upgrading to different types of analyzers that are specified in part 1065 but not in part 90 or part 91. It may also involve recoding computers to do modal calculations specified in part 1065 instead of the weight-based calculations in part 90 or part 91. At the same time, this would allow EPA to do confirmatory testing using the upgraded procedures without waiting for the proposed new standards to apply. This is important because EPA testing facilities are used for many different programs and the conversion to testing according to part 1065 specifications is well underway. We are aware that the new test specifications regarding engine mapping, generating duty cycles, and applying cycle-validation criteria would affect the emission measurements so we would follow the manufacturers' methods for these parameters in any case. For any other parameters, we would understand any differences between test procedures specified in parts 90, 91, and 1065 either to have no effect on emission measurements or to improve the accuracy of the measurement.

We have identified various provisions in part 90 and part 91 that may need correction or adjustment. We request comment on the following possible changes:

- Changing the standard temperature condition for volume-related calculations in § 90.311(a)(2) and § 91.311(a)(2) from 25 °C to 20 °C. This would be consistent with EPA's test regulations, including the specifications in § 1065.640.
- Removing the requirement to derive calibration and span gas concentrations from NIST Standard Reference Materials in § 90.312(c) and § 91.312(c). This goes beyond the traceability requirements of other EPA test regulations and standard lab practices. We could instead refer to § 1065.750 for calibration and span gas concentrations.
- Changing the direction for specifying gas concentrations in § 90.312(c)(3) and § 91.312(c)(3) from a volumetric basis to a molar basis.
- Correcting inconsistent requirements related to gas dividers. The regulations at § 90.312(c)(4) and § 91.312(c)(4) specify an accuracy of ±2 percent, while § 90.314(c) and § 91.314(c) specify an accuracy of ±1.5 percent. We could select one of these values, or we could refer to the gas divider specifications in § 1065.248 and § 1065.307.
- Correcting inconsistent specifications related to the timing of CO interference checks. The regulations at § 90.317(b) and § 91.317(b) specify that interference checks occur as part of annual maintenance, § 90.325(a) and § 91.325(a) specify that interference checks occur after any major repairs that could affect analyzer performance. We believe it would be most appropriate to make these consistent based on the specification in § 1065.303, which calls for interference checks to occur after major maintenance.

As we have done in previous programs, we are proposing specific test procedures to define how measurements are to be made but would allow the use of alternate procedures if they are shown to be equivalent to our specified procedures.[98] The test procedures proposed in part 1065 are derived from our test procedures in 40 CFR part 86 for highway heavy-duty gasoline engines and light-duty vehicles. The procedures have been simplified (and to some extent generalized) to better fit nonroad engines. The procedures in part 1065 currently apply to recreational vehicles and to nonroad spark-ignition engines above 19 kW. We request comment on all aspects of these proposed test procedures. We also request comment regarding whether any additional parts of the test procedures contained in 40 CFR part 86 (for highway vehicles and engines), in other parts that apply to nonroad engines, or

[98] Note that the published procedures still apply if we approve a manufacturer's use of an alternative procedure. EPA testing may be done using the published procedures or the alternate procedures approved for a given engine family.

in ISO 8178 should be incorporated into the final test procedures.

A. Overview

Part 1065 is organized by subparts as shown below:

- Subpart A: General provisions; global information on applicability, alternate procedures, units of measure, etc.
- Subpart B: Equipment specifications; required hardware for testing
- Subpart C: Measurement instruments
- Subpart D: Calibration and verifications; for measurement systems
- Subpart E: Engine selection, preparation, and maintenance
- Subpart F: Test protocols; step-by-step sequences for laboratory testing and test validation
- Subpart G: Calculations and required information
- Subpart H: Fuels, fluids, and analytical gases
- Subpart I: Oxygenated fuels; special test procedures
- Subpart J: Field testing and portable emissions measurement systems
- Subpart K: Definitions, references, and symbols

The regulations prescribe scaled specifications for test equipment and measurement instruments by parameters such as engine power, engine speed and the emission standards to which an engine must comply. That way this single set of specifications will cover the full range of engine sizes and our full range of emission standards. Manufacturers will be able to use these specifications to determine what range of engines and emission standards may be tested using a given laboratory or field testing system.

The content already adopted in part 1065 is mostly a combination of material from our most recent updates to other test procedures and from test procedures specified by the International Organization for Standardization (ISO). There are also some provisions we created specifically for part 1065, generally to address very recent advances such as measuring very low concentrations of emissions, using new measurement technology, using portable emissions measurement systems, and performing field testing.

The content in part 1065 also reflects a shift in our approach for specifying measurement performance. In the past we specified numerous calibration accuracies for individual measurement instruments, and we specified some verifications for individual components such as NO_2-to-NO converters. We have shifted our focus away from individual instruments and toward the overall performance of complete measurement systems. We did this for several reasons. First, some of what we specified in the past precluded the implementation of new measurement technologies. These new technologies, sometimes called ''smart analyzers,'' combine signals from multiple instruments to compensate for interferences that were previously tolerable at higher emissions levels. These analyzers are useful for detecting low concentrations of emissions. They are also useful for detecting emissions from raw exhaust, which can contain high concentrations of interferences, such as water vapor. This is particularly important for field testing, which will most likely rely upon raw exhaust measurements. Second, this new ''systems approach'' requires periodic verifications for complete measurement systems, which we feel will provide a more robust assurance that a measurement system as a whole is operating properly. Third, the systems approach provides a direct pathway to demonstrate that a field test system performs similarly to a laboratory system. Finally, we feel that our systems approach will lead to a more efficient way of ensuring measurement performance in the laboratory and in the field. We believe this efficiency will stem from less frequent calibrations of individual instruments and higher confidence that a complete measurement system is operating properly.

Below is a brief description of the content of each subpart. The discussion highlights some recent changes to part 1065. We are not proposing any changes to part 1065 as part of this proposal, but we intend to make various changes to part 1065 as part of a concurrent rulemaking to set new emission standards for marine diesel and locomotive engines. Manufacturers of engines that are the subject of this proposal are encouraged to stay abreast of testing changes that we propose in this other rulemaking.

(1) Subpart A General Provisions

In Subpart A we identify the applicability of part 1065 and describe how procedures other than those in part 1065 may be used to comply with a standard-setting part. In § 1065.10(c)(1) we specify that testing must be conducted in a way that represents in-use engine operation, such that in the rare case where provisions in part 1065 result in unrepresentative testing, we may cooperate with manufacturers to work out alternative testing approaches for demonstrating compliance with emission standards. Another aspect of representative testing relates to the desire to maintain consistency between certification testing and in-use testing. If we or manufacturers test in-use engines, we would expect the engine to be removed from the equipment and installed on an engine dynamometer for testing with no changes to the engine (including the governor, fuel system, exhaust system and other components).

In § 1065.10(c)(7) and § 1065.12 we describe a process by which we may approve alternative test procedures that we determine to be equivalent to (or more accurate than) the specified procedures. Given the new testing specifications in part 1065 and the standard-setting parts, and this more detailed approach to approving alternative test procedures, we will not allow manufacturers to continue testing based on any earlier approvals for alternative testing under part 90 or part 91. Any manufacturer wishing to continue testing with any method, device, or specification that departs from that included in this proposal would need to request approval for such testing under § 1065.10(c)(7).

Other information in this subpart includes a description of the conventions we use regarding units and certain measurements and we discuss recordkeeping. We also provide an overview of how emissions and other information are used for determining final emission results. The regulations in § 1065.15 include a figure illustrating the different ways we allow brake-specific emissions to be calculated.

In this same subpart, we describe how continuous and batch sampling may be used to determine total emissions. We also describe the two ways of determining total work that we approve. Note that the figure indicates our default procedures and those procedures that require additional approval before we will allow them.

(2) Subpart B Equipment Specifications

Subpart B first describes engine and dynamometer related systems. Many of these specifications are scaled to an engine's size, speed, torque, exhaust flow rate, etc. We specify the use of in-use engine subsystems such as air intake systems wherever possible to best represent in-use operation when an engine is tested in a laboratory.

Subpart B also describes sampling dilution systems. These include specifications for the allowable components, materials, pressures, and temperatures. We describe how to sample crankcase emissions.

The regulations in § 1065.101 include a diagram illustrating all the available equipment for measuring emissions.

(3) Subpart C Measurement Instruments

Subpart C specifies the requirements for the measurement instruments used for testing. These specifications apply to both laboratory and field testing. In subpart C we recommend accuracy, repeatability, noise, and response time specifications for individual measurement instruments, but note that we require that overall measurement systems meet the calibrations and verifications in Subpart D.

In some cases we allow new instrument types to be used where we previously did not allow them. For example, we now allow the use of a nonmethane cutter for NMHC measurement, a nondispersive ultraviolet analyzers for NO_X measurement, zirconia sensors for O_2 measurement, various raw-exhaust flow meters for laboratory and field testing measurement, and an ultrasonic flow meter for CVS systems.

(4) Subpart D Calibrations and Verifications

Subpart D describes what we mean when we specify accuracy, repeatability and other parameters in Subpart C. These specifications apply to both laboratory and field testing. We are adopting calibrations and verifications that scale with engine size and with the emission standards to which an engine is certified. We are replacing some of what we have called ''calibrations'' in the past with a series of verifications, such as a linearity verification, which essentially verifies the calibration of an instrument without specifying how the instrument must be initially calibrated. Because new instruments have built-in routines that linearize signals and compensate for various interferences, our existing calibration specifications sometimes conflicted with an instrument manufacturer's instructions. In addition, there are new verifications in subpart D to ensure that the new instruments we specify in Subpart C are used correctly.

(5) Subpart E Engine Selection, Preparation, and Maintenance

Subpart E describes how to select, prepare, and maintain a test engine. We updated these provisions to include both gasoline and diesel engines.

(6) Subpart F Test Protocols

Subpart F describes the step-by-step protocols for engine mapping, test cycle generation, test cycle validation, pre-test preconditioning, engine starting, emission sampling, and post-test validations. We adopted an improved way to map and generate cycles for constant-speed engines that would better represent in-use engine operation. We adopted a more streamlined set of test cycle and validation criteria. We allow modest corrections for drift of emission analyzer signals within a certain range.

(7) Subpart G Calculations and Required Information

Subpart G includes all the calculations required in part 1065. We adopted definitions of statistical quantities such as mean, standard deviation, slope, intercept, t-test, F-test, etc. By defining these quantities mathematically we intend to resolve any potential ambiguity when we discuss these quantities in other subparts. We have written all calculations for calibrations and emission calculations in international units to comply with 15 CFR part 1170, which removes the voluntary aspect of the conversion to international units for federal agencies. Furthermore, Executive Order 12770 (56 FR 35801, July 29, 1991) reinforces this policy by providing Presidential authority and direction for the use of the metric system of measurement by Federal agencies and departments. For our standards that are not completely in international units (*i.e.*, grams/horsepower-hour, grams/mile), we specify in part 1065 the correct use of internationally recognized conversion factors.

We also specify emission calculations based on molar quantities for flow rates instead of volume or mass. This change eliminates the frequent confusion caused by using different reference points for standard pressure and standard temperature. Instead of declaring standard densities at standard pressure and standard temperature to convert volumetric concentration measurements to mass-based units, we declare molar masses for individual elements and compounds. Since these values are independent of all other parameters, they are known to be universally constant.

(8) Subpart H Fuels, Fluids, and Analytical Gases

Subpart H specifies test fuels, lubricating oils and coolants, and analytical gases for testing. We are not identifying any detailed specification for service accumulation fuel. Instead, we specify that service accumulation fuel must be either a test fuel or a commercially available in-use fuel. This helps ensure that testing is representative of in-use engine operation. We are adding a list of ASTM specifications for in-use fuels as examples of appropriate service accumulation fuels. Compared to the proposed regulatory language, we have clarified that § 1065.10(c)(1) does not require test fuels to be more representative than the specified test fuels. We have added an allowance to use similar test fuels that do not meet all of the specifications provided they do not compromise the manufacturer's ability to demonstrate compliance. We also now allow the use of ASTM test methods specified in 40 CFR part 80 in lieu of those specified in part 1065. We did this because we may more frequently review and update the ASTM methods in part 80 versus those in part 1065.

Proper testing requires the use of good engineering judgment to maintain the stability of analytical gases.

(9) Subpart I Oxygenated Fuels

Subpart I describes special procedures for measuring certain hydrocarbons whenever oxygenated fuels are used. We updated the calculations for these procedures in Subpart G. We have made some revisions to the proposed text to make it consistent with the original content of the comparable provisions in part 86. We have also added an allowance to use the California NMOG test procedures to measure alcohols and carbonyls.

(10) Subpart J Field Testing and Portable Emissions Measurement Systems

Portable Emissions Measurement Systems (PEMS) for field testing for marine spark-ignition engines must generally meet the same specifications and verifications that laboratory instruments must meet according to subparts B, C, and D. However, we allow some deviations from laboratory specifications. In addition to meeting many of the laboratory system requirements, a PEMS must meet an overall verification relative to laboratory measurements. This verification involves repeating a duty cycle several times. The duty cycle itself must have several individual field-test intervals (*e.g.*, NTE events) against which a PEMS is compared to the laboratory system. This is a comprehensive verification of a PEMS. We also adopted a procedure for preparing and conducting a field test and adopted drift corrections for emission analyzers. Given the evolving state of PEMS technology, the field-testing procedures provide for a number of known measurement techniques. We have added provisions and conditions for using PEMS in an engine dynamometer laboratory to conduct laboratory testing.

(11) Subpart K Definitions, References, and Symbols

Subpart K includes all the defined terms, identification of reference materials, and lists of acronyms and abbreviations used throughout part 1065.

B. Special Provisions for Nonroad Spark-Ignition Engines

While part 1065 defines a wide range of specifications to define appropriate test procedures, several parameters are unique to each program. For example, each category of engines has one or more duty cycles that describe exactly how to operate each engine during the test. These category-specific provisions are described in part 1045, subpart F, for Marine SI engines and in part 1054, subpart F, for Small SI engines.

Manufacturers may run the specified steady-state duty cycle either as a series of discrete modes or as a ramped-modal cycle. The ramped-modal cycle specifies the same engine speeds and loads as in conventional discrete-mode testing, but the modes are connected by gradual ramps in engine speed and torque for a single, continuous emission-sampling period. The different modes are connected with twenty-second linear speed and torque transitions during which emissions are measured. Emission sampling therefore starts at the beginning of a ramped-modal cycle and does not stop until its last mode is completed.

Ramped-modal cycles involve a different sequence of modes than is specified for discrete-mode testing. For example, the first mode, which is engine idle, is split so that half the idle mode occurs at the beginning of the test and half occurs at the end of the test. This helps facilitate certain technical aspects of emission sampling. Instead of using weighting factors for each steady-state mode, a ramped-modal cycle specifies different time durations for each mode. Time durations of the modes and transitions are proportioned to the established modal weighting factors for the specified cycle.

There are several advantages to ramped-modal testing. Using discrete-mode testing, manufacturers sample emissions for an unspecified time duration near the end of each individual mode. The result is several separate measurements that must be combined mathematically to yield an overall emission result in g/kW-hr. The ramped-modal cycle has a single emission-sampling period. This decreases testing variability and reduces the overall cost of running tests. Ramped-modal testing also enables the use of batch sampling systems such as bag samplers.

X. Energy, Noise, and Safety

Section 213 of the Clean Air Act directs us to consider the potential impacts on safety, noise, and energy when establishing the feasibility of emission standards for nonroad engines. Furthermore, section 205 of EPA's 2006 Appropriations Act requires us to assess potential safety issues, including the risk of fire and burn to consumers in use, associated with the proposed emission standards for nonroad spark-ignition engines below 50 horsepower.[99] As further detailed in the following sections, we expect that the proposed exhaust and evaporative emission standards will either have no adverse affect on safety, noise, and energy or will improve certain aspects of these important characteristics. A more in depth discussion of these topics relative to the proposed exhaust and evaporative emission standards is contained in Chapters 4 and 5 of the Draft RIA, respectively. Also, our conclusions relative to safety are fully documented in our comprehensive safety study which is discussed in the next section.

A. Safety

We conducted a comprehensive, multi-year safety study of spark-ignition engines that focused on the four areas where we are proposing new emission standards.[100] These areas are:

- New catalyst-based $HC+NO_X$ exhaust emission standards for Class I and Class II nonhandheld spark-ignition engines;
- New fuel evaporative emission standards for nonhandheld and handheld equipment;
- New $HC+NO_X$ exhaust emission standards for outboard and personal watercraft engines and vessels, and a new CO exhaust emission standard for nonhandheld engines used in marine auxiliary applications; and
- New fuel evaporative emission standards for outboard and personal watercraft engines and vessels.

Each of these four areas is discussed in greater detail in the next sections.

[99] Department of the Interior, Environment, and Related Agencies Appropriations Act, 2006, Pub. L. 109–54, Title II, sec. 205, 119 Stat. 499, 532 (August 2, 2005).

[100] "EPA Technical Study on the Safety of Emission Controls for Nonroad Spark-Ignition Engines < 50 Horsepower," Office of Transportation and Air Quality, U.S. Environmental Protection Agency, Washington, DC, EPA420–R–06–006, March 2006. This document is available in Docket EPA–HQ–OAR–2004–0008. This report was also subject to peer review, as described in a peer review report that is also available in the docket.

(1) Exhaust Emission Standards for Small Spark-Ignition Engines

The technology approaches that we assessed for achieving the proposed Small SI engine standards included exhaust catalyst aftertreatment and improvements to engine and fuel system designs. In addition to our own testing and development effort, we also met with engine and equipment manufacturers to better understand their designs and technology and to determine the state of technological progress beyond EPA's Phase 2 emission standards.

The scope of our safety study included Class I and Class II engine systems that are used in residential walk-behind and ride-on lawn mower applications, respectively. Residential lawn mower equipment was chosen for the following reasons.

- Lawn mowers and the closely-related category of lawn tractors overwhelmingly represent the largest categories of equipment using Class I and Class II engines.
- Consumer Product Safety Commission (CPSC) data indicate that more thermal burn injuries are associated with lawn mowers than occur with other nonhandheld equipment; lawn mowers therefore represent the largest thermal burn risk for these classes of engines.
- General findings regarding advanced emission control technologies for residential lawn and garden equipment carry over to commercial lawn and turf care equipment as well as to other nonhandheld equipment using Class I and Class II engines.

We conducted the technical study of the incremental risk on several fronts. First, working with CPSC, we evaluated their reports and databases and other outside sources to identify those in-use situations which create fire and burn risk for consumers. The outside sources included meetings, workshops, and discussions with engine and equipment manufacturers. From this information, we identified ten scenarios for evaluation that covered a comprehensive variety of in-use conditions or circumstances which potentially could lead to an increased risk in burns or fires.

Second, we conducted extensive laboratory and field testing of both current technology (Phase 2) and prototype catalyst-equipped advanced-technology engines and equipment (Phase 3) to assess the emission control performance and thermal characteristics of the engines and equipment. This testing included a comparison of exhaust system, engine, and equipment surface temperatures using still and full motion video thermal imaging equipment.

Third, we conducted a design and process Failure Mode and Effects Analyses (FMEA) comparing current Phase 2 and Phase 3 compliant engines and equipment to evaluate incremental changes in risk probability as a way of evaluating the incremental risk of upgrading Phase 2 engines to meet Phase 3 emission standards.[101] This is an engineering analysis tool to help engineers and other professional staff to identify and manage risk. In an FMEA, potential failure modes, causes of failure, and failure effects are identified and a resulting risk probability is calculated from these results. This risk probability is used by the FMEA team to rank problems for potential action to reduce or eliminate the causal factors. Identifying these causal factors is important because they are the elements that a manufacturer can consider to reduce the adverse effects that might result from a particular failure mode.

Our technical work and subsequent analysis of all of the data and information strongly indicate that effective catalyst-based standards can be implemented without an incremental increase in the risk of fire or burn to the consumer either during or after using the equipment. Similarly, we did not find any increase in the risk of fire during refueling or in storage near typical combustible materials. For example, our testing program demonstrated that properly designed catalyst-mufflers could, in some cases, actually result in systems that were significantly cooler than many current original equipment mufflers. A number of design elements appear useful to properly managing heat loads including: (1) The use of catalyst designs that minimize CO oxidation through careful selection of catalyst size, washcoat composition, and precious metal loading; (2) positioning the catalyst within the cooling air flow of the engine fan or redirecting some cooling air over the catalyst area with a steel shroud; (3) redirecting exhaust flow through multiple chambers or baffles within the catalyst-muffler; and (4) larger catalyst-muffler volumes than the original equipment muffler.

[101] ''EPA Technical Study on the Safety of Emission Controls for Nonroad Spark-Ignition Engines < 50 Horsepower,'' Office of Transportation and Air Quality, U.S. Environmental Protection Agency, Washington, DC, EPA420-R–06–006, March 2006. This document is available in Docket EPA-HQ-OAR–2004–0008.

(2) Fuel Evaporative Emission Standards for Nonhandheld and Handheld Engines and Equipment

We reviewed the fuel line and fuel tank characteristics for nonhandheld and handheld equipment and evaluated control technology which could be used to reduce evaporative emissions from these two subcategories. The available technology is capable of achieving reductions in fuel tank and fuel line permeation without an adverse incremental impact on safety. For fuel lines and fuel tanks, the applicable consensus safety standards, manufacturer specific test procedures and EPA requirements are sufficient to ensure that there will be no increase in the types of fuel leaks that lead to fire and burn risk during in-use operation. Instead, these standards will reduce vapor emissions both during operation and in storage. That reduction, coupled with some expected equipment redesign, is expected to lead to reductions in the risk of fire or burn without affecting component durability.

The Failure Mode and Effects Analyses, which was described in the previous section, also evaluated permeation and running loss controls on nonhandheld engines. We found that these controls would not increase the probability of fire and burn risk from those expected with current fuel systems, but could in fact lead to directionally improved systems from a safety perspective. Finally, the running loss control program being proposed for nonhandheld equipment will lead to changes that are expected to reduce risk of fire during in-use operation. Moving fuel tanks away from heat sources, improving cap designs to limit leakage on tip over, and requiring a tethered cap will all help to eliminate conditions which lead to in-use problems related to fuel leaks and spillage. Therefore, we believe the application of emission control technology to reduce evaporative emissions from these fuel lines and fuel tanks will not lead to an increase in incremental risk of fires or burns and in some cases is likely to at least directionally reduce such risks.

(3) Exhaust Emission Standards for Outboard and Personal Watercraft Marine Engines and Vessels and Marine Auxiliary Engines

Our analysis of exhaust emission standards for OB/PWC engines and marine auxiliary engines found that the U. S. Coast Guard (USCG) has comprehensive safety standards that apply to engines and fuel systems used in these vessels. Additionally, organizations such as the Society of Automotive Engineers, Underwriters Laboratories, and the American Boat and Yacht Council (ABYC) also have safety standards that apply in this area. We also found that the four-stroke and two-stroke direct injection engine technologies which are likely to be used to meet the exhaust emission standards contemplated for OB/PWC engines are in widespread use in the vessel fleet today. These more sophisticated engine technologies are replacing the traditional two-stroke carbureted engines. The four-stroke and two-stroke direct injection engines meet applicable USCG and ABYC safety standards and future products will do so as well. The proposed emission standards must be complementary to existing safety standards and our analysis indicates that this will be the case. There are no known safety issues with the advanced technologies compared with two-stroke carbureted engines. The newer-technology engines arguably provide safety benefits due to improved engine reliability and range in-use. Based on the applicability of USCG and ABYC safety standards and the good in-use experience with advanced-technology engines in the current vessel fleet, we believe new emission standards would not create an incremental increase in the risk of fire or burn to the consumer.

(4) Fuel Evaporative Emission Standards for Outboard and Personal Watercraft Engines and Vessels

We reviewed the fuel line and fuel tank characteristics for marine vessels and evaluated control technology which could be used to reduce evaporative emissions from boats. With regard to fuel lines, fuel tanks, and diurnal controls, there are rigorous USCG, ABYC, United Laboratories, and Society of Automotive Engineers standards which manufacturers will continue to meet for fuel system components. All of these standards are designed to address the in-use performance of fuel systems, with the goal of eliminating fuel leaks. The low-permeation fuel lines and tanks needed to meet the Phase 3 requirements would need to pass these standards and every indication is that they would pass.[102]

Furthermore, the EPA permeation certification requirements related to emissions durability will add an additional layer of assurance. Low-permeation fuel lines are used safely

[102] ''EPA Technical Study on the Safety of Emission Controls for Nonroad Spark-Ignition Engines < 50 Horsepower,'' Office of Transportation and Air Quality, U.S. Environmental Protection Agency, Washington, DC, EPA420-R–06–006, March 2006. This document is available in Docket EPA-HQ-OAR–2004–0008.

today in many marine vessels. Low-permeation fuel tanks and diurnal emission controls have been demonstrated in various applications for many years without an increase in safety risk. Furthermore, a properly designed fuel system with fuel tank and fuel line permeation controls and diurnal emission controls would reduce the fuel vapor in the boat, thereby reducing the opportunities for fuel related fires. In addition, using improved low-permeation materials coupled with designs meeting USCG and ABYC requirements should reduce the risk of fuel leaks into the vessel. We believe the application of emission control technologies on marine engines and vessels for meeting the proposed fuel evaporative emission standards would not lead to an increase in incremental risk of fires or burns, and in many cases may incrementally decrease safety risk in certain situations.

B. Noise

As automotive technology demonstrates, achieving low emissions from spark-ignition engines can correspond with greatly reduced noise levels. Direct-injection two-stroke and four-stroke OB/PWC have been reported to be much quieter than traditional carbureted two-stroke engines. Catalysts in the exhaust act as mufflers which can reduce noise. Additionally, adding a properly designed catalyst to the existing muffler found on all Small SI engines can offer the opportunity to incrementally reduce noise.

C. Energy

(1) Exhaust Emission Standards

Adopting new technologies for controlling fuel metering and air-fuel mixing, particularly the conversion of some carbureted engines to advanced fuel injection technologies, will lead to improvements in fuel consumption. This is especially true for OB/PWC engines where we expect the proposed standards to result in the replacement of old technology carbureted two-stroke engines with more fuel-efficient technologies such as two-stroke direct injection or four-stroke engines. Carbureted crankcase-scavenged two-stroke engines are inefficient in that 25 percent or more of the fuel entering the engine may leave the engine unburned. EPA estimates that conversion to more fuel efficient recreational marine engines would save 61 million gallons of gasoline per year in 2030. The conversion of some carbureted Small SI engines to fuel injection technologies is also expected to improve fuel economy. We estimate approximately 18 percent of the Class II engines will be converted to fuel injection and that this will result in a fuel savings of about 10 percent for each converted engine. This translates to a fuel savings of about 56 million gallons of gasoline in 2030 when all of the Class II engines used in the U.S. will comply with the proposed Phase 3 standards. By contrast, the use of catalyst-based control systems on Small SI engines is not expected to change their fuel consumption characteristics.

(2) Fuel Evaporative Emission Standards

We anticipate that the proposed fuel evaporative emission standards will have a positive impact on energy. By capturing or preventing the loss of fuel due to evaporation, we estimate that the lifetime average fuel savings would be about 1.6 gallons for an average piece of Small SI equipment and 32 gallons for an average boat. This translates to a fuel savings of about 41 million gallons for Small SI equipment and 30 million gallons for Marine SI vessels in 2030 when most of the affected equipment used in the U.S. would be expected to have evaporative emission controls.

XI. Proposals Affecting Other Engine and Vehicle Categories

We are proposing to make several regulatory changes that would affect engines, equipment, and vessels other than Small SI and Marine SI. These changes are described in the following sections. We request comment on all aspects of these proposed changes.

A. State Preemption

Section 209(e) of the Clean Air Act prohibits states and their political subdivisions from adopting or enforcing standards and other requirements relating to the control of emissions from nonroad engines or vehicles. Section 209(e) authorizes EPA to waive this preemption for California for standards and other requirements for nonroad engines and vehicles, excluding new engines that are smaller than 175 horsepower used in farm or construction equipment or vehicles and new locomotives or new engines used in locomotives. States other than California may adopt and enforce standards identical to California standards authorized by EPA.

EPA promulgated regulations implementing section 209(e) on July 20, 1994 (59 FR 36987). EPA subsequently promulgated revised regulations implementing section 209(e) on December 30, 1997 (62 FR 67733). See 40 CFR part 85, subpart Q. We are proposing to create a new part 1074 that would describe the federal preemption of state and local emission requirements. This is being done as part of EPA's ongoing effort to write its regulations in plain language format in subchapter U of title 40 of the CFR. The proposed regulations are based directly on the existing regulations in 40 CFR part 85, subpart Q. With the exception of the simplification of the language and specific changes described in this section, we are not changing the meaning of these regulations.

Pursuant to section 428 of the 2004 Consolidated Appropriations Act, we are proposing to add regulatory language to implement the legislative restriction on states other than California adopting, after September 1, 2003, standards or other requirements applicable to spark-ignition engines smaller than 50 horsepower. We are also proposing to add, pursuant to that legislation, criteria for EPA's consideration in authorizing California to adopt and enforce standards applicable to such engines.[103]

On July 12, 2002, the American Road and Transportation Builders Association (ARTBA) petitioned EPA to amend EPA's rules implementing section 209(e) of the Act.[104] In particular, ARTBA petitioned EPA to amend its regulations and interpretive rule regarding preemption of state and local requirements "that impose in-use and operational controls or fleet-wide purchase, sale or use standards on nonroad engines."[105]

ARTBA believes such controls should be preempted. As we are already revising the preemption provisions to a certain extent in this rule, we believe it is appropriate to respond to ARTBA's petition in the context of this rule, while giving the public the ability to respond to provide comments regarding ARTBA's petition. EPA is not proposing to adopt the explicit changes requested by ARTBA in its petition; however, EPA will continue to review the arguments raised by ARTBA's petition, as well as all further arguments provided by ARTBA and other commenters during the period for notice and comment on

[103] See section 428 of the Appropriations Act for 2004.

[104] "Petition to Amend Rules Implementing Clean Air Act section 209(e)," American Road and Transportation Builders Association (ARTBA), July 12, 2002. Also, EPA received an additional communication from ARTBA urging EPA to grant the petition after the decision of the U.S. Supreme Court in EMA v. SCAQMD, 541 U.S. 246 (2004). See "ARTBA Petition," L. Joseph, ARTBA, to D. Dickinson & R. Doyle, EPA, April 30, 2004. These documents are available in Docket EPA–HQ–OAR–2004–0008.

[105] In 1994, EPA promulgated an interpretive rule at Appendix A to subpart A of 40 CFR part 89. The appendix provides that state restrictions on the use and operation of nonroad engines are not preempted under section 209.

this issue. We will respond to the petition, and if appropriate, make any changes to the regulations to conform our response to ARTBA and other commenters in the final rule. We request comment from the public regarding issues related to ARTBA's petition and how we should respond.

B. Certification Fees

Under our current certification program, manufacturers pay a fee to cover the costs associated with various certification and other compliance activities associated with an EPA issued certificate of conformity. These fees are based on the actual and/or projected cost to EPA per emission family. We are proposing to establish a new fees category for certification related to the proposed evaporative emission standards. Sections III and VI describe how these fees would apply to sterndrive/inboard marine engines and equipment and vessels subject to evaporative emission standards since these products are not currently required to pay certification fees.

In addition, we are proposing to create a new part 1027 in title 40 that would incorporate the new and existing fee requirements under a single part in the regulations. This is being done as part of EPA's ongoing effort to write its regulations in plain language format in subchapter U of title 40 of the CFR. The proposed regulations are based directly on the existing regulations in 40 CFR part 85, subpart Y. Aside from a variety of specific changes, moving this language to part 1027 is not intended to affect the substance of the existing fee provisions. We are proposing the following adjustments and clarifications to the existing regulations:

• Establishing a new fees category for new evaporative emission standards.

• Eliminating one of the paths for applying for a reduced fee. The existing regulations specify that applications covering fewer than six vehicles or engines, each with an estimated retail sales price below $75,000, shall receive a certificate for five vehicles or engines. Holders of these certificates are required to submit an annual model year reduced fee payment report adjusting the fees paid. We are proposing to eliminate this pathway and the associated report, as they are complex and have been rarely used.

• Clarifying the obligation to make additional payment on a reduced fee certificate if the actual final sales price is more than the projected retail sales price for a reduced fee vehicle or engine. As before, the final fee payment must also reflect the actual number of vehicles.

• Applying the calculated fee changes for later years, which are based on the Consumer Price Index and the total number of certificates, only after the change in the fee's value since the last reported change has reached $50. The fee change for the ''Other'' category for calendar year 2005 to 2006 changed from $826 to $839 and for non-road compression-ignition engines from $1822 to $1831. Under the proposal, the fee would not change until such time as the fee increase would be $50.00 or greater. This might not occur after one year, but after two or more years the calculated increase in a fee based on the change in the Consumer Price Index might be more than $50.00. The same applies if the price goes both up and down. For example, if the fee published in EPA guidance for a category of engine was $1,000 in 2011 and the calculated fee for 2012 is $990 and in 2013 is $1040, the fee in 2013 would remain at $1,000 since the change from the 2011 fee is only $40. This would minimize confusion related to changing fees where the calculated fee is very close to that already established for the previous year. It will also lessen paperwork and administrative burdens for manufacturers and EPA in making adjustments for small fees changes for applications that are completed around the change in a calendar year. The number of certificates may go up or down in any given year, while the Consumer Price Index would generally increase annually. As a result, this change would be revenue-neutral or would perhaps slightly decrease overall revenues.

• Clarifying that all fee-related records need to be kept, not just those related to the ''final reduced fee calculation and adjustment.''

• Adding *www.Pay.gov* or other methods specified in guidance as acceptable alternative methods for payment and filing of fee forms. We anticipate several changes in administration of the fees program in coming months. It is likely that future payment of fees by electronic funds transfers (other than wire payments through the Federal Reserve) will be available only through online payments via *www.Pay.gov.* We are also receiving an increasing number of fee forms through e-mail submissions, which has proved to be a reliable and convenient method. We will be establishing a specific e-mail address for these submissions.

• Establishing a single deadline for all types of refunds: total, partial for reduced fees, and partial for corrections. In all cases, refund requests must be received within six months of the end of the model year. A common type of request is due to an error in the fee amount paid as a result of changed fees for a new calendar year. We frequently apply these overpayments to other pending certification applications. This is less burdensome than applying for a simple refund, both for EPA and for most manufacturers. Applications to apply such refunds to other certification applications must also be received within six months of the end of the model year of the original engine family or test group.

• Emphasizing with additional cross references that the same reduced fee provisions that apply to Independent Commercial Importers also apply to modification and test vehicle certificates under 40 CFR 85.1509 and 89.609: the number of vehicles covered is listed on the certificate, a revision of the certificate must be applied for and additional reduced fee payments made if additional vehicles are to be covered, and the certificate must be revised to show the new total number of vehicles to be covered.

C. Amendments to General Compliance Provisions in 40 CFR Part 1068

The provisions of part 1068 currently apply for nonroad diesel engines regulated under 40 CFR part 1039, Large SI engines regulated under 40 CFR part 1048, and recreational vehicles regulated under 40 CFR part 1051. We are proposing to apply these provisions also for Small SI and Marine SI engines, equipment, and vessels. Any changes we make to part 1068 will apply equally for these other types of engines and vehicles. We therefore encourage comment from any affected companies for any of these proposed changes.

The most significant change we are proposing for part 1068 is to clarify the language throughout to make necessary distinctions between engines, equipment, and fuel-system components—and particularly between equipment using certified engines and equipment that has been certified to meet equipment-based standards. This becomes necessary because the evaporative emission standards proposed in this document apply in some cases to equipment manufacturers and boat builders, while the exhaust emission standards apply only to engine manufacturers. Some provisions in part 1068 apply to equipment manufacturers differently if they hold a certificate of conformity rather than merely installing certified engines (or certified fuel-system components). The proposed changes in regulatory language are intended to help make those distinctions. See § 1068.2 for a description of the proposed terminology that we intend to use throughout part 1068.

We are aware that in some cases manufacturers produce nonroad engines by starting with a complete or partially complete engine from another manufacturer and modifying it as needed for the particular application. This is especially common for Marine SI and Large SI engines and equipment, but it may also occur for other types of nonroad engines and equipment. We are concerned that an interpretation of the prohibited acts in § 1068.101 would disallow this practice because the original engine manufacturer is arguably selling an engine that is not covered by a certificate of conformity even though emission standards apply. We are addressing this first by proposing to define ''engine'' for the purposes of the regulations (see § 1068.30). To do this, we differentiate between complete engines and partially complete engines, both of which need to be covered by a certificate. Partially complete engines would include any engine, consisting of the engine block plus at least one attached component such that the engine is not yet in its final, certified configuration. We are also proposing to allow for a path by which the original engine manufacturer would not need to certify partially complete engines or request approval for an exemption (see § 1068.262). To do this though, the original engine manufacturer would need a written request from a secondary engine manufacturer who already holds a valid certificate of conformity for the engine based on its final configuration and application. These proposed provisions are intended generally to be clarifications of the existing regulatory provisions, particularly those in § 1068.330 for imported engines.

One situation involving partially complete engines involves the engine block as a replacement part where the original engine had major structural damage. In this case the engine manufacturer will typically sell an engine block with piston, crankshaft, and other internal components to allow the user to repower with many of the components from the original engine. Under the proposed definitions, these short blocks or three-quarter blocks would be new engines subject to emission standards. We believe it would be appropriate to address this situation in the regulations with the replacement engine provisions in § 1068.240, which provides a path for making new engines that are exempt from current emission standards. We request comment on applying these replacement-engine provisions to engine blocks as replacement parts.

We are proposing to further clarify the requirement for engine manufacturers to sell engines in their certified configuration. The existing provisions in § 1068.260 describe how manufacturers may use delegated assembly to arrange for equipment manufacturers to separately source aftertreatment components for engines that depend on aftertreatment to meet emission standards. We are proposing to include language to clarify that we will consider an engine to be in its certified configuration in certain circumstances even if emission-related components are not assembled to the engine. This is intended to reflect common practice that has developed over the years. We are also proposing to clarify that engines may be shipped without radiators or other components that are unrelated to emission controls, and that we may approve requests to ship engines without emission-related components in some circumstances. This would generally be limited to equipment-related components such as vehicle-speed sensors. We could specify conditions that we determine are needed to ensure that shipping the engine without such components will not result in the engine being operated outside of its certified configuration.

We adopted a definition of ''nonroad engine'' that continues to apply today (see § 1068.30). This definition distinguishes between portable or transportable engines that may be considered either nonroad or stationary, depending on the way they will be used. The distinction between nonroad and stationary engines is most often relevant for new engines in determining which emission standards apply. However, we have received numerous questions related to equipment whose usage has changed so that the original designation no longer applies. The definition does not address these situations. We are therefore proposing to adopt provisions that would apply when an engine previously used in a nonroad application is subsequently used in an application other than a nonroad application, or when an engine previous used in a stationary application is moved (see § 1068.31).

In addition, we are proposing several amendments to part 1068 to clarify various items. These include:

- § 1068.101(a)(1): Revising the prohibited act to specify that engines must be ''covered by'' a certificate rather than ''having'' a certificate. The revised language is more descriptive and consistent with the Clean Air Act.
- § 1068.101(a)(1)(i): Clarifying that engines or equipment are considered to be uncertified if they are not in a configuration that is included in the applicable certificate of conformity. This would apply even if the product had an emission label stating that it complies with emission standards.
- § 1068.101(a)(2): Clarifying the prohibition on recordkeeping to apply also to submission of records to the Agency.
- § 1068.101(b)(2): Adding a prohibition against using engines in a way that renders emission controls inoperative, such as misfueling or failing to use additives that the manufacturer specifies as part of the engine's certified configuration. This is more likely to apply for compression-ignition engines than spark-ignition engines.
- § 1068.101(b)(7): Clarifying the prohibitions related to warranty to require the submission of specified information in the application for certification; adding language to identify obligations related to recall; and preventing the manufacturer from communicating to users that warranty coverage is conditioned on using authorized parts or service facilities. These provisions are consistent with requirements that apply in other EPA programs.
- § 1068.105(a): Revising the regulation to allow equipment manufacturers to use up normal inventories of previous model year engines only if it is a continuation of ongoing production with existing inventories. These provisions would not apply for an equipment manufacturer starting to produce a new equipment model.
- § 1068.105: Eliminating paragraph (b) related to using highway certification for nonroad engines or equipment, since these provisions are spelled out specifically for each nonroad program where appropriate.
- § 1068.105(b): Clarifying the requirement to follow emission-related installation instructions to include installation instructions from manufacturers that certify components to evaporative emission standards.
- § 1068.120: Clarifying the rebuilding provisions to apply to maintenance related to evaporative emissions.
- § 1068.240: Clarifying that the scope of the exemption for new replacement engines is limited to certain engines; also clarifying that the replacement engine provisions apply for replacing engines that meet alternate emission standards (such as those produced

under the Transition Program for Equipment Manufacturers).

- § 1068.250: Revising the applicability of the hardship provisions to small businesses more broadly by referring to a term that is defined in § 1068.30; this would include small businesses as identified in the standard-setting part, or any companies that meet the criteria established by the Small Business Administration.
- § 1068.250: Clarifying the timing related to hardship approvals, and the ability to get extensions under appropriate circumstances.
- § 1068.260: Revising the provisions related to delegated assembly as described in Section XI.F and clarifying that reduced auditing rates as specified in paragraph (a)(6) should be based on the number of equipment manufacturers involved rather than the number of engines; also specifying that manufacturers may itemize invoices to ensure that the Customs valuation for assessment of import duties is based on the price of the imported engine without the aftertreatment components that are being shipped separately. We request comment on adding a provision allowing for a separate invoice for aftertreatment components that are shipped separately.
- § 1068.305: Clarifying that the requirement to submit importation forms applies to all engines, not just nonconforming engines; also adding a requirement to keep these records for five years. Both of these changes are consistent with the Customs regulations at 19 CFR 12.74.
- Part 1068, Appendix I: Clarifying that the fuel system includes evaporative-related components and that the parts comprising the engine's combustion chamber are emission-related components.

Manufacturers have also expressed a concern that the engine rebuilding provisions in § 1068.120 do not clearly address the situation in which rebuilt engines are used to repower equipment where the engine being replaced meets alternate emission standards (such as those produced under the Transition Program for Equipment Manufacturers). These engines are not certified to the emission standards that would otherwise apply for the given model year, so there may be some confusion regarding the appropriate way of applying these regulatory requirements.

In Section V.E.6 we describe several proposed special compliance provisions that are intended to improve our ability to oversee our emission control program for Small SI engines. For example, we are proposing that manufacturers take steps to ensure that they will be able to honor emission-related warranty claims, meet any compliance- or enforcement-related obligations that may arise, and import new engines and equipment in a timely manner after we adopt new standards. We request comment on the appropriateness of adopting any or all of those provisions under part 1068 such that they would apply to all engines and equipment subject to part 1068. We also request comment on any adjustments to those provisions that would be appropriate for other categories of engines and equipment, whether we choose to adopt these provisions in this proposal or in a separate rulemaking.

In addition, we request comment on early application of the provisions of part 1068 before the standards proposed in this notice take effect. For example, for any provisions not directly related to the emission standards, we could revise the regulations in part 90 and part 91 to reference the corresponding provisions in part 1068. We similarly request comment on making these changes for diesel engines regulated under part 89 (land-based) and part 94 (marine). This would allow us to accelerate the transition to plain-language regulations and prevent confusion from maintaining multiple versions of similar provisions for several years. We would also be able to substantially decrease printing costs. The provisions most appropriately considered for early transition to part 1068 include: (1) Selective enforcement audits, (2) exemptions, (3) importation provisions, (4) defect reporting and recall, (5) hearing procedures, and (6) treatment of confidential information.

We are also seeking comment on revisions to 40 CFR 1068.101. Section 203 of the Act (42 U.S.C. 7522) states that performing certain acts, ''and causing thereof,'' constitutes a prohibited act. We are interested in revising the regulations to specifically include this prohibition on the ''causing'' of any of the prohibited acts listed in the statute and the regulations. Adding this clarification would help people who are subject to the regulations to more fully understand what actions are prohibited and may potentially subject them to enforcement proceedings under the Act. The revisions themselves would not be intended to add new enforcement authorities beyond what is already specified in the statute.

If we consider it a violation to cause someone to commit a prohibited act, then persons causing any prohibited act would also be subject to the full administrative and judicial enforcement actions allowable under the Act and the regulations. The prohibition on ''causing'' a prohibited act would apply to all persons and would not be limited to manufacturers or importers of regulated engines or equipment.

If this provision is adopted, EPA would interpret the ''causation'' aspect of section 203 broadly. In assessing whether a person has caused a prohibited act, EPA would evaluate the totality of circumstances. For example, in certain circumstances EPA believes a retailer may be responsible for causing the importation of engines or equipment not covered by a valid certificate of conformity or otherwise in violation of our regulations, such as the labeling requirements. In addition to the prohibitions that apply to manufacturers and importers generally under section 203, EPA will also consider many factors in assessing whether a manufacturer, importer, retailer, distributor or other person has caused a prohibited act, including, but not limited to, the following: (1) The contractual or otherwise established business relationship of those persons involved in producing and/or selling new engines and equipment; (2) the particular efforts or influence of the alleged violator contributing to, leading to or resulting in the prohibited act; and (3) the efforts, or lack thereof, of the person to prevent such a violation. EPA will evaluate the entire circumstances in determining whether a person caused another person to commit a prohibited act such as importing engines or equipment in violation of our regulations.

D. Amendments Related to Large SI Engines (40 CFR Part 1048)

Manufacturers of Large SI engines are encouraged to review the proposed changes described in Section XI.C related to 40 CFR part 1068.

Some of the issues related to Marine SI engines described in Section III relate to Large SI engines. In particular, the uncertain availability of certain base engine models from General Motors for use in nonroad applications poses a challenge for efforts to certify the engines to the Large SI standards. In particular, the uncertain lead time associated with getting the new engines and the level of effort expected for certifying the existing engine models that are planned for obsolescence make it difficult for companies, especially small businesses, to go through the certification process and recover costs for repeated testing. Of greatest concern are requirements related to developing deterioration factors for these engines. The existing regulations allow for assigned deterioration factors for small businesses, but these apply only to companies with fewer than 200 employees. We are therefore proposing to expand the definition of small-volume engine manufacturer to also include companies with annual U.S. sales of no more than 2000 Large SI engines. This would align with the provisions already adopted by California ARB. Similarly, we are proposing a provision allowing for assigned deterioration factors for small-volume engine families for Small SI engines (see Section V). A similar dynamic applies for Large SI engines. Any such allowance would apply to engine families with projected sales up to 300 or 500 units to reflect to different production volumes. We request comment on allowing assigned deterioration factors for small-volume engine families for Large SI engines, and on the appropriate threshold for this provision.

We are also proposing to revise the provisions related to competition engines to align with the proposal for Small SI engines. Any Small SI engine that is produced under the competition exemption will very likely exceed 19 kW. As a result, we believe it is appropriate to make these provisions identical to avoid confusion.

Manufacturers have notified us that the transient test for constant-speed engines does not represent in-use operation in a way that significantly affects measured emission levels. This notification is required by § 1065.10(c)(1). In particular, manufacturers have pointed out that the specified operation involves light engine loads such that combustion and exhaust temperatures do not rise enough to reach catalyst light-off temperatures. As a result, meeting the standard using the constant-speed transient test would require the use of significantly oversized catalysts, which would add significant costs without a commensurate improvement for in-use emission control. We faced a similar dilemma in the effort to adopt transient standards for nonroad diesel engines, concluding that the transient standards should not apply until we develop a more suitable duty cycle that more appropriately reflects in-use operation. We are proposing to take this same approach for Large SI engines, waiving the requirement constant speed engines to meet the transient standards until we are able to develop a more appropriate duty cycle. Manufacturers must continue to meet the standards for steady-state testing and the field-testing standards continue to apply. We are also proposing to clarify that manufacturers certifying constant-speed engines should describe their approach to controlling emissions during transient operation in their application for certification.

Manufacturers have also pointed out that a multiplicative deterioration factor is problematic for engines with very low emission levels. While the $HC+NO_X$ emissions may be as high as 2.7 g/kW-hr, manufacturers are certifying some engine families with deteriorated emission levels below 0.1 g/kW-hr. These very low emission levels are well below the standard, but the measurement systems are challenged to produce a precisely repeatable emission level at that point. As a result, measurement variability and minor engine-to-engine variability can lead to small absolute differences in emission levels that become magnified by a deterioration factor that reflects the extremely small low-hour measurement. We are therefore proposing to specify that manufacturers use an additive deterioration factor if their low-hour emission levels are below 0.3 g/kW-hr. This change would accommodate the mathematical and analyzer effects of very low emission levels without changing the current practice for the majority of engines that are certified with emission levels closer to the standard. This change would remove the incentive for manufacturers to increase their engine's emission levels to avoid an artificially large deterioration factor. The only exception would be for cases in which good engineering judgment dictates that a multiplicative deterioration factor would nevertheless be appropriate for engines with very low emissions. This may be the case if an engine's deterioration can be attributed, even at very low emission levels, to proportionally decreased catalyst conversion of emissions from an aged engine. It is important to note that Large SI engine manufacturers are subject to in-use testing to demonstrate that they meet emission standards throughout the useful life. Should such testing indicate that an additive deterioration factor does not appropriately reflect actual performance, we would require manufacturers to revise their deterioration factors appropriately, as required under the current regulations. If such discrepancies appear for multiple manufacturers, we would revise the regulation to again require multiplicative deterioration factors for all aftertreatment-based systems. We also request comment on a further refinement of the form of the deterioration factor to more closely reflect the degradation in catalyst conversion efficiency. For example, measuring engine-out emissions would allow for calculating catalyst conversion efficiency, such that changes in this parameter over an engine's useful life could be factored into a calculation to characterize an engine's actual rate of deterioration.

Most Large SI engines are installed in equipment that has metal fuel tanks. This formed the basis of the regulatory approach to set evaporative emission standards and certification requirements. Manufacturers have raised questions about the appropriate steps to take for systems that rely on plastic fuel tanks. These tanks are able to meet standards, but questions have been raised about the engine manufacturer's role in certifying a range of fuel tanks with their engines. We request comment on the extent to which the current regulatory requirements might limit the range of fuel tank designs.

The current permeation standards for Large SI equipment references Category 1 fuel lines as defined in the version of SAE J2260 that was issued in November, 1996. In 2004, the Society of Automotive Engineers (SAE) updated SAE J2260. Manufacturers have asked whether we will approve fuel lines based on the updated procedures. The new procedures have two primary differences related to fuel line permeation. First, the test fuel was changed from CM15 to CE10.[106] Second, the associated limits for the different categories of fuel line permeation were revised. Data presented in Chapter 5 of the Draft RIA suggest that permeation from low-permeation fuel line materials can be less than half on CE10 than on CM15. The permeation specification for Category 1 fuel line was revised by SAE from 0–25 g/m^2/day to 3–10 g/m^2/day. (A new Category 0 was added at 0–3 g/m^2/day.) Directionally, the new Category 1 permeation limits seem to account for the change in the test fuel. In addition, ethanol fuel blends are commonly used in-use while methanol fuel blends are less common. We request comment on updating the regulations for Large SI equipment to reference the Category 1 fuel line specifications in the updated version of SAE J2260 (revised November 2004). We also request comment on whether this new specification would affect the stringency of the standard or the choice of fuel line constructions for this equipment.

We are also proposing several technical amendments to part 1048. Many of these simply correct

[106] "C" refers to fuel C as specified in ASTM D 412, E10 refers to 10 percent ethanol, and M15 refers to 15 percent methanol.

typographical errors or add references to the proposed regulatory cites in part 1054. Several changes are intended merely to align regulatory language with that of other programs, including those that would be subject to the standards proposed in this notice. In addition, we are proposing the following changes:

• § 1048.5: Clarifying that locomotive propulsion engines are not subject to Large SI emission standards, even if they use spark-ignition engines. This is based on the separate provisions that apply to locomotives in Clean Air Act section 213.

• § 1048.101: Clarifying manufacturer's responsibility to meet emission standards for different types of testing, especially to differentiate between field-testing standards and duty-cycle standards.

• § 1048.105: Clarifying that only the permeation standards of SAE J2260 apply to fuel lines used with Large SI engines.

• § 1048.105: Clarifying that the requirement to prevent fuel boiling is affected by the pressure in the fuel tank. The regulation currently characterizes the boiling point of fuel only at atmospheric pressure. Pressurizing the fuel tank increases the boiling point of the fuel.

• § 1048.105: Reorganizing the regulatory provisions to align with the new language in 40 CFR part 1060. This is not intended to change any of the applicable requirements.

• § 1048.110: Clarifying that ''malfunctions'' relate to engines failing to maintain emission control and not to diagnostic systems that fail to report signals; and clarifying that the malfunction indicator light needs to stay illuminated for malfunctions or for system errors.

• § 1048.120: Clarifying that the emission-related warranty covers only those components from 40 CFR part 1068, Appendix I, whose failure will increase emissions.

• § 1048.125: Clarifying the provisions related to noncritical emission-related maintenance.

• § 1048.135: Revising the engine labeling requirements to allow omission of the manufacturing date only if the date is stamped or engraved on the engine, rather than allowing manufacturers to keep records of engine build dates. This is important for verifying that engines comply with standards based on their build date.

• § 1048.205: Removing detailed specifications for describing auxiliary emission control devices in the application for certification. This responds to the concern expressed by manufacturers that the existing, very prescriptive approach requires much more information than is needed to adequately describe emission control systems. We are proposing to leave in place a broad requirement to describe emission control systems and parameters in sufficient detail to allow EPA to confirm that no defeat devices are employed. Manufacturers should be motivated to include substantial information to make such determinations in the certification process, rather than being subject to this type of investigation for emission control approaches that are found to be outside of the scope of the application for certification.

• § 1048.205: Adding requirement to align projected sales volumes with actual sales from previous years. This does not imply additional reporting or recordkeeping requirements. It is intended simply to avoid situations where manufacturers intentionally mis-state their projected sales volume to gain some advantage under the regulations.

• § 1048.205: Specifying that manufacturers must submit modal emission results rather than just submitting a weighted average. Since this information is already part of the demonstration related to the field-testing standards, this should already be common practice.

• § 1048.220: Clarifying that if manufacturers change their maintenance instructions after starting production for an engine family, they may not disqualify engines for in-use testing or warranty claims based on the fact that operators did not follow the revised maintenance instructions.

• § 1048.225: Clarifying the terminology to refer to ''new or modified engine configurations'' rather than ''new or modified nonroad engines.'' This is necessary to avoid using the term ''new nonroad engine'' in a way that differs from the definitions in § 1048.801.

• § 1048.230: Clarifying that engine families relate fundamentally to emission certification and that we would expect manufacturers to suggest a tailored approach to specifying engine families under § 1048.230(d) to occur only in unusual circumstances.

• 1048.240: Adding a requirement for design-based certification for the diurnal standards that fuel tanks need to use low-permeation materials.

• 1048.245: Adding the provision to allow for component certification for plastic fuel tanks. The revised language clarifies the requirement related to allowing pressure relief for vacuum pressures and for controlling permeation rates from plastic fuel tanks.

• § 1048.250: Adding a requirement for manufacturers to report their sales volumes for an engine family if they are using a provision that depends on production volumes.

• § 1048.301: Clarifying that engine families with projected sales volumes below 150 units may have reduced testing rates for production-line testing. This level of production does not allow for adequate testing to use the statistical techniques before exceeding specified maximum testing rates.

• § 1048.305: Clarifying that (1) Tested engines should be built in a way that represents production engines; (2) the field-testing standards apply for any testing conducted (this may involve simply comparing modal results to the field-testing standards); and (3) we may review a decision to use emission results from a retested engine instead of the original results.

• § 1048.310: Clarifying the relationship between quarterly testing and compliance with the annual testing requirements.

• § 1048.315: Correcting the equation for the CumSum statistic to prevent negative values.

• § 1048.410: Clarifying that repeat tests with an in-use test engine are acceptable, as long as the same number of repeat tests are performed for all engines.

• § 1048.415: Clarifying that the provisions related to defect reporting in 40 CFR 1068.501 apply for in-use testing.

• § 1048.501: Removing specified mapping procedures, since these are addressed in 40 CFR part 1065.

• § 1048.505: Removing redundant text and removing sampling times specified in Table 1, since these are addressed in § 1048.505(a)(1).

• § 1048.505: Correcting the mode sequence listed in the table for the ramped-modal testing.

• § 1048.505: Clarifying that cycle statistics for discrete-mode testing must be calculated separately for each mode.

• §§ 1048.605 and 1048.610: Requiring some demonstration that the sales restrictions that apply for these sections are met, and clarifying the provisions related to emission credits for vehicles that generate or use emission credits under 40 CFR part 86.

• § 1048.801: Revising several definitions to align with updated definitions adopted (or proposed) for other programs.

We request comment on changing § 1048.220 to prevent manufacturers from distributing revised emission-related maintenance instructions until we have approved them. We are taking this approach for Small SI and Marine

SI engines in this proposal (see §§ 1045.220 and 1054.220) because we believe it would be inappropriate for manufacturers to specify increased or decreased emission-related maintenance without EPA approval of those changes. The same concern applies equally to all nonroad spark-ignition engines and vehicles, so we would expect to apply the same policy to all these engines.

For Small SI and Marine SI engines we are proposing to require manufacturers of imported engines to include basic information in the application for certification, including identification of associated importers, specific ports intended for importation, and testing facilities where testing could be done in the United States. We request comment on extending these provisions to Large SI engines. See § 1054.205.

E. Amendments Related To Recreational Vehicles (40 CFR Part 1051)

Manufacturers of recreational vehicles are encouraged to review the proposed changes described in Section XI.C related to 40 CFR part 1068.

We are proposing in this notice to establish a process by which manufacturers of fuel system components certify that their products meet emission standards. For recreational vehicles we adopted a program in which the exhaust and evaporative emission standards apply to the vehicle so we did not set up a process for certifying fuel-system components. We continue to believe that evaporative emission standards should apply to the vehicle. However, we are proposing to allow manufacturers of fuel-system components to opt in to this program by certifying their fuel tanks or fuel lines to the applicable standards. While this would be a voluntary step, any manufacturer opting into the program in this way would be subject to all the requirements that apply to certificate holders. While manufacturers of recreational vehicles would continue to be responsible for meeting standards and certifying their vehicles, it may be appropriate to simplify their compliance effort by allowing them to rely on the certification of the fuel-line manufacturer or fuel-tank manufacturer.

We also request comment on specifying that vehicle manufacturers use the certification and testing procedures proposed in 40 CFR part 1060 to meet the evaporative emission standards included in part 1051. This would not be intended to affect the stringency of current requirements. This would simply allow us to maintain consistent requirements across programs and avoid publishing redundant specifications.

We are also proposing several technical amendments to part 1051. Many of these simply correct typographical errors or add references to the proposed regulatory cites in part 1054. Several changes are intended merely to align regulatory language with that of other programs, including those that would be subject to the standards proposed in this notice.

In addition, we are proposing the following changes:

- § 1051.1: Revising the speed threshold for offroad utility vehicles to be subject to part 1051. Changing from ''25 miles per hour or higher'' to ''higher than 25 miles per hour'' aligns this provision with the similar threshold for qualifying as a motor vehicle in 40 CFR 85.1703.
- § 1051.5: Clarifying the status of very small recreational vehicles to reflect the provisions in the current regulations in 40 CFR part 90 to treat such vehicles with a dry weight under 20 kilograms as Small SI engines.
- § 1051.25: Clarifying that manufacturers of recreational vehicles that use engines certified to meet exhaust emission standards must still certify the vehicle with respect to the evaporative emission standards.
- § 1051.120: Clarifying that the emission-related warranty covers only those components from 40 CFR part 1068, Appendix I, whose failure will increase emissions.
- § 1051.125: Clarifying the provisions related to noncritical emission-related maintenance.
- § 1051.135: Revising the labeling requirements to allow omission of the manufacturing date only if the date is stamped or engraved on the vehicle, rather than allowing manufacturers to keep records of vehicle build dates. This is important for verifying that vehicles comply with standards based on their build date.
- § 1051.135: Adding a requirement to include family emission limits related to evaporative emissions to the emission control information label. Since this change may involve some time for manufacturers to comply, we are proposing to apply this starting with the 2009 model year.
- § 1051.137: Clarifying how the labeling requirements apply with respect to the averaging program and selected family emission limits.
- § 1051.205: Removing detailed specifications for describing auxiliary emission control devices in the application for certification. This responds to the concern expressed by manufacturers that the existing, very prescriptive approach requires much more information that is needed to adequately describe emission control systems. We are proposing to leave in place a broad requirement to describe emission control systems and parameters in sufficient detail to allow EPA to confirm that no defeat devices are employed. Manufacturers should be motivated to include substantial information to make such determinations in the certification process, rather than being subject to this type of investigation for emission control approaches that are found to be outside of the scope of the application for certification.
- § 1051.205: Requirements to align projected sales volumes with actual sales from previous years. This does not imply additional reporting or recordkeeping requirements. It is intended simply to avoid situations where manufacturers intentionally misstate their projected sales volume to gain some advantage under the regulations.
- § 1051.220: Clarifying that if manufacturers change their maintenance instructions after starting production for an engine family, they may not disqualify vehicles for warranty claims based on the fact that operators did not follow the revised maintenance instructions.
- § 1051.225: Clarifying the terminology to refer to ''new or modified vehicle configurations'' rather than ''new or modified vehicles.'' This is necessary to avoid confusion with the term ''new vehicle'' as it relates to introduction into commerce.
- § 1051.225: Clarifying the provisions related to changing an engine family's Family Emission Limit after the start of production.
- § 1051.255: Adopting a different SAE standard for specifying low-permeability materials to allow for design-based certification of metal fuel tanks with gaskets made of polymer materials. The existing language does not adequately characterize the necessary testing and material specifications.
- § 1051.230: Clarifying that engine families relate fundamentally to emission certification and that we would expect manufacturers to suggest a tailored approach to specifying engine families under § 1051.230(e) to occur only in unusual circumstances.
- § 1051.250: Adding a requirement for manufacturers to report their sales volumes for an engine family if they are using a provision that depends on production volumes.
- § 1051.301: Clarifying that engine families with projected sales volumes

below 150 units may be exempted from production-line testing. This level of production does not allow for adequate testing to use the statistical techniques before exceeding specified maximum testing rates.

- § 1051.305: Clarifying that tested vehicles should be built in a way that represents production vehicles.
- § 1051.310: Clarifying the relationship between quarterly testing and compliance with the annual testing requirements; and clarifying the testing provisions that apply for engine families where the production period is substantially less than a full year.
- § 1051.315: Correcting the equation for the CumSum statistic to prevent negative values.
- § 1051.325: Clarifying the basis on which we would approve retroactive changes to the Family Emission Limit for an engine family that has failed under production-line testing.
- § 1051.505: Clarifying that cycle statistics for discrete-mode testing must be calculated separately for each mode.
- §§ 1051.605 and 1051.610: Requiring some demonstration that the sales restrictions that apply for these sections are met.
- § 1051.650: Add a requirement to certify vehicles that are converted to run on a different fuel. We expect this is a rare occurrence, but one that we should make subject to certification requirements (see Section VII.B.3).
- § 1051.701: Clarifying that manufacturers using emission credits to meet emission standards must base their credit calculations on their full product line-up, rather than considering only those engine families with Family Emission Limits above or below the emission standard. We are also clarifying that a single family may not generate emission credits for one pollutant while using emission credits for another pollutant, which is common to all our emission control programs.
- § 1051.735: Adding a requirement to keep records related to banked emission credits for as long as a manufacturer intends for those credits to be valid. This is necessary for us to verify the appropriateness of credits used for demonstrating compliance with emission standards in later model years.
- § 1051.801: Revising several definitions to align with updated definitions adopted (or proposed) for other programs.

We request comment on changing § 1051.220 to prevent manufacturers from distributing revised emission-related maintenance instructions until we have approved them. We are taking this approach for Small SI and Marine SI engines in this proposal (see §§ 1045.220 and 1054.220) because we believe it would be inappropriate for manufacturers to specify increased or decreased emission-related maintenance without EPA approval of those changes. The same concern applies equally to all nonroad spark-ignition engines and vehicles, so we would expect to apply the same policy to all these engines.

For Small SI and Marine SI engines we are proposing to require manufacturers of imported engines to include basic information in the application for certification, including identification of associated importers, specific ports intended for importation, and testing facilities where testing could be done in the United States. We request comment on extending these provisions to recreational vehicles. See § 1054.205.

F. Amendments Related to Heavy-Duty Highway Engines (40 CFR Part 85)

We are proposing to make several adjustments to the provisions related to delegated assembly specified in § 85.1713. These adjustments include:

- Removing the provision related to auditing outside the United States since equipment manufactured in other countries would not be subject to these provisions
- Clarifying that the exemption expires when the equipment manufacturer takes possession of the engine, but not before it reaches the point of final assembly
- Clarifying the prohibition related to following installation instructions to ensure that engines will be in their certified configuration when installed in a piece of equipment.

We believe all these amendments are straightforward adjustments that are appropriate for maintaining a program that allows for appropriate oversight and implementation.

G. Amendments Related to Stationary Spark-Ignition Engines (40 CFR Part 60)

On June 12, 2006 we proposed emission standards for stationary spark-ignition engines (71 FR 33804). The June 2006 proposal specified that stationary spark-ignition engines at or below 19 kW would be subject to all the same emission standards and certification requirements that apply to Small SI engines. If we would include the new Phase 3 standards for Small SI engines in 40 CFR part 90, these requirements would apply automatically to those stationary engines. However, since the Phase 3 standards will be in 40 CFR part 1054, as described in Section V, we are proposing to revise the regulatory language for stationary spark-ignition engines in 40 CFR part 60, subpart JJJJ, to directly reference the Phase 3 standards part 1054.

XII. Projected Impacts

A. Emissions from Small Nonroad and Marine Spark-Ignition Engines

As discussed in previous sections, this proposal will reduce exhaust emissions from specific sizes of nonhandheld Small SI and Marine SI engines. It will also reduce evaporative emissions from the fuel systems used on nonhandheld and handheld Small SI equipment and Marine SI vessels (for simplicity we collectively include the evaporative emission requirements from equipment or vessels when referring to Small SI or Marine SI engines in the remainder of this section). The proposed exhaust and evaporative emission standards will directly affect volatile organic hydrocarbon compounds (VOC), oxides of nitrogen (NO_X), and to a lesser extent carbon monoxide (CO). Also, we anticipate that the emission control technology which is likely to be used to meet the exhaust emission standards will affect directly emitted particulate matter, most importantly particles with diameters of 2.5 micrometers or less ($PM_{2.5}$). It will also incrementally reduce air toxic emissions. A detailed analysis of the effects of this proposal on emissions and emission inventories can be found in Chapter 3 of the Draft RIA.

The contribution of exhaust and evaporative emissions from Small SI and Marine SI engines to total 50-state emission inventories is significant and will remain so into the future. Table XII–1 presents the nationwide inventory for these engines for both 2001 and 2020. (The inventories cover all Small SI and Marine SI engines including the portion of Small SI engines regulated by the California ARB.) Table XII–1 shows that for the primary pollutants affected by this proposal, these engines contribute about 25 to 30 percent of the nationwide VOC emissions from all mobile sources. The nationwide contribution to the total mobile source NO_X inventory is about 5 percent or less. Finally, for $PM_{2.5}$, the contribution ranges from about 25 to 30 percent.

TABLE XII–1.—CONTRIBUTION OF SMALL NONROAD AND MARINE SI ENGINES TO NATIONAL (50-STATE) MOBILE SOURCE EMISSION INVENTORIES

Pollutant	2001		2020	
	Small SI/marine SI inventory, tons	Percent of mobile source inventory	Small SI/marine SI inventory, tons	Percent of mobile source inventory
VOC	2,239,056	28	1,351,739	27
NO_X	159,051	1	201,789	4
$PM_{2.5}$	42,294	9	39,271	16
CO	20,867,436	24	16,373,518	31

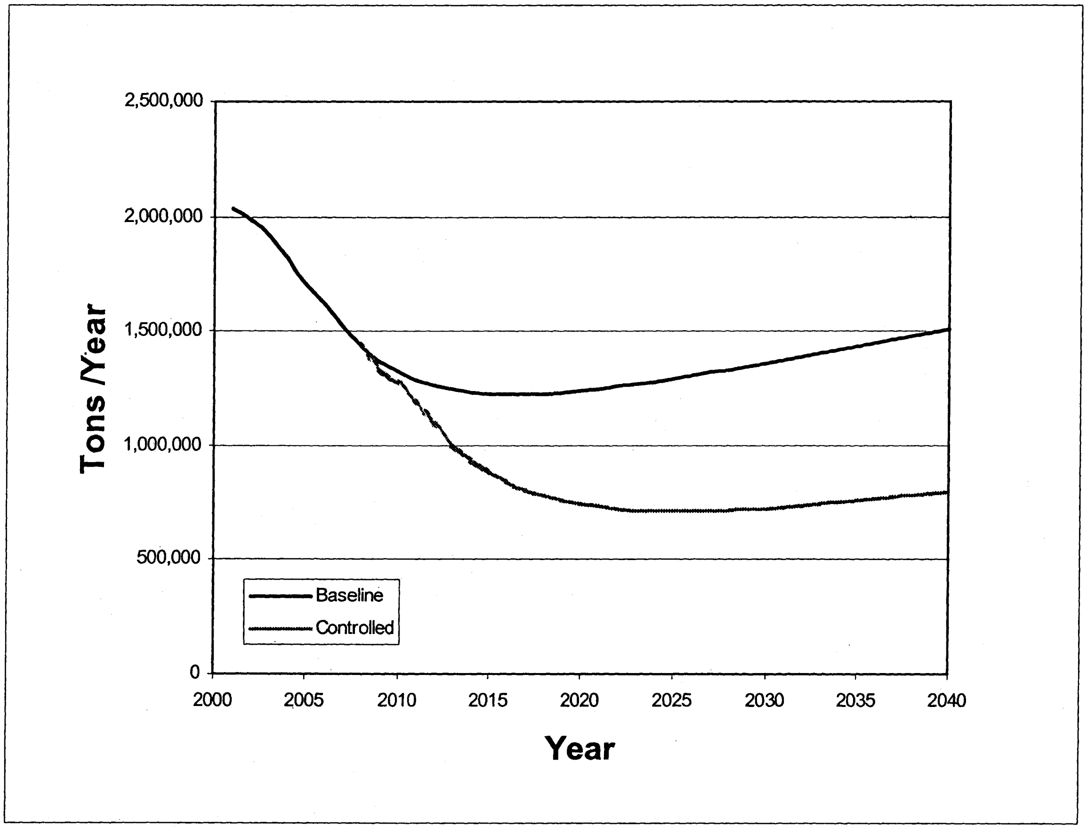
(1) VOC

Table XII–2 shows the VOC emissions and emission reductions we expect both with and without the proposed standards for engines, equipment, and vessels affected by the proposal. In 2001, Small SI and Marine SI emitted approximately 1,081,000 and 961,000 tons of VOC, respectively. Without the proposed standards, these emissions will decrease because of the effect of the existing emission control requirements to about 1,005,000 and 490,000 tons by 2040, respectively. With the proposed controls, this pollutant will be further reduced by 34 percent for Small SI engines and 74 percent for Marine SI engines by 2040. The VOC emission inventory trends over time for both categories of engines that are subject to the proposal are shown in Figure XII–1.

TABLE XII–2.—NATIONAL (50-STATE) VOC EMISSIONS AND EMISSION REDUCTIONS FOR SMALL SI AND MARINE SI ENGINES

Year	Category	Without proposed rule	With proposed rule	Reduction	Percent reduction
2001	Small Engine	1,080,898	1,080,898		
	Marine	961,240	961,240		
	Both	2,042,138	2,042,138		
2015	Small Engine	708,331	510,617	197,714	28
	Marine	513,105	372,020	141,086	27
	Both	1,221,436	882,637	338,799	28
2020	Small Engine	764,453	508,677	255,776	33
	Marine	466,624	232,697	233,927	50
	Both	1,231,078	741,375	489,703	40
2030	Small Engine	884,188	581,766	302,422	34
	Marine	464,490	135,956	328,533	71
	Both	1,348,678	717,723	630,955	47
2040	Small Engine	1,005,403	659,976	345,427	34
	Marine	490,052	127,158	362,893	74
	Both	1,495,455	787,135	708,320	47

Figure XII-1: Estimated VOC Emissions from Small SI and Marine SI Engines



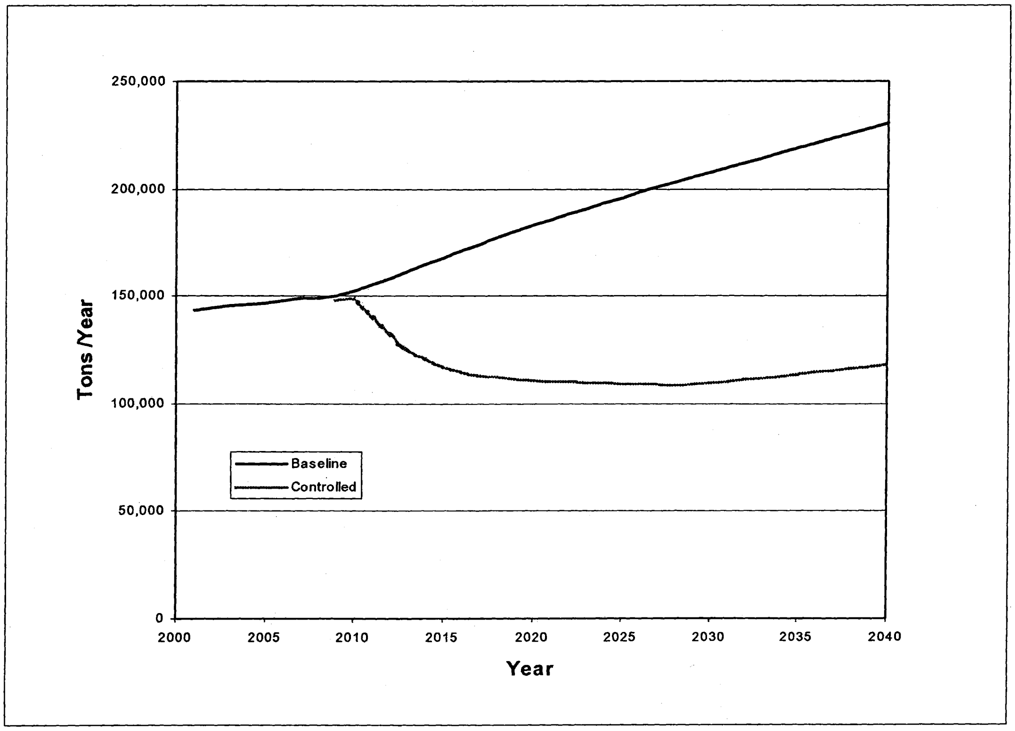
(2) NO_X

Table XII–3 shows the NO_X emissions and emission reductions we expect both with and without the proposed standards for engines affected by the proposal. In 2001, Small SI and Marine SI emitted approximately 102,000 and 41,500 tons of NO_X, respectively. Without the proposed standards, these emissions will increase to about 135,000, and 95,400 tons by 2040, respectively. With the proposed controls, this pollutant will be reduced by 47 percent for Small SI engines and 51 percent for Marine SI engines by 2040. The NO_X emission inventory trends over time for both categories of engines that are subject to the proposal are shown in Figure XII–2.

TABLE XII–3.—NATIONAL (50-STATE) NO_X EMISSIONS AND EMISSION REDUCTIONS FOR SMALL SI AND MARINE SI ENGINES

Year	Category	Without proposed rule	With proposed rule	Reduction	Percent reduction
2001	Small Engine	101,928	101,928		
	Marine	41,514	41,514		
	Both	143,442	143,442		
2015	Small Engine	94,432	58,117	36,315	38
	Marine	73,583	59,024	14,558	20
	Both	168,015	117,141	50,874	30
2020	Small Engine	102,310	55,241	47,069	46
	Marine	80,655	55,656	24,999	31
	Both	182,965	110,896	72,069	39
2030	Small Engine	118,615	62,778	55,837	47
	Marine	89,225	46,859	42,366	47
	Both	207,840	109,637	98,203	47
2040	Small Engine	135,136	71,361	63,775	47
	Marine	95,440	46,874	48,567	51
	Both	230,577	118,235	112,342	49

Figure XII-2: Estimated NOx Emissions from Small SI and Marine SI Engines



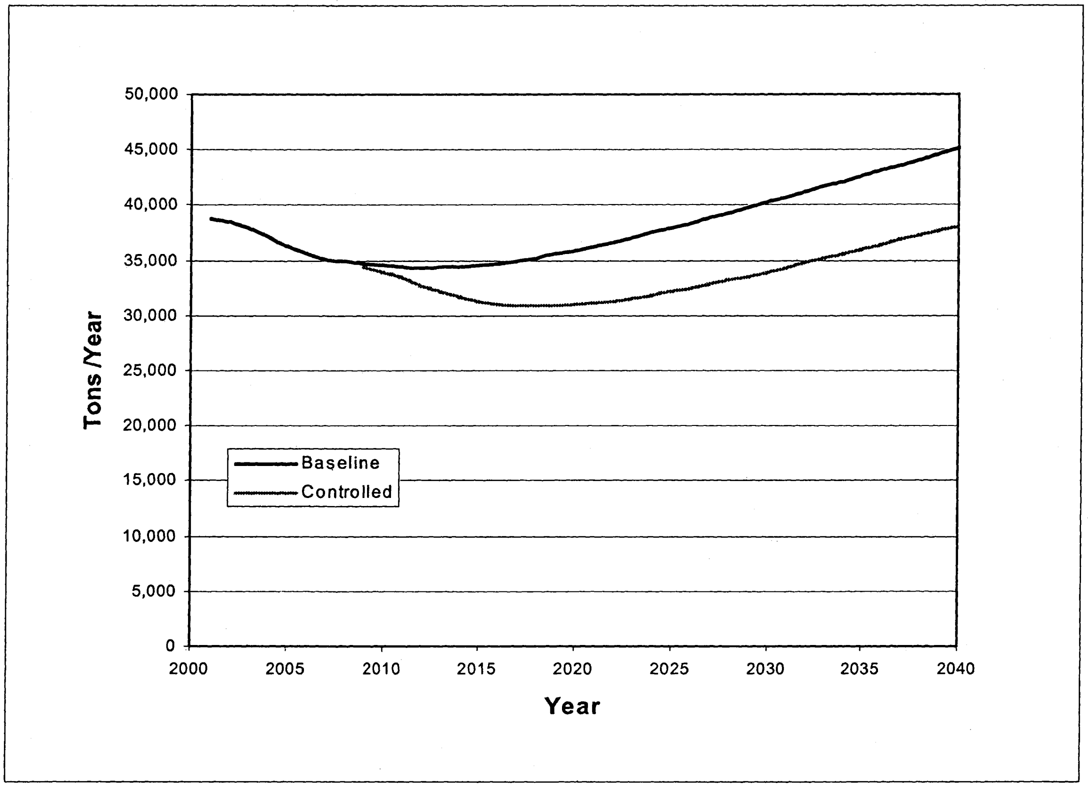
(3) PM2.5

Table XII–4 shows the PM2.5 emissions and emission reductions we expect both with and without the proposed standards for engines affected by the proposal. In 2001, Small SI and Marine SI emitted 23,200 and 15,600 tons of PM2.5, respectively. Without the proposed standards, the PM2.5 emissions from Small SI engines will increase to 39,100 by 2040, while those from Marine SI will decrease to about 6,000 tons in that year due to the effects of the existing emission control requirements for certain types of recreational marine engines, *e.g*, outboards. With the proposed controls, this pollutant will be reduced by 5 percent for Small SI engines and a further 84 percent for Marine SI engines by 2040. The PM2.5 emission inventory trends over time for both categories of engines that are subject to the proposal are shown in Figure XII–3.

TABLE XII–4.—NATIONAL (50-STATE) PM2.5 EMISSIONS AND EMISSION REDUCTIONS FOR SMALL SI AND MARINE SI ENGINES

Year	Category	Without proposed rule	With proposed rule	Reduction	Percent reduction
2001	Small Engine	23,163	23,163		
	Marine	15,625	15,625		
	Both	38,789	38,789		
2015	Small Engine	27,747	26,647	1,100	4
	Marine	6,823	4,666	2,157	32
	Both	34,570	31,313	3,256	9
2020	Small Engine	30,009	28,574	1,435	5
	Marine	5,908	2,448	3,461	59
	Both	35,917	31,022	4,896	14
2030	Small Engine	34,535	32,849	1,686	5
	Marine	5,719	1,107	4,613	81
	Both	40,255	33,956	6,299	16
2040	Small Engine	39,079	37,153	1,926	5
	Marine	6,016	985	5,031	84
	Both	45,095	38,138	6,957	15

Figure XII-3: Estimated PM2.5 Emissions from Small SI and Marine SI Engines



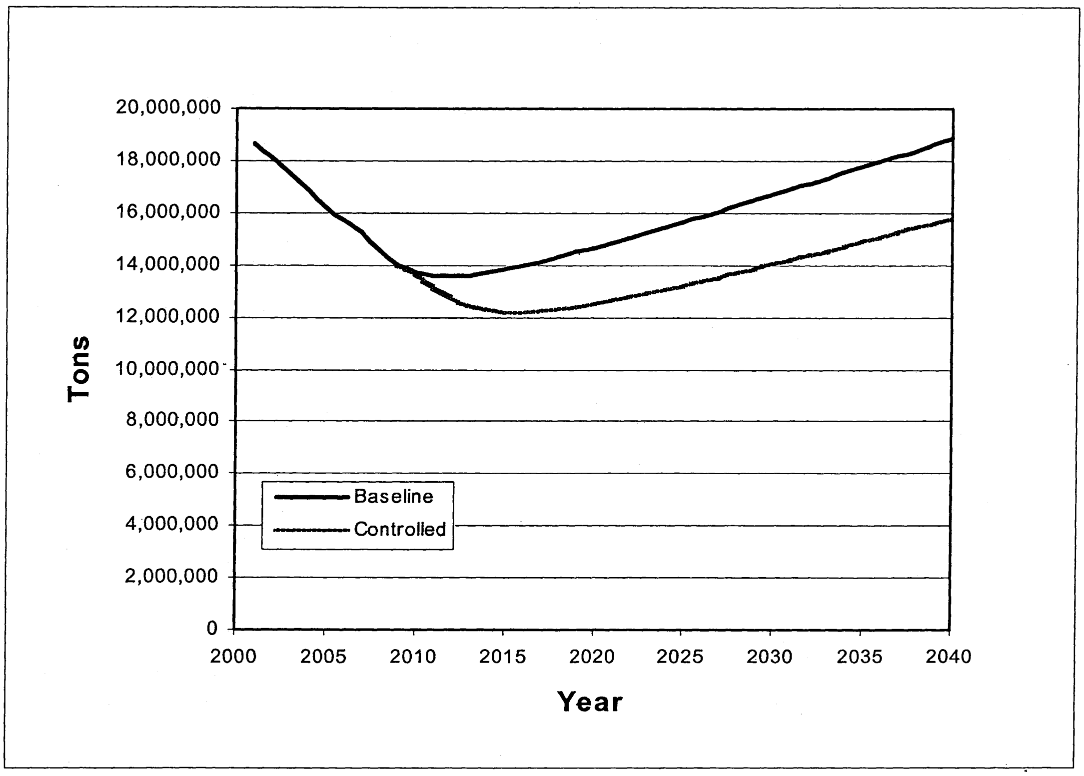
(4) CO

Table XII.–5 shows the CO emissions and emission reductions we expect both with and without the proposed standards for engines affected by the proposal. In 2001, Small SI and Marine SI emitted 16,108,000 and 2,585,000 tons of PM2.5, respectively. Without the proposed standards, these emissions will increase slightly for Small SI engines to 16,727,000 and decrease slightly for Marine SI engines to 2,122,000 tons by 2040, respectively. With the proposed controls, this pollutant will be reduced by 16 percent for Small SI engines and a further 22 percent for Marine SI engines by 2040. The CO emission inventory trends over time for both categories of engines that are subject to the proposal are shown in Figure XII–4.

TABLE XII–5.—NATIONAL (50-STATE) CO EMISSIONS AND EMISSION REDUCTIONS FOR SMALL SI AND MARINE SI ENGINES

Year	Category	Without proposed rule	With proposed rule	Reduction	Percent reduction
2001	Small Engine	16,108,103	16,108,103		
	Marine	2,584,786	2,584,786		
	Both	18,692,890	18,692,890		
2015	Small Engine	11,797,078	10,317,051	1,480,027	13
	Marine	2,031,684	1,883,241	148,443	7
	Both	13,828,762	12,200,291	1,628,471	12
2020	Small Engine	12,712,775	10,782,258	1,930,518	15
	Marine	1,968,663	1,718,956	249,707	13
	Both	14,681,439	12,501,214	2,180,225	15
2030	Small Engine	14,700,521	12,411,661	2,288,860	16
	Marine	2,009,248	1,607,678	401,570	20
	Both	16,709,768	14,019,339	2,690,429	16
2040	Small Engine	16,726,708	14,113,517	2,613,191	16
	Marine	2,122,336	1,665,392	456,943	22
	Both	18,849,044	15,778,910	3,070,134	16

Figure XII-4: Estimated CO Emissions from Small SI and Marine SI Engines



B. Estimated Costs

In assessing the economic impact of setting emission standards, we have made a best estimate of the costs associated with the technologies we anticipate manufacturers will use in meeting the standards. In making our estimates for the proposed rule, we have relied on our own technology assessment, which includes information developed by EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL). Estimated costs include variable costs (e.g. hardware and assembly time) and fixed costs (e.g. research and development, retooling, engine certification and test cell upgrades to 40 CFR 1065 requirements). We projected that manufacturers will recover the fixed costs over five years of production and used an amortization rate of 7 percent in our analysis. The analysis also considers total operating costs, including maintenance and fuel consumption. Cost estimates based on the projected technologies represent an expected change in the cost of engines as they begin to comply with new emission standards. All costs are presented in 2005 dollars. Full details of our cost analysis can be found in Chapter 6 of the Draft RIA. Estimated costs related to exhaust emissions were also subject to peer review, as described in a set of peer review reports that are available in the docket for this rulemaking.

Cost estimates based on the current projected costs for our estimated technology packages represent an expected incremental cost of equipment in the near term. For the longer term we have identified factors that would cause cost impacts to decrease over time. First, as noted above, we project that manufacturers will spread their fixed costs over the first five years of production. After the fifth year of production, we project that the fixed costs would be retired and the unit costs could be reduced as a result.

The cost analysis considers both long-term and short-term costs. We expect that over time, manufacturers will undergo a learning process that will lead to lower variable costs. For instance, the analysis incorporates the expectation that Small SI engine manufacturers will optimize the catalyst muffler offerings available and thereby streamline their production and reduce costs. The cost analysis generally incorporates this learning effect by decreasing estimated variable costs by 20 percent starting in the sixth year of production. Long-term impacts on costs are expected to decrease as manufacturers fully amortize their fixed costs and learn to optimize their designs and production processes to meet the standards more efficiently. The learning curve has not been applied to Small SI EFI systems due to the fact that the technologies are currently well established on similar sized engines in other applications.

We project average costs to comply with the proposed exhaust emission standards for Small SI engines and equipment to range from $9–$15 per Class I equipment to meet the Phase 3 standards. We anticipate the manufacturers will meet the emission standard with several technologies including engine improvements and catalysts. For Class II equipment, we project average costs to range from $22–$47 per equipment to meet the proposed emission standards. We anticipate the manufacturers of Class II engines would meet the proposed exhaust emission standards by engine improvements and adding catalysts and/or electronic fuel injection to their engines.

For Small SI equipment, we have also estimated a per-unit cost for the proposed evaporative emission standards. The average short-term costs without fuel savings are projected to be $0.82 for handheld equipment, $3.16 for Class I equipment, and $6.90 for Class II equipment. These costs are based on fuel tank and fuel line permeation control, and for non-handheld equipment, running loss and diffusion control. Because evaporative emissions are composed of otherwise usable fuel that is lost to the atmosphere, measures that reduce evaporative emissions will result in fuel savings. We estimate that the average fuel savings, due to permeation control, be about 1.2 gallons over the 5-year average operating lifetime. This translates to a discounted lifetime savings of more than $2 at an average fuel price of $1.81 per gallon.

For marine engines, we estimated per-engine costs for OB, PWC, and SD/I engines for meeting the proposed exhaust emission standards. The short-term cost estimates without fuel savings are $280 for OB, $360 for PWC, and $360 for SD/I engines. For OB/PWC engines, we anticipate that manufacturers would meet the standards through the expanded production of existing low-emission technologies such as four-stroke and direct-injection two-stroke engines. For SD/I engines, we anticipate that manufacturers would use catalytic control to meet the proposed standards.

For marine vessels, we have also estimated a per-unit cost for the proposed evaporative emission standards. The average short-term costs without fuel savings are projected to be $12 for boats with portable fuel tanks, $17 for PWC, and $74 for boats with installed fuel tanks. These costs are based on fuel tank and fuel line permeation control and diurnal emission control. For portable fuel tanks, diurnal emission control is based on an automatic sealing vent, for PWC we estimate that changes will not be necessary from current designs, and for other boats with installed fuel tanks, the estimated costs are based on the use of a passively-purged carbon canister. Because evaporative emissions are composed of otherwise usable fuel that is lost to the atmosphere, measures that reduce evaporative emissions will result in fuel savings. We estimate that the average fuel savings, due to permeation control, be about 31 gallons over the 15-year average operating lifetime. This translates to a discounted lifetime savings of about $36 at an average fuel price of $1.81 per gallon.

C. Cost per Ton

We have calculated the cost per ton of the Phase 3 standards contained in this proposal by estimating costs and emission benefits for these engines. We made our best estimates of the combination of technologies that engine manufacturers might use to meet the new standards, best estimates of resultant changes to equipment design, engine manufacturer compliance program costs, and fuel savings in order to assess the expected economic impact of the proposed Phase 3 emission standards for Small SI engines and Marine SI engines. Emission reduction benefits are taken from the results of the Inventory chapter of the RIA (Chapter 3).

A summary of the annualized costs to Small SI and Marine SI engine manufacturers is presented in Table XII–6. These annualized costs are over a 30-year period and presented both with a 3-percent and a 7-percent discount rate. The annualized fuel savings for Small SI engines are due to reduced fuel costs from the use of electronic fuel injection on Class II engines as well as fuel savings from evaporative measures on all Small SI engines. The annualized fuel savings for Marine SI engines are due to reduced fuel costs from the expected elimination of 2-stroke outboard motors from the new engine fleet as well as fuel savings from evaporative emission controls on all vessels.

TABLE XII–6.—ESTIMATED ANNUALIZED COST TO MANUFACTURERS AND ANNUALIZED FUEL SAVINGS OVER 30 YEARS DUE TO THE PHASE 3 SMALL SI AND MARINE SI ENGINE STANDARDS

[2005$, 3 and 7 percent discount rates]

Engine category	Emissions category	Annualized cost to manufactuers (millions/yr)		Annualized fuel savings (millions/yr)	
		3%	7%	3%	7%
Small SI Engines	Exhaust	$281	$267	$71	$63
	Evaporative	70	67	58	52
	Aggregate	350	334	129	114
Marine SI Engines	Exhaust	134	141	76	67
	Evaporative	26	26	29	25
	Aggregate	160	167	105	92

We have estimated the Small SI and Marine SI engine cost per ton of the Phase 3 HC+NO_X standards over the typical lifetime of the equipment that are covered by this proposal. We have examined the cost per ton by performing a nationwide cost per ton analysis in which the net present value of the cost of compliance per year is divided by the net present value of the HC+NO_X benefits over 30 years. The resultant discounted cost per ton is presented in Table XII–7. The total (exhaust and evaporative) cost per ton, using a 7 percent discount rate, with fuel savings is $950 for Small SI equipment and $350 for marine vessels. For the proposal as a whole, the cost per ton of HC+NO_X reduction is $660. Reduced operating costs offset a portion of the increased cost of producing the cleaner Small SI and Marine SI engines. Reduced fuel consumption also offsets the costs of permeation control. Chapter 7 of the RIA contains a more detailed discussion of the cost per ton analysis.

TABLE XII–7.—ESTIMATED COST PER TON OF THE HC+NO_X EMISSION STANDARDS

[2005$, 3 and 7 percent discount rates]

Category	Implementation dates	Discounted cost per ton	
		Without fuel savings (3%/7%)	With fuel savings (3%/7%)
Small SI Exhaust	2011–2012	$1700/$1860	$1270/$1420

TABLE XII–7.—ESTIMATED COST PER TON OF THE $HC+NO_X$ EMISSION STANDARDS—Continued

[2005$, 3 and 7 percent discount rates]

Category	Implementation dates	Discounted cost per ton	
		Without fuel savings (3%/7%)	With fuel savings (3%/7%)
Small SI Evaporative	2008–2013	720/770	120/170
Marine SI Exhaust	2009–2013	690/820	300/430
Marine SI Evaporative	2009–2012	530/630	(70)/35
Aggregate	2008–2013	660/1120	226/660

As is discussed above, we are also expecting some reduction in direct PM emissions and carbon monoxide. These reductions will come primarily as product of the technology being used to meet HC and NO_X standards and not directly as a result of the implementation of specific technology to achieve these gains. Thus, we have elected to focus our cost per ton analysis on $HC+NO_X$.

One useful purpose of cost per ton analysis is to compare this program to other programs designed to achieve similar air quality objectives. Toward that end, we made a comparison between the $HC+NO_X$ cost per ton values presented in Table C–2 and the $HC+NO_X$ cost per ton of other recent mobile source programs. Table XII–8 summarizes the $HC+NO_X$ cost per ton of several recent EPA actions for controlled emissions from mobile sources. While the analyses for each rule were not completely identical, it is clear that the Small SI and Marine SI values compare favorably with the other recent actions.

TABLE XII–8.—COST PER TON OF PREVIOUSLY IMPLEMENTED $HC+NO_X$ MOBILE SOURCE PROGRAMS

[2005$, 7 percent discount with fuel savings]

Program		Discounted cost per ton
2002	HH engines Phase 2	840
2001	NHH engines Phase 2	* neg
1998	Marine SI engines	1900
2004	Comm Marine CI	200
2007	Large SI exhaust	80
2006	ATV exhaust	300
2006	Off-highway motorcycle	290
2006	Recreational marine CI	700
2010	Snowmobile	1430
2006	<50cc highway motorcycle	1860
2010	Class 3 highway motorcycle	1650

* Fuel savings outweigh engineering/hardware costs.

D. Air Quality Impact

Information on the air quality impacts of this proposed action can be found in Section II of this preamble. Section II includes health effect information on ozone, PM, CO and air toxics. It also includes modeled projections of future ozone concentrations with and without the controls detailed in this proposal. The proposed emission reductions would lead to reductions in ambient concentrations of ozone, PM, CO and air toxics.

E. Benefits

This section presents our analysis of the health and environmental benefits that can be expected to occur as a result of the proposed Small SI and Marine SI engine standards throughout the period from initial implementation through 2030. Nationwide, the engines that are subject to the proposed emission standards in this rule are a significant source of mobile source air pollution. The proposed standards would reduce exposure to hydrocarbon, CO and NO_X emissions and help avoid a range of adverse health effects associated with ambient ozone and $PM_{2.5}$ levels. In addition, the proposed standards would help reduce exposure to CO, air toxics, and $PM_{2.5}$ for persons who operate or who work with or are otherwise active in close proximity to these engines.

EPA typically quantifies PM- and ozone-related benefits in its regulatory impact analyses (RIAs) when possible. In the analysis of past air quality regulations, ozone-related benefits have included morbidity endpoints and welfare effects such as damage to commercial crops. EPA has not recently included a separate and additive mortality effect for ozone, independent of the effect associated with fine particulate matter. For a number of reasons, including (1) Advice from the Science Advisory Board (SAB) Health and Ecological Effects Subcommittee (HEES) that EPA consider the plausibility and viability of including an estimate of premature mortality associated with short-term ozone exposure in its benefits analyses and (2) conclusions regarding the scientific support for such relationships in EPA's 2006 Air Quality Criteria for Ozone and Related Photochemical Oxidants (the CD), EPA is in the process of determining how to appropriately characterize ozone-related mortality benefits within the context of benefits analyses for air quality regulations. As part of this process, we are seeking advice from the National Academy of Sciences (NAS) regarding how the ozone-mortality literature should be used to quantify the reduction in premature mortality due to diminished exposure to ozone, the amount of life expectancy to be added and the monetary value of this increased life expectancy in the context of health benefits analyses associated with regulatory assessments. In addition, the agency has sought advice on characterizing and communicating the uncertainty associated with each of these aspects in health benefit analyses.

Since the NAS effort is not expected to conclude until 2008, the agency is currently deliberating how best to characterize ozone-related mortality benefits in its rulemaking analyses in the interim. For the analysis of the proposed standards, we do not quantify an ozone mortality benefit. So that we do not provide an incomplete picture of all of the benefits associated with reductions in emissions of ozone precursors, we have chosen not to include an estimate of total ozone benefits in the proposed RIA. By omitting ozone benefits in this proposal, we acknowledge that this analysis underestimates the benefits associated with the proposed standards. Our analysis, however, indicates that the rule's monetized $PM_{2.5}$ benefits alone substantially exceed our estimate of the costs.

The $PM_{2.5}$ benefits are scaled based on relative changes in $PM_{2.5}$ precursor emissions (direct PM and NO_X) between this rule and the proposed Clean Air Nonroad Diesel (CAND) rule. As explained in Section 8.2.1 of the RIA for this rule, the $PM_{2.5}$ benefits scaling approach is limited to those studies, health impacts, and assumptions that were used in the proposed CAND analysis. As a result, PM-related premature mortality is based on the updated analysis of the American Cancer Society cohort (ACS; Pope et al., 2002).[107] However, it is important to note that since the CAND rule, EPA's Office of Air and Radiation (OAR) has adopted a different format for its benefits analyses in which characterization of the uncertainty in the concentration-response function is integrated into the main benefits analysis. This new approach follows the recommendation of NRC's 2002 report ''Estimating the Public Health Benefits of Proposed Air Pollution Regulations'' to begin moving the assessment of uncertainties from its ancillary analyses into its main benefits presentation through the conduct of probabilistic analyses.[108] Within this context, additional data sources are available, including a recent expert elicitation and updated analysis of the Six-Cities Study cohort (Laden et al., 2006).[109] Please see the PM NAAQS RIA for an indication of the sensitivity of our results to use of alternative concentration-response functions. The $PM_{2.5}$-related benefits associated with the proposed standards are presented in table XII–9.

It should be noted that since the CAND rule, EPA's Office of Air and Radiation (OAR) has adopted a different format for its benefits analysis in which characterization of uncertainty is integrated into the main benefits analysis. The benefits scaling approach used in the analysis of the proposed standards limits our ability to integrate uncertainty into the main analysis. For the benefits analysis of the final standards, we will adopt this integrated uncertainty approach. Please see the PM NAAQS RIA for an indication of the uncertainty present in the base estimate of benefits and the sensitivity of our results to the use of alternative concentration-response functions.

TABLE XII–9.—ESTIMATED MONETIZED PM-RELATED HEALTH BENEFITS OF THE PROPOSED STANDARDS

	Total Benefits[a, b, c] (billions 2005$)	
	2020	2030
Using a 3% discount rate	\$2.1 + B	\$3.4 + B
Using a 7% discount rate	\$1.9 + B	\$3.1 + B

[a] Benefits include avoided cases of mortality, chronic illness, and other morbidity health endpoints. PM-related mortality benefits estimated using an assumed PM threshold at background levels (3 µg/m³). There is uncertainty about which assumed threshold to use and this may impact the magnitude of the total benefits estimate. For a more detailed discussion of this issue, please refer to Section 8.6.2.2 of the RIA.

[b] For notational purposes, unquantified benefits are indicated with a ''B'' to represent the sum of additional monetary benefits and disbenefits. A detailed listing of unquantified health and welfare effects is provided in Table XII–12.

[c] Results reflect the use of two different discount rates: 3 and 7 percent, which are recommended by EPA's Guidelines for Preparing Economic Analyses[110] and OMB Circular A–4.[111] Results are rounded to two significant digits for ease of presentation and computation.

(1) Quantified Human Health and Environmental Effects of the Proposed Standards

In this section we discuss the $PM_{2.5}$ benefits of the proposed standards. To estimate $PM_{2.5}$ benefits, we rely on a benefits transfer technique. The benefits transfer approach uses as its foundation the relationship between reductions in precursors to $PM_{2.5}$ (NO_X and direct $PM_{2.5}$ emissions) and ambient $PM_{2.5}$ concentrations modeled across the contiguous 48 states (and DC) for the Clean Air Nonroad Diesel (CAND) proposal.[112] For a given future year, we first calculate the ratio between CAND direct $PM_{2.5}$ emission reductions and direct $PM_{2.5}$ emission reductions associated with the proposed control standards (proposed emission reductions/CAND emission reductions). We calculate a similar ratio for NO_X. We then multiply these ratios by the percent that direct $PM_{2.5}$ and NO_X emissions, respectively, contribute towards population-weighted reductions in ambient $PM_{2.5}$ due to the CAND standards. This calculation results in a ''benefits apportionment factor'' for the relationship between direct PM emissions and ambient $PM_{2.5}$ and NO_X emissions and ambient $PM_{2.5}$, which are then applied to the incidence and monetized benefits from the CAND proposal. In this way, we apportion the results of the proposed CAND analysis to its underlying PM precursor emission reductions and scale the apportioned

[107] Pope, C.A., III, R.T. Burnett, M.J. Thun, E.E. Calle, D. Krewski, K. Ito, and G.D. Thurston. 2002. ''Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution.'' Journal of the American Medical Association 287:1132–1141.

[108] National Research Council (NRC). 2002. Estimating the Public Health Benefits of Proposed Air Pollution Regulations. Washington, DC: The National Academies Press.

[109] Laden, F., J. Schwartz, F.E. Speizer, and D.W. Dockery. 2006. Reduction in Fine Particulate Air Pollution and Mortality. American Journal of Respiratory and Critical Care Medicine. 173: 667–672.

[110] U.S. Environmental Protection Agency. September 2000. *Guidelines for Preparing Economic Analyses.* EPA 240–R–00–003.

[111] U.S. Office of Management and Budget (OMB). 2003. Circular A–4 Guidance for Federal Agencies Preparing Regulatory Analyses, Available at: *http://www/whitehouse.gov/omb/inforeg/iraguide.html.* Accessed December 15, 2005.

[112] See 68 FR 28327, May 23, 2003.

benefits to reflect differences in emission reductions between the two rules.[113] This benefits transfer method is consistent with the approach used in other recent mobile and stationary source rules.[114]

Table XII–10 presents the primary estimates of reduced incidence of PM-related health effects for the years 2020 and 2030 for the proposed emission control strategy.[115] In 2030, we estimate that PM-related annual benefits include approximately 450 fewer premature fatalities, 290 fewer cases of chronic bronchitis, 800 fewer non-fatal heart attacks, 460 fewer hospitalizations (for respiratory and cardiovascular disease combined), 310,000 days of restricted activity due to respiratory illness and approximately 52,000 fewer work-loss days. We also estimate substantial health improvements for children from reduced upper and lower respiratory illness, acute bronchitis, and asthma attacks.

TABLE XII–10.—ESTIMATED ANNUAL REDUCTIONS IN INCIDENCE OF HEALTH EFFECTS [a]

Health effect	2020 annual incidence reduction	2030 annual incidence reduction
PM-Related Endpoints:		
Premature Mortality [b]—		
Adult, age 30 and over plus Infant, age <1 year	290	450
Chronic bronchitis (adult, age 26 and over)	200	290
Non-fatal myocardial infarction (adult, age 18 and over)	490	800
Hospital admissions—respiratory (all ages) [c]	160	270
Hospital admissions—cardiovascular (adults, age >18) [d]	130	200
Emergency room visits for asthma (age 18 years and younger)	210	310
Acute bronchitis, (children, age 8–12)	470	700
Lower respiratory symptoms (children, age 7–14)	5,600	8,300
Upper respiratory symptoms (asthmatic children, age 9–18)	4,300	6,300
Asthma exacerbation (asthmatic children, age 6–18)	7,000	10,000
Work loss days	38,000	52,000
Minor restricted activity days (adults age 18–65)	220,000	310,000

[a] Incidence is rounded to two significant digits. The PM estimates represent benefits from the proposed rule nationwide. The ozone estimates only represent benefits from the Eastern 37 states and DC, though the program is national in scope.

[b] PM-related adult mortality based upon studies by Pope, et al 2002.[116] PM-related infant mortality based upon studies by Woodruff, Grillo, and Schoendorf,1997.[117]

[c] Respiratory hospital admissions for PM include admissions for chronic obstructive pulmonary disease (COPD), pneumonia and asthma.

[d] Cardiovascular hospital admissions for PM include total cardiovascular and subcategories for ischemic heart disease, dysrhythmias, and heart failure.

(2) Monetized Benefits

Table XII–11 presents the estimated monetary value of reductions in the incidence of health and welfare effects. Annual PM-related health benefits are approximately $3.4 billion in 2030, assuming a 3 percent discount rate (or $3.1 billion assuming a 7 percent discount rate). All monetized estimates are stated in 2005 dollars. These estimates account for growth in real gross domestic product (GDP) per capita between the present and the years 2020 and 2030. As the table indicates, total benefits are driven primarily by the reduction in premature fatalities each year, which accounts for well over 90 percent of total benefits.

Table XII–11 indicates with a ''B'' those additional health and environmental benefits of the rule that we were unable to quantify or monetize. These effects are additive to the estimate of total benefits, and are related to the following sources:

- There are many human health and welfare effects associated with ozone, PM, and toxic air pollutant reductions that remain unquantified because of current limitations in the methods or available data. A full appreciation of the overall economic consequences of the proposed standards requires consideration of all benefits and costs expected to result from the new standards, not just those benefits and costs which could be expressed here in dollar terms. A listing of the benefit categories that could not be quantified or monetized in our benefit estimates are provided in Table XII–12.
- The PM air quality model only captures the benefits of air quality improvements in the 48 states and DC; PM benefits for Alaska and Hawaii are not reflected in the estimate of benefits.

[113] Note that while the proposed regulations control hydrocarbons (VOCs), which contribute to PM formation, the benefits transfer scaling approach only scales benefits based on NO_X, SO_2, and direct PM emission reductions. PM benefits will likely be underestimated as a result, though we are unable to estimate the magnitude of the underestimation. Note also that PM-related mortality benefits estimated for the CAND analysis used an assumed PM threshold at background levels (3 µg/m^3). There is uncertainty about which threshold to use and this may impact the magnitude of the total benefits estimate. For a more detailed discussion of this issue, please refer to Chapter 8.2 of the RIA.

[114] See: Mobile Source Air Toxics proposed rule (71 FR 15803, March 29, 2006); Clean Air Nonroad Diesel final rule (69 FR 38958, June 29, 2004); Nonroad Large Spark-Ignition Engines and Recreational Engines standards (67 FR 68241, November 8, 2002); Final Industrial Boilers and Process Heaters NESHAP (69 FR 55217, September 13, 2004); Final Reciprocating Internal Combustion Engines NESHAP (69 FR 33473, June 15, 2004); Final Clean Air Visibility Rule (EPA–452/R–05–004, June 15, 2005); Ozone Implementation Rule (documentation forthcoming).

[115] The ''primary estimate'' refers to the estimate of benefits that reflects the suite of endpoints and assumptions that EPA believes yields the expected value of air quality improvements related to the proposed standards. The impact that alternative endpoints and assumptions have on the benefit estimates are explored in appendixes to the RIA.

[116] Pope, C.A., III, R.T. Burnett, M.J. Thun, E.E. Calle, D. Krewski, K. Ito, and G.D. Thurston. 2002. ''Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution.'' *Journal of American Medical Association* 287:1132–1141.

[117] Woodruff, T.J., J. Grillo, and K.C. Schoendorf. 1997. ''The Relationship Between Selected Causes of Postneonatal Infant Mortality and Particulate Infant Mortality and Particulate Air Pollution in the United States.'' *Environmental Health Perspectives* 105(6):608–612.

[118] U.S. Environmental Protection Agency, 2000. Guidelines for Preparing Economic Analyses. *www.yosemite1.epa.gov/ee/epa/eed/hsf/pages/Guideline.html.*

[119] Office of Management and Budget, The Executive Office of the President, 2003. Circular A–4. *http://www.whitehouse.gov/omb/circulars.*

TABLE XII–11.—ESTIMATED ANNUAL MONETARY VALUE OF REDUCTIONS IN INCIDENCE OF HEALTH AND WELFARE EFFECTS (2005$) [a, b]

Health effect	Pollutant	2020 estimated value of reductions (millions)	2030 estimated value of reductions (millions)
PM-Related Premature mortality [c, d]			
Adult >30 years	$PM_{2.5}$.		
3 percent discount rate		$2,000	$3,100
7 percent discount rate		1,800	2,800
Child <1 year		5	6
Chronic bronchitis (adults, 26 and over)	$PM_{2.5}$	90	140
Non-fatal acute myocardial infarctions			
3 percent discount rate		50	77
7 percent discount rate	$PM_{2.5}$	48	75
Hospital admissions for respiratory causes	$PM_{2.5}$	2.9	5.0
Hospital admissions for cardiovascular causes	$PM_{2.5}$	3.1	4.7
Emergency room visits for asthma	$PM_{2.5}$	0.07	0.11
Acute bronchitis (children, age 8–12)	$PM_{2.5}$	0.20	0.30
Lower respiratory symptoms (children, age 7–14)	$PM_{2.5}$	0.11	0.16
Upper respiratory symptoms (asthma, age 9–11)	$PM_{2.5}$	0.13	0.19
Asthma exacerbations	$PM_{2.5}$	0.36	0.54
Work loss days	$PM_{2.5}$	5.8	7.0
Minor restricted activity days (MRADs)	$PM_{2.5}$	14	19
Monetized Total [e]			
Base estimate:			
3 percent discount rate	$PM_{2.5}$	2,100 + B	3,400 + B
7 percent discount rate		1,900 + B	3,100 + B

[a] Incidence is rounded to two significant digits. The PM estimates represent benefits from the proposed rule nationwide.
[b] Monetary benefits adjusted to account for growth in real GDP per capita between 1990 and the analysis year (2020 or 2030).
[c] Valuation of premature mortality based on long-term PM exposure assumes discounting over the SAB recommended 20 year segmented lag structure described in the Regulatory Impact Analysis for the Final Clean Air Interstate Rule (March 2005). Results show 3 percent and 7 percent discount rates consistent with EPA and OMB guidelines for preparing economic analyses (US EPA, 2000 and OMB, 2003).[118, 119]
[d] Adult mortality based upon the ACS cohort study (Pope et al., 2002). Infant mortality based upon studies by Woodruff, Grillo, and Schoendorf, 1997.
[e] B represents the monetary value of health and welfare benefits not monetized. A detailed listing is provided in Table XII–12.

TABLE XII–12.—UNQUANTIFIED AND NON-MONETIZED EFFECTS OF THE PROPOSED SMALL SPARK IGNITION/RECREATIONAL MARINE ENGINE RULE

Pollutant/effects	Effects not included in primary estimates—changes in:
Ozone Health [a]	Premature mortality: short-term exposures [b].
	Hospital admissions: respiratory.
	Emergency room visits for asthma.
	Minor restricted-activity days.
	School loss days.
	Asthma attacks.
	Cardiovascular emergency room visits.
	Acute respiratory symptoms.
	Chronic respiratory damage.
	Premature aging of the lungs.
	Non-asthma respiratory emergency room visits.
	Increased exposure to UVb.
Ozone Welfare	Yields for
	—commercial forests.
	—some fruits and vegetables.
	—non-commercial crops.
	Damage to urban ornamental plants.
	Impacts on recreational demand from damaged forest aesthetics.
	Ecosystem functions.
	Increased exposure to UVb.
PM Health [c]	Premature mortality—short term exposures [d].
	Low birth weight.
	Pulmonary function.
	Chronic respiratory diseases other than chronic bronchitis.
	Non-asthma respiratory emergency room visits.
	Exposure to UVb (±)[e].
PM Welfare	Visibility in Class I areas.
	Residential and recreational visibility in non-Class I areas.
	Soiling and materials damage.
	Damage to ecosystem functions.
	Exposure to UVb (±)[e].

TABLE XII–12.—UNQUANTIFIED AND NON-MONETIZED EFFECTS OF THE PROPOSED SMALL SPARK IGNITION/RECREATIONAL MARINE ENGINE RULE—Continued

Pollutant/effects	Effects not included in primary estimates—changes in:
Nitrogen and Sulfate Deposition Welfare.	Commercial forests due to acidic sulfate and nitrate deposition.
	Commercial freshwater fishing due to acidic deposition.
	Recreation in terrestrial ecosystems due to acidic deposition.
	Existence values for currently healthy ecosystems.
	Commercial fishing, agriculture, and forests due to nitrogen deposition.
	Recreation in estuarine ecosystems due to nitrogen deposition.
	Ecosystem functions.
	Passive fertilization.
CO Health	Behavioral effects.
HC Health [f]	Cancer (benzene, 1,3-butadiene, formaldehyde, acetaldehyde).
	Anemia (benzene).
	Disruption of production of blood components (benzene).
	Reduction in the number of blood platelets (benzene).
	Excessive bone marrow formation (benzene).
	Depression of lymphocyte counts (benzene).
	Reproductive and developmental effects (1,3-butadiene).
	Irritation of eyes and mucus membranes (formaldehyde).
	Respiratory irritation (formaldehyde).
	Asthma attacks in asthmatics (formaldehyde).
	Asthma-like symptoms in non-asthmatics (formaldehyde).
	Irritation of the eyes, skin, and respiratory tract (acetaldehyde).
	Upper respiratory tract irritation and congestion (acrolein).
HC Welfare	Direct toxic effects to animals.
	Bioaccumulation in the food chain.
	Damage to ecosystem function.
	Odor.

[a] In addition to primary economic endpoints, there are a number of biological responses that have been associated with ozone health effects including increased airway responsiveness to stimuli, inflammation in the lung, acute inflammation and respiratory cell damage, and increased susceptibility to respiratory infection. The public health impact of these biological responses may be partly represented by our quantified endpoints.

[b] Recent analyses provide evidence that short-term ozone exposure is associated with increased premature mortality. As a result, EPA is considering how to incorporate ozone mortality benefits into its benefits analyses as a separate estimate of the number of premature deaths that would be avoided due to reductions in ozone levels.

[c] In addition to primary economic endpoints, there are a number of biological responses that have been associated with PM health effects including morphological changes and altered host defense mechanisms. The public health impact of these biological responses may be partly represented by our quantified endpoints.

[d] While some of the effects of short-term exposures are likely to be captured in the estimates, there may be premature mortality due to short-term exposure to PM not captured in the cohort study upon which the primary analysis is based.

[e] May result in benefits or disbenefits.

[f] Many of the key hydrocarbons related to this rule are also hazardous air pollutants listed in the Clean Air Act.

(3) What Are the Significant Limitations of the Benefits Analysis?

Every benefit-cost analysis examining the potential effects of a change in environmental protection requirements is limited to some extent by data gaps, limitations in model capabilities (such as geographic coverage), and uncertainties in the underlying scientific and economic studies used to configure the benefit and cost models. Deficiencies in the scientific literature often result in the inability to estimate quantitative changes in health and environmental effects, such as potential increases in premature mortality associated with increased exposure to carbon monoxide. Deficiencies in the economics literature often result in the inability to assign economic values even to those health and environmental outcomes which can be quantified. These general uncertainties in the underlying scientific and economics literature, which can cause the valuations to be higher or lower, are discussed in detail in the RIA and its supporting references. Key uncertainties that have a bearing on the results of the benefit-cost analysis of the proposed standards include the following:

- The exclusion of potentially significant and unquantified benefit categories (such as health, odor, and ecological benefits of reduction in ozone, air toxics, and PM);
- Errors in measurement and projection for variables such as population growth;
- Uncertainties in the estimation of future year emissions inventories and air quality, especially regarding the discrepancy between the modeled and proposed suite of standards and their impact on emissions inventories;
- Uncertainties associated with the scaling of the PM results of the modeled benefits analysis to the proposed standards, especially regarding the assumption of similarity in geographic distribution between emissions and human populations and years of analysis;
- Uncertainty in the estimated relationships of health and welfare effects to changes in pollutant concentrations including the shape of the concentration-response function, the size of the effect estimates, and the relative toxicity of the many components of the PM mixture;
- Uncertainties in exposure estimation; and
- Uncertainties associated with the effect of potential future actions to limit emissions.

As Table XII–11 indicates, total benefits are driven primarily by the reduction in premature fatalities each year. Elaborating on the list of uncertainties above, some key assumptions underlying the primary estimate for the premature mortality category include the following:

• Inhalation of fine particles is causally associated with premature death at concentrations near those experienced by most Americans on a daily basis. Although biological mechanisms for this effect have not yet been completely established, the weight of the available epidemiological, toxicological, and experimental evidence supports an assumption of causality. The impacts of including a probabilistic representation of causality were explored in the expert elicitation-based results of the recently published PM NAAQS RIA. Because the analysis of the proposed standards is constrained to the studies included in the CAND PM benefits scaling approach, we are unable to conduct the same analysis of expert elicitation-based mortality incidence for the proposed standards.[120] However, we qualitatively describe the expert elicitation-based mortality results associated with the final PM NAAQS to provide an indication of the sensitivity of our PM-related premature mortality results to use of alternative concentration-response functions. We present this discussion in the RIA.

• Since the publication of CAIR, a follow up to the Harvard six-city study on premature mortality was published (Laden et al., 2006 based on Dockery et al., 1993),[121] [122] which both confirmed the effect size from the first study and provided additional evidence that reductions in $PM_{2.5}$ directly result in reductions in the risk of premature death. The impacts of including this study in the primary analysis were explored in the results of the recently published PM NAAQS RIA. Because the analysis of the proposed standards is constrained to the studies included in the CAND PM benefits scaling approach, we are unable to characterize PM-related mortality based on Laden et al. However, we discuss the implications of these results in the RIA for the proposed standards.

• All fine particles, regardless of their chemical composition, are equally potent in causing premature mortality. This is an important assumption, because PM produced via transported precursors emitted from Small SI and Marine SI engines may differ significantly from PM precursors released from electric generating units and other industrial sources. However, no clear scientific grounds exist for supporting differential effects estimates by particle type.

• The concentration-response function for fine particles is approximately linear within the range of ambient concentrations under consideration. Thus, the estimates include health benefits from reducing fine particles in areas with varied concentrations of PM, including both regions that may be in attainment with $PM_{2.5}$ standards and those that are at risk of not meeting the standards.

Taking into account these uncertainties, we believe this benefit-cost analysis provides a conservative estimate of the expected economic benefits of the proposed standards in future years because of the exclusion of potentially significant benefit categories. Acknowledging benefits omissions and uncertainties, we present a best estimate of the total benefits based on our interpretation of the best available scientific literature and methods. Furthermore, our analysis reflects many methodological improvements that were incorporated into the analysis of the final Clean Air Interstate Rule (CAIR), including a revised value of a statistical life, a revised baseline rate of future mortality, and a revised mortality lag assumption. Details of these improvements can be found in the RIA for this rule and in the final CAIR rule RIA.[123] Once again, however, it should be noted that since the CAIR rule, EPA's Office of Air and Radiation (OAR) has adopted a different format for its benefits analysis in which characterization of uncertainty is integrated into the main benefits analysis. Please see the PM NAAQS RIA for an indication of the uncertainty present in the base estimate of benefits and the sensitivity of our results to the use of alternative concentration-response functions.

(4) How Do the Benefits Compare to the Costs of the Proposed Standards?

The proposed rule establishes separate standards that reduce the evaporative and exhaust emissions from Small SI and Marine SI engines. A full appreciation of the overall economic consequences of these provisions requires consideration of the benefits and costs expected to result from each standard. Due to limitations in data availability and analytical methods, however, we are only able to present the benefits of the entire proposed rule in the aggregate for both $PM_{2.5}$ and ozone. There are also a number of health and environmental effects associated with the proposed standards that we were unable to quantify or monetize (see Table XII–12).

Table XII–13 contains the estimates of monetized $PM_{2.5}$-related benefits of the proposed standards and estimated social welfare costs for each of the proposed control programs. The annual social welfare costs of all provisions of this proposed rule are described more fully in the next section. The results in Table XII–13 suggest that the 2020 and 2030 monetized benefits of the proposed standards are much greater than the expected social welfare costs. Specifically, the annual benefits of the program would be approximately $2.1 + B billion annually in 2020 using a three percent discount rate (or $1.9 + B billion using a seven percent discount rate), compared to estimated social welfare costs of approximately $252 million in that same year. The net benefits are expected to increase to $3.4 + B billion annually in 2030 using a three percent discount rate (or $3.1 + B billion using a seven percent discount rate), even as the social welfare costs of that program fall to $241 million.

In Table XII–13, we present the costs and PM-related benefits related to each of the two broad engine classes regulated by the proposed standards: Small SI and Marine SI engines. Table XII–13 also presents the costs and PM-related benefits related to the specific engine classes regulated by the proposed standards: Small SI—Class I, Class II, and Handheld (HH); Marine SI—Sterndrive/Inboard (SD/I), and Outboard/Personal Water Craft (OB/PWC). Using the same PM scaling approach described in Chapter 8.2 of the RIA, we are able to split out the estimated PM benefits related to the different Small SI and Marine SI engine classes. One can see that in all cases, the PM benefits accrued by the engine classes are greater than the costs, even when fuel savings is not factored into the cost estimate. The benefit-to-cost ratio would be even greater if we

[120] The scaling approach relies on the incidence and valuation estimates derived from the studies available at the time of the CAND analysis. Incidence estimates and monetized benefits derived from new information, including mortality derived from the full expert elicitation, are not available for scaling. Please refer to section 2 of this preamble and Chapter 12 of the RIA for more information about the benefits scaling approach.

[121] Laden, F., J. Schwartz, F.E. Speizer, and D.W. Dockery. 2006. Reduction in Fine Particulate Air Pollution and Mortality. *American Journal of Respiratory and Critical Care Medicine*. 173: 667–672.

[122] Dockery, D.W., C.A. Pope, X.P. Xu, J.D. Spengler, J.H. Ware, M.E. Fay, B.G. Ferris, and F.E. Speizer. 1993. "An Association between Air Pollution and Mortality in Six U.S. Cities." *New England Journal of Medicine* 329(24):1753–1759.

[123] See Chapter 4 of the Final Clean Air Interstate Rule RIA (*http://www.epa.gov/cair*) for a discussion of EPA's ongoing efforts to address the NAS recommendations in its regulatory analyses.

estimated the ozone benefits related to the proposed standards.

TABLE XII–13.—SUMMARY OF ANNUAL BENEFITS, COSTS, AND NET BENEFITS OF THE PROPOSED SMALL SI AND MARINE SI ENGINE RULE [a]

Description	2020 (Millions of 2005 dollars)	2030 (Millions of 2005 dollars)
Estimated Social Welfare Costs [b c]		
Small SI	$351	$404
Class I	145	167
Class II	199	229
HH [d]	7	8
Marine SI	154	164
SD/I	41	44
OB/PWC	113	120
Total	505	569
Fuel Savings	(253)	(327)
Total Social Welfare Costs	252	241
Estimated Benefits [e f]		
PM-Only Small SI Benefits		
3 percent discount rate	861	1,280
7 percent discount rate	782	1,160
Class I		
3 percent discount rate	478	647
7 percent discount rate	434	587
Class II		
3 percent discount rate	383	627
7 percent discount rate	348	570
PM-Only Marine SI Benefits		
3 percent discount rate	1,280	2,110
7 percent discount rate	1,160	1,190
SD/I		
3 percent discount rate	209	487
7 percent discount rate	190	442
OB/PWC		
3 percent discount rate	1,070	1,620
7 percent discount rate	969	1,470
Total PM-Only Benefits [g]		
3 percent discount rate	2,140+B	3,380+B
7 percent discount rate	1,940+B	3,070+B
Annual Net PM-Only Benefits (Total Benefits-Total Costs) [g]		
3 percent discount rate	1,890+B	3,140+B
7 percent discount rate	1,690+B	2,830+B

[a] All estimates are rounded to three significant digits and represent annualized benefits and costs anticipated for the years 2020 and 2030. Columnar totals may not sum due to rounding.

[b] Note that costs are the annual total costs of reducing all pollutants associated with each provision of the proposed control package, while the benefits reflect the value of reductions in $PM_{2.5}$ only.

[c] To calculate annual fixed costs, we use a 7 percent average before-tax rate of return on private capital (see Chapter 9). We do not present annual costs using an alternative rate of return. In Chapter 9, however, we use both a 3 percent and 7 percent social discount rate to calculate the net present value of total social costs consistent with EPA and OMB guidelines for preparing economic analyses (US EPA, 2000 and OMB, 2003).[124 125]

[d] Handheld emission reductions associated with the proposed standards, volatile organic hydrocarbons, are not accounted for in the PM benefits scaling approach. The PM benefit scaling approach is based upon changes in NO_X and direct $PM_{2.5}$ (see section 8.2 of the RIA). We therefore do not estimate any PM-related benefits associated with emission reductions in the handheld engine class.

[e] PM-related benefits in this table are nationwide.

[f] Valuation of premature mortality based on long-term PM exposure assumes discounting over the SAB recommended 20-year segmented lag structure described in section 8.3 of the RIA. Valuation of non-fatal myocardial infarctions is based on the cost-of-illness over a 5-year period after the incident. The valuation of both endpoints therefore requires the use of a discount rate. We present the PM-related benefits results using a 3 percent and 7 percent social discount rate consistent with EPA and OMB guidelines for preparing economic analyses (US EPA, 2000 and OMB, 2003).

[g] Not all possible benefits or disbenefits are quantified and monetized in this analysis. B is the sum of all unquantified benefits and disbenefits. Potential benefit categories that have not been quantified and monetized are listed in Table XII–12.

F. Economic Impact Analysis

We prepared an Economic Impact Analysis (EIA) to estimate the economic impacts of the proposed emission control program on the Small SI and Marine SI engine and equipment markets. In this section we briefly describe the Economic Impact Model (EIM) we developed to estimate the market-level changes in price and outputs for affected markets, the social costs of the program, and the expected distribution of those costs across affected stakeholders. We also present the results of our analysis. We request comment on all aspects of the analysis,

[124] U.S. Environmental Protection Agency, 2000. Guidelines for Preparing Economic Analyses. *http:// www.yosemite1.epa.gov/ee/epa/eed/hsf/pages/Guideline.html*.

[125] Office of Management and Budget, The Executive Office of the President, 2003. Circular A–4. *http://www.whitehouse.gov/omb/circulars*.

including the model and the model inputs.

We estimate the net social costs of the proposed program to be about $241 million in 2030.[126, 127] This estimate reflects the estimated compliance costs associated with the Small SI and Marine SI engine standards and the expected fuel savings from improved evaporative controls. When the fuel savings are not taken into account, the results of the economic impact modeling suggest that the social costs of these programs are expected to be about $569 million in 2030. Consumers of Small SI and Marine products are expected to bear about 75 percent of these costs. Small SI engine and equipment manufacturers are expected to bear 6 percent and 19 percent, respectively. We estimate fuel savings of about $327 million in 2030, which will accrue to consumers.

With regard to market-level impacts in 2030, the average price increase for Small SI engines is expected to be about 9.1 percent ($17 per unit). The average price increase for Marine SI engines is expected to be about 1.7 percent ($195 per unit). The largest average price increase for Small SI equipment is expected to be about 5.6 percent ($15 per unit) for Class I equipment. The largest average price increase for Marine SI vessels is expected to be about 2.1 percent ($178 per unit) for Personal Watercraft.

(1) What is an Economic Impact Analysis?

An Economic Impact Analysis (EIA) is prepared to inform decision makers about the potential economic consequences of a regulatory action. The analysis consists of estimating the social costs of a regulatory program and the distribution of these costs across stakeholders. These estimated social costs can then be compared with estimated social benefits (as presented in Section XII.E). As defined in EPA's *Guidelines for Preparing Economic Analyses*, social costs are the value of the goods and services lost by society resulting from (a) The use of resources to comply with and implement a regulation and (b) reductions in output.[128] In this analysis, social costs are explored in two steps. In the *market analysis*, we estimate how prices and quantities of goods affected by the proposed emission control program can be expected to change once the program goes into effect. In the *economic welfare analysis*, we look at the total social costs associated with the program and their distribution across stakeholders.

(2) What Is the Economic Impact Model?

The EIM is a behavioral model developed for this proposal to estimate price and quantity changes and total social costs associated with the emission controls under consideration. The EIM simulates how producers and consumers of affected products can be expected to respond to an increase in production costs as a result of the proposed emission control program. In this EIM, compliance costs are directly borne by producers of affected goods. Depending on the producers' and consumers' sensitivity to price changes, producers of affected products will try to pass some or all of the increased production costs on to the consumers of these goods through price increases. In response to the price increases, consumers will decrease their demand for the affected good. Producers will react to the decrease in quantity demanded by decreasing the quantity they produce; the market will react by setting a higher price for those fewer units. These interactions continue until a new market equilibrium quantity and price combination is achieved. The amount of the compliance costs that can be passed on to the consumers is ultimately limited by the price sensitivity of consumers and producers in the relevant market (represented by the price elasticity of demand or supply). The EIM explicitly models these behavioral responses and estimates the new equilibrium prices and output and the resulting distribution of social costs across these stakeholders (producers and consumers).

(3) What Economic Sectors Are Included in This Economic Impact Analysis?

There are two broad economic sectors affected by the emission control program described in this proposal: (1) Small SI engines and equipment, and (2) Marine SI engines and equipment. For Small SI engines and equipment we distinguish between handheld and nonhandheld sectors. For handheld, we model one integrated handheld engine and equipment category. On the nonhandheld side, we model 6 engine categories, depending on engine class and useful life (Class I: UL125, UL250, and UL500; Class II: UL250, UL500, UL1000), and 8 equipment categories (agriculture/construction/general industrial; utility and recreational vehicles; lawn mowers; tractors; other lawn and garden; generator sets/welders; pumps/compressors/pressure washers; and snowblowers). For Marine SI engines and equipment, we distinguish between sterndrives and inboards (SD/I), outboards (OB), and personal watercraft (PWC). SD/I and OB are further categorized by whether they are luxury or not. All of these markets are described in more detail in Chapter 9 of the RIA and in the industry characterizations prepared for this proposal.

This analysis assumes that all of these products are purchased and used by residential households. This means that to model the behavior change associated with the proposed standards we model all uses as residential lawn and garden care or power generation (Small SI) or personal recreation (Marine SI). We do not explicitly model commercial uses (how the costs of complying with the proposed programs may affect the production of goods and services that use Small SI or Marine SI engines or equipment as production inputs); we treat all commercial uses as if they were residential uses. We believe this approach is reasonable because the commercial share of the end use markets for both Small SI and Marine SI equipment is very small.[129] In addition, for any commercial uses of these products the share of the cost of these products to total production costs is also small (*e.g.*, the cost of a Small SI generator is only a very small part of the total production costs for a construction firm). Therefore, a price increase of the magnitude anticipated for this control program is not expected to have a noticeable impact on prices or quantities of goods or services produced using Small SI or Marine SI equipment as inputs (*e.g.*, commercial turf care, construction, or fishing).

[126] All estimates presented in this section are in 2005$.

[127] This analysis is based on an earlier version of the engineering compliance developed for this rule. The net present value of the engineering costs used in this analysis (without taking the fuel savings into account, at a 3 percent discount rate over the period of the analysis) is $10.0 billion, which is about $100 million less than the net present value of the final estimated engineering costs, $10.1 billion. We do not expect that a difference of this magnitude would change the overall results of this economic impact analysis, in terms of market impacts and how the costs are expected to be shared among stakeholders.

[128] EPA *Guidelines for Preparing Economic Analyses*, EPA 240-R–00–003, September 2000, p 113. A copy of this document can be found at *http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html*.

[129] The Outdoor Power Equipment Institute (OPEI) provides annual estimates of Small SI shipments (unit volumes) broken out into commercial and residential markets. For 2003 and 2004, the commercial share for NHH products is estimated to be 3.3 percent and 2.8 percent, respectively; for all Small SI products is estimated to be 1.4 percent and 1.2 percent. Similarly, commercial uses of Marine SI vessels are limited. See the industry characterizations prepared for this proposal for more information (RTI, 2006).

In the EIM the Small SI and Marine SI markets are not linked (there is no feedback mechanism between the Small SI and Marine SI market segments). This is appropriate because the affected equipment is not interchangeable and because there is very little overlap between the engine producers in each market. These two sectors represent different aspects of economic activity (lawn and garden care and power generation as opposed to recreational marine) and production and consumption of one product is not affected by the other. In other words, an increase in the price of lawnmowers is not expected to have an impact on the production and supply of personal watercraft, and vice versa. Production and consumption of each of these products are the results of other factors that have little cross-over impacts (the need for residential garden upkeep or power generation; the desire for personal recreation).

(4) What Are the Key Features of the Economic Impact Model?

A detailed description of the features of the EIM and the data used in this analysis is provided in Chapter 9 of the RIA prepared for this rule. The model methodology is firmly rooted in applied microeconomic theory and was developed following the methodology set out in OAQPS's *Economic Analysis Resource Document*.[130]

The EIM is a computer model comprised of a series of spreadsheet modules that simulate the supply and demand characteristics of the markets under consideration. The initial market equilibrium conditions are shocked by applying the compliance costs for the control program to the supply side of the markets (this is done by shifting the relevant supply curves by the amount of the compliance costs). The EIM uses the model equations, model inputs, and a solution algorithm to estimate equilibrium prices and quantities for the markets with the regulatory program. These new prices and quantities are used to estimate the social costs of the model and how those costs are shared among affected markets.

The EIM uses a multi-market partial equilibrium approach to track changes in price and quantity for the modeled markets. As explained in EPA's *Guidelines for Preparing Economic Analyses,* ''partial equilibrium'' means that the model considers markets in isolation and that conditions in other markets are assumed either to be unaffected by a policy or unimportant for social cost estimation. Multi-market analysis models go beyond partial equilibrium by extending the inquiry to more than just single markets and attempt to capture at least some of the interaction between markets—in this case, between selected engine and equipment markets sectors.[131]

The EIM uses an intermediate run time frame. This means that some factors of production are fixed and some are variable. In very short analyses, all factors of production would be assumed to be fixed, leaving the producers with no means to respond to the increased production costs associated with the regulation (*e.g.*, they cannot adjust labor or capital inputs). Under this time horizon, the costs of the regulation fall entirely on the producer. In the long run, all factors of production are variable and producers can adjust production in response to cost changes imposed by the regulation (*e.g.*, using a different labor/capital mix). In the intermediate run there is some resource immobility which may cause producers to suffer producer surplus losses, but they can also pass some of the compliance costs to consumers.

The EIM assumes a perfectly competitive market structure. The perfect competition assumption is a widely accepted economic practice for this type of analysis, and only in rare cases are other approaches used.[132] It should be noted that the perfect competition assumption is not about the number of firms in a market, it is about how the market operates. The markets included in this analysis do not exhibit evidence of noncompetitive behavior: there are no indications of barriers to entry, the firms in these markets are not price setters, and there is no evidence of high levels of strategic behavior in the price and quantity decisions of the firms. These markets are also mature markets as evidenced by unit sales growing at the rate of population increases. Pricing power in such markets is typically limited. In addition, the products produced within each market are somewhat homogeneous in that engines and equipment from one firm can be purchased instead of engines and equipment from another firm. Finally, according to contestable market theory, oligopolies and even monopolies will behave very much like firms in a competitive market if it is possible to enter particular markets without cost (i.e., there are no sunk costs associated with market entry or exit). This is the case with these markets, as there is significant excess production capacity in both the Small SI and Marine SI industries, in part due to improved productivity and efficiency in current plants. Idle production capacity also limits the ability of firms to raise prices, since competitors can easily capture market share by increasing their production at the expense of a producer that increases its prices. For all of these reasons it is appropriate to use a perfect competition model to estimate the economic impacts of this proposal.

The perfect competition assumption has an impact on the way the EIM is structured. In a competitive market the supply curve is based on the industry marginal cost curve; fixed costs do not influence production decisions at the margin. Therefore, in the market analysis the model is shocked by variable costs only. However, the nature of the Small SI and Marine SI markets suggests the market supply curve shifts in the model should include fixed and variable compliance costs. This is because Small SI and Marine SI engine and equipment manufacturers produce a product that changes very little over time. These manufacturers may not engage in research and development to improve their products on a continuous basis (as opposed to highway vehicles or nonroad engines and equipment). If this is the case, then the product changes that would be required to comply with the proposed standards would require these manufacturers to devote new funds and resources to product redesign and facilities changes. In this situation, Small SI and Marine SI engine and equipment manufacturers would be expected to increase their prices by the full amount of the compliance costs (both fixed and variable) to attempt to recover those costs. To reflect these conditions, the supply shift in this EIM is based on both fixed and variable costs, even though the model assumes perfect competition. A sensitivity analysis was performed to investigate the impacts under the alternative scenarios of shifting the supply curve by the variable costs only. The results of that analysis can be found in the RIA prepared for this proposal. We request comment on the extent to which manufacturers can be expected to devote additional funds to cover the fixed costs associated with the standards, or whether they in fact do provide for product development resources on a continuous basis and can

[130] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Innovative Strategies and Economics Group, *OAQPS Economic Analysis Resource Document*, April 1999. A copy of this document can be found at *http://www.epa.gov/ttn/ecas/econdata/Rmanual2.*

[131] *EPA Guidelines for Preparing Economic Analyses,* EPA 240–R–00–003, September 2000, p. 125–6.

[132] See, for example, *EPA Guidelines for Preparing Economic Analyses,* EPA 240–R–00–003, September 2000, p 126.

be expected to use those funds to cover the fixed costs. We also request comment on whether companies would attempt to pass fixed costs to consumers as an additional price increase and, if so, how much of the fixed costs would be based on and for how long.

The market interactions modeled in the EIM are those between producers and consumers of the specified engines and the equipment that use those engines. The EIM does not consider sales distribution networks or how the regulated goods are sold to final consumers through wholesalers and/or retailers. This is appropriate because the proposed regulatory program does not impose additional costs on the distribution networks and those relationships are not expected to change as a result of the standards. In the case of Small SI equipment, however, concerns have been raised about the potential for dominant retailers (big box stores such as Wal-Mart, Sears and K-Mart) to affect the ability of manufacturers to pass along cost increases associated with new emission control requirements, forcing them to absorb the compliance costs associated with the proposed standards. As described in greater detail in Chapter 9 of the RIA, dominant retailers are not expected to affect market interactions in ways that would offset the assumption of perfect competition by preventing firms from passing on increases in costs associated with the control program. This is because all firms in the market are expected to comply with the control program, and all will experience an increase in marginal costs. Profit-maximizing manufacturers will continue to follow a marginal cost pricing rule regardless of the distribution arrangements. If large retail distributors attempted to prevent efficient manufacturers from raising prices in response to the standards, manufacturers would likely respond to a retailer's price pressure by reducing output. This would result in large excess demand in the equipment market which would ultimately have to be satisfied through a new higher equilibrium price, which in turn would result in greater supply, thus bidding the price down to a new market equilibrium after the application of the control program.

The relationships modeled in the EIM do not include substitution away from Small SI and Marine SI engines and equipment to diesel or electric alternatives. This is appropriate because consumers are not likely to make these substitutions. Substitution to diesel Small SI equipment is not a viable option for most residential consumers, either because diesel equipment does not exist (*e.g.*, diesel string trimmers) or because there would be a large price premium that would discourage the use of diesel equipment (*e.g.*, diesel lawnmowers and diesel recreational marine vessels). In addition, most households are not equipped to handle the additional fuel type and misfueling would carry a high cost. Finally, the lack of a large infrastructure system already in place like the one supporting the use of gasoline equipment for residential and recreational purposes, including refueling and maintenance, represents a large barrier to substitution from gasoline to diesel equipment. On the electric side, the impact of substitution to electric for Small SI equipment (there are no comparable options for Marine SI) is also expected to be negligible. Gasoline is the power source of choice for small and inexpensive equipment due to its low initial cost. Gasoline equipment is also inherently portable, which make them more attractive to competing electric equipment that must be connected with a power grid or use batteries that require frequent recharging.

The EIM is a market-level analysis that estimates the aggregate economic impacts of the control program on the relevant market. It is not a firm-level analysis and therefore the supply elasticity or individual compliance costs facing any particular manufacturer may be different from the market average. This difference can be important, particular where the rule affects different firms' costs over different volumes of production. However, to the extent there are differential effects on individual firms, EPA believes that the wide array of compliance flexibilities provided in this proposal are adequate to address any cost inequities that are likely to arise.

Finally, consistent with the proposed emission controls, this EIA covers engines sold in 49 states. California engines are not included because California has its own state-level controls for Small SI and Marine SI engines. The sole exceptions are Small SI engines used in agriculture and construction applications in California. These engines are included in the control program and in this analysis because the Clean Air Act pre-empts California from setting standards for these engines.

(5) What Are the Key Model Inputs?

Key model inputs for the EIM are the behavioral parameters, the market equilibrium quantities and prices, and the compliance cost estimates.

The model's behavioral paramaters are the price elasticities of supply and demand. These parameters reflect how producers and consumers of the engines and equipment affected by the standards can be expected to change their behavior in response to the costs incurred in complying with the standards. More specifically, the price elasticity of supply and demand (reflected in the slope of the supply and demand curves) measure the price sensitivity of consumers and producers. The price elasticities used in this analysis are summarized in Table XII.F–1 and are described in more detail in Chapter 9 of the RIA. An ''inelastic'' price elasticity (less than one) means that supply or demand is not very responsive to price changes (a one percent change in price leads to less than one percent change in demand). An ''elastic'' price elasticity (more than one) means that supply or demand is sensitive to price changes (a one percent change in price leads to more than one percent change in demand). A price elasticity of one is unit elastic, meaning there is a one-to-one correspondence between a change in price and change in demand.

TABLE XII. F–1.—BEHAVIORAL PARAMETERS USED IN SMALL SI/MARINE SI ECONOMIC IMPACT MODEL

Sector	Market	Demand elasticity	Source	Supply elasticity	Source
Engine	Small SI and Marine SI Engine Market.	Derived	N/A	3.8 (elastic)	EPA Econometric Estimate.
Small SI Equipment	All handheld	−1.9 (elastic)	EPA Econometric Estimate.	3.4 (elastic)	EPA Econometric Estimate.
	Lawn Mowers	−0.2 (inelastic)	EPA Econometric Estimate.	Same as above.	
	Other lawn & garden	−0.9 (inelastic)	EPA Econometric Estimate.	Same as above.	

TABLE XII. F–1.—BEHAVIORAL PARAMETERS USED IN SMALL SI/MARINE SI ECONOMIC IMPACT MODEL—Continued

Sector	Market	Demand elasticity	Source	Supply elasticity	Source
	Gensets/welders (class I).	−1.4 (elastic)	EPA Econometric Estimate.	3.3 (elastic)	EPA Econometric Estimate.
	Gensets/welders (class II).	−1.1 (elastic)	EPA Econometric Estimate.	Same as above.	
	All other non-handheld.	−1.0 (unit elastic)	EPA Econometric Estimate.	3.4 (elastic) Same as above.	
Marine SI Equipment	PWC	−2.0 (elastic)	EPA Econometric Estimate.	3.4 (elastic)	EPA Econometric Estimate.
	All other vessels types.	Same as above		2.3 (elastic)	EPA Econometric Estimate.

The estimated supply and demand elasticities were based on best data we could find. We used (1) The industry-level data published by the National Bureau of Economic Research (NBER)-Center for Economic Studies (Bartlesman, Becker, and Gray, 2000); (2) Current Industrial Reports (CIR) series from the U.S. Census Bureau; (3) several data series reported in a study by Air Improvement Resource Inc. and National Economic Research Associates (AIR/NERA, 2003) for the walk-behind lawnmowers; (4) the U.S. Census Bureau historical data on household income and housing starts (U.S. Census Bureau, 2002; 2004); (5) price, wage, and material cost indexes from the Bureau of Labor Statistics (BLS) (BLS, 2004a,b,c,d,e); (6) the implicit gross domestic product (GDP) price deflator reported by the U.S. Bureau of Economic Analysis (BEA, 2004). It should be noted that the aggregate data we used to estimate elasticities include data on other markets as well as the Small SI or Marine SI markets. If we had been able to obtain market-specific data for Small SI or Marine SI only, the estimated price elasticities may have been different.

The estimated supply elasticities for all of the equipment and engine markets are elastic, ranging from 2.3 for all recreational marine except PWC, to 3.3 for generators, 3.4 for PWCs and all Small SI except generators, and 3.8 for engines. This means that quantities supplied are expected to be fairly sensitive to price changes (*e.g.*, a 1% change in price yields a 3.3 percent change in quantity of generators produced).

On the demand side, the Marine SI equipment market estimated demand elasticity is elastic, at −2.0. This is consistent with the discretionary nature of purchases of recreational marine vessels (consumers can easily decide to spend their recreational budget on other alternatives).

The estimated demand elasticity for handheld equipment is elastic, at −1.9. This suggests that consumers are more sensitive to price changes for handheld equipment than for other Small SI equipment. In other words, they are more likely to change their purchase decision for a small change in the price of a string trimmer, perhaps opting for trimmer shears or deciding to forego trimming altogether.

The estimated demand elasticity for lawnmowers is very inelastic at −0.2. This suggests that consumers of this equipment are not very sensitive to price changes. Most of this equipment is sold to individual homeowners, who are often required by local authorities to keep their lawns trimmed. Household ownership of a gasoline lawnmower is often their least expensive option. Lawncare services are more expensive since the price for these services includes labor and other factors of production. Purchasing other equipment may also not be attractive, since electric and diesel mowers are generally more expensive and often less convenient. Finally, the option of using landscape alternatives (e.g., prairie, wildflower, or rock gardens) may not be attractive for homeowners who may also use their yards for recreational purposes. For all these reasons, the price sensitivity of homeowners to lawnmower prices would be expected to be inelastic.

All the other demand elasticities, for gensets, welders, compressors, and ag/construction equipment, are about unit elastic, at −1.0 meaning a 1 percent change in price is expected to result in a 1 percent change in demand.

The demand elasticities for the engine markets are internally derived as part of the process of running the model. This is an important feature of the EIM, which allows it to link the engine and equipment components of each model and simulate how compliance costs can be expected to ripple through the affected market. In actual markets, for example, the quantity of lawnmowers produced in a particular period depends on the price of engines (the Small SI engine market) and the demand for equipment by residential consumers. Similarly, the number of engines produced depends on the demand for engines (the lawnmower market) which depends on consumer demand for equipment. Changes in conditions in one of these markets will affect the others. By designing the model to derive the engine demand elasticities, the EIM simulates these connections between supply and demand among the product markets and replicates the economic interactions between producers and consumers.

Initial market equilibrium quantities for these markets are simulated using the same current year sales quantities used in the engineering cost analysis. The initial market equilibrium prices for Small SI and Marine SI engines and equipment were derived from industry sources and published data and are described in Chapter 9 of the Draft RIA.

The compliance costs used to shock the model, to simulate the application of the control program, are the same as the engineering costs described in Chapter 6. However, the EIM uses an earlier version of the engineering compliance developed for this rule. The net present value of the engineering costs used in this analysis (without taking the fuel savings into account, at a 3 percent discount rate over the period of the analysis) is $10.0 billion, which is about $100 million less than the net present value of the final estimated engineering costs, $10.1 billion. We do not expect that a difference of this magnitude would change the overall results of this economic impact analysis, in terms of market impacts and how the costs are expected to be shared among stakeholders.

As explained in Section XII.F.4, the EIM uses both fixed and variable engineering costs to shock the initial equilibrium conditions. The fixed costs are amortized over the first 5 years of the standards and include a 7 percent cost of capital. For some elements of the program (i.e., evaporative emission controls), fixed costs are incurred throughout the period of analysis due to the need to replace tooling.

Additional costs that need to be considered in the EIM are the operating costs (fuel savings) associated with the evaporative emission controls. These fuel savings are not included in the market analysis for this economic impact analysis. This is because all available evidence suggests that fuel savings do not affect consumer decisions with respect to the purchase of this equipment. Unlike motor vehicles or other consumer goods, neither Small SI nor Marine SI equipment is labeled with expected fuel consumption or expected annual operating costs. Therefore, there is no information available for the consumer to use to make this decision. Instead consumers base their purchase decision on other attributes of the product for which the manufacturer provides information. For lawn mowers this may be the horsepower of the engine, whether the machine has a bag or has a mulching feature, its blade size, etc. For PWC it may be how many people it can carry, its maximum speed, its horsepower, etc. In many cases, especially for Small SI equipment, the consumer may not even be aware of the fuel savings when operating the equipment, especially if he or she uses the same portable fuel storage container to fuel several different pieces of equipment.

These fuel savings are included in the social cost analysis. This is because they are savings that accrue to society. These savings are attributed to consumers of the relevant equipment. As explained in more detail in Section 9.3.5 of the Draft RIA, the social cost analysis is based on the equivalent of the pre-tax price of gasoline in that analysis. Although the consumer will realize a savings equal to the pump price of gasoline (post-tax), part of that savings is offset by a tax loss to governmental agencies and is thus a loss to consumers of the services supported by those taxes. This tax revenue loss, considered a transfer payment in this analysis, does not affect the benefit-cost analysis results.

(6) What Are the Results of the Economic Impact Modeling?

Using the model and data described above, we estimated the economic impacts of the proposed emission control program. We performed a market analysis for all years and all engine and equipment types. In this section we present summarized results for selected markets and years. More detail can be found in the appendices to Chapter 9 of the RIA and in the docket for this rule.[133] Also included in Appendix 9H to that chapter are sensitivity analyses for several key inputs.

The EIA consists of two parts: a market analysis and a welfare analysis. The market analysis looks at expected changes in prices and quantities for affected products. The welfare analysis looks at economic impacts in terms of annual and present value changes in social costs.

As explained in Section XII.F.4, the EIM is shocked by the sum of fixed and variable costs. For the market analysis, this leads to a small increase in estimated price impacts for the years 2011 through 2016, the period during which fixed costs are recovered. The increase is small because, for many elements of the program, annual per unit fixed costs are smaller than annual per unit variable costs. For the welfare analysis, applying both fixed and variable costs means that the burden of the social costs attributable to producers and consumers remains fixed throughout the period of analysis. This is because producers pass the fixed costs to consumers at the same rate as the variable costs instead of having to absorb them internally.

(a) Market Impact Analysis

In the market analysis, we estimate how prices and quantities of goods affected by the proposed emission control program can be expected to change once the program goes into effect. The analysis relies on the initial market equilibrium prices and quantities for each type of equipment and the price elasticity of supply and demand. It predicts market reactions to the increase in production costs due to the new compliance costs (variable and fixed). It should be noted that this analysis does not allow any other factors of production to vary. In other words, it does not consider that manufacturers may adjust their production processes or marketing strategies in response to the control program. Also, as explained above, while the markets are shocked by both fixed and variable costs, the market shock is not offset by fuel savings.

A summary of the estimated market impacts is presented in Table XII.F–2 for 2013, 2018, and 2030. These years were chosen because 2013 is the year of highest compliance; after 2018, the fixed costs are recovered and the market impacts reflect variable costs as well as growth in equipment population; and 2030 illustrates the long-term impacts of the program.

Market level impacts are reported for the engine and equipment markets separately. This is because the EIM is a two-level model that treats these markets separately. However, changes in equipment prices and quantities are due to impacts of both direct equipment compliance costs and indirect engine compliance costs that are passed through to the equipment market from the engine market through higher engine prices.

The average market-level impacts presented in this section are designed to provide a broad overview of the expected market impacts that is useful when considering the impacts of the rule on the economy as a whole. The average price impacts are product-weighted averages of the results for the individual engine and equipment categories included in that sub-sector (*e.g.*, the estimated Marine SI engine price and quantity changes are weighted averages of the estimated results for all of the Marine SI engine markets). The average quantity impacts are the *sum* of the decrease in units produced units across sub-markets. Price increases and quantity decreases for specific types of engines and equipment are likely to be different.

Although each of the affected equipment in this analysis generally requires one engine (the exception being Marine SI sterndrive/inboards), the estimated decrease in the number of engines produced in Table XII.F–2 is less than the estimated decrease in the number of equipment produced. At first glance, this result seems counterintuitive because it does not reflect the approximate one-to-one correspondence between engines and equipment. This discrepancy occurs because the engine market-level analysis examines only output changes for engines that are produced by independent engine manufacturers and subsequently sold to independent equipment manufacturers. Engines produced and consumed by vertically integrated equipment/engine manufacturers are not explicitly modeled. Therefore, the market-level analysis only reflects engines sold on the ‘‘open market,’’ and estimates of output changes for engines consumed internally are not reflected in this number.[134] Despite the fact that changes

[133] Li, Chi. 2007. Memorandum to Docket EPA–HQ–OAR–2004–0008. Detailed Results From Economic Impact Model.

[134] For example, PWC and handheld equipment producers generally integrate equipment and engine manufacturing processes and are included in the EIM as one-level equipment markets. Since there is no engine market for these engines, the EIM does not include PWC and handheld engine

in consumption of internally consumed engines are not directly reported in the market-level analysis results, the costs associated with these engines are included in the market-level analysis (as supply shift for the equipment markets). In addition, the cost and welfare analyses include the compliance costs associated with internally consumed engines.

Marine SI Market Analysis

The average price increase for Marine SI engines in 2013, the high cost year, is estimated to be about 2.3 percent, or $257. By 2018, this average price increase is expected to decline to about 1.7 percent, or $196, and remain at that level for later years. The market impact analysis predicts that with these increases in engine prices the expected average decrease in total sales in 2013 is about 2.0 percent, or 8,800 engines. This decreases to about 1.6 percent in 2018, or about 7,000 engines.

On the vessel side, the average price change reflects the direct equipment compliance costs plus the portion of the engine costs that are passed on to the equipment purchaser (via higher engine prices). The average price increase in 2013 is expected to be about 1.3 percent, or $232. By 2018, this average price increase is expected to decline to about 1 percent, or $178. These price increases are expected to vary across vessel categories. The category with the largest price increase in 2013 is expected to be personal watercraft engines, with an estimated price increase of about 2.8 percent in 2013; this is expected to decrease to 2.1 percent in 2018. The smallest expected change in 2013 is expected to be for sterndrive/inboards and outboard recreational vessels, which are expected to see price increases of about 0.7 percent. The market impact analysis predicts that with these increases in vessel prices the expected average decrease in quantity produced in 2013 is about 2.7 percent, or 11,000 vessels.[135] This is expected to decrease to about 2.0 percent in 2018, or about 8,600 vessels. The personal watercraft category is expected to experience the largest decline in 2013, about 5.6 percent (4,800 vessels). The smallest percentage decrease in production is expected for sterndrive/inboards at 1.4 percent (1,300 vessels); the smallest absolute decrease in quantity is expected for outboard recreational vessels, at 113 vessels (1.5 percent).

Small SI Market Analysis

The average price increase for Small SI engines in 2013, the high cost year, is estimated to be about 11.7 percent, or $22. By 2018, this average price increase is expected to decline to about 9.1 percent, or $17, and remain at that level for later years. The market impact analysis predicts that with these increases in engine prices the expected average decrease in total sales in 2013 is expected to be about 2.3 percent, or 371,000 engines. This is expected to decrease to about 1.7 percent in 2018, or about 299,000 engines.

On the equipment side, the average price change reflects the direct equipment compliance costs plus the portion of the engine costs that are passed on to the equipment purchaser (via higher engine prices). The average price increase for all Small SI equipment in 2013 is expected to be about 3.1 percent, or $14. By 2018, this average price increase is expected to decline to about 2.4 percent, or $10. The average price increase and quantity decrease differs by category of equipment. As shown in Table XII.F–2, the price increase for Class I equipment is estimated to be about 6.9 percent ($19) in 2013, decreasing to 5.5 percent ($15) in 2018. The market impact analysis predicts that with these increases in equipment prices the expected average decrease in the quantity of Class I equipment produced in 2013 is about 2.2 percent, or 219,400 units.[136] This is expected to decrease to about 1.8 percent in 2018, or about 189,700 units. For Class II equipment, a higher price increase is expected, about 3.9 percent ($41) in 2013, decreasing to 2.6 percent ($25) in 2018. The expected average decrease in the quantity of Class II equipment produced in 2013 is about 4.3 percent, or 157,300 units, decreasing to 2.8 percent, or about 114,000 units, in 2018.

For the handheld equipment market, prices are expected to increase about 0.3 percent for all years, and quantities are expected to decrease about 0.6 percent.

TABLE XII.F–2.—ESTIMATED MARKET IMPACTS FOR 2013, 2018, 2030

[2005$]

Market	Change in price		Change in quantity	
	Absolute	Percent	Absolute	Percent
2013				
Marine:				
Engines	$257	2.3	−8,846	−2.0
Equipment	232	1.3	−10,847	−2.7
SD/I	252	0.7	−1,336	−1.4
OB Recreational	638	0.7	−113	−1.5
OB Luxury	206	1.1	−4,579	−2.1
PWC	237	2.8	−4,819	−5.6
Small SI:				
Engines	22	11.7	−371,097	−2.3
Equipment	14	3.1	−482,942	−1.9
Class I	19	6.9	−219,400	−2.2
Class II	41	3.9	−157,306	−4.3
HH	0.3	0.3	−106,236	−0.6

consumption changes in engine market-level results.

[135] It should be noted that the absolute change in the number of engines and equipment does not match. This is because the absolute change in the quantity of engines represents only engines sold on the open market. Reductions in engines consumed internally by integrated engine/equipment manufacturers are not reflected in this number but are captured in the social cost analysis.

[136] See previous note.

TABLE XII.F–2.—ESTIMATED MARKET IMPACTS FOR 2013, 2018, 2030—Continued

[2005$]

Market	Change in price		Change in quantity	
	Absolute	Percent	Absolute	Percent
2018				
Marine:				
Engines	196	1.7	−7,002	−1.6
Equipment	178	1.0	−8,563	−2.0
SD/I	195	0.5	−1,072	−1.1
OB Recreational	496	0.6	−91	−1.1
OB Luxury	160	0.8	−3,634	−1.6
PWC	178	2.1	−3,766	−4.2
Small SI:				
Engines	17	9.1	−298,988	−1.7
Equipment	10	2.4	−401,025	−1.4
Class I	15	5.5	−189,771	−1.8
Class II	25	2.6	−113,999	−2.8
HH	0.2	0.3	−97,255	−0.5
2030				
Marine:				
Engines	195	1.7	−7,728	−1.6
Equipment	179	1.0	−9,333	−2.0
SD/I	195	0.5	−1,161	−1.1
OB Recreational	496	0.6	−98	−1.1
OB Luxury	160	0.8	−3,998	−1.7
PWC	178	2.1	−4,076	−4.2
Small SI:				
Engines	17	9.1	−354,915	−1.7
Equipment	10	2.4	−475,825	−1.4
Class I	15	5.6	−225,168	−1.8
Class II	25	2.6	−135,400	−2.8
HH	0.2	0.3	−115,257	−0.5

(b) Economic Welfare Analysis

In the economic welfare analysis we look at the costs to society of the proposed program in terms of losses to consumer and producer surplus. These surplus losses are combined with the fuel savings to estimate the net economic welfare impacts of the proposed program. Estimated annual net social costs for selected years are presented in Table XII–F–3. This table shows that total social costs for each year are slightly less than the total engineering costs. This is because the total engineering costs do not reflect the decreased sales of engines and equipment that are incorporated in the total social costs.

TABLE XII.F–3.—ESTIMATED ANNUAL ENGINEERING AND SOCIAL COSTS, THROUGH 2038

[2005$, $million]

Year	Total engineering costs	Total social costs	Fuel savings	Net engineering costs (including fuel savings)	Net social costs (including fuel savings)
2008	$9.5	$9.5	$3.1	$6.4	$6.4
2009	171.7	168.8	13.7	157.9	155.1
2010	191.1	188.0	25.4	165.7	162.6
2011	470.5	463.4	64.9	405.7	398.5
2012	647.3	638.2	103.5	543.8	534.7
2013	652.5	643.4	136.5	516.0	506.9
2014	621.1	613.1	161.2	459.9	451.9
2015	627.0	619.0	182.3	444.7	436.7
2016	520.9	515.2	200.9	320.0	314.2
2017	492.6	487.5	216.2	276.4	271.3
2018	497.2	492.0	229.9	267.3	262.1
2019	503.6	498.4	242.1	261.5	256.2
2020	510.0	504.7	253.1	256.9	251.6
2021	516.4	511.0	263.3	253.1	247.8
2022	522.7	517.3	272.9	249.8	244.4
2023	529.1	523.7	281.4	247.7	242.3
2024	535.8	530.3	289.3	246.5	241.0
2025	542.3	536.7	296.6	245.6	240.0
2026	548.7	543.1	303.6	245.1	239.5

TABLE XII.F–3.—ESTIMATED ANNUAL ENGINEERING AND SOCIAL COSTS, THROUGH 2038—Continued

[2005$, $million]

Year	Total engineering costs	Total social costs	Fuel savings	Net engineering costs (including fuel savings)	Net social costs (including fuel savings)
2027	555.2	549.4	310.1	245.1	239.3
2028	561.6	555.8	316.3	245.3	239.5
2029	568.0	562.2	322.0	246.1	240.2
2030	574.5	568.6	327.3	247.2	241.3
2031	580.9	575.0	332.3	248.6	242.6
2032	587.4	581.3	337.1	250.3	244.2
2033	593.8	587.7	341.7	252.1	246.0
2034	600.3	594.1	346.1	254.2	248.0
2035	606.7	600.5	350.4	256.3	250.1
2036	613.1	606.9	354.5	258.6	252.3
2037	619.6	613.2	358.5	261.1	254.7
2038	626.0	619.6	362.5	263.6	257.1
NPV at 3% [a]	9,996.2	9,882.2	4,356.2	5,640.1	5,526.0
NPV at 7% [a]	5,863.6	5,794.1	2,291.5	3,572.1	3,502.6

[a] EPA EPA presents the present value of cost and benefits estimates using both a three percent and a seven percent social discount rate. According to OMB Circular A–4, "the 3 percent discount rate represents the "social rate of time preference'* * * [which] means the rate at which 'society' discounts future consumption flows to their present value"; "the seven percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy* * * [that] approximates the opportunity cost of capital."

Table XII.F–4 shows how total social costs are expected to be shared across stakeholders, for selected years. According to these results, consumers in the Marine SI market are expected to bear approximately 66 percent of the cost of the Marine SI program. This is expected to be offset by the fuel savings. Vessel manufacturers are expected to bear about 22 percent of that program, and engine manufacturers the remaining 11 percent. In the Small SI market, consumers are expected to bear 79 percent of the cost of the Small SI program. This will also be offset by the fuel savings. Equipment manufacturers are expected to bear about 17 percent of that program, and engine manufacturers the remaining 4 percent. The estimated percentage changes in surplus are the same for all years because the initial equilibrium conditions are shocked by both fixed and variable costs; producers would pass the fixed costs to consumers at the same rate as the variable costs.

TABLE XII.F–4: SUMMARY OF ESTIMATED SOCIAL COSTS FOR 2013, 2018, 2030

[2005 $, $ million]

Market	Absolute change in surplus	Percent change in surplus	Fuel savings	Total change in surplus
2013				
Marine SI:				
Engine Manufacturers	−$21.54	11		−$21.54
Equipment Manufacturers	−42.23	22		−42.23
End User (Households)	−125.14	66	$42.27	−82.87
Subtotal	−188.91			−146.64
Small SI:				
Engine Manufacturers	−18.36	4		−18.36
Equipment Manufacturers	−80.16	18		−80.16
End User (Households)	−355.95	78	94.26	−261.69
Subtotal	−454.47			−360.21
Total	−643.38		136.53	−506.85
2018				
Marine SI:				
Engine Manufacturers	−17.29	11		−17.29
Equipment Manufacturers	−34.02	22		−34.02
End User (Households)	−100.19	66	87.12	−13.07
Subtotal	−151.50			−64.38
Small SI:				
Engine Manufacturers	−13.89	4		−13.89
Equipment Manufacturers	−57.65	17		−57.65

TABLE XII.F–4: SUMMARY OF ESTIMATED SOCIAL COSTS FOR 2013, 2018, 2030—Continued

[2005 $, $ million]

Market	Absolute change in surplus	Percent change in surplus	Fuel savings	Total change in surplus
End User (Households)	−268.95	79	142.78	−126.17
Subtotal	−340.49			−197.71
Total	−491.99		229.90	−262.09
2030				
Marine SI:				
Engine Manufacturers	−18.81	11		−18.81
Equipment Manufacturers	−36.97	23		−36.97
End User (Households)	−108.52	66	149.36	40.84
Subtotal	−164.30			−14.94
Small SI:				
Engine Manufacturers	−16.49	4		−16.49
Equipment Manufacturers	−68.45	17		−68.45
End User (Households)	−319.31	79	177.89	−141.42
Subtotal	−404.25			−226.36
Total	−568.55		327.25	−241.30

Table XII.F–5 contains more detailed information on the sources of the social costs for 2013. This table shows that vessel and equipment manufacturers are expected to bear more of the burden of the program than engine manufacturers. On the marine side, the loss of producer surplus for the vessel manufacturers has two sources. First, they would bear part of the burden of the equipment costs. Second, they would also bear part of the engine costs, which are passed on to vessel manufacturers in the form of higher engine prices. Vessel manufacturers would not be able to pass along a greater share of the engine and vessel compliance costs to end consumers due to the elastic price elasticity of demand for consumers of these vessels. On the Small SI side, equipment manufacturers can pass on more of the compliance costs to end consumers because the price elasticity of demand in these markets is less elastic.

TABLE XII.F–5.—DISTRIBUTION OF ESTIMATED SURPLUS CHANGES BY MARKET AND STAKEHOLDER FOR 2013

[2005$, million$]

Scenario	Engineering compliance costs	Producer surplus	Consumer surplus	Total surplus	Fuel savings	Net surplus
Marine SI						
Engine Manufacturers	$133.2	−$21.5		−$21.5		−$21.5
Equipment Manufacturers	59.1	−42.2		−42.2		−42.2
Engine Price Changes		−18.7				
Equipment Cost Changes		−23.6				
End User (Households)			−125.1	−125.1	42.3	−82.8
Engine Price Changes			−91.8			
Equipment Price Changes			−33.3			
Subtotal	192.2	−63.8	−125.1	−188.9	42.3	−146.6
Small SI						
Engine Manufacturers	371.9	−18.4		−18.4		−18.4
Equipment Manufacturers	88.4	−80.2		−80.2		−80.2
Engine Price Changes		−59.0				
Equipment Cost Changes		−21.1				
End User (Households)			−355.9	−355.9	94.3	−261.7
Engine Price Changes			−289.8			
Equipment Cost Changes			−66.1			
Subtotal	460.3	−98.5	−355.9	−454.5	94.3	−360.2

TABLE XII.F–5.—DISTRIBUTION OF ESTIMATED SURPLUS CHANGES BY MARKET AND STAKEHOLDER FOR 2013—Continued

[2005$, million$]

Scenario	Engineering compliance costs	Producer surplus	Consumer surplus	Total surplus	Fuel savings	Net surplus
Total	652.5	−162.3	−481.1	−643.4	136.6	−506.8

The present value of net social costs of the proposed standards through 2038 at a 3 percent discount rate, shown in Table XII.F–6, is estimated to be $5.5 billion, taking the fuel savings into account. We also performed an analysis using a 7 percent social discount rate.[137] Using that discount rate, the present value of the net social costs through 2038 is estimated to be $3.5 billion, including the fuel savings.

TABLE XII.F–6.—ESTIMATED NET SOCIAL COSTS THROUGH 2038 BY STAKEHOLDER

[2005$, $million]

Market	Total change in surplus	Percentage change in total surplus	Fuel savings	Net change in surplus
Net Present Value 3%				
Marine SI:				
Engine Manufacturers	−$354.4	11		−$354.4
Equipment Manufacturers	−688.8	22		−688.8
End User (Households)	−2,058.8	66	$1,831.3	−227.5
Subtotal	−3,102.0		1,831.3	−1,270.7
Small SI:				
Engine Manufacturers	−275.0	4		−275.0
Equipment Manufacturers	−1,171.8	17		−1,171.8
End User (Households)	−5,333.4	79	2,524.8	−2,808.6
Subtotal	−6,780.2		2,524.8	−4,255.4
Total	−9,882.2		4,356.1	−5,526.1
Net Present Value 7%				
Marine SI:				
Engine Manufacturers	−216.4	11		−216.4
Equipment Manufacturers	−417.6	22		−417.6
End User (Households)	−1,259.5	66	937.1	−322.8
Subtotal	−1,893.8		937.1	956.8
Small SI:				
Engine Manufacturers	−157.8	4		157.8
Equipment Manufacturers	−680.4	17	1,354.4	680.4
End User (Households)	−3,062.1	79	1,354.4	1,707.7
Subtotal	−3,900.3			
Total	−5,794.2		2,291.5	−3,502.6

(7) What Are the Significant Limitations of the Economic Impact Analysis?

Every economic impact analysis examining the market and social welfare impacts of a regulatory program is limited to some extent by limitations in model capabilities, deficiencies in the economic literatures with respect to estimated values of key variables necessary to configure the model, and data gaps. In this EIA, there are three potential sources of uncertainty: (1) Uncertainty resulting from the way the EIM is designed, particularly from the use of a partial equilibrium model; (2) uncertainty resulting from the values for key model parameters, particularly the price elasticity of supply and demand; and (3) uncertainty resulting from the values for key model inputs, particularly baseline equilibrium price and quantities.

Uncertainty associated with the economic impact model structure arises from the use of a partial equilibrium approach, the use of the national level of analysis, and the assumption of perfect competition. These features of the model mean it does not take into account impacts on secondary markets or the general economy, and it does not

[137] EPA has historically presented the present value of cost and benefits estimates using both a 3 percent and a 7 percent social discount. The 3 percent rate represents a demand-side approach and reflects the time preference of consumption (the rate at which society is willing to trade current consumption for future consumption). The 7 percent rate is a cost-side approach and reflects the shadow price of capital.

consider regional impacts. The results may also be biased to the extent that firms have some control over market prices, which would result in the modeling over-estimating the impacts on producers of affected goods and services.

The values used for the price elasticities of supply and demand are critical parameters in the EIM. The values of these parameters have an impact on both the estimated change in price and quantity produced expected as a result of compliance with the proposed standards and on how the burden of the social costs will be shared among producer and consumer groups. In selecting the values to use in the EIM it is important that they reflect the behavioral responses of the industries under analysis.

Published estimates of price elasticities of supply and demand from the economic literature should be used whenever possible. Such estimates would be peer reviewed and generally constitute reasonable estimates for the industries in question. In this analysis, because we were unable to find published supply and demand elasticities for the Small SI and Marine SI markets, we estimated these parameters econometrically using the procedures described in Chapter 9 of the Draft RIA.

The estimates on the supply elasticity reflect a production function approach using data at the industry level. This method was chosen because of limitations with the available data. We were not able to obtain firm-level or plant-level production data for companies that operate in the affected sectors. However, the use of aggregate industry level data may not be appropriate and may not be an accurate way to estimate the price elasticity of supply compared to firm-level or plant-level data. This is because, at the aggregate industry level, the size of the data sample is limited to the time series of the available years and because aggregate industry data may not reveal each individual firm or plant production function (heterogeneity). There may be significant differences among the firms that may be hidden in the aggregate data but that may affect the estimated elasticity. In addition, the use of time series aggregate industry data may introduce time trend effects that are difficult to isolate and control.

To address these concerns, EPA intends to investigate estimates for the price elasticity of supply for the affected industries for which published estimates are not available, using an alternative method and data inputs. This research program will use the cross-sectional data model at either the firm level or the plant level from the U.S. Census Bureau to estimate these elasticities. We plan to use the results of this research, provided the results are robust and they are available in time for the analysis for the final rule.

Finally, uncertainty in measurement of data inputs can have an impact on the results of the analysis. This includes measurement of the baseline equilibrium prices and quantities and the estimation of future year sales. In addition, there may be uncertainty in how similar engines and equipment were combined into smaller groups to facilitate the analysis. There may also be uncertainty in the compliance cost estimations.

To explore the effects of key sources of uncertainty, we performed a sensitivity analysis in which we examine the results of using alternative values for the price elasticity of supply and demand, alternative baseline prices for certain equipment markets, and alternative methods in compliance costs to shock the market. The results of these analyses are contained in Appendix 9H of the Draft RIA.

Despite these uncertainties, we believe this economic impact analysis provides a reasonable estimate of the expected market impacts and social welfare costs of the proposed standards in future. Acknowledging benefits omissions and uncertainties, we present a best estimate of the social costs based on our interpretation of the best available scientific literature and methods supported by EPA's Guidelines for Preparing Economic Analyses and the OAQPS Economic Analysis Resource Document.

XIII. Public Participation

We request comment on all aspects of this proposal. This section describes how you can participate in this process.

In 2001 we published a proposed rule to adopt evaporative emission standards for marine vessels powered by spark-ignition engines (67 FR 53050, August 14, 2002). We are withdrawing that proposal and reissuing our proposal in this notice. We received several comments on that proposed rule and have attempted to take all those comments into account in this action. Commenters on the previous proposal who feel their concerns have not been addressed should send us updated comments expressing any remaining concerns. This proposal includes a variety of changes from the earlier proposal, mostly centered on testing methods and implementation dates.

A hearing will be held on Tuesday, June 5, 2007 in Washington, DC. The hearing will start at 10 a.m. and continue until testimony is complete. See **ADDRESSES** above for location and phone information.

Please notify the contact person listed above at least ten days before the hearing if you would like to present testimony at a public hearing. You should estimate the time you will need for your presentation and identify any needed audio/visual equipment. We suggest that you bring copies of your statement or other material for the EPA panel and the audience. It would also be helpful if you send us a copy of your statement or other materials before the hearing.

We will conduct the hearing informally so technical rules of evidence will not apply. We will arrange for a written transcript of the hearing and keep the official record of the hearing open for 30 days to allow you to submit supplementary information. You may make arrangements to purchase copies of the transcript directly with the court reporter.

The comment period for this rule will end on August 3, 2007.

XIV. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under section 3(f)(1) of Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is an ''economically significant regulatory action'' because it is likely to have an annual effect on the economy of $100 million or more. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and any changes made in response to OMB recommendations have been documented in the docket for this action.

In addition, EPA prepared an analysis of the potential costs and benefits associated with this action. This analysis is contained in the Draft Regulatory Impact Analysis, which is available in the docket for this action and is summarized in Section XII.

B. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the *Paperwork Reduction Act*, 44 U.S.C. 3501 *et seq.* The Information Collection Request (ICR) document prepared by EPA has been assigned EPA ICR number 2251.01.

The Agency proposes to collect information to ensure compliance with the provisions in this rule. This includes a variety of requirements, both for engine manufacturers, equipment manufacturers and manufacturers of fuel system components. Section 208(a) of the Clean Air Act requires that manufacturers provide information the Administrator may reasonably require to determine compliance with the regulations; submission of the information is therefore mandatory. We will consider confidential all information meeting the requirements of section 208(c) of the Clean Air Act.

As shown in Table XIV–1, the total annual burden associated with this proposal is about 131,000 hours and $18 million based on a projection of 1,100 respondents. The estimated burden for engine manufacturers is a total estimate for both new and existing reporting requirements. Most information collection is based on annual reporting. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

TABLE XIV–1.—ESTIMATED BURDEN FOR REPORTING AND RECORDKEEPING REQUIREMENTS

Industry sector	Number of respondents	Average burden per respondent	Annual burden hours	Annualized capital costs	Annual labor costs	Annual operation and maintenance costs
Small SI engine manufacturers	58	885	51,301	$5,529,000	$2,065,643	$3,100,306
Small SI equipment & fuel system component mfr. (evaporative)	623	1,568	62,715	0	497,631	624,066
Marine SI engine manufacturers	40	19	11,605	0	2,677,821	8,299,569
Marine SI equipment & fuel system component mfr. (evaporative)	380	14	5,241	0	224,871	383,024
Total	1,101	2,486	130,862	5,529,000	5,465,966	12,406,965
					Total Annual Cost = 18,012,246	

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques, EPA has established a public docket for this rule, which includes this ICR, under Docket ID number EPA–HQ–OAR–2004–0008. Submit any comments related to the ICR for this proposed rule to EPA and OMB. See **ADDRESSES** section at the beginning of this notice for where to submit comments to EPA. Send comments to OMB at the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW., Washington, DC 20503, Attention: Desk Office for EPA. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after May 18, 2007, a comment to OMB is best assured of having its full effect if OMB receives it by June 18, 2007. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

C. Regulatory Flexibility Act

(1) Overview

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of this action on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201 (see Table XIV–2, below); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of smaller than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. The following table provides an overview of the primary SBA small business categories potentially affected by this regulation.

TABLE XIV–2.—SMALL BUSINESS DEFINITIONS FOR ENTITIES AFFECTED BY THIS RULE

Industry	NAICS [a] codes	Threshold definitions for small business [b] (employees)
Small SI and Marine SI Engine Manufacturers	333618	1,000

TABLE XIV–2.—SMALL BUSINESS DEFINITIONS FOR ENTITIES AFFECTED BY THIS RULE—Continued

Industry	NAICS [a] codes	Threshold definitions for small business [b] (employees)
Equipment Manufacturers:		
Farm Machinery	333111	500
Lawn and Garden	333112	500
Construction	333120	750
Sawmill and Woodworking	333210	500
Pumps	333911	500
Air and Gas Compressors	333912	500
Generators	335312	1,000
Boat Builders	336612	500
Fuel Tank Manufacturers:		
Other Plastic Products	326199	500
Metal Stamping	332116	500
Metal Tank (Heavy Gauge)	332420	500
Fuel Line Manufacturers:		
Rubber and Plastic Fuel Lines	326220	500

[a] North American Industry Classification System

[b] According to SBA's regulations (13 CFR 121), businesses with no more than the listed number of employees are considered ''small entities'' for RFA purposes.

Pursuant to section 603 of the RFA, EPA prepared an initial regulatory flexibility analysis (IRFA) that examines the impact of the proposed rule on small entities along with regulatory alternatives that could reduce that impact. The IRFA, as summarized below, is available for review in the docket and Chapter 10 of the Draft RIA.

(2) Background

Air pollution is a serious threat to the health and well-being of millions of Americans and imposes a large burden on the U.S. economy. Ground-level ozone and carbon monoxide are linked to potentially serious respiratory health problems, especially respiratory effects and environmental degradation, including visibility impairment in and around our national parks. (Section II of this preamble and Chapter 2 of the Draft RIA for this rule describe these pollutants and their health effects.) Over the past quarter century, state and federal representatives have established emission control programs that significantly reduce emissions from individual sources. Many of these sources now pollute at only a small fraction of their pre-control rates.

This proposal includes standards that would require manufacturers to substantially reduce exhaust emissions and evaporative emissions from Marine SI engines and vessels and from Small SI engines and equipment. We are proposing the standards under section 213(a)(3) of the CAA which directs EPA to set emission standards that ''achieve the greatest degree of emission reduction achievable through the application of technology'' giving appropriate consideration to cost, noise, energy, safety, and lead time. In addition to the general authority to regulate nonroad engines under the CAA, Section 428 of 2004 Consolidated Appropriations Act requires EPA to propose and finalize new regulations for nonroad spark-ignition engines below 50 horsepower.

(3) Summary of Regulated Small Entities

The standards being proposed for Small SI engines and equipment will affect manufacturers of both handheld equipment and nonhandheld equipment. Based on EPA certification records, the Small SI nonhandheld engine industry is made up primarily of large manufacturers including Briggs and Stratton, Tecumseh, Honda, Kohler and Kawasaki. The Small SI handheld engine industry is also made up primarily of large manufacturers including Electrolux Home Products, MTD, Homelite, Stihl and Husqvarna. EPA has identified 10 Small SI engine manufacturers that qualify as a small business under SBA definitions. Half of these small manufacturers certify gasoline engines and the other half certify liquefied petroleum gas (LPG) engines.

The Small SI equipment market is dominated by a few large businesses including Toro, John Deere, MTD, Briggs and Stratton, and Electrolux Home Products. While the Small SI equipment market may be dominated by just a handful of companies, there are many small businesses in the market; however these small businesses account for less than 10 percent of equipment sales. We have identified over three hundred equipment manufacturers that qualify as a small business under the SBA definitions. More than 90 percent of these small companies manufacture fewer than 5,000 pieces of equipment per year. The median employment level is 65 employees for nonhandheld equipment manufacturers and 200 employees for handheld equipment manufacturers. The median sales revenue is approximately $9 million for nonhandheld equipment manufacturers and $20 million for handheld equipment manufacturers.

EPA has identified 25 manufacturers that produce fuel tanks for the Small SI equipment market that meet the SBA definition of a small business. Fuel tank manufacturers rely on three different processes for manufacturing plastic tanks—rotational molding, blow molding and injection molding. EPA has identified small business fuel tank manufacturers using the rotational molding and blow molding processes but has not identified any small business manufacturers using injection molding. In addition, EPA has identified two manufacturers that produce fuel lines for the Small SI equipment market that meet the SBA definition of a small business. The majority of fuel line in the Small SI market is made by large manufacturers including Avon Automotive and Dana Corporation.

The standards being proposed for Marine SI engines and vessels will affect manufacturers in the OB/PWC market and the SD/I market. Based on EPA certification records, the OB/PWC market is made up primarily of large manufacturers including, Brunswick (Mercury), Bombardier Recreational

Products, Yamaha, Honda, Kawasaki, Polaris, Briggs & Stratton, Nissan, and Tohatsu. One company that qualifies as a small business under the SBA definitions has certified their product as a PWC. This company is Surfango who makes a small number of motorized surfboards.

The SD/I market is made up mostly of small businesses; however, these businesses account for less than 20 percent of engine sales. Two large manufacturers, Brunswick (Mercruiser) and Volvo Penta, dominate the market. We have identified 28 small entities manufacturing SD/I marine engines. The third largest company is Indmar, which has much fewer than the SBA threshold of 1,000 employees. Based on sales estimates, number of employees reported by Thomas Register, and typical engine prices, we estimate that the average revenue for the larger small SD/I manufacturers is about $50–60 million per year. However, the vast majority of the SD/I engine manufacturers produce low production volumes of engines and typically have fewer than 50 employees.

The two largest boat building companies are Brunswick and Genmar. Brunswick owns approximately 25 boat companies and Genmar owns approximately 12 boat companies. Based on a manufacturer list maintained by the U.S. Coast Guard, there are over 1,600 boat builders in the United States. We estimate that, based on manufacturer identification codes, more than 1,000 of these companies produce boats using gasoline marine engines. According to the National Marine Manufacturers Association (NMMA), most of these boat builders are small businesses. These small businesses range from individuals building one boat per year to businesses near the SBA small business threshold of 500 employees.

We have identified 15 marine fuel tank manufacturers in the United States that qualify as small businesses under the SBA definition. These manufacturers include five rotational molders, three blow molders, six aluminum fuel tank manufacturers, and one specialty fuel tank manufacturer. The small rotational molders average fewer than 50 employees while the small blow-molders average over 100 employees. Moeller qualifies as a large business because they are owned by Moore; however, their rotational molding business is a small part of the company and operates similar to the smaller businesses. Other blow-molders are in the same situation such as Attwood which is owned by Brunswick.

We have only identified one small fuel line manufacturer that produces for the Marine SI market. Novaflex primarily distributes fuel lines made by other manufacturers but does produce its own filler necks. Because we expect vessel manufacturers will design their fuel systems such that there will not be standing liquid fuel in the fill neck (and therefore the proposed low-permeation fuel line requirements will not apply to the fill neck), we have not included this manufacturer in our analysis. The majority of fuel line in the Marine SI market is made by large manufacturers including Goodyear and Parker-Hannifin.

To gauge the impact of the proposed standards on small businesses, EPA employed a cost-to-sales ratio test to estimate the number of small businesses that would be impacted by less than one percent, between one and three percent, and above three percent. For this analysis, EPA assumed that the costs of complying with the proposed standards are completely absorbed by the regulated entity. Overall, EPA projects that 60 small businesses will be impacted by one to three percent, 18 small businesses will be impacted by over three percent, and the remaining companies (over 1,000 small businesses) will be impacted by less than one percent. Table XIV–3 summarizes the impacts on small businesses from the proposed exhaust and evaporative emission standards for Small SI engines and equipment and Marine SI engines and vessels. A more detailed description of the inputs used for each affected industry sector and the methodology used to develop the estimated impact on small businesses in each industry sector is included in the IRFA as presented in Chapter 10 of the Draft RIA for this rulemaking.

TABLE XIV–3.—SUMMARY OF IMPACTS ON SMALL BUSINESSES

Industry sector	0–1 percent	1–3 percent	> 3 percent
Manufacturers of Marine OB/PWC engines	1	0	0
Manufacturers of Marine SD/I engines < 373 kW	4	5	0
Manufacturers of Marine SD/I engines ≥ 373 kW (high-performance)	2	17	0
Boat Builders	>1,000	0	0
Manufacturers of Fuel Lines and Fuel Tanks for Marine SI Vessels	15	0	0
Small SI engines and equipment	314	38	18
Manufacturers of Fuel Lines and Fuel Tanks for Small SI Applications	27	0	0
Total	363 + >1,000 boat builders.	60	18

(4) Potential Reporting, Recordkeeping, and Compliance

For any emission control program, EPA must have assurances that the regulated products will meet the standards. Historically, EPA's programs for Small SI engines and Marine SI engines have included provisions requiring that engine manufacturers be responsible for providing these assurances. The program that EPA is considering for manufacturers subject to this proposal may include testing, reporting, and recordkeeping requirements for manufacturers of engines, equipment, vessels, and fuel system components including fuel tanks, fuel lines, and fuel caps.

For Small SI engine manufacturers and OB/PWC engine manufacturers, EPA is proposing to continue the same reporting, recordkeeping, and compliance requirements prescribed in the current regulations. For SD/I engine manufacturers, which are not currently subject to EPA regulation, EPA is proposing to apply similar reporting, recordkeeping, and compliance requirements to those for OB/PWC engine manufacturers. Testing requirements for engine manufacturers would include certification emission (including deterioration factor) testing and production-line testing. Reporting requirements would include emission test data and technical data on the engines. Manufacturers would also need to keep records of this information.

Because of the proposed evaporative emission requirements, there would be new reporting, recordkeeping and compliance requirements for Small SI equipment manufacturers. Small SI equipment manufacturers participating in the proposed transition program would also be subject to reporting, recordkeeping and compliance requirements. There may also be new reporting, recordkeeping and compliance requirements for fuel tank manufacturers, fuel line manufacturers, fuel cap manufacturers and marine vessel manufacturers. Testing requirements for these manufacturers could include certification emission testing. Reporting requirements could include emission test data and technical data on the designs. Manufacturers would also need to keep records of this information.

(5) Relevant Federal Rules

For Small SI engines and equipment, the primary federal rules that are related to the rule under consideration are EPA's Phase 1 rule for Small SI engines (60 FR 34582, July 3, 1995), EPA's Phase 2 rule for Small SI nonhandheld engines (64 FR 15208, March 30, 2004), and EPA's Phase 2 rule for Small SI handheld engines (65 FR 24268, April 25, 2000). For Marine SI engines and vessels, the primary federal rule that is related to the rule under consideration is EPA's October 1996 final rule (61 FR 52088, October 4, 1996).

Three other federal agencies have regulations that relate to the equipment and vessels under consideration. These agencies are the Consumer Product Safety Commission (CPSC), United States Department of Agriculture (USDA), and the United States Coast Guard (USCG). CPSC has safety requirements that apply to walk-behind lawnmowers to protect operators of such equipment. USDA has design requirements intended to reduce the potential fire threat of Small SI equipment. The USCG has safety regulations for marine engine and fuel system designs. The USCG safety regulations include standards for exhaust system temperature, fuel tank durability and fuel line designs, including specific requirements related to system survivability in a fire. Manufacturers will need to consider both EPA and other federal standards when certifying their products.

(6) Significant Alternatives

For Small SI engines and equipment, EPA looked at the existing Phase 2 rule for small engines, as well as other recent EPA rules, to provide potential flexibilities which might be offered with the Phase 3 standards. For engine manufacturers, the potential flexibilities considered included extra time before the Phase 3 requirements would apply and reduced testing burden, such as assigned deterioration factors for certification purposes and exemption from the production-line testing requirements. For equipment manufacturers, the potential flexibilities considered included extra time before having to use Phase 3 engines and the ability to request extra time for a variety of reasons, including technical hardship, economic hardship, and unusual circumstances. For fuel tank and fuel line manufacturers, EPA has tried to develop the timing of the proposal to accommodate all manufacturers, including small businesses. We also considered offering manufacturers the ability to request extra time for a variety of reasons, including economic hardship and unusual circumstances.

For Marine SI engines and vessels, EPA previously convened two Small Business Advocacy Review Panel (SBAR Panel, or the Panel) to obtain advice and recommendation of representatives of the small entities that potentially would be subject to the requirements under consideration at the time. The Panels took place in 1999 and 2001 and addressed small business issues related to exhaust and evaporative emission standards similar to those described in this proposal. Nineteen small entities that sell in the Marine SI engine and vessel sectors participated as Small Entity Representatives (SERs) in the two previous Panels.

On June 7, 1999, we convened a SBAR Panel to address small entity issues related to anticipated exhaust emission standards for SD/I marine engines. As part of that Panel, we considered a range of regulatory options, including standards that would be expected to require the use of catalytic control. With input from the SERs, the 1999 Panel drafted a report providing findings and recommendations to us on how to reduce potential burden on small businesses that may occur as a result of this proposed rule. Small business flexibility approaches recommended by the 1999 Panel included the following:

- Broad definition of engine families for certification.
- Minimizing compliance testing requirements.
- Design-based certification (as an option to emission testing).
- Use of emission credits.
- Delay of the implementation date of the standards.
- Hardship provisions (for economic reasons or under unusual circumstances).
- Limited temporary exemptions for small boat builders.

On May 3, 2001, we convened a SBAR Panel to address potential small entity issues for a number of emission programs under consideration. One of the programs was evaporative emission standards for boats using gasoline engines. With input from SERs, the 2001 Panel drafted a report providing findings and recommendations to us on how to reduce potential burden on small businesses that may occur as a result of this proposed rule. The flexibility approaches recommended by the 2001 Panel included the following:

- Broad definition of emission families for certification.
- Design-based certification (as an option to emission testing).
- Use of emission credits.
- Delay of the implementation date of the standards.
- Hardship provisions (for economic reasons or under unusual circumstances).

In the time since the 1999 and 2001 SBAR Panels were completed, a great deal of development has been performed on exhaust and evaporative emission control technology. We considered the flexibilities recommended by the 1999 and 2001 Panels (as noted above) in the context of this new information.

(7) Panel Process and Panel Outreach

As required by section 609(b) of the RFA, as amended by SBREFA, EPA also has conducted outreach to small entities and convened a SBAR Panel to obtain advice and recommendation of representatives of the small entities that potentially would be subject to the requirements of this rule. On August 17, 2006 EPA's Small Business Advocacy Chairperson convened a Panel under section 609(b) of the RFA. In addition to the Chair, the Panel consisted of the Division Director the Assessment and Standards Division within EPA's Office of Air and Radiation, the Chief Counsel for Advocacy of the Small Business Administration, and the Administrator of the Office of Information and Regulatory Affairs within the Office of Management and Budget.

As part of the SBAR Panel process we conducted outreach with representatives from 25 various small entities that would be affected by this rule. The SERs included engine, equipment, fuel tank and fuel line manufacturers for the Small SI market and engine, vessel, fuel tank and fuel line manufacturers for the Marine SI market. We met with these SERs to discuss the potential rulemaking approaches and potential options to decrease the impact of the rulemaking on their industries. We distributed outreach materials to the SERs; these materials included background on the rulemaking, possible regulatory approaches, and possible rulemaking alternatives (as noted earlier). The Panel met with SERs from the industries that will be impacted directly by this rule on September 12, 2006 to discuss the outreach materials and receive feedback on the approaches and alternatives detailed in the outreach packet. (EPA also met with SERs on July 11, 2006 for an initial outreach meeting.) The Panel received written comments from the SERs following the meeting in response to discussions at the meeting and the questions posed to the SERs by the Agency. The SERs were specifically asked to provide comment on regulatory alternatives that could help to minimize the rule's impact on small businesses.

(8) Panel Recommendations for Small Business Flexibilities

The Panel recommended that EPA consider and seek comment on a wide range of regulatory alternatives to mitigate the impacts of the rulemaking on small businesses, including those flexibility options described below. The following section summarizes the SBAR Panel recommendations. EPA has proposed provisions consistent with each of the Panel's recommendations.

Consistent with the RFA/SBREFA requirements, the Panel evaluated the assembled materials and small-entity comments on issues related to elements of the IRFA. A copy of the Final Panel Report (including all comments received from SERs in response to the Panel's outreach meeting (Appendix D) as well as summaries of both outreach meetings that were held with the SERs (Appendices B and C)) is included in the docket for this proposed rule. A summary of the Panel recommendations is detailed below. As noted above, this proposal includes proposed provisions for each of the Panel recommendations.

(a) Manufacturer Flexibilities for Small SI Engine Exhaust Standards

The Panel's recommendations for the Phase 3 exhaust emission standards for nonhandheld engines are summarized below. A complete discussion of the proposed small business provisions in response to each of the Panel recommendations noted below can be found in Section V.F of this preamble.

Additional Lead Time for Nonhandheld Engine Manufacturers—The Panel recommended that EPA propose two additional years of lead time before the Phase 3 standards take effect for small business engine manufacturers. For Class I engines, the effective date for small business engine manufacturers would be 2014. For Class II engines, the effective date for small business engine manufacturers would be 2013.

Assigned Deterioration Factors—The Panel recommended EPA propose that small business engine manufacturers be allowed the option to use EPA-developed assigned deterioration factors in demonstrating compliance with the Phase 3 exhaust emission standards.

Production-Line Testing Exemption—The Panel recommended EPA propose that small business engine manufacturers be exempted from the production line testing requirements for the Phase 3 exhaust emission standards.

Broader Definition of Engine Family—The Panel recommended that EPA propose allowing small business engine manufacturers to group all of their Small SI engines into a single engine family for certification by engine class and useful life category, subject to good engineering judgment.

Simplified Engine Certification for Equipment Manufacturers—Generally, it has been engine manufacturers who certify with EPA for the exhaust emission standards since the standards are engine-based standards. However, a number of equipment manufacturers, especially those that make low-volume models, believe it may be necessary for equipment manufacturers to certify their own unique engine/muffler designs with EPA (but using the same catalyst substrate already used in a muffler certified by the engine manufacturer). The Panel recommended that EPA propose a simplified engine certification process for small business equipment manufacturers in such situations. Under such a simplified certification process, the equipment manufacturer would need to demonstrate that it is using the same catalyst substrate as the approved engine manufacturer's family, provide information on the differences between their engine/exhaust system and the engine/exhaust system certified by the engine manufacturer, and explain why the deterioration data generated by the engine manufacturer would be representative for the equipment manufacturer's configuration.

Additional Lead Time for Small SI Equipment Manufacturers—The Panel recommended that EPA propose a transition program that would allow small business equipment manufacturers to continue using Phase 2 engine designs (i.e., engines meeting the Phase 2 exhaust emission standards) during the first two years that the Phase 3 standards take effect. (For equipment using Class I engines, the provision would apply in 2012 and 2013. For equipment using Class II engines, the provision would apply in 2011 and 2012.) The Panel also recommended that EPA propose to allow small business equipment manufacturers to use Phase 3 engines without the catalyst during this initial two-year period provided the engine manufacturer has demonstrated that the engine without the catalyst would comply with the Phase 2 exhaust emission standards and labels it appropriately.

Eligibility for the Small Business Flexibilities—For purposes of determining which engine and equipment manufacturers are eligible for the small business flexibilities described above, EPA is proposing criteria based on a production cut-off of 10,000 nonhandheld engines per year for engine manufacturers and 5,000 pieces of nonhandheld equipment per year for equipment manufacturers. The Panel recommended that EPA propose to allow engine and equipment manufacturers which exceed the production cut-off levels noted above but meet the SBA definitions for a small business (i.e., fewer than 1,000 employees for engine manufacturers or fewer than 500 employees for most types of equipment manufacturers) to request treatment as a small business.

(b) Manufacturer Flexibilities for SD/I Marine Exhaust Standards

The Panel's recommendations for the exhaust emission standards for SD/I marine engines are summarized below. A complete discussion of the proposed small business provisions in response to each of the Panel recommendations noted below can be found in Section III.F of this preamble.

Additional Lead Time for SD/I Engine Manufacturers—The Panel recommended that EPA propose an implementation date of 2011 for SD/I engines below 373 kW produced by small business marine engine manufacturers and an implementation date of 2013 for small business manufacturers of high performance SD/I marine engines (at or above 373 kW). Based on the proposed 2009 implementation date for the remaining SD/I engine manufacturers (*i.e.*, the large businesses), these dates would provide small business SD/I engine manufacturers with two years additional lead time for SD/I engines below 373 kW and four years additional lead time for SD/I engines at or above 373 kW.

Exhaust Emission ABT—EPA is proposing an averaging, banking and trading (ABT) program for the SD/I engine standards. Because EPA is proposing an ABT program for SD/I engines, the Panel recommended that EPA request comment on the desirability of credit trading between high performance and other SD/I marine engines and the impact it could have on small business.

Early Credit Generation for ABT—EPA is proposing an early banking program for SD/I marine engines. Under the early banking provisions, manufacturers can generate ''bonus'' credits for the early introduction of engines meeting the proposed emission standards. The Panel supports EPA proposing an early banking program and believes that bonus credits will provide greater incentive for more small business engine manufacturers to introduce advanced technology earlier than would otherwise occur.

Assigned Emission Rates for High Performance SD/I Engines—The Panel recommended that EPA propose to allow the use of default emission rates that could be used by small business high performance SD/I engine manufacturers as part of their certification. Based on currently available test data, the proposed default baseline emission levels for high performance engines are 30 g/kW-hr $HC+NO_X$ and 350 g/kW-hr CO.

Alternative Standards for High Performance SD/I Engines—SERs expressed concern that that catalysts have not been demonstrated on high performance engines and that they may not be practicable for this application. While EPA is proposing a standard based on the use of catalysts, EPA is requesting comment on a standard for high performance SD/I marine engines that could be met without the use of a catalyst. (Based on available data, levels of 16 g/kW-hr $HC+NO_X$ and 350 g/kW-hr CO were discussed with the SERs). The Panel recommended EPA request comment on a non-catalyst based standard for high performance marine engines.

EPA is proposing to not apply the not-to-exceed (NTE) standards to high performance SD/I engines. The Panel supports excluding high performance SD/I engines from NTE requirements.

Broad Engine Families for High Performance SD/I Engines—The Panel recommended that EPA propose allowing small businesses to group all of their high performance SD/I engines into a single engine family for certification, subject to good engineering judgment.

Simplified Test Procedures for High Performance SD/I Engines—For high performance SD/I engines, it may be difficult to hold the engine at idle or high power within the tolerances currently specified in existing EPA test procedures. The Panel recommended that EPA propose less restrictive specifications and tolerances for small businesses testing high performance SD/I engines, which would allow the use of portable emission measurement equipment.

Eligibility for the Small Business Flexibilities—For purposes of determining which engine manufacturers are eligible for the small business flexibilities described above for SD/I engine manufacturers, EPA is proposing criteria based on a production cut-off of 5,000 SD/I engines per year. The Panel recommended EPA propose to allow engine manufacturers that exceed the production cut-off level noted above but meet the SBA definitions for a small business (*i.e.*, fewer than 1,000 employees for engine manufacturers), to request treatment as a small business.

(c) Manufacturer Flexibilities for Small SI and Marine SI Evaporative Standards

The Panel's recommendations for the evaporative emission standards for Small SI engines and equipment and SD/I marine engines and vessels are summarized below. SERs raised many of the same issues regarding evaporative emission standards for both Small SI and marine applications. In fact, many of the SERs supply fuel system components to both industries. For these reasons, the Panel's recommendations on regulatory flexibility discussed below would apply to Small SI equipment and to SD/I marine vessels except where noted.

Because the majority of fuel tanks produced for the Small SI equipment and the SD/I marine vessel market are made by small businesses, the details of the evaporative emissions program under consideration and the flexibility provisions shared by EPA with the SERs were noted as being available to all fuel tank manufacturers. Therefore, the Panel recommendations on regulatory flexibility for fuel tank manufacturers discussed below are being proposed to apply to all fuel tank manufacturers. A complete discussion of the proposed provisions in response to each of the Panel recommendations noted below can be found in Section VI.G of this preamble.

Consideration of Appropriate Lead Time—The Panel recommended that EPA propose to implement the fuel tank permeation standards in 2011 with an additional year (2012) for rotationally molded marine fuel tanks. The extra year for rotationally molded marine tanks would give manufacturers time to address issues that are specific to the marine industry.

With regard to diurnal emissions control, SERs commented that they would like additional time to install carbon canisters in their vessels because of deck and hull changes that might be needed to accommodate the carbon canisters. SERs commented that they would consider asking EPA to allow the use of low-permeation fuel lines prior to 2009 as a method of creating an emission neutral flexibility option for providing extra time for canisters. The Panel recommended that EPA continue discussions with the marine industry and request comment on environmentally neutral approaches to provide more flexibility in meeting the potential diurnal emission standards.

Fuel Tank ABT and Early Incentive Program—The Panel recommended that EPA propose an ABT program for fuel tank permeation. The Panel also recommended that EPA request comment on including service tanks (i.e., replacement tanks) in the ABT program. Finally, the Panel recommended that EPA request comment on an early incentive program for tank permeation.

Broad Definition of Evaporative Emission Family for Fuel Tanks—The Panel recommended that EPA propose a broad emission family definition for Small SI fuel tanks and for Marine SI fuel tanks similar to that in the regulations for recreational vehicles. Under the recreation vehicle evaporative emission regulations, EPA specifies that fuel tank permeation emission families be based on type of material (including additives such as pigments, plasticizers, and ultraviolet (UV) inhibitors), emission control strategy, and production methods. Fuel tanks of different sizes, shapes, and wall thicknesses may be grouped into the same emission family.

Compliance Progress Review for Marine Fuel Tanks—While there is clearly a difference of opinion among the SERs involved in tank manufacturing, some SERs expressed concern that there is not an established low-permeation technology available for rotationally molded marine fuel tanks. These SERs stated that they are working on developing such technology but do not have in-use experience to demonstrate the durability of low-permeation rotationally molded fuel tanks. The Panel recommended that if a rule is implemented, EPA undertake a ''compliance progress review'' assessment with the manufacturers. In this effort, EPA should continue to engage on a technical level with