ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 86, 90, and 1051

[AMS–FRL–7604–8]

RIN 2060–AJ90

Control of Emissions From Highway Motorcycles

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: In this action we are adopting revised exhaust emission standards for currently regulated highway motorcycles. We are also adopting new exhaust emissions standards for motorcycles of less than 50 cubic centimeters in displacement, which had not previously been subject to EPA regulations. Finally, we are adopting new permeation evaporative emission standards for all classes of highway motorcycles. Highway motorcycles contribute to ozone and particulate matter (PM) nonattainment, as well as other types of pollution impacting human health and welfare.

We expect that manufacturers will be able to maintain or even improve the performance of their products without compromising safety when producing highway motorcycles in compliance with these standards. In fact, we estimate that the fuel costs savings associated with these regulations will offset about one fourth of the program's cost by the time the standards are fully phased in (2030). There are also several provisions to address the unique limitations of small volume manufacturers.

EFFECTIVE DATE: This final rule is effective March 15, 2004.

ADDRESSES: Materials relevant to this rulemaking are contained in Public Docket Numbers A–2000–01 and A–2000–02 at the following address: EPA Docket Center (EPA/DC), Public Reading Room, Room B102, EPA West Building, 1301 Constitution Avenue, NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, except on government holidays. You can reach the Reading Room by telephone at (202) 566–1742, and by facsimile at (202) 566–1741. The telephone number for the Air Docket is (202) 566–1742. You may be charged a reasonable fee for photocopying docket materials, as provided in 40 CFR part 2.

For further information on electronic availability of this action, see **SUPPLEMENTARY INFORMATION** below.

FOR FURTHER INFORMATION CONTACT: U.S. EPA, Office of Transportation and Air Quality, Assessment and Standards Division hotline, (734) 214–4636, *asdinfo@epa.gov.* Carol Connell, (734) 214–4636; *connell.carol@epa.gov.*

SUPPLEMENTARY INFORMATION:

Regulated Entities

This action will affect companies that manufacture or introduce into commerce highway motorcycles subject to the standards. This includes motorcycles with engines with a displacement of less than 50 cubic centimeters (cc) provided the vehicle otherwise meets the regulatory definition of a highway motorcycle. Regulated categories and entities include:

Category	NAICS Codes [a]	SIC Codes [b]	Examples of potentially regulated entities
Industry	336991	....	Motorcycle manufacturers.
Industry	421110	....	Independent Commercial Importers of Vehicles and Parts.

Notes:
[a] North American Industry Classification System (NAICS).
[b] Standard Industrial Classification (SIC) system code.

This list is not intended to be exhaustive, but rather provides a guide regarding entities likely to be regulated by this action. To determine whether this action regulates particular activities, you should carefully examine the regulations. You may direct questions regarding the applicability of this action to the person listed in **FOR FURTHER INFORMATION CONTACT.**

How Can I Get Copies of This Document and Other Related Information?

Docket. EPA has established an official public docket for this action under Docket ID Nos. OAR–2002–0024, A–2000–01, and A–2000–02. The official docket consists of the documents specifically referenced in this action, any public comments received, and other information related to this action. Although a part of the official docket, the public docket does not include Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. The official public docket is the collection of materials that is available for public viewing at Air Docket in the EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Reading Room is (202) 566–1742, and the telephone number for the Air Docket is (202) 566–1742.

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I. Introduction

A. 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, carbon monoxide, and particulate matter are linked to potentially serious respiratory health problems, especially respiratory effects and environmental degradation, including visibility impairment in our national parks.

This rule addresses these air pollution concerns by adopting national emission standards for highway motorcycles, including a category of motorcycle that is currently unregulated. These new standards are a continuation of the process of establishing emission standards for on-highway engines and vehicles under Clean Air Act section 202(a). We are adopting new exhaust emission standards and new standards for permeation emissions from highway motorcycles.

Over the past quarter century, state and federal governments have established emission-control programs that significantly reduce emissions from numerous types of sources. Many of these sources now pollute at only a small fraction of their pre-control rates. In contrast, today's rule revises EPA standards for on-highway motorcycles for the first time since 1977.[1] These final standards for motorcycles reflect the development of emission-control technology that has occurred since we last set standards for these engines which took effect in 1978. A review of current motorcycle certification results clearly indicates that the emissions performance of a majority of current motorcycles surpasses levels required by current federal regulations. The standards established in this rule will further lower emissions in the next 3–7 years.

Nationwide, highway motorcycles are significant contributors to mobile-source air pollution, currently accounting for 0.6 percent of mobile-source hydrocarbon (HC) emissions, 0.1 percent of mobile-source oxides of nitrogen (NO_X) emissions, and less than 0.1 percent of mobile-source particulate matter (PM) emissions.[2] Without these further regulations, highway motorcycles would account for 2.2 percent of mobile source HC, 0.3 percent of mobile source NO_X, and 0.1 percent of mobile-source particulate matter (PM) emissions by 2020. These standards will reduce exposure to these emissions and help avoid a range of adverse health effects associated with ambient ozone and PM levels, especially in terms of respiratory impairment and related illnesses. In addition, the standards will help reduce acute exposure to air toxics and PM for persons who operate or who work with or are otherwise active in close proximity to these sources. They will also help address other environmental problems associated with these sources, such as visibility impairment in our national parks and other wilderness areas.

This final rule follows several EPA notices: An Advance Notice of Proposed Rulemaking (ANPRM) published on December 7, 2000 (65 FR 76797); a Notice of Proposed Rulemaking (NPRM) published on August 14, 2002 (67 FR 53050), and an additional notice dated October 30, 2002 (67 FR 66097). In the NPRM we proposed new exhaust emission standards for highway motorcycles, including motorcycles of less than 50 cubic centimeters (cc) in displacement, and requested comment on promulgating standards controlling emissions from fuel tank and hose permeation from highway motorcycles.[3] We received comments on the NPRM from a wide variety of stakeholders, including the motorcycle manufacturing industry, motorcycle user groups, various governmental bodies, environmental groups, and the general public. These comments are available for public viewing in Docket A–2000–02. Our responses to these comments are detailed in the Summary and Analysis of Comments, which is available in the docket and on our Web site.

B. How Is This Document Organized?

This final rule covers highway motorcycles, which vary in size from small scooters with engines of less than 50cc displacement to large touring models with engines that approach the size of small automobile engines (over 1000cc). In general the text is often organized by EPA's definitions of motorcycle classes, which are based on the size of the engine and are used to distinguish motorcycles for the purposes of applying emission standards.

Section I describes the general provisions that we are finalizing and provides some background and context for the final rule.

Section II describes the air quality needs that cause us to publish this final rule, as well as describing how highway motorcycles contribute to air pollution.

Section III describes specifically which vehicles are covered by the final rule.

[1] *See* 42 FR 1122, Jan. 5, 1977.

[2] While we characterize emissions of hydrocarbons, this can be used as a surrogate for volatile organic compounds (VOC), which comprises a very similar, but slightly different, set of compounds. Hydrocarbons are generally easier to test for, and therefore, are easier to regulate.

[3] The NPRM also proposed provisions for controlling evaporative emissions from marine vessels that use spark-ignition engines. These provisions are not a part of this action; a final rule addressing these provisions is being developed and will be published in a separate future action.

Section IV describes the new exhaust emission standards and related provisions that we are finalizing.

Section V describes our findings regarding the technological feasibility of the exhaust emission standards for highway motorcycles.

Section VI describes the permeation evaporative emission standards and related provisions that we are finalizing. It also describes the permeation testing requirements and our findings regarding the technological feasibility of the permeation requirements.

Section VII summarizes the projected environmental impacts and costs of this rule. We expect the costs of this emission control program to be about $27 million (including fuel savings) annually by the time the program is fully implemented. The emission benefits of this program are projected to be approximately 55,000 tons of $HC+NO_X$ annually by the time the program is fully implemented.

Finally, Sections VIII and IX contain information about public participation and various administrative requirements.

The remainder of this section summarizes the new requirements and provides some background and context for the final rule.

C. What Requirements Are We Adopting?

In general, we are harmonizing the federal motorcycle exhaust emission standards with those of the state of California, but on a delayed schedule relative to implementation in California and with some additional provisions that provide additional flexibility in meeting the standards. The process by which motorcycle manufacturers certify their motorcycles to the exhaust emission standards, including the test procedures, the driving cycle, and other elements of the federal program, are generally unchanged. We are also adopting exhaust emission standards for previously unregulated motorcycles with engines that are less than 50cc in displacement. In addition, we are adopting standards that will require the use of low permeability fuel tanks and fuel hoses on all motorcycles.

1. Class I and II Motorcycles

We are adopting a new exhaust emission standard for Class I and Class II motorcycles of 1.0 g/km HC, to replace the current federal HC standard of 5.0 g/km. This standard will become effective starting with the 2006 model year. Class I and II motorcycles have been meeting a standard of 1.0 g/km HC in California since 1982, and by 2006 the European versions of these motorcycles will be meeting HC and NO_X standards that when combined are below 1.0 g/km.[4] We are also finalizing an optional $HC+NO_X$ standard of 1.4 g/km, which will be required for manufacturers who decide to take advantage of provisions that allow the transfer of emission credits and averaging of Class I and II engine families. Class I and II motorcycles represent about 5–10 percent of annual U.S. motorcycle sales. Class I and II motorcycles will also have to meet new requirements regarding low permeation fuel tanks and fuel hoses.

We are also adopting a new definition of a Class I motorcycle which includes motorcycles with engine displacements of less than 50cc. These motorcycles—which are powered mostly by two-stroke engines currently—have not been subject to EPA emission regulations until now. We are finalizing a useful life for the under 50cc category of 5 years or 6,000 km, whichever first occurs. We are also revising the test procedure for this unique category of Class I motorcycles to ensure that these small motorcycles are tested appropriately.

2. Class III Motorcycles

We are adopting new exhaust emission standards for Class III motorcycles. Class III motorcycles represent more than 90 percent of annual U.S. sales. These standards, which can be met on a corporate-average basis, are identical to the standards of the California program. Specifically, we are adopting a ''Tier-1'' standard of 1.4 g/km $HC+NO_X$ starting in the 2006 model year, and a ''Tier-2'' standard of 0.8 g/km starting in the 2010 model year. Because both HC and NO_X are ozone precursors, this new standard will better reduce ozone than an HC-only standard. Implementation on a nationwide basis will take place starting two model years after implementation of identical exhaust emission standards in California, ensuring that manufacturers have adequate lead time to plan for these new standards and to have full product lines available for sale. The federal CO standard of 12.0 g/km is unchanged by this final rule. The process by which manufacturers certify their motorcycles, the test procedures, the driving cycle, and other elements of the federal program remain unchanged. Class III motorcycles will also have to meet new requirements regarding low permeation fuel tanks and fuel hoses.

[4] California standards are met using a test procedure identical to EPA's, whereas compliance with European standards is determined using a different test procedure.

D. Putting This Action Into Perspective

Federal standards for highway motorcycles were first established in the 1978 model year (see 42 FR 1126, Jan. 5, 1977). Interim standards were effective for the 1978 and 1979 model years, and final standards took effect with the 1980 model year. The interim standards ranged from 5.0 to 14.0 g/km HC depending on engine displacement, while the interim CO standard of 17.0 g/km applied to all motorcycles. The standards and requirements effective for 1980 and later model year motorcycles, which do not include NO_X emission standards, currently remain unchanged from when they were established 25 years ago. Crankcase emissions from motorcycles have also been prohibited since 1980. The level of technology required to meet these standards is widely considered to be comparable to the pre-catalyst technology in the automobile. These standards, which resulted in the phase-out of two-stroke engines for highway motorcycles above 50cc displacement, achieved significant reductions in emissions. There are no current federal standards for evaporative emissions from motorcycles. The current federal exhaust emission standards are shown in Table I.D–1.

TABLE I.D–1.—CURRENT FEDERAL EXHAUST EMISSION STANDARDS FOR MOTORCYCLES

Class	Engine size	HC (g/km)	CO (g/km)	Useful life (km)[a]
I	50–169	5.0	12.0	12,000
II	170–279	5.0	12.0	18,000
III	>279	5.0	12.0	30,000

Notes:
[a] "Useful life" is the period over which the manufacturer must demonstrate compliance with emission standards. It is unrelated to how long a consumer can keep or ride a motorcycle.

However, it is clear that the impact of the current federal standards on motorcycle emission control was fully realized by the end of the 1980's, and that international and other efforts have been the driving factor in more recent technology development for motorcycle emissions control. In the past two decades, other actions in Europe, Asia, and California have caused motorcycle emission controls to continue to advance, despite the static U.S. emission standards in that same time period. In fact, most manufacturers elect to certify many of their motorcycles to the California standards (described below in section I.D.2) and market them nationwide. This practice has resulted in the average certification levels shown in Table I.D–2.

TABLE I.D–2.—AVERAGE CERTIFICATION LEVELS FOR 2003 MODEL YEAR MOTORCYCLES

Class	Engine size	HC (g/km)	CO (g/km)
I	50–169	1.3	7.2
II	170–279	0.9	7.2
III	>279	0.9	6.7

Note: Manufacturers typically certify at levels that provide them with sufficient "headroom" between the actual certification level and the standard. This "headroom" is often 30–50% of the standard, as can be seen in the CO levels in this table which compare to a standard of 12 g/km.

1. New Federal Emission Standards for Recreational Vehicles

On November 8, 2002, we adopted new standards for all-terrain vehicles (ATVs), snowmobiles, and off-highway motorcycles.[5] These standards resulted from requirements in the Clean Air Act regarding all nonroad vehicles. In light of the requirements in the Act and our subsequent action to control emissions from off-road motorcycle and ATV emissions, we felt it both necessary and a matter of common sense to initiate an action to review and update the two-decade-old highway motorcycle emission standards. Table I.D–3 shows the emission standards that apply to recreational vehicles.

Compliance with the off-highway motorcycle and ATV standards will be determined using the same test cycle that is currently used for highway motorcycles. Therefore the standards are directly comparable. The current federal highway motorcycle HC standard of 5.0 g/km appears even more misaligned with the current state of emission control technology when compared to the standards that their off-highway cousins will be meeting in the next few years. Today's action rectifies this imbalance in motorcycle and ATV emission standards.

TABLE I.D–3.—RECREATIONAL VEHICLE EXHAUST EMISSION STANDARDS

Vehicle	Model year	Emission standards		Phase-in
		HC g/kW-hr	CO g/kW-hr	
Snowmobile	2006	100	275	50%
	2007 through 2009	100	275	100%
	2010 -option 1	75	200	
	2010 -option 2	45	275	
		$HC+NO_X$ g/km	CO g/km	
Off-highway	2006	2.0	25.0	50%
Motorcycle	2007 and later	2.0	25.0	100%
ATV	2006	1.5	35.0	50%
	2007 and later	1.5	35.0	100%

2. California Emission Standards for Highway Motorcycles

Motorcycle exhaust emission standards in California were originally identical to the federal standards that took effect in 1980. The definitions of motorcycle classes used by California ARB continue to be identical to the federal definitions. However, California ARB has revised its standards several times in bringing them to their current levels (see Table I.D–4). In the 1982

[5] See 67 FR 68241 (November 8, 2002). The final rule also contained new standards for large spark-ignition engines such as those used in forklifts and airport ground-service equipment and recreational marine diesel engines.

model year the standards were modified to tighten the HC standard from 5.0 g/km to 1.0 or 1.4 g/km, depending on engine displacement. California adopted an evaporative emission standard of 2.0 g/test for all three motorcycle classes for 1983 and later model year motorcycles. California later amended the regulations for 1988 and later model year motorcycles to further lower emissions and to make the compliance program more flexible for manufacturers. The 1988 and later standards could be met on a corporate-average basis, and the Class III motorcycles were split into two separate categories: 280 cc to 699 cc and 700 cc and greater. These are the standards that apply in California now. Like the federal standards, there are currently no limits on NO_X emissions for highway motorcycles in California. Under the corporate-average scheme, no individual engine family is allowed to exceed a cap of 2.5 g/km HC. Like the federal program, California also prohibits crankcase emissions. Current California exhaust emission standards are shown in Table I.D–4.

TABLE I.D–4.—CURRENT CALIFORNIA HIGHWAY MOTORCYCLE EXHAUST EMISSION STANDARDS

Class	Engine size (cc)	HC (g/km)	CO (g/km)
I & II	50–279	1.0	12.0
III	280–699	1.0	12.0
III	700 and above	1.4	12.0

In November 1999, the California ARB adopted new exhaust emission standards for Class III motorcycles that would take effect in two phases—Tier 1 standards starting with the 2004 model year, followed by Tier 2 standards starting with the 2008 model year (see Table I.D–5). Existing California standards for Class I and Class II motorcycles (see Table I.D–4), which have been in place since 1982, remain unchanged, as does their evaporative emissions standard. As with the current standards in California, manufacturers will be able to meet the requirements on a corporate-average basis. Perhaps most significantly, California ARB's Tier 1 and Tier 2 standards control NO_X emissions for the first time by establishing a combined $HC+NO_X$ standard. California ARB made no changes to the CO emission standard, which remains at 12.0 g/km, equivalent to the existing federal standard. In addition, California ARB is providing an incentive program to encourage the introduction of Tier 2 motorcycles before the 2008 model year. This incentive program allows the accumulation of emission credits that manufacturers can use to meet the 2008 standards. Like the federal program, these standards will also apply to dual-sport motorcycles.

TABLE I.D–5.—TIER 1 AND TIER 2 CALIFORNIA CLASS III HIGHWAY MOTORCYCLE EXHAUST EMISSION STANDARDS

Model year	Engine displacement	$HC + NO_X$ (g/km)	CO (g/km)
2004 through 2007 (Tier 1)	280 cc and greater	1.4	12.0
2008 and subsequent (Tier 2)	280 cc and greater	0.8	12.0

California ARB also adopted a new definition of small-volume manufacturer that will take effect with the 2008 model year. Currently and through the 2003 model year, all manufacturers must meet the standards, regardless of production volume. Small-volume manufacturers, defined in California ARB's recent action as a manufacturer with California sales of combined Class I, Class II, and Class III motorcycles not greater than 300 units annually, do not have to meet the new standards until the 2008 model year, at which point the Tier 1 standard applies.

3. European Union and Other International Actions

The European Union (EU) has established a new phase of motorcycle standards, which took effect in 2003, and has recently finalized a second phase that will start in 2006. The 2003 European standards are more stringent than the existing federal standards, and, with the exception of the CO standard, are roughly comparable to the California Tier 1 standards taking effect in 2004. The 2003 standards would require emissions to be below the values shown in Table I.D–6, as measured over the European ECE–40 test cycle.[6] The standards in Table I.D–6 apply to motorcycles of less than 50cc (*e.g.*, scooters and mopeds) only if the motorcycle can exceed 45 kilometers per hour (28 miles per hour). Starting in 2002 motorcycles of less than 50cc that cannot exceed 45 kilometers per hour (28 miles per hour) are subject to a new $HC+NO_X$ standard of 1.2 grams per kilometer and a CO standard of 1.0 gram per kilometer.

[6] The ECE–40 cycle is used by several countries around the world for motorcycle emission testing. It has its origins in passenger car driving, being derived from the European ECE–15 passenger car cycle. The speed-time trace is simply a combination of straight lines, resulting in a ''modal'' cycle, rather than the transient nature of the U.S. Federal Test Procedure (FTP).

TABLE I.D–6.—EUROPEAN UNION 2003 MOTORCYCLE EXHAUST EMISSION STANDARDS FOR MOTORCYCLES >150CC

HC (g/km)	CO (g/km)	NO_X (g/km)
1.0	5.5	0.3

New standards that would apply starting in 2006, along with a revised test cycle (as an interim cycle to bridge between the current EU cycle and a possible WMTC cycle in the future) have been recently finalized by the EU. Setting aside the difference in test cycles, the 2006 EU HC and NO_X standards are roughly comparable to and perhaps somewhat more stringent than the California Tier 2 motorcycle standards effective in 2008. The 2006 EU standards are shown in Table I.D–7.

TABLE I.D–7.—EUROPEAN UNION 2006 MOTORCYCLE EXHAUST EMISSION STANDARDS FOR MOTORCYCLES >150CC

HC (g/km)	CO (g/km)	NO_X (g/km)
0.3	2.0	0.15

Many other nations around the world, particularly in South Asia where two-stroke small displacement motorcycles can be a majority of the vehicle population, have also recently improved their emission standards or are planning to do so in the next several years. For example, Taiwan has adopted an $HC+NO_X$ standard of 1.0 gram per kilometer for all two-strokes starting in 2003 (as tested on the European ECE–40 test cycle). (Four-stroke motorcycle engines will have to meet at standard of 2.0 grams per kilometer.) India has proposed a standard for all motorcycles of 1.3 grams per kilometer $HC+NO_X$ in 2003 and 1.0 grams per kilometer $HC+NO_X$ in 2005 (as tested on the Indian Drive Cycle, or IDC).[7] China has adopted the 2003 European standards described above, implementing them in 2004, a year later than Europe.

E. Statutory Authority

Section 202(a)(1) and (2) of the Clean Air Act authorizes EPA to promulgate, and from time to time revise, standards applicable to emissions of any air pollutant from any class or classes of new motor vehicles that, in the Administrator's judgment cause or contribute to air pollution which in EPA's judgment may reasonably be anticipated to endanger public health or welfare. Such regulations shall apply for the useful life of the vehicle and ''shall take effect after such period as the Administrator finds is necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.''

In particular, section 202(a)(3)(E) states that motorcycles shall be treated as heavy-duty vehicles unless ''the Administrator promulgates regulations under subsection (a) of this section applying standards applicable to the emission of air pollutants from motorcycles as a separate class or category. In any case in which such standards are promulgated for such emissions as a separate class or category, the Administrator, in promulgating such standards, shall consider the need to achieve equivalency of emission reductions between motorcycles and other motor vehicles to the maximum extent practicable.''

EPA's initial standards regulating motorcycles were promulgated on December 23, 1976 (42 FR 1122). In that final rule EPA made the finding that highway motorcycles were a contributor to air pollution and that control of their emissions is necessary to meet the National Ambient Air Quality Standards. The air quality analyses conducted for this final rule (see the Final Regulatory Support Document) continue to support this conclusion. The standards promulgated in the 1976 rule and in this final rule treat motorcycles as a separate class of motor vehicle, and thus are governed by the language in section 202(a)(1) and (2) and 202(a)(3)(E). In promulgating these standards, EPA has considered the need to achieve equivalency in emission reduction between motorcycles and other motor vehicles (see Section 4.1 of the Final Regulatory Support Document).

F. Modification, Customization and Personalization of Motorcycles

Many motorcycle owners personalize their motorcycles in a variety of ways. This is one of the aspects of motorcycle ownership that is appealing to a large number of motorcycle owners, and they take their freedom to customize their bikes very seriously. However, there are some forms of customization that are not legal under the provisions of Clean Air Act section 203(a), which states that it is illegal:

> for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser or * * * after such sale and delivery to the ultimate purchaser.* * *

or

> for any person to manufacture or sell * * * or install, any part or component intended for use with * * * any motor vehicle * * * where a principal effect of the part or component is to bypass, defeat, or render inoperative any device or element of design installed on or in a motor vehicle * * * in compliance with regulations under this title, and where the person knows or should know that such part or component is being offered for sale or installed for such use. * * *

In other words, under current law, owners of motor vehicles [8] cannot legally make modifications that remove, bypass, or disable emission-control devices installed by the manufacturer.[9] It is also illegal for part manufacturers and dealers to manufacture, sell or install a part or component that the manufacturer or dealer knows or should know will be sold or used in a manner that defeats the emissions control system.

We use the term ''tampering'' to refer specifically to actions that are illegal under Clean Air Act section 203; the term, and the prohibition, do not apply generally to the wide range of actions that a motorcycle enthusiast can take to personalize his or her motorcycle, but only to actions that remove or disable emission control devices or cause the emissions to exceed the standards. We know, from anecdotal reports and from some data collected from in-use motorcycles, that a portion of the motorcycle riding population has removed, replaced, or modified the original equipment on their motorcycles. This customization can include changes that can be detrimental (or, in some cases, possibly beneficial) to the motorcycle's emission levels. The NPRM sought comments and data that could better help us understand the nature of the issue, such that our final rule decisions could be made with the best understanding possible of current consumer practices. We did not propose to revise the existing tampering restrictions or to prohibit many of the things that motorcycle owners are now doing legally.

The new emission standards that we are adopting do not change this ''tampering'' prohibition, which has been in the Clean Air Act for more than 20 years. Part manufacturers are still free to make parts, dealers are free to sell and install parts, and owners are free to customize their motorcycles in any way, as long as they do not disable emission controls or cause the motorcycle to exceed the emission standards. Owners are also free to perform routine maintenance on their motorcycles to restore or maintain the motorcycle engine and related components in their original condition and configuration.

[7] The IDC, although not a transient cycle like the FTP, appears to be the only cycle currently in use that is based on actual measurements of motorcycles in use. Although the FTP is based on real-world driving of passenger cars and not motorcycles, it is reasonable to argue that the two types of vehicles are driven similarly.

[8] A motorcycle is a ''motor vehicle'' as defined under section 216 of the Clean Air Act, which states that ''[t]he term ''motor vehicle'' means any self-propelled vehicle designed for transporting persons or property on a street or highway.''

[9] *See* Mobile Source Enforcement Memorandum No. 1A, Interim Tampering Enforcement Policy, Office of Enforcement and General Council, June 25, 1974 (Docket A–2000–01; document IV–A–27). (*http://www.epa.gov/oeca/ore/aed/comp/hcomp.html*)

G. Future Actions

1. 2006 Technology Progress Review

The California ARB has indicated plans for a technology progress review, to take place in 2006, to evaluate manufacturers' progress in meeting the Tier 2 standards. Specifically, California ARB documents state that the purpose of the 2006 review would be to ''* * * evaluate the success, cost, and consumer acceptance of engine modifications employed to meet Tier-1 * * *'' and to '' * * * review and discuss manufacturers' efforts to meet Tier-2 * * * ''[10] As part of that review, the California ARB has suggested they may reevaluate whether the Tier 2 standard should be applied to small-volume manufacturers in the future.[11] We plan to participate in that review and work with the California ARB and others. We would intend to make any appropriate adjustments to the Tier 2 standards or implementation schedule if our review leads to the conclusion that changes are warranted.

In the context of the 2006 progress review we will evaluate and possibly propose regulatory revisions with regard to a number of issues that are discussed in this final rule. In particular, we intend to pursue development of a program that would apply emission standards to motorcycle engine manufacturers. Small-volume manufacturers may be the primary consumers of motorcycle engines built by others, since they generally do not have the physical or technical resources to develop, test, and manufacture their own engines. Although these small manufacturers are provided with a substantial level of flexibility in the current program, some additional flexibility may be warranted in the future, especially with regard to very small manufacturers producing fewer than 100 motorcycles per year. In evaluating any potential future actions, we intend to carefully consider the potential impacts on the small segment of the motorcycle industry represented by the smallest manufacturers.

It is our view that a program could be structured such that small volume motorcycle manufacturers could purchase certified engines directly from an engine manufacturer. We believe that such a program could be structured such that it is both fair to the engine manufacturers and beneficial to small volume motorcycle manufacturers. Under one possible approach, small volume motorcycle manufacturers could choose to use certified engines and to accept the calibration or configuration of a certified engine that they purchase for use in their motorcycles. Small volume manufacturers would not be required to use certified engines, but if they chose either to use uncertified engines or to change the calibration or configuration of the certified engines they use, then they would have to independently certify their motorcycles to the applicable emission standards.

In the context of the 2006 review we may also evaluate additional evaporative emission requirements, more stringent CO standards, an $HC+NO_X$ standard for Class I and II motorcycles, and revisions to the useful life definitions. Further action on these or any other items would depend on an evaluation of appropriate criteria, including but not necessarily limited to costs and feasibility. These items, including the engine program, could be proposed with the world harmonized motorcycle test cycle discussed below if the timing is appropriate, or in an independent action if the timing is not appropriate.

2. Globally Harmonized Motorcycle Test Cycle

In the NPRM we noted the effort underway under the auspices of the United Nations/Economic Commission for Europe (UN/ECE) to develop a global harmonized world motorcycle test cycle (WMTC), and requested comment on adopting such a test cycle in the future. The United States is also a participating member of UN/ECE. The objective of the WMTC project is to develop a scientifically supported test cycle that accurately represents the in-use driving characteristics of highway motorcycles, and that could ultimately be integrated into the requirements of nations around the world. The advantages of such a test cycle are numerous. First, the industry could have a single test cycle to meet emission standards in many countries (the process recognizes that nations will have differing emission standards due the varying air-pollution concerns). Second, the test cycle could potentially be better than the existing FTP in that it is expected to better represent how a wide range of riders drive their motorcycles, which could ultimately result in further emission reductions.

At this time we are not adopting any modifications to the highway motorcycle test cycle. We continue to be involved in the WMTC process and are hopeful that a test cycle meeting the stated objectives can be agreed on by the international participants, including the United States. Although a draft test cycle has been developed, some issues remain unresolved and it will likely be some time before a new cycle can be issued as a global technical regulation under the process established by a 1998 international agreement. Under that process, if a test cycle is brought to a vote and the United States votes in the affirmative, we will then be committed to initiating a rulemaking that may lead to an action to adopt the new test cycle. If the timing is appropriate this action could include proposals relating to the 2006 technology review discussed above.

II. Why Is EPA Taking This Action?

This final rule establishes revised standards for highway motorcycles. The current emission standards for these vehicles were set in 1978 and are based on 1970-era emission control technology. We are adopting new HC and NO_X standards that reflect the application of more advanced emission control technology. These standards are harmonized with California's highway motorcycle emission standards, but on a delayed schedule relative to implementation in California and with some additional provisions that provide additional flexibility in meeting the standards. We are also finalizing new federal emission standards for highway motorcycles under 50cc that are currently uncontrolled. Finally, we are adopting standards to control permeation evaporative emissions from the fuel tanks and fuel hoses on highway motorcycles.

As described below and in the Final Regulatory Support Document, these standards will help address the contribution of these engines to air pollution that causes public health and welfare problems. HC and NO_X emissions from highway motorcycles contribute to ambient concentrations of ozone. They also add to fine particle levels and contribute to visibility impairment. The standards we are adopting, which are expected to result in about a 60 percent reduction in HC and NO_X emissions in 2020, will help reduce these harmful emissions. They will also reduce personal exposure for people who operate, who work with, or are otherwise in close proximity to these vehicles. This is important because, in addition to the health effects associated with exposure to ozone and fine PM, many types of hydrocarbons are also air toxics.

Based on the most recent data available for this rule (1999–2001),

[10] State of California Air Resources Board, October 23, 1998 ''Proposed Amendments to the California On-Road Motorcycle Regulation'' Staff Report: Initial Statement of Reasons (Docket A–2000–01; document II–D–12).

[11] State of California Air Resources Board, ''Final Statement of Reasons for Rulemaking: Proposed Amendments to the California On-Road Motorcycle Regulation.''

ozone and PM air quality problems are widespread in the United States. There are about 111 million people living in counties with monitored concentrations exceeding the 8-hour ozone NAAQS, and over 65 million people living in counties with monitored $PM_{2.5}$ levels exceeding the $PM_{2.5}$ NAAQS. This emission control program is another component of the effort by federal, state and local governments to reduce the health related impacts of air pollution and to reach attainment of the National Ambient Air Quality Standard (NAAQS) for ozone and particulate matter as well as to improve other environmental conditions such as atmospheric visibility.

A. What Are The Health and Welfare Effects of Highway Motorcycle Emissions?

Highway motorcycles generate emissions that contribute to ozone formation and ambient levels of PM and air toxics. This section summarizes the general health effects of these pollutants. National inventory estimates are set out in Section II.B, and estimates of the expected impact of these programs are described in Section VII. Interested readers are encouraged to refer to the Regulatory Support Document for this rule for more in-depth discussions.

1. Health and Welfare Effects Associated With Ground Level Ozone and Its Precursors

a. Health and Welfare Effects

Highway motorcycles contribute to ambient ozone levels through their HC and NO_X emissions. Volatile organic compounds (VOC) and NO_X are precursors in the photochemical reaction which forms tropospheric ozone. Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of VOCs and NO_X in the presence of heat and sunlight. Hydrocarbons are a set of compounds that are very similar to, but slightly different from, VOCs, and to reduce mobile-source VOC levels we set maximum limits for HC emissions.[12]

Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or uncomfortable sensation in the chest.[13 14] Ozone can reduce lung function and make it more difficult to breathe deeply, and breathing may become more rapid and shallow than normal, thereby limiting a person's normal activity. Ozone also can aggravate asthma, leading to more asthma attacks that require a doctor's attention and/or the use of additional medication. In addition, ozone can inflame and damage the lining of the lungs, which may lead to permanent changes in lung tissue, irreversible reductions in lung function, and a lower quality of life if the inflammation occurs repeatedly over a long time period (months, years, a lifetime). People who are of particular concern with respect to ozone exposures include children and adults who are active outdoors. Others particularly susceptible to ozone effects are people with respiratory disease, such as asthma, and people with unusual sensitivity to ozone, and children. Beyond its human health effects, ozone has been shown to injure plants, which has the effect of reducing crop yields and reducing productivity in forest ecosystems.[15 16]

The 8-hour ozone standard, established by EPA in 1997, is based on well-documented science demonstrating that more people are experiencing adverse health effects at lower levels of exertion, over longer periods, and at lower ozone concentrations than addressed by the one-hour ozone standard.[17] The 8-hour standard addresses ozone exposures of concern for the general population and populations most at risk, including children active outdoors, outdoor workers, and individuals with pre-existing respiratory disease, such as asthma.

There has been new research that suggests additional serious health effects beyond those that were known when the 8-hour ozone health standard was set. Since 1997, over 1,700 new health and welfare studies relating to ozone have been published in peer-reviewed journals.[18] Many of these studies investigate the impact of ozone exposure on such health effects as changes in lung structure and biochemistry, inflammation of the lungs, exacerbation and causation of asthma, respiratory illness-related school absence, hospital and emergency room visits for asthma and other respiratory causes, and premature mortality. EPA is currently in the process of evaluating these and other studies as part of the ongoing review of the air quality criteria and NAAQS for ozone. A revised Air Quality Criteria Document for Ozone and Other Photochemical Oxidants will be prepared in consultation with EPA's Clean Air Science Advisory Committee (CASAC). Key new health information falls into four general areas: development of new-onset asthma, hospital admissions for young children, school absence rate, and premature mortality. In all, the new studies that have become available since the 8-hour ozone standard was adopted in 1997 continue to demonstrate the harmful effects of ozone on public health and the need for areas with high ozone levels to attain and maintain the NAAQS.

In addition to these health effects, HC emissions contain several air toxics that can also have adverse impacts on human health. The health effects of air toxics are briefly described below and discussed in more detail in the final Regulatory Support Document for this rule.

Ozone and its precursors also have welfare effects. Ozone has been shown to injure plants, which has the effect of reducing crop yields, reducing productivity in forests and other ecosystems. Ozone also attacks certain materials such as rubbers and plastics. Other environmental effects, such as acid deposition and eutrophication, are related to ozone precursors, such as NO_X. Acid deposition, or acid rain as it is commonly known, occurs when SO2 and NO_X react in the atmosphere with water, oxygen, and oxidants to form various acidic compounds that later fall to earth in the form of precipitation or dry deposition of acidic particles.[19] Acid rain contributes to damage of trees at high elevations and in extreme cases

[12] For more information about VOC and HC, *see* U.S. EPA (1997), Conversion Factors for Hydrocarbon Emission Components, Report No. NR–002. A copy of this document is available in Docket A–2000–02, Document IV–A–26.

[13] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA/600/P–93/004aF. Docket No. A–99–06. Document Nos. II-A–15 to 17. More information on health effects of ozone is also available at *http:/www.epa.gov/ttn/naaqs/standards/ozone/s.03.index.html.*

[14] U.S. EPA. (1996). Review of National Ambient Air Quality Standards for Ozone, Assessment of Scientific and Technical Information, OAQPS Staff Paper, EPA–452/R–96–007. Docket No. A–99–06. Document No. II–A–22.

[15] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA/600/P–93/004aF. Docket No. A–99–06. Document Nos. II–A–15 to 17. More information on health effects of ozone is also available at *http:/www.epa.gov/ttn/naaqs/standards/ozone/s.03.index.html.*

[16] U.S. EPA. (1996). Review of National Ambient Air Quality Standards for Ozone, Assessment of Scientific and Technical Information, OAQPS Staff Paper, EPA–452/R–96–007. Docket No. A–99–06. Document No. II–A–22.

[17] See, *e.g.*, 62 FR 38861–62, July 18, 1997.

[18] New Ozone Health and Environmental Effects References, Published Since Completion of the Previous Ozone AQCD, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711 (7/2002) Docket No. A–2001–28, Document II–A–79.

[19] Much of the information in this subsection was excerpted from the EPA document, Human Health Benefits from Sulfate Reduction, written under Title IV of the 1990 Clean Air Act Amendments, U.S. EPA, Office of Air and Radiation, Acid Rain Division, Washington, DC 20460, November 1995. Available in Docket A–2000–01, Document No. II–A–32.

may cause lakes and streams to become so acidic that they cannot support aquatic life. In addition, acid deposition accelerates the decay of building materials and paints, including irreplaceable buildings, statues, and sculptures that are part of our nation's cultural heritage. To reduce damage to automotive paint caused by acid rain and acidic dry deposition, some manufacturers use acid-resistant paints, at an average cost of $5 per vehicle—a total of $80–85 million per year when applied to all new cars and trucks sold in the U.S.

Eutrophication is the accelerated production of organic matter, particularly algae, in a water body. This increased growth can cause numerous adverse ecological effects and economic impacts, including nuisance algal blooms, dieback of underwater plants due to reduced light penetration, and toxic plankton blooms. Algal and plankton blooms can also reduce the level of dissolved oxygen, which can also adversely affect fish and shellfish populations. Deposition of nitrogen from on-highway motorcycle engines contributes to elevated nitrogen levels in waterbodies.

b. Current and Projected Ozone Levels

Ground level ozone today remains a pervasive pollution problem in the United States. In 2003, 114 million people (2000 census) lived in 53 areas designated nonattainment under the 1-hour ozone NAAQS.[20] This sharp decline from the 101 nonattainment areas originally identified under the Clean Air Act Amendments of 1990 demonstrates the effectiveness of the last decade's worth of emission-control programs. However, elevated ozone concentrations remain a serious public health concern throughout the nation. Unhealthy ozone concentrations exceeding the level of the 8-hour standard (*i.e.*, not requisite to protect the public health with an adequate margin of safety) occur over wide geographic areas, including most of the nation's major population centers. These monitored areas include much of the eastern half of the U.S. and large areas of California.

According to data from 1999 to 2001, there are 291 counties where 111 million people live that measured values that violate the 8-hour ozone NAAQS.[21] An additional 37 million people live in 155 counties that have air quality measurements within 10 percent of the level of the standard. These areas, though currently not violating the standard, will also benefit from the additional emission reductions from this rule.

Based on our air quality modeling performed for our recent Notice of Proposed Rulemaking proposing more stringent emission standards for nonroad diesel engines and the diesel fuel used in those engines (68 FR 28328, May 23, 2003), we anticipate that without emission reductions beyond those already required under promulgated regulations and approved SIPs, ozone nonattainment will likely persist into the future. With reductions from programs already in place, the number of counties violating the ozone 8-hour standard is expected to decrease in 2020 to 30 counties where 43 million people are projected to live. Thereafter, exposure to unhealthy levels of ozone is expected to begin to increase again. In 2030 the number of counties violating the ozone 8-hour NAAQS is projected to increase to 32 counties where 47 million people are projected to live. In addition, in 2030, 82 counties where 44 million people are projected to live will be within 10 percent of violating the ozone 8-hour NAAQS.

EPA is still developing the implementation process for bringing the nation's air into attainment with the ozone 8-hour NAAQS (*see* proposal, 68 FR 32702, June 2, 2003). The Act contains two sets of requirements for State plans implementing the national ozone air quality standards in nonattainment areas. Under subpart 1 of Title I, Part D, a State must demonstrate that nonattainment areas will attain the ozone 8-hour standard as expeditiously as practicable but no later than five years from the date that the area was designated nonattainment. However, based on the severity of the air quality problem and the availability and feasibility of control measures, the Administrator may extend the attainment date "for a period of no greater than 10 years from the date of designation as nonattainment." Based on these provisions, we expect that most or all areas covered under subpart 1 will attain the ozone standard in the 2007 to 2014 time period. For areas covered under subpart 2, the maximum attainment dates provided under the Act range from 3 to 20 years after designation, depending on an area's classification. We anticipate that areas covered by subpart 2 will attain in the 2007 to 2024 time period.[22]

Since the HC and NO_X emission reductions expected from this final rule will go into effect during the period when areas will need to attain the 8-hour ozone NAAQS, the projected reductions in highway motorcycle emissions are expected to assist States in their effort to meet and maintain that standard.

2. Health and Welfare Effects Associated With Particulate Matter

a. Health and Welfare Effects

Highway motorcycles contribute to ambient particulate matter in two ways. First, they contribute through direct emissions of particulate matter in the exhaust. Second, they contribute through the indirect formation of PM (namely ammonium nitrate and organic carbonaceous $PM_{2.5}$) in the atmosphere through their NO_X and organic carbon emissions, especially HC. Carbonaceous $PM_{2.5}$ is a major portion of ambient $PM_{2.5}$, especially in populous urban areas. The relative contribution of various chemical components to $PM_{2.5}$ varies by region of the country.

Particulate matter represents a broad class of chemically and physically diverse substances. It can be principally characterized as discrete particles that exist in the condensed (liquid or solid) phase spanning several orders of magnitude in size. All particles equal to and less than 10 microns are called PM_{10} Fine particles can be generally defined as those particles with an aerodynamic diameter of 2.5 microns or less (also known as $PM_{2.5}$), and coarse fraction particles are those particles with an aerodynamic diameter greater than 2.5 microns, but equal to or less than a nominal 10 microns. Fine particles can remain in the atmosphere for days to weeks and travel through the atmosphere hundreds to thousands of kilometers, while coarse particles deposit to the earth within minutes to

[20] "One-hour Ozone and PM 10 Nonattainment Status and Air Quality Data Update," Memorandum from Patricia Koman to Docket A–2000–2, August 11, 2003, Docket A–2000–02, Document IV–B–07. See also National Air Quality and Emissions Trends Report, 1999, EPA, 2001, at Table A–19. This document is available at *http://www.epa.gov/oar/aqtrnd99/.* The data from the Trends report are the most recent EPA air quality data that have been quality assured. A copy of this table can also be found in Docket No. A–2000–01, Document No. II–A–64.

[21] Additional counties may have levels above the NAAQS but do not currently have monitors. See U.S. EPA OAQPS Air Quality Data Analysis 1999–2001 Technical Support Document for Regulatory Actions (Docket A–2001–28; No. II–A–196).

[22] EPA has proposed that States submit SIPs that address how areas will attain the 8-hour ozone standard within 3 years after nonattainment designation for moderate and above areas classified under subpart 2 and for some areas classified under subpart 1. EPA is also proposing that marginal areas and some areas designated under subpart 1 (*i.e.*, those with early attainment dates) will not be required to submit attainment demonstrations for the 8-hour ozone standard. We therefore anticipate that States will submit their attainment demonstration SIPs by April 2007.

hours and within tens of kilometers from the emission source.

Scientific studies show ambient PM (which is attributable to a number of sources, including highway motorcycles) is associated with a series of adverse health effects. These health effects are discussed in detail in the EPA Criteria Document for PM as well as the draft updates of this document released in the past year. [23] [24]

As described in these documents, health effects associated ambient PM have been indicated by epidemiologic studies showing associations between short-term exposure and increased hospital admissions for ischemic heart disease, heart failure, respiratory disease, including chronic obstructive pulmonary disease (COPD) and pneumonia. Short-term elevations in ambient PM have also been associated with increased cough, lower respiratory symptoms, and decrements in lung function. Short-term variations in ambient PM have also been associated with increases in total and cardiorespiratory daily mortality. Studies examining populations exposed to different levels of air pollution over a number of years, including the Harvard Six Cities Study and the American Cancer Society Study suggest an association between exposure to ambient $PM_{2.5}$ and premature mortality. [25] [26] Two studies further analyzing the Harvard Six Cities Study's air quality data have also established a specific influence of mobile source-related $PM_{2.5}$ on daily mortality [27] and a concentration-response function for mobile source-associated $PM_{2.5}$ and daily mortality.[28] Another recent study in 14 U.S. cities examining the effect of PM_{10} on daily hospital admissions for cardiovascular disease found that the effect of PM_{10} was significantly greater in areas with a larger proportion of PM_{10} coming from motor vehicles, indicating that PM_{10} from these sources may have a greater effect on the toxicity of ambient PM_{10} when compared with other sources.[29] Additional studies have associated changes in heart rate and/or heart rhythm in addition to changes in blood characteristics with exposure to ambient PM. [30] [31] For additional information on health effects, see the Regulatory Support Document for this rule.

The health effects of PM_{10} are similar to those of $PM_{2.5}$, since PM_{10} includes all of $PM_{2.5}$ plus the coarse fraction from 2.5 to 10 micrometers in size. EPA also evaluates the health effects of PM between 2.5 and 10 micrometers in the draft revised Criteria Document. As discussed in the Diesel HAD and other studies, most diesel PM is smaller than 2.5 micrometers.[32] Both fine and coarse fraction particles can enter and deposit in the respiratory system.

PM also causes adverse impacts to the environment. Fine PM is the major cause of reduced visibility in parts of the United States, including many of our national parks. Other environmental impacts occur when particles deposit onto soils, plants, water or materials. For example, particles containing nitrogen and sulphur that deposit on to land or water bodies may change the nutrient balance and acidity of those environments. Finally, PM causes soiling and erosion damage to materials, including culturally important objects such as carved monuments and statues. It promotes and accelerates the corrosion of metals, degrades paints, and deteriorates building materials such as concrete and limestone.

b. Current and Projected Levels

There are NAAQS for both PM_{10} and $PM_{2.5}$. Violations of the annual $PM_{2.5}$ standard are much more widespread than are violations of the PM_{10} standards. Each of these are discussed below.

i. PM_{10} Levels. The current NAAQS for PM_{10} were established in 1987. The primary (health-based) and secondary (public welfare based) standards for PM_{10} include both short- and long-term NAAQS. The short-term (24 hour) standard of 150 ug/m^3 is not to be exceeded more than once per year on average over three years. The long-term standard specifies an expected annual arithmetic mean not to exceed 50 ug/m^3 averaged over three years.

Currently, 29 million people live in PM_{10} nonattainment areas. There are currently 56 moderate PM_{10} nonattainment areas with a total population of 6.6 million.[33] The attainment date for the initial moderate PM_{10} nonattainment areas, designated by law on November 15, 1990, was December 31, 1994. Several additional PM_{10} nonattainment areas were designated on January 21, 1994, and the attainment date for these areas was December 31, 2000. There are an additional 8 serious PM_{10} nonattainment areas with a total affected population of 22.7 million. According to the Act, serious PM_{10} nonattainment areas must attain the standards no later than 10 years after designation. The initial serious PM_{10} nonattainment areas were designated January 18, 1994 and had an attainment date set by the Act of December 31, 2001. The Act provides that EPA may grant extensions of the serious area attainment dates of up to 5 years, provided that the area requesting the extension meets the requirements of Section 188(e) of the Act. Four serious PM_{10} nonattainment areas (Phoenix, Arizona; Coachella Valley, South Coast (Los Angeles), and Owens Valley, California) have received extensions of the December 31, 2001 attainment date and thus have new attainment dates of December 31, 2006.[34]

While all of these areas are expected to be in attainment before any significant emission reductions from this rule are expected to occur, these reductions will help these areas in maintaining the standards.

ii. $PM_{2.5}$ Levels. The NAAQS for $PM_{2.5}$ were established by EPA in 1997 (62 Fed. Reg., 38651, July 18, 1997). The short term (24-hour) standard is set at a level of 65 μg/m^3 based on the 98th percentile concentration averaged over three years. (This air quality statistic

[23] U.S. EPA (1996). Air Quality Criteria for Particulate Matter—Volumes I, II, and III, EPA, Office of Research and Development. Report No. EPA/600/P–95/001a–cF. This material is available in Docket A–99–06, Documents IV–A–30 to 32. It is also available electronically at *http://www.epa.gov/ttn/oarpg/ticd.html.*

[24] U.S. EPA (2002). Air Quality Criteria for Particulate Matter—Volumes I and II (Third External Review Draft) This material is available in Docket A–2001–28, Documents II–A–98 and II–A–71. It is also available electronically at *http://cfpub.epa.gov/ncea/cfm/partmatt.cfm.*

[25] Dockery, DW; Pope, CA, III; Xu, X; *et al.* (1993). An association between air pollution and mortality in six U.S. cities. N Engl J Med 329:1753–1759.

[26] Pope, CA, III; Thun, MJ; Namboordiri, MM; *et al.* (1995). Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults. Am J Respir Crit Care Med 151:669–674.

[27] Laden F; Neas LM; Dockery DW; *et al.* (2000). Association of fine particulate matter from different sources with daily mortality in six U.S. cities. Environ Health Perspect 108(10):941–947.

[28] Schwartz J; Laden F; Zanobetti A. (2002). The concentration-response relation between PM(2.5) and daily deaths. Environ Health Perspect 110(10): 1025–1029.

[29] Janssen NA; Schwartz J; Zanobetti A.; *et al.* (2002). Air conditioning and source-specific particles as modifiers of the effect of PM_{10} on hospital admissions for heart and lung disease. Environ Health Perspect 110(1):43–49.

[30] Pope CA III, Verrier RL, Lovett EG; *et al.* (1999). Heart rate variability associated with particulate air pollution. Am Heart J 138(5 Pt 1):890–899.

[31] Magari SR, Hauser R, Schwartz J; *et al.* (2001). Association of heart rate variability with occupational and environmental exposure to particulate air pollution. Circulation 104(9):986–991.

[32] U.S. EPA (1985). Size specific total particulate emission factor for mobile sources. EPA 460/3–85–005. Office of Mobile Sources, Ann Arbor, MI. A copy of this document is available in Docket A–2001–28, Document II–A–35.

[33] ''One-hour Ozone and PM_{10} Nonattainment Status and Air Quality Data Update,'' Memorandum from Patricia Koman to Docket A–2000–2, August 11, 2003, Docket A–2000–02, Document IV–B–07.

[34] EPA has also proposed to grant Las Vegas, Nevada, an extension until December 31, 2006.

compared to the standard is referred to as the ''design value.'') The long-term standard specifies an expected annual arithmetic mean not to exceed 15 ug/m³ averaged over three years.

High ambient levels of $PM_{2.5}$ are widespread throughout the country. Current $PM_{2.5}$ monitored values for 1999–2001, which cover counties having about 75 percent of the country's population, indicate that at least 65 million people in 129 counties live in areas where annual design values of ambient fine PM violate the $PM_{2.5}$ NAAQS. There are an additional 9 million people in 20 counties where levels above the NAAQS are being measured, although there are insufficient data at this time to calculate a design value in accordance with the standard and thus determine whether these areas are violating the $PM_{2.5}$ NAAQS. In total, this represents 37 percent of the counties and 64 percent of the population in the areas with monitors with levels above the NAAQS. Furthermore, an additional 11 million people live in 41 counties that have air quality measurements within 10 percent of the level of the standard, with complete data. These areas, although not currently violating the standard, will also benefit from the additional HC and NO_X reductions from these motorcycle emission standards.

The air quality modeling performed for our recent Notice of Proposed Rulemaking proposing more stringent emission standards for nonroad diesel engines and the diesel fuel used in those engines (68 FR 28328, May 23, 2003) suggests that similar conditions are likely to continue to exist in the future in the absence of additional measures to reduce these emissions. For example, in 2020 based on emission controls currently adopted, we project that 66 million people will live in 79 counties with average $PM_{2.5}$ levels above 15 ug/m³. In 2030, the number of people projected to live in areas exceeding the $PM_{2.5}$ standard is expected to increase to 85 million in 107 counties. An additional 24 million people are projected to live in counties within 10 percent of the standard in 2020, which will decrease to 17 million people in 2030.

By reducing HC and NO_X emissions from highway motorcycles, the standards we are finalizing will assist States as they implement local controls to reduce $PM_{2.5}$ levels and help ensure long term maintenance with the NAAQS.

3. Health Effects Associated With Air Toxics

In addition to the human health and welfare impacts described above, emissions from the engines covered by this rule also contain several Mobile Source Air Toxics, including benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and acrolein.[35] The health effects of these air toxics are described in more detail in the Regulatory Support Document for this rule. Additional information can also be found in the Technical Support Document for our final Mobile Source Air Toxics rule.[36]

The hydrocarbon controls contained in this rule are expected to reduce exposure to air toxics and therefore may help reduce the impact of these engines on cancer and noncancer health effects.

B. What Is the Emission Inventory Contribution From Highway Motorcycles?

The highway motorcycles subject to the standards finalized today contribute to the national inventories of pollutants that are associated with the health and public welfare effects described in Section II.A. Emission estimates for highway motorcycles were developed using information on the certification levels of current motorcycles and information on motorcycle use provided by the motorcycle industry. A more detailed description of the highway motorcycle modeling and our estimation methodology can be found in the Chapter 6 of the Draft Regulatory Support Document.

In order to determine the relative contribution of highway motorcycles to overall emissions, we estimated the emissions from all sources. Overall emission inventory estimates for the years 1996 and 2020 are summarized in Tables II.B–1 through II.B–3 for VOC, NO_X, and PM emissions, respectively.[37] The estimates shown for highway motorcycles are baseline estimates and do not account for the impact of the standards adopted today. These tables show the relative contributions of the different mobile-source categories to the overall national mobile-source inventory. Of the total emissions from mobile sources, highway motorcycles contribute about 0.6 percent, 0.1 percent, and less than 0.1 percent of VOC, NO_X, and PM emissions, respectively, in the year 1996. The projections for 2020 for the highway motorcycles subject to the standards adopted today show that emissions from these categories are expected to increase over time if left uncontrolled. Projections indicate that motorcycles are expected to contribute 2.3 percent, 0.3 percent, and 0.1 percent of mobile source VOC, NO_X, and PM emissions in the year 2020 if left uncontrolled. Population growth and the effects of other regulatory control programs are factored into these projections.

TABLE II.B–1.—ANNUAL VOC BASELINE EMISSION LEVELS FOR MOBILE

Category	1996			2020		
	VOC short tons	% of mobile source	% of total	VOC short tons	% of mobile source	% of total
Highway Motorcycles	47,368	0.6	0.3	86,520	2.2	0.6
Highway Light-duty	4,635,410	55.8	25.0	1,755,119	45.4	13.0
Highway Heavy-duty	608,607	7.3	3.3	226,641	5.9	1.7
Land-based Nonroad Diesel	221,403	2.7	1.2	96,855	2.5	0.7
Recreational Marine Diesel ≤50 hp	128	0.0	0.0	108	0.0	0.0
Recreational Marine Diesel >50 hp	1,199	0.0	0.0	1,531	0.0	0.0
Recreational Marine SI	804,488	9.7	4.3	380,891	9.9	2.8

[35] EPA recently finalized a list of 21 Mobile Source Air Toxics, including VOCs, metals, and diesel particulate matter and diesel exhaust organic gases (collectively DPM+DEOG). 66 FR 17230, March 29, 2001. This material is available in Docket No. A–2000–01, Documents Nos. II–A–42 and II–A–30.

[36] See our Mobile Source Air Toxics final rulemaking, 66 FR 17230, March 29, 2001, and the Technical Support Document for that rulemaking. Copies of these documents are available in Docket No. A–2000–01, Documents Nos. II–A–42 and II–A–30.

[37] The inventories cited in Tables II.B–1 through II.B–3 were developed for the Nonroad Diesel Rulemaking. See 68 FR 28328, May 23, 2003. The inventories for recreational marine engines greater than 50 horsepower, nonroad spark-ignition engines greater than 25 horsepower, and recreation spark-ignition engines have been updated using the latest version of EPA's NONROAD model to account for the new standards adopted by EPA in late 2002. See 67 FR 68242, November 8, 2002.

TABLE II.B–1.—ANNUAL VOC BASELINE EMISSION LEVELS FOR MOBILE CONTINUED

Category	1996			2020		
	VOC short tons	% of mobile source	% of total	VOC short tons	% of mobile source	% of total
Nonroad SI ≤25 hp	1,330,229	16.0	7.2	650,158	16.8	4.8
Nonroad SI >25hp	85,701	1.0	0.5	12,265	0.3	0.1
Recreational SI	308,285	3.7	1.7	339,098	8.8	2.5
Commercial Marine Diesel	31,545	0.4	0.2	37,290	1.0	0.3
Commercial Marine SI	960	0.0	0.0	998	0.0	0.0
Locomotive	48,381	0.6	0.3	36,546	0.9	0.3
Aircraft	176,394	2.1	1.0	239,654	6.2	1.8
Total Nonroad	3,008,713	36	16	1,795,394	46	13
Total Highway	5,291,385	64	29	2,068,280	54	15
Total Mobile Sources	8,300,098	100	45	3,863,674	100	29
Stationary Point and Area Sources	10,249,136		55	9,648,376		71
Total Man-Made Sources	18,549,234			13,512,050		
Mobile Source Percent of Total	45			29		

Notes:
[a] These are 48-state inventories. They do not include Alaska and Hawaii.
[b] The mobile source estimates include both exhaust and evaporative emissions.
[c] Hydrocarbons (HC) are a set of compounds that are very similar to, but slightly different from, VOCs, and to reduce mobile source VOC levels we set maximum limits for HC emissions.

TABLE II.B–2.—ANNUAL NO_X BASELINE EMISSION LEVELS FOR MOBILE AND OTHER SOURCE CATEGORIES [a]

Category	1996			2020		
	NO_X short tons	% of mobile source	% of total	NO_X short tons	% of mobile source	% of total
Highway Motorcycles	7,284	0.1	0.0	14,059	0.3	0.1
Highway Light-duty	4,427,634	33.8	18.0	1,264,342	25.0	8.4
Highway Heavy-duty	4,626,004	35.3	18.8	696,911	13.8	4.6
Land-based Nonroad Diesel	1,583,664	12.1	6.4	1,140,727	22.6	7.6
Recreational Marine Diesel ≤50 hp	523	0.0	0.0	682	0.0	0.0
Recreational Marine Diesel >50 hp	33,468	0.3	0.1	47,675	0.9	0.3
Recreational Marine SI	33,304	0.3	0.1	61,749	1.2	0.4
Nonroad SI ≤25 hp	63,584	0.5	0.3	100,119	2.0	0.7
Nonroad SI >25hp	273,099	2.1	1.1	43,322	0.9	0.3
Recreational SI	4,297	0.0	0.0	17,129	0.3	0.1
Commercial Marine Diesel	959,704	7.3	3.9	819,201	16.2	5.4
Commercial Marine SI	6,428	0.0	0.0	4,551	0.1	0.0
Locomotive	921,556	7.0	3.8	612,722	12.1	4.1
Aircraft	165,018	1.3	0.7	228,851	4.5	1.5
Total Nonroad	4,044,645	31	16	3,076,728	61	20
Total Highway	9,060,922	69	37	1,975,312	39	13
Total Mobile Sources	13,105,567	100	53	5,052,040	100	33
Stationary Point and Area Sources	11,449,752		47	10,050,213		67
Total Man-Made Sources	24,555,319			15,102,253		
Mobile Source Percent of Total	53			33		

Notes:
[a] These are 48-state inventories. They do not include Alaska and Hawaii.

TABLE II.B–3.—ANNUAL DIRECT PM–2.5 BASELINE EMISSION LEVELS FOR MOBILE AND OTHER SOURCE CATEGORIES [a,b]

Category	1996			2020		
	PM–2.5 short tons	% of mobile source	% of total	PM–2.5 short tons	% of mobile source	% of total
Highway Motorcycles	184	0.0	0.0	434	0.1	0.0
Highway Light-duty	57,534	10.2	2.6	47,136	13.2	2.3
Highway Heavy-duty	172,965	30.7	7.8	24,806	7.0	1.2
Land-based Nonroad Diesel	176,510	31.3	8.0	124,334	34.9	6.0
Recreational Marine Diesel ≤50 hp	62	0.0	0.0	70	0.0	0.0
Recreational Marine Diesel >50 hp	815	0.1	0.0	1,162	0.3	0.1

TABLE II.B–3.—ANNUAL DIRECT PM–2.5 BASELINE EMISSION LEVELS FOR MOBILE AND OTHER SOURCE CATEGORIES [a,b]—Continued

Category	1996			2020		
	PM–2.5 short tons	% of mobile source	% of total	PM–2.5 short tons	% of mobile source	% of total
Recreational Marine SI	35,147	6.2	1.6	26,110	7.3	1.3
Nonroad SI ≤25 hp	24,130	4.3	1.1	29,998	8.4	1.5
Nonroad SI >25hp	1,374	0.2	0.1	2,302	0.6	0.1
Recreational SI	7,968	1.4	0.4	9,963	2.8	0.5
Commercial Marine Diesel	36,367	6.5	1.6	41,365	11.6	2.0
Commercial Marine SI	1,370	0.2	0.1	1,326	0.4	0.1
Locomotive	20,937	3.7	0.9	16,727	4.7	0.8
Aircraft	27,891	5.0	1.3	30,024	8.4	1.5
Total Nonroad	332,571	59	15	283,381	80	14
Total Highway	230,683	41	10	72,376	20	4
Total Mobile Sources	563,254	100	25	355,757	100	17
Stationary Point and Area Sources	1,653,392		75	1,712,004		83
Total Man-Made Sources	2,216,646			2,067,761		
Mobile Source Percent of Total	25			17		

Notes:
[a] These are 48-state inventories. They do not include Alaska and Hawaii.
[b] Excludes natural and miscellaneous sources.

III. Which Vehicles and Engines Are Covered?

We are adopting new standards for new highway motorcycles, including those with engines with displacements of less than 50cc. These requirements apply to manufacturers of motorcycles. Companies that produce and sell motorcycle engines are not directly covered, unless such a company also manufactures motorcycles. Every company that manufactures motorcycles for introduction into commerce in the U.S., whether or not they also manufacture motorcycle engines, is covered by EPA regulations. Engine manufacturers will be indirectly required to design and build complying engines, because their customers (*e.g.*, motorcycle manufacturers that purchase their engines) will require engines that comply with emission standards.

In order to be defined as a highway motorcycle—and therefore covered by the new standards—a motorcycle must first be defined as a motor vehicle under the Clean Air Act and EPA regulations. EPA regulations then specify the characteristics that cause a motor vehicle to be defined as a highway motorcycle. EPA regulations also divide highway motorcycles into three ‘‘classes,’’ which are used to determine the specific compliance requirements applicable to a given motorcycle. This section explains the definitions and the motorcycle classes defined by EPA.

A. What Is a Highway Motorcycle?

To reach the conclusion that a two- or three-wheeled vehicle is a highway motorcycle (a motorcycle legal for use on public roads), the vehicle must first be defined as a ‘‘motor vehicle’’ under the Clean Air Act.

The Clean Air Act specifies that the term ‘‘motor vehicle,’’ as used in the Act, applies only to vehicles ‘‘designed for transporting persons or property on a street or highway’’ (CAA section 216). In addition, EPA has promulgated regulations, in 40 CFR 85.1703, that elaborate on the Act's definition of motor vehicles and set forth three criteria, which, if any one is met, would cause a vehicle to not be considered a motor vehicle under the regulations, and therefore not subject to requirements applicable to motor vehicles. These criteria are:

(1) The vehicle cannot exceed a maximum speed of 25 miles per hour over a level paved surface; or

(2) The vehicle lacks features customarily associated with safe and practical street or highway use, including such things as a reverse gear (except motorcycles), a differential, or safety features required by state and/or federal law; or

(3) The vehicle exhibits features which render its use on a street or highway unsafe, impractical, or highly unlikely, including tracked road contact means, an inordinate size, or features ordinarily associated with military combat or tactical vehicles such as armor and/or weaponry.

A vehicle that cannot be considered a motor vehicle under the statutory and regulatory definitions described above is generally considered under the Clean Air Act to be a ‘‘nonroad’’ vehicle. Mopeds and scooters that do not meet the definition of ‘‘motor vehicle’’ (*e.g.*, very small mopeds and scooters) because they can not exceed 25 miles per hour or because they meet some of the other criteria described above are considered nonroad recreational vehicles and are subject to the applicable emission standards for off-highway motorcycles.

Once it is determined that a vehicle is a ‘‘motor vehicle’’, EPA regulations then determine which motor vehicles are highway motorcycles for the purposes of applying emission standards. Although motorcycles come in a variety of two- and three-wheeled configurations and styles, for the most part they are two-wheeled, self-powered vehicles. EPA regulations currently define a motorcycle as ‘‘any motor vehicle with a headlight, taillight, and stoplight and having: two wheels, or three wheels and a curb mass less than or equal to 793 kilograms (1749 pounds)’’ (See 40 CFR 86.402–98).

In the past, vehicles that would otherwise meet the definition of a motorcycle but with an engine displacement of less than 50cc (*e.g.*, small scooters and mopeds), have not been subject to any EPA emission standards. In this final rule we are, for the first time, applying emission standards to any highway motorcycle, regardless of displacement.

B. What Are Class I, Class II, and Class III Highway Motorcycles?

Both EPA and California regulations sub-divide highway motorcycles into classes based on engine displacement. These divisions have been consistent between EPA and the California ARB for many years. However, we are adopting a revised definition for Class I motorcycles in order to apply the Class I emission standards to motorcycles with displacements of less than 50cc. The revised definition will take effect with the 2006 model year. Table V.A–1 shows how these classes are defined before and after implementation of new standards for motorcycles with engines of less than 50cc displacement.

TABLE III.B–1.—MOTORCYCLE AND MOTORCYCLE ENGINE CLASSES

Motorcycle class	Engine displacement (cubic centimeters)	
	Through 2005 model year	2006 and later model years
Class I	50–169	0–169.
Class II	170–279	170–279.
Class III	280 and greater	280 and greater.

Highway motorcycles with engine displacements less than 50cc are mostly mopeds and motor scooters (''scooters,'' or sometimes, ''motorbikes''). These vehicles are generally powered by 49cc two-stroke engines, although four-stroke engines are becoming more popular. Honda, a major player in this market sector, will no longer be marketing any two-stroke street-use motorcycles as of the 2003 model year; everything, including their 49cc scooter, will be powered by a four-stroke engine.

All motorcycles currently certified to EPA emission standards are powered by four-stroke engines. Class I and II motorcycles, which make up less than ten percent of unit sales and only 24 out of 175 certified 2002 engine families, consist mostly of dual-sport motorcycles, scooters, and entry-level sport bikes and cruisers. Class III motorcycles represent 151 of the 175 certified 2002 engine families, and more than 90 percent of annual sales. Most Class III motorcycles are powered by relatively large engines, as demonstrated by an average displacement in the class of about 1100cc. Although there are some motorcycles that use eight-cylinder automotive engines and some on the horizon that may have displacements near 2300cc, the typical top-end displacement is around 1800cc.

IV. Exhaust Emission Standards and Test Procedures

We are adopting new exhaust emission standards for highway motorcycles. This section includes a description of the new standards and other important provisions. A discussion of the technological feasibility of the standards is in Section V of this document.

A. What Are the New Exhaust Emission Standards?

In general, we are harmonizing the federal exhaust emission standards for all classes of motorcycles with those of the California program, but on a delayed schedule relative to implementation in California. For Class I and Class II motorcycles this means meeting exhaust emission standards for HC and CO that have applied in California since 1982. Motorcycles with engine displacements of less than 50cc (previously unregulated) will be considered Class I motorcycles, and thus subject to the Class I standards. However, we have set a useful life of 6,000 km for under 50cc motorcycles. We are also adopting an optional HC+NO_X standard for Class I and II motorcycles, which will be required of manufacturers wishing to average their emissions or transfer emission credits across classes. For Class III motorcycles, the standards will require compliance with two tiers of exhaust emission standards that California ARB has put in place for future model years. The existing federal CO standard of 12.0 g/km remains unchanged. The process by which manufacturers certify their motorcycles, the test procedures, the driving cycle, and other elements of the federal program also remain unchanged.

1. Class I and II Motorcycles

We are adopting the current California ARB Class I and II exhaust emission standards on a nationwide basis starting with the 2006 model year. These standards, which have been in place in California since 1982, are shown in Table IV.A–1. In recent years, motorcycles certified to the California standards have been sold nationwide, and there have been few, if any, motorcycles in those classes that are limited to 49-state sales due to their not being able to meet the California standards.

TABLE IV.A–1.—FINAL CLASS I AND II EXHAUST EMISSION STANDARDS

Class and displacement (cc)	HC (g/km)	CO (g/km)	Useful life
I–A (0–49)	1.0	12.0	5 years/6,000 km [a].
I–B (50–169)	1.0	12.0	5 years/12,000 km [a].
II (170–279)	1.0	12.0	5 years/18,000 km.

Notes:

[a] In order to distinguish the two segments within Class I that have differing useful life definitions, the regulatory text defines Class I–A (0–49cc) and Class I–B (50–169cc).

We are also redefining Class I motorcycles to include those motorcycles with engine displacements under 50cc; thus, these previously unregulated motorcycles will be subject to the Class I standards shown in Table IV.A–1. As described further in Section IV.C, certain Class I motorcycles with an engine displacement under 50cc will be tested on a driving cycle that is slightly modified in order to accommodate the lower speed and acceleration capabilities of these motorcycles relative to other Class I motorcycles.

For all Class I and II motorcycles we are also adopting an optional HC+NO_X standard of 1.4 g/km. As of 2006 when new Class I and II standards become effective, the category of motorcycles under 50cc will be meeting an HC+NO_X standard of 1.2 g/km in the EU, albeit on a different duty cycle. Also in 2006, motorcycles at or above 50cc but less than 150cc in the EU will be meeting an

HC standard of 0.8 g/km and a NO_X standard of 0.15 g/km (combined $HC+NO_X$ of 0.95), and motorcycles over 150cc will be meeting standards that are even lower. In addition, an $HC+NO_X$ standard of 1.4 g/km is equivalent to the Class III standard that goes into effect in 2006. We believe that an $HC+NO_X$ standard is the only appropriate way to enable the transfer of credits across motorcycle classes in the finalized averaging program, and this optional standard should also be required of any manufacturer who wants to average Class I and II engine families (discussed in detail in Section IV.B).

We are providing a few years of lead time before these standards take effect for several reasons. First, the previously unregulated Class I category under 50cc will require some lead time to meet new standards. Second, we are allowing some averaging provisions that enable manufacturers to transfer Class III emission credits to Classes I and II, and these provisions will not be applicable until new Class III standards take effect in 2006. Third, although all Class I and II engine families in the 2002 model met these standards, that is not the case with the 2003 model year. This indicates to us that there may possibly be some models already under development in the context of the existing federal standard, and an abrupt transition to the new standard would create some difficulty in such cases. Given that the vast majority of Class I and II motorcycles do already meet the standards we are finalizing, it seems unreasonable to potentially disrupt the introduction and sale of a small number of motorcycles to advance the standards to an earlier date.

As we noted in the NPRM, the U.S. is a minor market for small motorcycles, scooters, and mopeds, especially those with engine displacements of under 50cc. Some manufacturers, such as Piaggio (maker of the Vespa scooters), may sell only a few thousand units in the U.S., but have worldwide sales of scooters that approach the magnitude of total U.S. motorcycle sales. We believe that an attempt to drive technology and emission limits for these vehicles beyond those that are applicable in the major small motorcycle and scooter markets could result in the outright withdrawal of some manufacturers' products from the U.S. market. These companies could choose to forego the small amount of U.S. sales rather than develop specific technologies to address U.S. requirements.

2. Class III Motorcycles

We are harmonizing the federal Class III motorcycle standards with the exhaust emission standards of the California program, as shown in Table IV.A–1. Specifically, we are adopting a Tier 1 standard of 1.4 g/km $HC+NO_X$ starting in the 2006 model year, and a Tier 2 standard of 0.8 g/km $HC+NO_X$ starting in the 2010 model year. Because both HC and NO_X are ozone precursors, this new standard would better reduce ozone than an HC-only standard. Implementation on a nationwide basis will take place starting two model years after implementation of identical exhaust emission standards in California, ensuring that manufacturers have adequate lead time to plan for these new standards. As described in Section IV.B in further detail, these standards can be met on a corporate-average basis.

TABLE IV.A–1.—FINAL CLASS III EXHAUST EMISSION STANDARDS (G/KM)

Model year	$HC+NO_X$	CO
2006–2009	1.4	12.0
2010 and later	0.8	12.0

As noted earlier, California ARB plans a technology progress review in 2006 to evaluate manufacturers' progress in meeting the Class III Tier 2 standards. We plan to participate in that review and work with California ARB and others, intending to make any appropriate adjustments to the standards or implementation schedule if warranted.

B. Can I Average, Bank, or Trade Emission Credits?

To provide flexibility in meeting the standards, we are adopting an emission-credit program comparable to the existing California ARB regulations, but with additional flexibility relative to California ARB's program. The program consists of two parts. The first component, the averaging program, allows manufacturers to meet the standards on a fleet-average basis. The second component, the early credits programs, provides incentives for the early introduction of Class III motorcycles meeting the Tier 2 standards. We are not adopting any banking provisions beyond the early credits program, and are not adopting any form of emissions trading program. The emission-credit program is described in detail in the following paragraphs.

Under the averaging program, manufacturers are able to balance the certified emissions of their motorcycles so that the sales-weighted emissions level meets the applicable standard. This means that some engine families may have emissions below the standards, while others have emissions higher than the standards. For enforcement purposes, manufacturers are required to specify a certification limit, or ''Family Emission Limit'' (FEL) for each engine family. The FEL is the emission level that a particular engine family is certified as meeting and, in effect, become the standard for the individual family. The FEL may be above or below the applicable standard as long as the manufacturer's sales-weighted emissions level meets the applicable standard.

We proposed an averaging program for Class III motorcycles only, and requested comment on whether we should include Class I and II motorcycles in the averaging program. Based on comments, we are including Class I and II motorcycles in the averaging program with certain restrictions intended to address concerns about the relative stringency of the Class I and II standards relative to the Class III standards. We are creating two separate averaging sets, one for Class I and II motorcycles and one for Class III motorcycles. Averaging would be allowed without constraint within each of these two averaging sets. However, we are limiting the manner in which credits could be exchanged between the two averaging sets. Credits from Class III motorcycles could be used to offset debits from Class I and II motorcycles. These credits are calculated by multiplying the g/km emission level by the useful life (in km) to give total grams of credits. Therefore, there is no need to accommodate the engine size differences between the different motorcycle classes. However, given that the Class I and II standards are less stringent than the Class III standards, we are not allowing Class I and II credits to be used to offset debits from Class III motorcycles. This also addresses concerns expressed by some commenters that all manufacturers do not offer products in all classes, and allowing Class I and II credits to be used for Class III compliance would inherently disadvantage Class III-only manufacturers. Because the Class III standards are $HC+NO_X$ standards while the primary Class I and II standards are HC only, we will allow such cross class averaging only if the manufacturer uses the optional $HC+NO_X$ standards for Classes I and II. In addition, Class I and II motorcycles could be averaged together, but must be certified to the optional $HC+NO_X$ standards in order to participate in the averaging program. We believe that this is an appropriate approach for several reasons. California does not currently offer an averaging program for Class I and II motorcycles. Therefore, the optional standard provides additional flexibility relative to the California program, and this flexibility allows the certification of motorcycles that are higher-emitting than those allowed in California. An averaging program with an HC-only standard would result in additional flexibility, but also in additional uncertainty regarding the overall impact on total emissions of ozone precursors. We have also established that in some recent model years all Class I and II motorcycles have been in compliance with the primary HC standard that we are adopting, which is not typically the sort of situation where additional flexibility is warranted or offered. However, we believe that additional flexibility can be offered in exchange for controlling NO_X to reasonably achievable levels.

We believe that it is appropriate to retain our general historical approach to FEL caps by setting the Class III FEL cap at 5.0 g/km $HC+NO_X$ as proposed, primarily to allow flexibility in the transition to the new standards. While it is true that this approach will allow some motorcycle models which do not meet the California FEL cap of 2.5 g/km $HC+NO_X$ to be manufactured and sold outside of California, the number of models is quite small (less than ten of the 192 model year 2003 engine families certified as of March, 2003). However, we also believe that such an approach, while helping to ease the transition to the new standards, is not defensible for the long term. Thus, we are adopting an FEL cap of 2.5 g/km $HC+NO_X$ (the level of the California FEL cap) for Class III motorcycles to be effective with the implementation of the Tier 2 standards in the 2010 model year. Consistent with our approach to FEL caps for Class III motorcycles, we are adopting 5.0 g/km $HC+NO_X$ as an FEL cap for Class I and II motorcycles, to apply in the 2006 model year when the new standards and averaging program take effect for these motorcycles.

To encourage early compliance with the Tier 2 standards for Class III motorcycles, we are adopting an early credits program similar to the one in place in California, with timing adjusted due to the differing federal implementation schedule. We believe the incentives in this program will encourage manufacturers to introduce Tier 2 motorcycles nationwide earlier than required by the rule. In addition, we believe some manufacturers can reduce emissions even further than required by the Tier 2 standard, and we would like to encourage the early introduction of these very low-emission vehicles.

Under the early credits program, credits will be calculated based on the amount that a Class III motorcycle is below the Tier 2 standards. These credits are banked and can be used beginning with the 2010 model year. In order to provide incentives for the early introduction of even cleaner Tier 2 motorcycles, we are also adopting provisions to increase these early credits by a specific multiplier factor depending on how far below the Tier 2 standards a motorcycle is and how long before 2010 it is produced. These multipliers are shown in Table IV.B–1. Because we expect the Tier 2 technologies to become more widespread as 2010 approaches, the multipliers decrease linearly in value from 2006 until 2010, when the early compliance incentive will no longer have any value (*i.e.*, the multiplier has a value of 1.0) and the program will terminate.

TABLE IV.B–1.—MULTIPLIERS TO ENCOURAGE EARLY COMPLIANCE WITH THE TIER 2 STANDARD AND BEYOND

Model year sold	Multiplier (Y) for use in MY 2010 and later corporate averaging [a]	
	Early tier 2	Certified at 0.4 g/km $HC+NO_X$
2003 through 2006	1.5	3.0
2007	1.375	2.5
2008	1.250	2.0
2009	1.125	1.5

Notes:

[a] Early Tier 2 motorcycles and motorcycles certified to 0.4 g/km are counted cumulatively toward the MY 2010 and later corporate average.

In 2010 and later model years the program becomes a basic averaging program, where each manufacturer has to meet the applicable $HC+NO_X$ standard on a fleet-average basis. See the regulations at § 86.449.

We are not adopting a required production line testing (PLT) program for highway motorcycles as part of this action. However, we are concerned about the integrity of post-certification changes to FELs in the absence of a PLT program which could be the source of data needed to justify a downward change in an FEL. Thus, we will not allow post-certification downward changes to FELs in the absence of supporting emission data. Further, a manufacturer must provide such data and seek advance approval from us for a downward FEL change. In addition, any such downward FEL change could not be inconsistent with the levels shown in existing certification data. These requirements only apply to downward FEL adjustments. We will not require such data or advance notice to justify upward adjustments to FELs. However, any upward adjustment to FELs must not cause a manufacturer's fleet to violate the relevant standard.

C. What Are the Applicable Test Procedures?

With the exception of the newly regulated category of motorcycles with engines of less than 50cc displacement, we are not making any changes to the motorcycle exhaust emission test procedures. We have noted the potential for a world harmonized test cycle—which would likely affect all highway motorcycle classes, and in fact would possibly redefine the classes—but international discussions regarding such a test cycle and associated standards are still likely two to three years away from being completed.

Class I motorcycles are currently provided with a less severe test cycle than Class II and III motorcycles. This test cycle is essentially the traditional FTP, but with lower top speeds and reduced acceleration rates relative to the FTP that is used for Class II and III motorcycles and other light-duty vehicles. The Class I FTP has a top speed of 58.7 km/hr (36.5 mph), whereas the Class II/III FTP has a top speed of 91.2 km/hr (56.7 mph). In the NPRM we requested comment on whether the existing Class I driving cycle was appropriate for the under 50cc category, and manufacturers of these motorcycles commented that it was not. The manufacturers (MIC and ACEM) noted that many of the machines in the under 50cc category have top speeds that are less than 36.5 mph, the highest speed of the current Class I test cycle. Based on these comments, we are adopting a modified version of the Class I driving cycle—supported by the manufacturers—that ensures that motorcycles under 50cc that have top speeds below 58.7 km/hr (36.5 mph) are tested within their operational limits.

Starting with the 2006 model year, the existing Class I driving cycle will be modified for motorcycles under 50cc with vehicle top speeds of less than 36.5 mph by adjusting each speed point of the driving cycle by the ratio of the top speed of the motorcycle to 36.5 mpg (the top speed of the existing Class I drive cycle). We are defining ''vehicle top speed'' in the regulations as the highest sustainable speed on a flat paved surface with a rider weighing 80 kg (176 lbs).[38] A motorcycle under 50cc with a top speed at or greater than 36.5 mph is required to be tested using the existing and unmodified Class I driving cycle.

D. What Test Fuel Is Required for Emission Testing?

The specifications for gasoline to be used by the EPA and by manufacturers for emission testing can be found in 40 CFR 86.513–94. These regulations also specify that the fuel used for vehicle service accumulation shall be ''representative of commercial fuels and engine lubricants which will be generally available through retail outlets.'' During the last twenty years of regulation of motorcycle emissions, the fuel specifications for motorcycle testing have been essentially identical to those for automotive testing. However, on February 10, 2000, EPA published a final rule entitled ''Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements'' (65 FR 6697, Feb. 10, 2000). In addition to finalizing a single set of emission standards that will apply to all passenger cars, light trucks, and larger passenger vehicles (*e.g.*, large SUVs), the rule requires the introduction of low-sulfur gasoline nationwide. To provide consistency with the fuels that will be in the marketplace, the rule amended the test fuel specifications, effective starting in 2004 when the new standards will take effect. The principal change that was made was a reduction in the allowable levels of sulfur in the test fuel, from a maximum of 0.10 percent by weight to a range of 0.0015 to 0.008 percent by weight.

Given that low-sulfur fuel will be the existing fuel in the marketplace when our program will take effect (and therefore required for service accumulation), we are amending the motorcycle test fuel to reflect the true nature of the fuels that will be available in the marketplace. Doing so will remove the possibility that a test could be conducted with an unrealistically high level of sulfur in the fuel. It will also ensure that motorcycles are tested using the same fuels found in the marketplace.

E. Hardship Provisions

We proposed two types of hardship provisions, one of which was intended specifically for small businesses and the other intended for all manufacturers. The first type of hardship provision allows a small volume motorcycle manufacturer to petition for up to three years additional lead time if the manufacturer can demonstrate that it has taken all possible steps to comply with the standards but the burden of compliance would have a significant impact on the company's solvency. The second type of hardship provision allows a company to apply for hardship relief if circumstances outside of the company's control cause a failure to comply, and the failure to sell the noncompliant product would have a major impact on the company's solvency.

In general, we do not expect that manufacturers will need to use these hardship provisions. However, having such provisions available gives us the flexibility to administratively deal with unexpected situations that may arise as companies work toward compliance with the regulations. Thus, we are adopting these hardship provisions as proposed.

F. Special Compliance Provisions for Small Manufacturers

While the highway motorcycle market is dominated by large companies, there are a large number of small businesses manufacturing motorcycles and motorcycle engines. They are active in both the federal and California markets. California has been much more active than EPA in setting new requirements for highway motorcycles, and indeed, the California requirements have driven the technology demands and timing for highway motorcycle emission controls. We have developed our special compliance provisions partly in response to the technology, timing, and scope of the requirements that apply to the small businesses in California's program. The provisions discussed below will reduce the economic burden on small businesses, allowing harmonization with California requirements in a phased, but timely manner.

The flexibilities described below will be available for small entities with U.S. highway motorcycle annual sales of fewer than 3,000 units per model year (combined Class I, II, and III motorcycles) *and* fewer than 500 employees worldwide. These provisions are appropriate because significant research and development resources may be necessary to meet the emission standards and related requirements. These provisions will reduce the burden while ensuring the vast majority of the program is implemented to ensure timely emission reductions. Many small highway motorcycle manufacturers market unique ''classic'' and ''custom'' motorcycles, often with a ''retro'' appearance, that tends to make the addition of new technologies a uniquely resource-intensive prospect.

1. Delay of Standards for Small Volume Manufacturers

We are delaying compliance with the Tier 1 standard of 1.4 g/km $HC+NO_X$ until the 2008 model year for small manufacturers, and at this time, we are not requiring these manufacturers to meet the Tier 2 standard. The existing California regulations do not require small manufacturers to comply with the Tier 2 standard of 0.8 g/km $HC+NO_X$. The California Air Resources Board found that the Tier 2 standard represents a significant technological challenge and is a potentially infeasible limit for these small manufacturers. As noted above, many of these manufacturers market specialty products with a ''retro'' simplicity and style that may not easily lend itself to the addition of advanced technologies like catalysts and electronic fuel injection. However, the California ARB has acknowledged that, in the course of their progress review planned for 2006, they will revisit their small-manufacturer provisions. We plan to participate with the ARB and others in the 2006 progress review. Following our review of these provisions, as appropriate, we may decide to propose to make changes to the emission standards and related requirements through notice and comment rulemaking, including the applicability of Tier 2 to small businesses.

2. Broader Engine Families

Small businesses have met EPA certification requirements since 1978. Nonetheless, certifying motorcycles to revised emission standards has cost and lead time implications. Relaxing the criteria for what constitutes an engine or vehicle family could potentially allow small businesses to put all of their models into one vehicle or engine family (or more) for certification purposes. Manufacturers would then certify their engines using the ''worst case'' configuration within the family. This is currently allowed under the existing regulations for small-volume highway motorcycle manufacturers. These provisions remain in place without revision.

3. Averaging, Banking, and Trading

An emission-credit program allows a manufacturer to produce and sell engines and vehicles that exceed the applicable emission standards, as long as the excess emissions are offset by the production of engines and vehicles emitting at levels below the standards. The sales-weighted average of a

[38] Loaded vehicle mass, as defined in 40 CFR 86.402–78.

manufacturer's total production for a given model year must meet the standards. An emission-credit program typically also allows a manufacturer to bank credits for use in future model years. The emission-credit program we are implementing for all highway motorcycle manufacturers is described above. Some credit programs allow manufacturers to buy and sell credits (trade) between and among themselves. We are not implementing such a provision at this time, but such flexibility could be made available to manufacturers as part of the upcoming technology review.

4. Reduced Certification Data Submittal and Testing Requirements

Current regulations allow significant flexibility for certification by manufacturers projecting sales below 10,000 units of combined Class I, II, and III motorcycles. For example, a qualifying manufacturer must submit an application for certification with a statement that their vehicles have been tested and, on the basis of the tests, conform to the applicable emission standards. The manufacturer retains adequate emission test data, for example, but need not submit it. Qualifying manufacturers also need not complete the detailed durability testing required in the regulations. We are incorporating no changes to these existing provisions.

G. Exemption for Motorcycle Kits and Custom Motorcycles

During the rulemaking we sought comment on the need for emission control requirements for motorcycle engines distinct and separate from the current and future requirements for complete motorcycles. We sought comment in this area because we had identified a small sector in the motorcycle market where the engine manufacturer and chassis manufacturer are not the same entity. This includes two very small parts of the market: one in which motorcycles are assembled by individuals from parts and subassemblies procured from motorcycle kit marketers or other separate sources; and another in which elaborate custom motorcycles are created for display by collectors. At this time, we are not including any certification requirements for engine manufacturers. *See* discussion in Chapter 1.5 of the Summary and Analysis of Comments. The small volume motorcycle manufacturers who purchase the vast majority of engines from other entities for incorporation into the motorcycles will continue to be subject to the regulations, and will continue to meet the requirements of the regulations, as they have in the past.

However, for those individuals who put together a single motorcycle for individual use and businesses that produce a handful of custom motorcycles for display, we believe it is appropriate not to require these entities to have to certify their assembled vehicles. Therefore, we are promulgating provisions for two special exemptions. The first is a one-time exemption for any person building a motorcycle from a kit for individual use. We believe that the small benefit of having single individuals certify to the standards is outweighed by the substantial burden to these individuals in certifying. Moreover, because the engines in such kits generally are built by the same companies as those engines going to the small volume motorcycle manufacturers, who still must certify and who will represent the majority of the engine-makers' production, we believe that most of the engines will be the same or very similar to the engines used in the certified motorcycles. Individuals may not use this provision as a regulatory loophole to modify or customize a certified motorcycle in a manner which adversely affects emissions. This provision is limited to one motorcycle per individual over the life of the provision.

In the case where the owner of the kit motorcycle is not the assembler of the motorcycle, the limitation of one motorcycle per person applies to the purchaser of the kit components of the motorcycle, who we expect is the end user of the motorcycle, rather than to the person or persons who actually assemble the motorcycle. A kit purchaser may have the kit assembled by another party and retain the one-time exemption for the motorcycle. In order to qualify for the exemption under these circumstances, the kit must be purchased by the ultimate owner before assembly begins. Parties or businesses who purchase kit motorcycles for assembly and retail sale are not covered by this exemption.

The second exemption is a sales-limited exemption for elaborate custom motorcycles that are created for display by collectors. The chassis of these ''display'' motorcycles are usually unique designs, while the engines are either purchased from independent engine manufacturers or custom built from engine components. Current regulations in 40 CFR 85.1707 contain provisions which provide an exemption applicable for all motor vehicles and engines produced solely for display purposes. While these regulations are generally appropriate for display engines, certain aspects of the current custom-built motorcycle market make it appropriate to add a new provision applicable only to such motorcycles. In particular, because these motorcycles are often sold to collectors, the current exemption, which does not apply to engines that are sold, would not be applicable. Therefore, we are adding a limited exemption for custom manufacturers to sell a small number of these engines every year, with the conditions discussed below. It is our understanding that these motorcycles are rarely operated on public streets. Therefore, as a condition of this exemption, these motorcycles would be allowed to operate on public streets or highways only as necessary to the display purpose, such as traveling to and from motorcycle shows. No request for the exemption is necessary for motorcycles that will not be sold or leased. However, manufacturers planning to sell motorcycles for display under this exemption will be required to notify EPA of their intent before they sell any exempted motorcycles. They must also maintain sales records of exempted motorcycles for at least three years and make them available to EPA upon request. Sales under this exemption would be limited to less than 25 per year per manufacturer. Every motorcycle exempted under this provision must include a label that identifies the manufacturer and includes the following statement: THIS MOTORCYCLE IS EXEMPT FROM EPA EMISSION REQUIREMENTS. ITS USE ON PUBLIC ROADS IS LIMITED PURSUANT TO 40 CFR 86.407–78(c). We will generally allow manufacturers to locate the label where it will not detract from the appearance of the motorcycle. For example, We could allow the label to be located under the seat.

As noted elsewhere, EPA may be revisiting several issues related to motorcycle standards in the context of the 2006 technology review and review of a possible World Motorcycle Test Cycle. One of the issues we may be reviewing at that time is whether it is appropriate to regulate motorcycle engine manufacturers or motorcycle kit manufacturers under the motorcycle regulations. If we agree to regulate loose engine sales at that time, these exemption provisions may no longer be necessary, since both kit builders and custom manufacturers would be able to purchase certified engines. Therefore, we may propose to remove or modify these provisions in the future.

V. Technological Feasibility of the Exhaust Emission Standards

A. Class I Motorcycles and Motorcycle Engines Under 50cc

As we have described earlier we are applying the current California standard for Class I motorcycles to motorcycles with displacements of less than 50cc (*e.g.*, many motor scooters). These motorcycles are currently not subject to regulation by the U.S. EPA or the State of California. They are, however, subject to emission standards in Europe and much of the rest of the world. Historically these motorcycles have been powered by 2-stroke engines, but a trend appears to be developing that would result in many of these being replaced by 4-stroke engines or possibly by advanced technology 2-stroke engines, in some cases with catalysts. This trend is largely due to emission requirements in the nations where these types of two-wheelers are popular forms of transportation.

It has already been demonstrated that the 4-stroke engine is capable of meeting the standards. Class I motorcycles above 50cc are already meeting these standards, most of them employing a 4-stroke engine with minimal additional emission controls. For example, all 2002 model year Class I motorcycles (10 engine families) were certified at levels ranging from 0.4 to 0.9 grams per kilometer HC. The 2003 Class I motorcycle models (11 engine families) were certified at similar levels with the exception of two newly introduced models, each of which is certified at a level above 3.0 g/km HC. All of these achieve the standards with 4-stroke engine designs, and only three incorporate additional technology (secondary air injection or a catalyst). These current engines range from 80 to 151cc in displacement, which provides an indication that small 4-stroke scooter engines are capable of meeting the standards. In a test program conducted by the Japan Automobile Research Institute, a 49cc 4-stroke achieved average HC emissions of 0.71 g/km, a level that falls well under the 1.0 g/km standard we are adopting.[39] The technological feasibility of meeting a 1.0 g/km HC standard was also supported by MIC if EPA made appropriate revisions to the test cycle and the useful life. We evaluated these recommendations and have adopted both of them in this final rule. The Association of European Motorcycle Manufacturers (ACEM) confirmed that European manufactures will seek to export to the U.S. the same motorcycles under 50cc that they develop for the European market, and that standards in the E.U. are forcing the transition to 2-stroke direct injection and 4-stroke EFI technologies in 2002 and 2003.[40] ACEM also confirmed the feasibility of meeting the new U.S. standard and aligned with MIC comments regarding the test cycle and useful life.

In order to meet more stringent standards being implemented worldwide, manufacturers are developing and implementing a variety of technology approaches. Honda, perhaps the largest seller of scooters in the U.S., has entirely eliminated 2-stroke engines from its scooter product lines as of the 2002 model year. They continue to offer a 50cc model, but with a 4-stroke engine. Both of Aprilia's 49cc scooters available in the U.S. have incorporated electronic direct injection technology, which, in the case of one model, enables it to meet the ''Euro-2'' standards of 1.2 grams per kilometer HC and 0.3 grams per kilometer NO_X, without use of a catalytic converter.[41] Piaggio, while currently selling a 49cc basic 2-stroke scooter in the U.S., expects to begin production of a direct injection version in 2002, and a 4-stroke 50cc scooter is also in development. Numerous 49cc models marketed by Piaggio in Europe are available either as a 4-stroke or a 2-stroke with a catalyst. Piaggio, also an engine manufacturer and seller, is already offering 50cc 4-stroke and 50cc direct injection 2-stroke engines that meet the Euro-2 limits to its customers for incorporation into scooters.

The U.S. represents a very small portion of the market for small motorcycles and scooters. There are few, if any, manufacturers that develop a small-displacement motorcycle exclusively for the U.S. market; the domestic sales volumes do not appear large enough at this time to support an investment of this kind. The Italian company Piaggio (maker of the Vespa scooters), for example, sold about as many scooters worldwide in 2000 (about 480,000) as the entire volume of highway motorcycles of all sizes sold in the U.S. in that year. U.S. sales of Vespas in 2000 amounted to about 4800. The largest scooter markets today are in South Asia and Europe, where millions are sold annually. In Taiwan alone almost 800,000 motorcycles were sold domestically. More than one third of these were powered by 2-stroke engines. Two- and three-wheelers constitute a large portion of the transportation sector in Asia, and in some urban areas these vehicles—many of them powered by 2-stroke engines—can approach 75 percent of the vehicle population. According to a World Bank report, two-stroke gasoline engine vehicles are estimated to account for about 60 percent of the total vehicle fleet in South Asia.[42]

Many nations are now realizing that the popularity of these vehicles and the high density of these vehicles in urban areas are contributing to severe air quality problems. As a consequence, some of the larger markets for small motorcycles in Asia and India are now placing these vehicles under fairly strict regulation. It is clear that actions in these nations will move the emission control technology on small motorcycles, including those under 50cc, in a positive direction. For example, according to the World Bank report, as of 2000 catalytic converters are installed in all new two-stroke engine motorcycles in India, and 2003 standards in Taiwan will effectively ban new two-strokes with emission standards so stringent that only a four-stroke engine is capable of meeting them.

Given the emerging international picture regarding emission standards for scooters, we believe that scooter manufacturers will be producing scooters of less than 50cc displacement that meet our standards well in advance of the 2006 model year, the first year we will subject this category of motorcycle to U.S. emission standards. We expect that small entities that import scooters into the U.S. from the larger scooter markets will be able to import complying vehicles. We requested comment on this assessment in the NPRM and received none indicating otherwise.

There are numerous other factors in the international arena that may affect the product offerings in the less than 50cc market segment. For example, the European Union recently changed the requirements regarding insurance and

[39] ''WMTC 2nd step validation test results in Japan,'' Japan Automobile Research Institute, Nov. 29, 2001. Available for review in Docket A–2000–02.

[40] ACEM members are: Aprilia, Benelli, BMW, Derbi, Ducati, Honda, Kawasaki, KTM, Malaguti, MV Augusta, Peugeot, Piaggio, Suzuki, Triumph, Yamaha.

[41] Aprila Web site, *http://www.apriliausa.com/ridezone/ing/models/scarabeo50dt/moto.htm* and *http://www.aprilia.com/portale/eng/cafera articolo.phtm1?id=14.* Available for review in public docket A–2000–02.

[42] Improving Urban Air Quality in South Asia by Reducing Emissions from Two-Stroke Engine Vehicles. Masami Kojima, Carter Brandon, and Jitendra Shah. December 2000. Prepared for the World Bank. Available in the public docket for a review (Docket A–2000–01; document II–D–191), or on the Internet at: *http://www.worldbank.org/html/fpd.esmap/publication/airquality.html.*

helmet use for under 50cc scooters and mopeds. Previously, the insurance discounts and lack of helmet requirements in Europe provided two relatively strong incentives to purchasers to consider a 49cc scooter. Recently, however, the provisions were changed such that helmets are now required and the insurance costs are comparable to larger motorcycles. The result was a drop of about 30 percent in European sales of 49cc scooters in 2001 due to customers perceiving little benefit from a 49cc scooter relative to a larger displacement engine.

B. Class I and Class II Motorcycles Between 50 and 180cc

As discussed above, we are adopting a new exhaust emission standards of 1.0 g/km HC for Class I and Class II motorcycles. The existing CO standard is unchanged. These standards have been in place in California since 1982. The question of whether or not these standards are technically feasible has been answered in the affirmative, since 21 of the 22 EPA-certified 2001 model year motorcycle engine families in these classes are already certified to these standards, all 24 of the 2002 model year engine families meet these standards, and 22 of 29 2003 model year engine families meet these standards. These 29 model year 2003 engine families are all powered by four-stroke engines, with a variety of emission controls applied, including basic engine modifications on almost all engine families, secondary air injection on three engine families, and catalysts on four engine families.

C. Class III Motorcycles

1. Tier 1 Standards

In the short term, the Tier 1 standard of 1.4 g/km $HC+NO_X$ reflects the goal of achieving emission reductions that can be met with reasonably available control technologies, primarily involving engine modifications rather than catalytic converters. As noted earlier, this standard will be effective starting with the 2006 model year. Based on current certification data, a number of existing engine families already could comply with this standard or will need relatively simple modifications to comply. In other cases, the manufacturers will need to use control technologies that are available but are not yet used on their particular cycles (*e.g.*, electronic fuel injection to replace carburetors, changes to cam lobes/timing, etc.). For the most part, manufacturers will not need to use advanced technologies such as close-coupled, closed-loop three-way catalysts.

While manufacturers will use various means to meet the Tier 1 standard, there are four basic types of existing, non-catalyst-based, emission-control systems available to manufacturers. The most important of these is the use of secondary pulse-air injection. Other engine modifications and systems include more precise fuel control, better fuel atomization and delivery, and reduced engine-out emission levels from engine changes. The combinations of low-emission technologies ultimately chosen by motorcycle manufacturers are dependent on the engine-out emission levels of the vehicle, the effectiveness of the prior emission-control system, and individual manufacturer preferences.

Secondary pulse-air injection, as demonstrated on current motorcycles, is applied using a passive system (*i.e.*, no air pump involved) that takes advantage of the flow of gases (''pulse'') in the exhaust pipes to draw in fresh air that further combusts unburned hydrocarbons in the exhaust. The extra air causes further combustion to occur, thereby controlling more of the hydrocarbons that escape the combustion chamber. This type of system is relatively inexpensive and uncomplicated because it does not require an air pump; air is drawn into the exhaust through a one-way reed valve due to the pulses of negative pressure inside the exhaust pipe. Secondary pulse-air injection is one of the most effective non-catalytic emission-control technologies; compared to engines without the system, reductions of 10 to 40 percent for HC are possible with pulse-air injection. Eighty—or about half—of the 162 2003 model year Class III engine families certified for sale in the U.S. employ secondary pulse-air injection to help meet the current California standards. We anticipate that most of the remaining engine families will use this technique to help meet the Tier 1 and Tier 2 standards. There are 47 2003 engine families that are certified using only engine management techniques (*e.g.*, no use of catalysts, fuel injection, secondary air injection, or oxygen sensors). The average certification HC level of these families is 1.17 g/km. By comparing this to the certification results of engine families that employ secondary air injection as the only means of emission control beyond engine modifications, we can gain some measure of the effectiveness of secondary air injection. We find that the currently certified 2003 models which employ secondary air injection have an average certification level of 0.91 g/km, a reduction of 0.26 g/km (or 22%) relative to those using only engine modification techniques.

Improving fuel delivery and atomization primarily involves the replacement of carburetors, currently used on most motorcycles, with more precise fuel injection systems. There are several types of fuel injection systems and components manufacturers can choose, including throttle-body injection systems, multi-point injection systems, and sequential multi-point fuel injection systems. Unlike conventional multi-point fuel injection systems that deliver fuel continuously or to paired injectors at the same time, sequential fuel injection can deliver fuel precisely when needed by each cylinder. The most likely type of fuel injection manufacturers will choose to help meet the Tier 1 standard is sequential multi-point fuel injection (SFI).

Motorcycle manufacturers are already using sequential fuel injection (SFI). Of the 162 2003 model year Class III motorcycle engine families certified to emission standards, at least 29 employ SFI systems.[43] We anticipate increased application of this or similar fuel injection systems to achieve the more precise fuel delivery needed to help meet the Tier 1 and Tier 2 standards. We analyzed the EPA certification data in the same way as done above with secondary air injection to estimate the effect of using SFI vehicle on emissions. Again, we identified the baseline of 47 engine families using the limited technologies and with an average certification level of 1.17 g/km HC, and compared the emissions of these engines with the emissions of engines using SFI. What we find is that use of all types of fuel injection can significantly reduce emissions. If we analyze those engine families that use some form of fuel injection other than SFI we see an average HC certification level of 1.09 g/km, a modest reduction of about 7 percent. However, the engines using SFI had significantly lower HC emissions on average of 0.72

[43] When manufacturers certify to EPA emission standards, they report the fuel delivery system used by each certified model as carbureted or fuel injected. They also report the emission control technologies used on each model to meet the emission standards. When reporting the fuel delivery system, they only indicate whether the system is carbureted or fuel injected, but not the specific type of fuel injection that is installed. When reporting the control technologies 29 models indicated the use of sequential fuel injection. However, there may be some inconsistencies in how these technologies are reported, and we believe that there may be models that employ sequential fuel injection that are shown in our database as being fuel injected, but the manufacturer may not have also specifically listed sequential fuel injection as a control technology on the motorcycle model. This is why we say ''at least'' 29 models are currently using sequential fuel injection.

g/km, a reduction of almost 40 percent. While this provides some indication of what can be achieved with fuel injection techniques (including SFI), it does not necessarily demonstrate the full potential of this technology. At this point in time it appears that SFI can get motorcycle certification levels down to about 0.4–0.6 g/km HC (certification at levels in this range can be seen in several current motorcycles that employ no other emission controls), but in the context of more stringent standards the manufacturers are likely to be able to accomplish even more with SFI, and further reductions by teaming SFI with additional emission reduction techniques.

In addition to the techniques mentioned above, various engine modifications can be made to improve emission levels. Engine modifications include a variety of techniques designed to improve fuel delivery or atomization; promote ''swirl'' (horizontal currents) and ''tumble'' (vertical currents); maintain tight control on air-to-fuel (A/F) ratios; stabilize combustion (especially in lean A/F mixtures); optimize valve timing; and retard ignition timing. Emission performance can be improved, for example, by reducing crevice volumes in the combustion chamber. Unburned fuel can be trapped momentarily in crevice volumes before being subsequently released. Since trapped and re-released fuel can increase engine-out emissions, the elimination of crevice volumes would be beneficial to emission performance. To reduce crevice volumes, manufacturers can evaluate the feasibility of designing engines with pistons that have reduced, top ''land heights'' (the distance between the top of the piston and the first ring).

Lubrication oil which leaks into the combustion chamber also has a detrimental effect on emission performance since the heavier hydrocarbons in oil do not oxidize as readily as those in gasoline and some components in lubricating oil may tend to foul a catalyst and reduce its effectiveness. Also, oil in the combustion chamber may trap HC and later release the HC unburned. To reduce oil consumption, manufacturers can tighten the tolerances and improve the surface finish on cylinders and pistons, piston ring design and materials, and exhaust valve stem seals to prevent excessive leakage of lubricating oil into the combustion chamber.

Increasing valve overlap is another engine modification that can help reduce emissions. This technique helps reduce NO_X generation in the combustion chamber by essentially providing passive exhaust gas recirculation (EGR). When the engine is undergoing its pumping cycle, small amounts of combusted gases flow past the intake valve at the start of the intake cycle. This creates what is essentially a passive EGR flow, which is then either drawn back into the cylinder or into another cylinder through the intake manifold during the intake stroke. These combusted gases, when combined with the fresh air/fuel mixture in the cylinder, help reduce peak combustion temperatures and NO_X levels. This technique can be implemented by making changes to cam timing and intake manifold design to optimize NO_X reduction while minimizing impacts to HC emissions.

Secondary pulse-air injection and engine modifications already play an important part in reducing emission levels, and we expect increased uses of these techniques to help meet the Tier 1 standard. Direct evidence of the extent to which these technologies can help manufacturers meet the Tier 1 standard can be found in EPA's highway motorcycle certification database. This database is comprised of publicly-available certification emission levels as well as some confidential data reported by the manufacturers pursuant to existing motorcycle emission certification requirements.

We do not expect any of these possible changes to adversely affect performance. Indeed, the transition to some of these technologies (*e.g.*, advanced fuel injection) is expected to improve performance, fuel economy, and reliability.

2. Tier 2 Standards

In the long term, the Tier 2 HC+NO_X standard of 0.8 g/km will ensure that manufacturers will continue to develop and improve emission control technologies. The Tier 2 standard will become effective in the 2010 model year. We believe this standard is technologically feasible, though it will present some technical challenges for manufacturers. Several manufacturers are, however, already using some of the technologies that will be needed to meet this standard. In addition, our implementation time frame gives manufacturers two years of experience in meeting this standard in California before having to meet it on a nationwide basis. Several manufacturers already use closed-loop, three-way catalysts on a number of their product lines. At least one manufacturer has already certified several models to the Tier 2 standards levels, and at least one of these models is being sold nationwide. A number of additional models currently in the market may also meet the Tier 2 standards, depending on NO_X levels, using combinations of catalysts, fuel injection, secondary air injection, and other engine modifications. The current average HC certification level for Class III motorcycles is 0.93 g/km, with about forty engine families from a variety of manufacturers at levels of 0.5 g/km or lower. We expect that the provided six to seven years of lead time prior to meeting these standards on a nationwide basis will allow manufacturers to optimize these and other technologies to meet the Tier 2 standard.

To meet the Tier 2 standard for HC+NO_X, manufacturers will likely use more advanced engine modifications and secondary air injection. Specifically, we believe manufacturers will use computer-controlled secondary pulse-air injection (*i.e.*, the injection valve would be connected to a computer-controlled solenoid). In addition to these systems, manufacturers will probably need to use catalytic converters on some motorcycles to meet the Tier 2 standards. There are two types of catalytic converters currently in use: two-way catalysts (which control only HC and CO) and three-way catalysts (which control HC, CO, and NO_X). Under the Tier 2 standard, manufacturers will need to minimize levels of both HC and NO_X. Therefore, to the extent catalysts are used, manufacturers will likely use a three-way catalyst in addition to engine modifications and computer-controlled secondary pulse-air injection.

As discussed previously, improving fuel control and delivery provides emission benefits by helping to reduce engine-out emissions and minimizing the exhaust variability which the catalytic converter experiences. One method for improving fuel control is to provide enhanced feedback to the computer-controlled fuel injection system through the use of heated oxygen sensors. Heated oxygen sensors (HO2S) are located in the exhaust manifold to monitor the amount of oxygen in the exhaust stream and provide feedback to the electronic control module (ECM). These sensors allow the fuel control system to maintain a tighter band around the stoichiometric A/F ratio than conventional oxygen sensors (O2S). In this way, HO2S assist vehicles in achieving precise control of the A/F ratio and thereby enhance the overall emissions performance of the engine. At least one manufacturer is currently using this technology on several 2003 as well as previous model year engine families.

In order to further improve fuel control, some motorcycles with electronic controls may utilize software algorithms to perform individual cylinder fuel control. While dual oxygen sensor systems are capable of maintaining A/F ratios within a narrow range, some manufacturers may desire even more precise control to meet their performance needs. On typical applications, fuel control is modified whenever the O2S determines that the combined A/F of all cylinders in the engine or engine bank is ''too far'' from stoichiometric. The needed fuel modifications (*i.e.*, inject more or less fuel) are then applied to all cylinders simultaneously. Although this fuel control method will maintain the ''bulk'' A/F for the entire engine or engine bank around stoichiometric, it would not be capable of correcting for individual cylinder A/F deviations that can result from differences in manufacturing tolerances, wear of injectors, or other factors.

With individual cylinder fuel control, A/F variation among cylinders will be diminished, thereby further improving the effectiveness of the emission controls. By modeling the behavior of the exhaust gases in the exhaust manifold and using software algorithms to predict individual cylinder A/F, a feedback fuel control system for individual cylinders can be developed. Except for the replacement of the conventional front O2S with an HO2S sensor and a more powerful engine control computer, no additional hardware is needed in order to achieve individual cylinder fuel control. Software changes and the use of mathematical models of exhaust gas mixing behavior are required to perform this operation.

In order to maintain good driveability, responsive performance, and optimum emission control, fluctuations of the A/F must remain small under all driving conditions including transient operation. Virtually all current fuel systems in automobiles incorporate an adaptive fuel control system that automatically adjusts the system for component wear, varying environmental conditions, varying fuel composition, etc., to more closely maintain proper fuel control under various operating conditions. For some current fuel control systems, this adaptation process affects only steady-state operating conditions (*i.e.*, constant or slowly changing throttle conditions). However, most vehicles are now being introduced with adaptation during ''transient'' conditions (*e.g.*, rapidly changing throttle positions).

Accurate fuel control during transient driving conditions has traditionally been difficult because of the inaccuracies in predicting the air and fuel flow under rapidly changing throttle conditions. Because of air and fuel dynamics (fuel evaporation in the intake manifold and air flow behavior) and the time delay between the air flow measurement and the injection of the calculated fuel mass, temporarily lean A/F ratios can occur during transient driving conditions that can cause engine hesitation, poor driveability and primarily an increase in NO_X emissions. However, by utilizing fuel and air mass modeling, vehicles with adaptive transient fuel control are more capable of maintaining accurate, precise fuel control under all operating conditions. Virtually all cycles will incorporate adaptive transient fuel control software; motorcycles with computer controlled fuel injection can also benefit from this technique at a relatively low cost.

Three-way catalytic converters traditionally utilize rhodium and platinum as the catalytic material to control the emissions of all three major pollutants (hydrocarbons (HC), CO, NO_X). Although this type of catalyst is very effective at converting exhaust pollutants, rhodium, which is primarily used to convert NO_X, tends to thermally deteriorate at temperatures significantly lower than platinum. Recent advances in palladium and tri-metal (*i.e.*, palladium-platinum-rhodium) catalyst technology, however, have improved both the light-off performance (light-off is defined as the catalyst bed temperature where pollutant conversion reaches 50-percent efficiency) and high temperature durability over previous catalysts. In addition, other refinements to catalyst technology, such as higher cell density substrates and adding a second layer of catalyst washcoat to the substrate (dual-layered washcoats), have further improved catalyst performance from just a few years ago.

Typical cell densities for conventional catalysts used in motorcycles are less than 300 cells per square inch (cpsi). To meet the Tier 2 standard, we expect manufacturers to use catalysts with cell densities of 300 to 400 cpsi. If catalyst volume is maintained at the same level (we assume volumes of up to 60 percent of engine displacement), using a higher density catalyst effectively increases the amount of surface area available for reacting with pollutants. Catalyst manufacturers have been able to increase cell density by using thinner walls between each cell without increasing thermal mass (and detrimentally affecting catalyst light-off) or sacrificing durability and performance.

In addition to increasing catalyst volume and cell density, we believe that increased catalyst loading and improved catalyst washcoats will help manufacturers meet the Tier 2 standards. In general, increased precious metal loading (to a point) will reduce exhaust emissions because it increases the opportunities for pollutants to be converted to harmless constituents. The extent to which precious metal loading is increased will be dependent on the precious metals used and other catalyst design parameters. We believe recent developments in palladium/rhodium catalysts are very promising since rhodium is very efficient at converting NO_X, and catalyst suppliers have been investigating methods to increase the amount of rhodium in catalysts for improved NO_X conversion.

Double layer technologies allow optimization of each individual precious metal used in the washcoat. This technology can provide reduction of undesired metal-metal or metal-base oxide interactions while allowing desirable interactions. Industry studies have shown that durability and pollutant conversion efficiencies are enhanced with double layer washcoats. These recent improvements in catalysts can help manufacturers meet the Tier 2 standard at reduced cost relative to older three-way catalysts.

New washcoat formulations are now thermally stable up to 1050 °C. This is a significant improvement from conventional washcoats, which are stable only up to about 900 oC. With the improvements in light-off capability, catalysts may not need to be placed as close to the engine as previously thought. However, if placement closer to the engine is required for better emission performance, improved catalysts based on the enhancements described above would be more capable of surviving the higher temperature environment without deteriorating. The improved resistance to thermal degradation will allow closer placement to the engines where feasible, thereby providing more heat to the catalyst and allowing them to become effective quickly.

It is well established that a warmed-up catalyst is very effective at converting exhaust pollutants. Recent tests on advanced catalyst systems in automobiles have shown that over 90 percent of emissions during the Federal Test Procedure (FTP) are now emitted during the first two minutes of testing after engine start up. Similarly, the highest emissions from a motorcycle occur shortly after start up. Although improvements in catalyst technology have helped reduce catalyst light-off times, there are several methods to provide additional heat to the catalyst. Retarding the ignition spark timing and computer-controlled, secondary air injection have been shown to increase the heat provided to the catalyst, thereby improving its cold-start effectiveness.

In addition to using computer-controlled secondary air injection and retarded spark timing to increase the heat provided to the catalyst, some vehicles may employ warm-up, pre-catalysts to reduce the size of their main catalytic converters. Palladium-only warm-up catalysts (also known as ''pipe catalysts'' or ''Hot Tubes'') using ceramic or metallic substrates may be added to further decrease warm-up times and improve emission performance. Although metallic substrates are usually more expensive than ceramic substrates, some manufacturers and suppliers believe metallic substrates may require less precious metal loading than ceramic substrates due to the reduced light-off times they provide.

Improving insulation of the exhaust system is another method of furnishing heat to the catalyst. Similar to close-coupled catalysts, the principle behind insulating the exhaust system is to conserve the heat generated in the engine for aiding catalyst warm-up. Through the use of laminated thin-wall exhaust pipes, less heat will be lost in the exhaust system, enabling quicker catalyst light-off. As an added benefit, the use of insulated exhaust pipes will also reduce exhaust noise. Increasing numbers of manufacturers are expected to utilize air-gap exhaust manifolds (*i.e.*, manifolds with metal inner and outer walls and an insulating layer of air sandwiched between them) for further heat conservation.

Besides the hardware modifications described above, motorcycle manufacturers may borrow from other current automobile techniques. These include using engine calibration changes such as a brief period of substantial ignition retard, increased cold idling speed, and leaner air-fuel mixtures to quickly provide heat to a catalyst after cold-starts. Only software modifications are required for an engine which already uses a computer to control the fuel delivery and other engine systems. For these engines, calibration modifications provide manufacturers with an inexpensive method to quickly achieve light-off of catalytic converters. When combined with pre-catalysts, computer-controlled secondary air injection, and the other heat conservation techniques described above, engine calibration techniques may be very effective at providing the required heat to the catalyst for achieving the Tier 2 standard.

D. Safety and Performance Impacts

We noted in the NPRM that the nature of motorcycling makes riders particularly aware of any safety issues that confront them. Many motorcycle riders and their organizations submitted comments on the NPRM regarding their concerns that the proposed standards would adversely affect both performance and safety. These issues are discussed in detail in the Summary and Analysis of Comments; the remainder of this section summarizes our key findings regarding these issues.

Motorcycle riders are inherently closer to the engine and exhaust pipes than the driver of an enclosed vehicle, and the engine components tend to be more exposed and accessible as well. Because of this fact, we received many comments regarding the potential safety risk of catalytic converters, and many questioned whether this emission control device could be implemented on motorcycles without increasing the risk of injury to the rider and/or passenger. An economic impact study submitted by the Motorcycle Riders Foundation claimed that ''EPA ignores the issue of rider safety,'' apparently basing this claim on a word search of the rulemaking documents for the terms ''rider safety'' and ''consumer safety.'' In fact, the NPRM contained several paragraphs regarding the issue of safety as it relates to the use of catalytic converters on motorcycles.

Because of the serious nature of the concerns expressed by riders we expanded our assessment of the potential risks of using catalytic converters as an emission control device on motorcycles. Our complete analysis, described in the Summary and Analysis of Comments, involved the following:

- An improved assessment of the current use of catalytic converters on motorcycles, both in the U.S. and worldwide;
- Feedback from the motorcycle manufacturers regarding this issue;
- An analysis of exhaust- and catalyst-based complaints filed by consumers with the National Highway Traffic Safety Administration's Office of Defects Investigation, including feedback from manufacturers on the nature of these complaints; and
- An assessment of the technological approaches to isolating the rider and/or passenger from the heat of a catalytic converter.

We found that in the last five years at least 16 manufacturers have certified dozens of models equipped with catalytic converters. In the last two years sales of catalyst-equipped models in each year have approached twenty percent of all motorcycles sold in the U.S., and we conservatively estimate that there are at least 150,000 catalyst-equipped motorcycles of all sizes and styles on the roads in the U.S. today. Given that the total annual mileage accumulated on these motorcycles in the U.S. likely exceeds 300 million miles, the rider experience with the emission control devices is not trivial. Given this experience, we believe that there has been ample opportunity to assess the issue of catalyst safety, not just on a hypothetical basis but on the basis of actual manufacturing and on-road riding experience. Any serious concerns would be likely to be brought to the attention of manufacturers and/or the National Highway Traffic Safety Administration (NHTSA). Our analysis of the NHTSA database on consumer complaints revealed a small number related to the exhaust pipe, and only seven related to heat from the exhaust pipe. (In 1998 there were an estimated 5.4 million on-highway motorcycles in use in the United States.) These seven complaints are detailed in Table V.D–1.

TABLE V.D–1.—NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, OFFICE OF DEFECTS INVESTIGATION; DATABASE OF CONSUMER COMPLAINTS: COMPLAINTS REGARDING EXCESS HEAT FROM EXHAUST PIPES

No.	Complaint
1	Passenger on motorcycle received burns on leg from hot mufflers.
2	Muffler not designed with heat shield, causing burn injury to driver when motorcycle turned over.
3	Exhaust manifold reaches temperatures so high that it has an orange glow. Manufacturer knows of problem, and there isn't a solution. Consumer will add additional information.

TABLE V.D–1.—NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, OFFICE OF DEFECTS INVESTIGATION; DATABASE OF CONSUMER COMPLAINTS: COMPLAINTS REGARDING EXCESS HEAT FROM EXHAUST PIPES—Continued

No.	Complaint
4	Consumer states that when at a stop the exhaust pipe will glow red and this can cause injuries to the consumer. Dealer notified.
5	Exhaust system cross over pipe is located too close to seat, causing driver to be burned while driving, even if properly dressed.
6	Consumer states exhaust pipes are positioned below foot pegs so that when you come to a stop and put feet down, it's very likely that pant leg will at least brush up against pipe. Consumer has ruined clothes because of this. Manufacturer does not feel this is a problem, they suggested to consumer that he buy after market exhaust guards, which are expensive.
7	Exhaust pipes are positioned below foot pegs so that when you come to a stop and put your foot down you will brush up against hot pipe.

Source: National Highway Traffic Safety Administration, Office of Defects Investigation. Consumer Complaints Database. See *http://www-odi.nhtsa.dot.gov/cars/problems/complain/.*

Two of the seven (Nos. 1 and 2 in the table above) were clearly regarding motorcycles without catalysts, and of the remaining five only two were regarding models that clearly did have catalysts (Nos. 6 and 7). We are unable to determine whether complaints numbered 3–5 involve motorcycles with catalysts; although the manufacturer has been using catalysts for a number of years, sales of these motorcycles have been limited to California to date. The complaints shown in the table originated from Ohio, New York, and Arizona. The manufacturers of the motorcycles reflected in these five complaints unanimously stated their belief that these are isolated cases, that they have no record of consumer complaints indicating that widespread problems exist, and that they make every effort to protect the rider from injury or harm.

We are confident that manufacturers can design and produce motorcycles that respond to these safety concerns, and information submitted by the manufacturers supports our assessment that catalytic converters can be safely integrated into motorcycle designs. There are a number of approaches that manufacturers are using today to protect the rider from excessive heat. Some motorcycle designs permit the catalyst to be placed on the underside of the motorcycle where it is unable to contact the rider. Other manufacturers will use a double-pipe exhaust system to reduce heat loss, allowing the exhaust gases to remain hot before reaching the catalyst while maintaining lower exterior temperatures. Some manufacturers are placing the catalyst inside the muffler or close to the manifold in areas where it is unlikely to be contacted by the rider or passenger. Footrests can be shielded and pipes can be insulated to reduce the exterior transmission of heat. The fact that these approaches are already being successfully employed, combined with the significant lead time provided for the Tier 2 standard, leads us to conclude that catalysts can be safely integrated into both current and future motorcycle designs.

Every motorcycle manufacturer who either testified at the public hearing or provided written comments on the proposed rule has unequivocally stated that they can build motorcycles that will meet the standards with no negative impact on safety or performance relative to motorcycles manufactured today. Finally, MECA addressed this issue at the public hearing by noting that catalyst technology has been applied to over 15 million two- and three-wheelers worldwide. There is no indication from any nation worldwide—some of which are far more dependent on motorcycles as daily transportation than we are in the U.S.—that the use of catalysts on motorcycles presents a significant risk to the rider.

We do not expect any of these possible technology changes to adversely affect performance. Indeed, the transition to some of these technologies (*e.g.*, advanced fuel injection) would be expected to improve performance, fuel economy, and reliability. In the last ten years, and especially within the last few years, there has been an increasing use of the technologies that we expect will be used to meet the new standards (*i.e.*, secondary air injection, sequential fuel injection, and catalytic converters). There is no evidence to suggest that motorcycle performance has declined during that period, and every reason to believe that manufacturers have been able to continue to develop products that make continual improvements in performance. There are too many examples to repeat here that demonstrate that emission controls can be incorporated into motorcycles concurrent with increases in performance and handling, as well as decreases in weight. Consider the redesigned 2003 Yamaha YZF–R6, a 600cc high performance motorcycle in the highly competitive middleweight super sport/racing category. Relative to the 2002 model, the 2003 YZF–R6 is eight pounds lighter, several horsepower stronger, is being very well-reviewed in the press, and has about half the emissions of the 2002 model (0.6 g/km HC in 2003 versus 1.1 g/km HC in 2002). It's also being sold at the same price as the 2002 model. Emission-related improvements for 2003 include the addition of fuel injection and a catalytic converter. Even with the addition of a catalytic converter, the use of advanced materials enables the exhaust system of the 2003 model to be more than two pounds lighter than the 2002 model. We recognize that these are examples and do not address all combinations of technology and all sizes and styles of motorcycles, but they are clear demonstrations of what is achievable with the technology and materials available today.

Finally, motorcycle manufacturers have a tremendous amount at stake with respect to the issues of performance and safety, as well as the greatest amount of experience and technological expertise. They have every reason to balk at new emission standards if they believe that catalytic converters will raise in-use safety concerns and cause rider injuries and deaths as some have alleged. However, the manufacturers have not raised concerns. In fact, more than a dozen manufacturers from Indian to Honda and Harley-Davidson have unequivocally stated in the public record—directly or through their industry association—that motorcycles produced under the new standards will be as safe and have the same or better performance as motorcycles today.

E. Non-Conformance Penalties

Clean Air Act section 206(g) (42 U.S.C. 7525(g)), allows us to issue a certificate of conformity for heavy-duty engines or for highway motorcycles that exceed an applicable section 202(a) emissions standard, but do not exceed an upper limit associated with that standard, if the manufacturer pays a nonconformance penalty (NCP) established by rulemaking. Congress adopted section 206(g) in the Clean Air Act Amendments of 1977 as a response to perceived problems with technology-forcing heavy-duty engine emissions standards. If strict standards were maintained, then some manufacturers, ''technological laggards,'' might be unable to comply initially and would be forced out of the marketplace. NCPs were intended to remedy this potential problem. The laggards would have a temporary alternative that would permit them to sell their engines or vehicles by payment of a penalty. Through regulation, we established three criteria for determining the eligibility of emission standards for NCPs in any given model year. First, the emission standard in question must become more difficult to meet, either by becoming more stringent itself or by its interaction with another emission standard that has become more stringent. Second, substantial work must be required to meet the emission standard. We consider ''substantial work'' to mean the application of technology not previously used in that vehicle or engine class/subclass, or a significant modification of existing technology, to bring that vehicle/engine into compliance. We do not consider minor modifications or calibration changes to be classified as substantial work. Third, it must be likely that a company will become a technological laggard. A technological laggard is defined as a manufacturer who cannot meet a particular emission standard due to technological (not economic) difficulties and who, in the absence of NCPs penalties, might be forced from the marketplace.

We do not believe that the three criteria could be satisfied with respect to the Tier 1 standards. Thus, we are not at this time planning to offer NCPs for the Tier 1 standards. Furthermore, it is too early to determine whether the criteria will be satisfied with regards to the Tier 2 standards. Thus, we are also not offering NCPs at this time for the Tier 2 standards. However, we will monitor the manufacturers' efforts to comply with the Tier 2 standards and will consider proposing NCPs for the standards in the future if we believe conditions warrant them.

VI. Permeation Emission Control

A. Overview

In the proposal we specified only exhaust emission controls for motorcycles. However, we provided a detailed discussion of permeation emissions from motorcycles and technological strategies for reducing such emissions. We requested comment on whether we should finalize standards that would require low permeation fuel tanks and hoses and on the possible forms that regulations on permeation emissions from motorcycles could take. In a supplemental **Federal Register** notice (67 FR 66097, October 30, 2002), we stated that if we were to finalize permeation requirements for motorcycles, that it was highly likely that they would be modeled after those in the recreational vehicle regulations which had been recently finalized. Motorcycle manufacturers initially expressed concern about the feasibility of the proposed standards. However, through discussions between EPA and industry, manufacturers' concerns about the feasibility of permeation standards were largely resolved.

We are adopting performance standards intended to reduce permeation emissions from motorcycles. The standards, which apply to new motorcycles starting in 2008, are nominally based on manufacturers reducing these permeation emissions from new motorcycles by approximately 90 percent overall. We are also adopting several special compliance provisions to reduce the burden of permeation emission regulations on small businesses. These special provisions are the same as for the exhaust emission standards, as applicable.

B. Permeation Emission Standards

1. What Are the Emission Standards and Compliance Dates?

We are finalizing new standards that will require an 85-percent reduction in plastic fuel tank permeation and a 95-percent reduction in fuel system hose permeation from new motorcycles beginning in 2008. These standards and their implementation dates are presented in Table VI.B–1. Section VI.C presents the test procedures associated with these standards. Test temperatures are presented in Table VI.B–1 because they represent an important parameter in defining the emission levels.

The permeation standards are based on the inside surface areas of the hoses and fuel tanks. We sought comment on whether the potential permeation standards for fuel tanks should be expressed as grams per gallon of fuel tank capacity per day or as grams per square meter of inside surface area per day. Although volume is generally used to characterize fuel tanks, we base the standard on inside surface area because permeation is a function of surface area. In addition, the surface to volume ratio of a fuel tank changes with capacity and geometry of the tank. Two similar shaped tanks of different volumes or two different shaped tanks of the same volume could have different g/gallon/day permeation rates even if they were made of the same material and used the same emission-control technology. Therefore, we believe that using a g/m^2/day form of the standard more accurately represents the emissions characteristics of a fuel tank and minimizes complexity. This is consistent with the permeation standards for recreational vehicles.

TABLE VI.B–1.—PERMEATION STANDARDS FOR MOTORCYCLES

Emission component	Implementation date	Standard	Test temperature
Fuel Tank Permeation	2008	1.5 g/m^2/day	28°C (82°F)
Hose Permeation	2008	15 g/m^2/day	23°C (73°F)

These standards are revised compared to the values we sought comment on in the notice. This revision is intended to accommodate emissions test variability and in-use deterioration associated with low permeation technology. Since the notice, we have received test information that suggests that a tank permeation standard representing an 85 rather than a 95-percent reduction is appropriate to accommodate these factors. Nonetheless, we continue to believe that manufacturers will target control technologies and strategies focused on achieving reductions of 95 percent in production tanks. With regard to the permeation standard for hoses, we have adjusted the standard slightly to give the manufacturers more freedom in selecting their hose material and to accommodate the fact that we selected a certification test fuel based on a 10-percent ethanol blend, which would be prone to greater permeation than neat gasoline. The final standards are consistent with the recreational vehicle standards that were finalized after the motorcycle NPRM.

Cost-effective technologies exist to significantly reduce permeation emissions. Because essentially all of the plastic fuel tanks are made from high density polyethylene (HDPE), manufacturers would be able to choose from several technologies for providing a permeation barrier in HDPE tanks. The use of metal fuel tanks would also meet the standards, because fuel does not permeate through metal. The hose permeation standard can be met using barrier hose technology or through using low permeation automotive-type tubing. These technologies are discussed in Section VI.E. The implementation date gives manufacturers four years to comply. This will allow manufacturers time to implement controls in their tanks and hoses in an orderly business manner.

2. Will I Be Able To Average, Bank, or Trade Emissions Credits?

Averaging, banking, and trading (ABT) refers to the generation and use of emission credits based on certified emission levels relative to the standard. The general ABT concept is discussed in detail in Section IV.C. In many cases, an ABT program can improve technological feasibility, provide manufacturers with additional product planning flexibility, and reduce costs which allows us to consider emission standards with the most appropriate level of stringency and lead time, as well as providing an incentive for the early introduction of new technology.

We are finalizing ABT for non-metal fuel tanks to facilitate the implementation of the standard across a variety of tank designs. To meet the standard on average, manufacturers would be able to divide their fuel tanks into different emission families and certify each of their emission families to a different Family Emissions Level (FEL). The emission families would include fuel tanks with similar characteristics, including wall thickness, material used (including additives such as pigments, plasticizers, and UV inhibitors), and the emission-control strategy applied. The FELs would then be weighted by sales volume and fuel tank inside surface area to determine the average level across a manufacturer's total production. An additional benefit of a corporate-average approach is that it provides an incentive for developing new technology that can be used to achieve even larger emission reductions or perhaps to achieve the same reduction at lower costs or to achieve some reductions early.

For purposes of ABT we will not consider metal tanks as part of any sort of credit program. In other words, metal fuel tanks will not be able to generate permeation credits. We do not want to provide an opportunity for "windfall" credits for metal fuel tanks because this would undermine the value of the standard. The standard is based on feasible technology for plastic fuel tanks. If averaging were allowed between plastic and metal fuel tanks (which are used on most motorcycles), the standard would have to be adjusted accordingly.

If a manufacturer were to certify the majority of their fuel tanks to a level below the permeation standard, they would have the option of leaving a small number of their fuel tanks uncontrolled. In this case, manufacturers would have the option of either testing the uncontrolled fuel tanks or using an assigned family emission level of 12 $g/m^2/day$.

Any manufacturer could choose to certify each of its evaporative emission control families at levels which would meet the standard. Some manufacturers may choose this approach as they could see it as less complicated to implement.

We are also finalizing a voluntary program intended to give an opportunity for manufacturers to prove out technologies earlier than 2008. Manufacturers will be able to use permeation control strategies early, and even if they do not meet the 1.5 $g/m^2/day$ standard, they can earn credit through partial emission reduction that will give them more lead time to meet the standard. This program will allow a manufacturer to certify fuel tanks early to a less stringent standard of 3.0 $g/m^2/day$ and thereby delay meeting the 1.5 $g/m^2/day$ fuel tank permeation standard by 1 tank-year for every tank-year of early certification. As an alternative, this delay could be applied to other fuel tanks provided that these tanks have an equal or smaller inside surface area and meet a level of 3.0 $g/m^2/day$. As an example, suppose a manufacturer were to sell 50 motorcycles in 2006 and 75 motorcycles in 2007 with fuel tanks that meet a level of 3.0 $g/m^2/day$. This manufacturer would then be able to sell 125 vehicles with fuel tanks that meet a level of 3.0 $g/m^2/day$ in 2008 and later years. No uncontrolled tanks could be sold after 2007. In addition to providing implementation flexibility to manufacturers, this option, if used, would result in additional and earlier emission reductions.

For hoses, we do not believe that ABT provisions would result in a significant technological or cost benefit to manufacturers. We believe that all fuel hoses can meet the permeation standards using straightforward technology as discussed in Section VI.E. From EPA's perspective, including an ABT program in the rule creates a long-term administrative burden that is not worth taking on since it does not provide the industry with useful flexibility.

3. How Do I Certify My Products?

We are finalizing a certification process similar to our existing program for other mobile sources. Manufacturers test representative prototype designs and submit the emission data along with other information to EPA in an application for a Certificate of Conformity. As discussed in Section VI.C.3, we will allow manufacturers to certify based on either design (for which there is already data) or by conducting its own emissions testing. If we approve the application, then the manufacturer's Certificate of Conformity allows the manufacturer to produce and sell the vehicles described in the application in the U.S.

Manufacturers certify their fuel systems by grouping them into emission families that have similar emission characteristics. The emission family definition is fundamental to the certification process and to a large degree determines the amount of testing required for certification. The regulations include specific characteristics for grouping emission families for each category of tanks and hoses. For fuel tanks, key parameters include wall thickness, material used (including additives such as pigments, plasticizers, and UV inhibitors), and the emission-control strategy applied. For hoses, key parameters include material, wall thickness, and emission-control strategy applied. To address a manufacturer's unique product mix, we may approve using broader or narrower engine families. The certification process for vehicle permeation is similar as for the process for certifying engines.

4. What Durability Provisions Apply?

We are adopting several additional provisions to ensure that emission controls will be effective throughout the life of the motorcycle. This section discusses these provisions for permeation emissions from motorcycles.

a. How Long Do My Vehicles Have To Comply?

Manufacturers would be required to build fuel systems that meet the emission standards over each motorcycle's useful life. For the permeation standards, we use the same useful life as for exhaust emissions from motorcycle engines based on the belief that fuel system components and engines are intended to have the same design life. This useful life is 5 years or 6,000 km for Class I <50cc, 12,000 km for Class I ≥50cc, 18,000 km for Class II, and 30,000 km for Class III. Further, we are applying the same warranty period for permeation emission related components of the fuel system as for exhaust emission-related components of the motorcycle.

b. How Do I Demonstrate Emission Durability?

We are adopting several additional provisions to ensure that emission controls will be effective throughout the life of the vehicle. Motorcycle manufacturers must demonstrate that the permeation emission-control strategies will last for the useful life of the vehicle. Any deterioration in performance would have to be included in the family emissions limit. This section discusses durability provisions for fuel tanks and hoses.

For plastic fuel tanks, we are specifying a preconditioning and four durability steps that must be performed in conjunction with the permeation testing for certification to the standard. These steps, which include fuel soaking, slosh, pressure-vacuum cycling, temperature cycling, and ultra-violet light exposure, are described in more detail in Section VI.C.1. The purpose of these preconditioning steps is to help demonstrate the durability of the fuel tank permeation control under conditions that may occur in use. For fuel hoses, the only preconditioning step that we are requiring is a fuel soak to ensure that the permeation rate is stabilized prior to testing. Data from before and after the durability tests would be used to determine deterioration factors for the certified fuel tanks. The durability factors would be applied to permeation test results to determine the certification emission level of the fuel tank at full useful life. The manufacturer would still be responsible for ensuring that the fuel tank and hose meet the permeation standards throughout the useful life of the motorcycle.

We recognize that motorcycle manufacturers will likely depend on suppliers/vendors for complying tanks and fuel hoses. We believe that, in addition to normal business practices, our testing requirements will help assure that suppliers/vendors consistently meet the performance specifications laid out in the certificate.

C. Testing Requirements

To obtain a certificate allowing sale of products meeting EPA emission standards, manufacturers generally must show compliance with such standards through emission testing. The test procedures for determining permeation emissions from fuel tanks and hoses on motorcycles are described below. This section also discusses design-based certification as an alternative to performing specific testing. These test procedures are the same as those existing for recreational vehicles.

1. What Are the Test Procedures for Measuring Permeation Emissions From Fuel Tanks?

Prior to testing the fuel tanks for permeation emissions, the fuel tank must be preconditioned by allowing the tank to sit with fuel in it until the hydrocarbon permeation rate has stabilized. Under this step, the fuel tank must be filled with a 10-percent ethanol blend in gasoline (E10), sealed, and soaked for 20 weeks at a temperature of 28 ± 5°C. Once the soak period has ended, the fuel tank is drained, refilled with fresh fuel, and sealed. The permeation rate from fuel tanks is measured at a temperature of 28 ± 2°C over a period of at least 2 weeks. Consistent with good engineering judgment, a longer period may be necessary for an accurate measurement for fuel tanks with low permeation rates. Permeation loss is determined by measuring the weight of the fuel tank before and after testing and taking the difference. Once the mass change is calculated, it is divided by the manufacturer determined tank surface area and the number of days of soak to get the emission rate. As an option, permeation may be measured using alternative methods that will provide equivalent or better accuracy. Such methods include enclosure testing as described in 40 CFR part 86. The fuel used for this testing will be a blend of 90-percent gasoline and 10-percent ethanol.

To determine permeation emission deterioration factor, we are specifying three durability tests: slosh testing, pressure-vacuum cycling, and ultra-violet exposure. The purpose of these deterioration tests is to help ensure that the technology is durable and the measured emissions are representative of in-use permeation rates. For slosh testing, the fuel tank is filled to 40-percent capacity with E10 fuel and rocked for 1 million cycles. The pressure-vacuum testing contains 10,000 cycles from −0.5 to 2.0 psi. These two durability tests are based on draft recommended SAE practice.[44] The third durability test is intended to assess potential impacts of UV sunlight (0.2 μm–0.4 μm) on the durability of the surface treatment. Because most of the irradiance from sunlight in this range is seen in wavelengths above 0.3 μm, we recommend testing with an average wavelength above 0.3 μm such as the UVA lamp described in SAE J2020.[45] In the UV exposure test, the tank must be exposed to a UV light of at least 24 W/m^2 (0.4 W-hr/m^2/min) on the tank surface for 15 hours per day for 30 days. Alternatively, it can be exposed to direct natural sunlight for an equivalent period of time. To allow for weekends and rainy days, these exposure days do not need to be continuous.

2. What Are the Test Procedures for Measuring Permeation Emissions From Fuel System Hoses?

The permeation rate of fuel from hoses would be measured at a temperature of 23 ± 2°C using SAE method J30 [46] with E10. The hose must be preconditioned with a fuel soak to ensure that the permeation rate has stabilized. The fuel to be used for this testing would be a blend of 90-percent gasoline and 10-percent ethanol. This fuel is consistent with the test fuel used for highway evaporative emission testing. Alternatively, for purposes of submission of data at certification, permeation could be measured using alternative equipment and procedures that provide equivalent results. To use these alternative methods, manufacturers would have to apply to us and demonstrate equivalence. Examples of alternative approaches that we anticipate manufacturers may use are the recirculation technique described in SAE J1737,[47] enclosure-type testing such as in 40 CFR part 86, or weight loss testing such as described in SAE J1527.[48]

[44] Draft SAE Information Report J1769, ''Test Protocol for Evaluation of Long Term Permeation Barrier Durability on Non-Metallic Fuel Tanks,'' (Docket A–2000–01, document IV–A–24).

[45] SAE Surface Vehicle Standard J2020, ''Accelerated Exposure of Automotive Exterior Materials Using a Fluorescent UV and Condensation Apparatus,'' Revised February, 2003 (Docket A–2000–02, document, IV–A–10).

[46] SAE Recommended Practice J30, ''Fuel and Oil Hoses,'' June 1998 (Docket A–2000–01, document IV–A–92).

[47] SAE Recommended Practice J1737, ''Test Procedure to Determine the Hydrocarbon Losses from Fuel Tubes, Hoses, Fittings, and Fuel Line Assemblies by Recirculation,'' 1997 (Docket A–2000–01, document, IV–A–34).

[48] SAE Recommended Practice J1527, ''Marine Fuel Hoses,'' 1993 (Docket A–2000–01, document IV–A–19).

3. Can I Certify Based on Engineering Design Rather Than Through Testing?

In general, test data would be required to certify fuel tanks and hoses to the permeation standards. Test data could be carried over from year to year for a given emission-control design. We do not believe the cost of testing tanks and hose designs for permeation would be burdensome especially given that the data could be carried over from year to year, and that there is a good possibility that the broad emission family concepts embodied in this program would lead to minimum testing. However, there are some specific cases where we would allow certification based on design. These special cases are discussed below.

We would consider a metal fuel tank to meet the design criteria for a low permeation fuel tank because fuel does not permeate through metal. However, we would not consider this design to be any more effective than any other low permeation fuel tank for the purposes of any sort of credit program. Although metal is impermeable, seals and gaskets used on the fuel tank may not be. The design criteria for the seals and gaskets would be that either they would not have a total exposed surface area exceeding 1000 mm^2, or the seals and gaskets would have to be made of a material with a permeation rate of 10 $g/m^2/day$ or less at 23°C as measured under ASTM D814.[49] A metal fuel tank with seals that meet this design criteria would readily pass the standard.

Another technology that we considered for design-certification was multi-layer fuel tank construction with low-permeation (EVOH) barrier. This technology is widely used in automotive applications to meet the vehicle evaporative emission standards. However, we believe that a manufacturer must demonstrate that their design meets the standards prior to certification. For instance, if the layers are not sealed well at a seam or if the fuel tank is prone to delamination in-use, permeation emissions could be above the standard without a noticeable fuel leak. Therefore, we would require the manufacturer to submit test data on the effectiveness and durability of the fuel tank. As discussed above, test data could be carried over from year-to-year and across product lines provided that a worst case configuration is tested.

Similarly, if manufacturers were to produce fuel tanks out of low-permeability materials other than metal (such as an acetal copolymer), permeation testing on a worst case configuration would initially need to be performed. This test data could then be used to certify other fuel tanks which are otherwise similar and using the same material (including additives). Because permeation is a function of wall thickness, the worst case configuration, in this case, would likely be the fuel tank design with the thinnest walls. If new test data demonstrates that the use of other technology designs will ensure compliance with the applicable emission standards, we may establish additional design certification options for these technologies such as those we are finalizing for metal fuel tanks.

Fuel hoses can be certified by design as being manufactured in compliance with certain accepted SAE specifications. Specifically, a fuel hose meeting the SAE J30 R11–A or R12 requirements could be design-certified to the standard. In addition, fuel line meeting the SAE J2260[50] Category 1 requirements could be design-certified to the standard. These fuel hoses and fuel line specifications are based on 15-percent methanol fuel and higher temperatures. We believe that fuel hoses and lines that are tested and meet these requirements would also meet our hose permeation standards because both are generally acknowledged as representing more stringent test parameters. In the future, if new SAE specifications are developed which are consistent with our hose permeation standards, we would consider including hoses meeting the new SAE requirements as being able to certify by design.

At certification, manufacturers will have to submit an engineering analysis showing that the tank or hose designs will meet the standards throughout their full useful life. The tanks and hoses will remain subject to the emission standards throughout their useful lives. The design criteria relate only to the issuance of a certificate.

4. Technical Amendments to 40 CFR Part 1051 Test Procedures

We are updating the figure in § 1051.515 that presents a flow chart of the fuel tank test procedures to help better clarify the procedures. In addition, we are updating the structure of the language in § 1051.515 to be parallel to the construction of the flow chart. In the UV exposure test, we are simplifying the units from $W\text{-}hr/m^2/min$ to W/m^2 (0.40 $W\text{-}hr/m^2/min$ equals 24 W/m^2). These changes are for clarity only and do not result in substantive changes to the test procedures. One other change we are making is to make the length of the UV exposure test in the regulations match the length specified in the preamble for the recreational vehicles FRM. Therefore, we are changing the specification of 4 weeks in the regulatory text to 30 days. The UV exposure test is contained in § 1051.515(d)(2). All of these changes were developed in the process of the motorcycle rulemaking. However, we decided to make the amendments applicible to recreational vehicles as well for several reasons. These reasons include: (1) The motorcycle permeation requirements are essentially the same as for recreational vehicles, (2) the motorcycle test procedures are in the same body of regulatory text as for recreational vehicles, (3) the amendments are not substantive, and (4) the amendments help clarify the test procedures.

D. Special Compliance Provisions

We believe that the permeation control requirements will be relatively easy for small businesses to meet, given the relatively low cost of the requirements and the availability of materials and treatment support by outside vendors. In addition, this regulatory program is structured in such a way to minimize burdens on all manufacturers by including design-based certification, ABT, broad emission families, minimized compliance requirements, and hardship provisions. Low permeation fuel hoses are available from vendors today, and we would expect that surface treatment would be applied through an outside company if that is the compliance approach used. However, to minimize any additional burden these requirements may impose on small businesses, we are delaying the implementation date of the permeation standards for small business manufacturers to 2010.

E. Technological Feasibility

We believe there are several strategies that manufacturers can use to meet our permeation emission standards. This section gives an overview of this technology. See Chapters 3 and 4 of the Final Regulatory Support Document for more detail on the technology discussed here.

1. Implementation Schedule

The permeation emission standards for fuel tanks become effective in the 2008 model year. Several technologies are available that could be used to meet this standard. Surface treatments to reduce tank permeation are widely used

[49] ASTM Standard Test Method D 814–95 (Reapproved 2000), "Rubber Property—Vapor Transmission of Volatile Liquids," (Docket A–2000–01, document IV–A–95).

[50] SAE Recommended Practice J2260, "Nonmetallic Fuel System Tubing with One or More Layers," 1996, (Docket A–2000–01, document IV–A–18).

today in other container applications, and the technology and production facilities needed to conduct this process exist. Selar® is used by at least one portable fuel tank manufacturer and has also been used in automotive applications. Plastic tanks with coextruded barriers have been used in automotive applications for years. However, plastic fuel tanks used in motorcycles are primarily high-density polyethylene tanks with no permeation control. We received comment that they it would be unreasonable for manufacturers to have to comply before 2008 because this is the date already established for recreational vehicles. Manufacturers will need lead time to allow for durability testing and other development work associated with applying this technology to motorcycles. This is especially true for manufacturers or vendors who choose to set up their own surface barrier treatment equipment in-house.

We believe that the low permeation hose technology can also be applied in the 2008 time frame. A lower permeation fuel hose exists today known as the SAE R9 hose that is as flexible as the SAE R7 hose used in most motorcycle applications today. These SAE hose specifications are contained in SAE J30 cited above. This hose would meet our permeation standard on gasoline, but probably not on a 10-percent ethanol blend. As noted in Chapter 4 of the Final Regulatory Support Document, barrier materials typically used in R9 hose today may have permeation rates 3 to 5 times higher on a 10-percent ethanol blend than on straight gasoline. However, there are several lower permeability barrier materials that can be used in rubber hose that will comply with the hose permeation requirement on a 10-percent ethanol blend and still be flexible and durable enough for use in motorcycles. This hose is available for automotive applications at this time, but some lead time may be required to apply these hoses to motorcycles if hose connection fitting changes were required. This would enhance both in-use effectiveness and safety. For these reasons, we are implementing the hose permeation standard on the same schedule as the tank permeation standards.

2. Standard Levels

We have identified several strategies for reducing permeation emissions from fuel tanks and hoses. We recognize that some of these technologies may be more desirable than others for some manufacturers, and we recognize that different strategies for equal emission reductions may be better for different applications. A specific example of technology that could be used to meet the fuel tank permeations would be surface barrier treatments such as sulfonation or fluorination. With these surface treatments, more than a 95-percent reduction in permeation emissions from new fuel tanks is feasible. However, variation in material tolerances and in-use deterioration can reduce this effectiveness. Given the lead time for the standards, manufacturers will be able to provide fuel tanks with consistent material quality, and the surface treatment processes can be optimized for a wide range of material qualities and additives such as pigments, plasticizers, and UV inhibitors. We do not expect a large deterioration in use; however, data on slosh testing suggest that some deterioration is likely. To accommodate variability and deterioration, we are finalizing a standard that represents about an 85-percent reduction in permeation emissions from plastic fuel tanks. It is our expectation that manufacturers will aim for an effectiveness rate as near to 100 percent as practical for new tanks. Therefore, even with variability and deterioration in use, control rates are likely to exceed 85 percent. Several materials are available today that could be used as a low permeation barrier in rubber hoses. We present more detail on these and other technological approaches below.

3. Technological Approaches

a. Fuel Tanks

Blow molding is widely used for the manufacture of fuel tanks for motorcycles. Typically, blow molding is performed by creating a hollow tube, known as a parison, by pushing high-density polyethylene (HDPE) through an extruder with a screw. The parison is then pinched in a mold and inflated with an inert gas. In highway applications, non-permeable plastic fuel tanks are produced by blow molding a layer of ethylene vinyl alcohol (EVOH) or nylon between two layers of polyethylene. This process is called coextrusion and requires at least five layers: the barrier layer, adhesive layers on either side of the barrier layer, and HDPE as the outside layers which make up most of the thickness of the fuel tank walls. However, multi-layer construction requires additional extruder screws which significantly increases the cost of the blow molding process. Multi-layer fuel tanks can also be formed using injection molding. In this method, a low viscosity polymer is forced into a thin mold to create each side of the fuel tank. The two sides are then welded together. To add a barrier layer, a thin sheet of the barrier material is placed inside the mold prior to injection of the polyethylene. The polyethylene, which generally has a much lower melting point than the barrier material, bonds with the barrier material to create a shell with an inner liner.

A less expensive alternative to coextrusion is to blend a low permeable resin in with the HDPE and extrude it with a single screw. The trade name typically used for this permeation control strategy is Selar®. The low permeability resin, typically EVOH or nylon, creates non-continuous platelets in the HDPE fuel tank which reduce permeation by creating long, tortuous pathways that the hydrocarbon molecules must navigate to pass through the fuel tank walls. Although the barrier is not continuous, this strategy can still achieve greater than a 90-percent reduction in permeation of gasoline. EVOH has much higher permeation resistance to alcohol than nylon; therefore, it would be the preferred material to use for meeting our standard which is based on testing with a 10-percent ethanol fuel.

Another type of low permeation technology for fuel tanks would be to treat the surfaces of plastic fuel tanks with a barrier layer. Two ways of achieving this are known as fluorination and sulfonation. The fluorination process causes a chemical reaction where exposed hydrogen atoms are replaced by larger fluorine atoms to create a barrier on the surface of the fuel tank. In this process, a batch of fuel tanks are generally processed post production by stacking them in a steel container. The container is then voided of air and flooded with fluorine gas. By pulling a vacuum in the container, the fluorine gas is forced into every crevice in the fuel tanks. As a result of this process, both the inside and outside surfaces of the fuel tank are treated. As an alternative, fuel tanks can be fluorinated on-line by exposing the inside surface of the fuel tank to fluorine during the blow molding process. However, this method may not prove as effective as off-line fluorination which treats the inside and outside surfaces.

Sulfonation is another surface treatment technology where sulfur trioxide is used to create the barrier by reacting with the exposed polyethylene to form sulfonic acid groups on the surface. Current practices for sulfonation are to place fuel tanks on a small assembly line and expose the inner surfaces to sulfur trioxide, then rinse with a neutralizing agent. However, sulfonation can also be performed using a batch method. Either of these processes can be used to reduce gasoline permeation by more than 95 percent.

Over the first month or so of use, polyethylene fuel tanks can expand by as much as three percent due to saturation of the plastic with fuel. Manufacturers have raised the concern that this hydrocarbon expansion could affect the effectiveness of surface treatments like fluorination or sulfonation. We believe this will not have a significant effect on the effectiveness of these surface treatments. We and California ARB have performed extensive permeation testing on HDPE fuel tanks with and without these surface treatments. Prior to the ARB permeation testing, the tanks were prepared by first performing a durability procedure where the fuel container is cycled a minimum of 1000 times between -1 psi and 5 psi. In addition, for both the EPA and ARB testing, the fuel containers were soaked with fuel to stabilize permeation rates. The test data, presented in Chapter 4 of the Final Regulatory Support Document show that fluorination and sulfonation are still effective after this testing.

Manufacturers have also commented that fuel sloshing in the fuel tank, under normal in-use operation, could wear off the surface treatments. However, we do not believe that this is likely. These surface treatments actually result in an atomic change in the structure of the outside surface of the fuel tank. To wear off the treatment, the plastic would need to be worn away on the outside surface. In addition, testing by California ARB shows that the fuel tank permeation standard can be met by fuel tanks that have been sloshed for 1.2 million cycles. Test data on an sulfonated automotive HDPE fuel tank after five years of use showed no deterioration in the permeation barrier. This data are presented in Chapter 4 of the Final Regulatory Support Document.

Permeation can also be reduced from fuel tanks by constructing them out of a lower permeation material than HDPE. For instance, metal fuel tanks would not permeate. In addition, there are grades of plastics other than HDPE that could be molded into fuel tanks. An example of materials which have excellent permeation resistance, even with alcohol-blended fuels, are acetal copolymers and thermoplastic polyesters.

b. Hoses

Fuel hoses produced for use in motorcycles are generally extruded nitrile rubber with a cover for abrasion resistance. Lower permeability fuel hoses produced today for other applications are generally constructed in one of two ways: either with a low permeability layer or by using a low permeability rubber blend. By using hose with a low permeation thermoplastic layer, permeation emissions can be reduced by more than 95 percent. Because the thermoplastic layer is very thin, on the order of 0.1 to 0.2 mm, the rubber hose retains its flexibility. Two thermoplastics which have excellent permeation resistance, even with an alcohol-blend fuel, are ETFE and THV.[51]

In automotive applications, multilayer plastic tubing, made of fluoropolymers is generally used. An added benefit of these low permeability lines is that some fluoropolymers can be made to conduct electricity and therefore can prevent the buildup of static charges. Although this technology can achieve more than an order of magnitude lower permeation than barrier hoses, it is relatively inflexible and may need to be molded in specific shapes for each motorcycle design. Manufacturers have commented that motorcycle hose would need to be designed for elements such as location, exposure, and vibration that are unique to motorcycle design.

4. Conclusions

The standards for permeation emissions for motorcycles reasonably reflect what manufacturers can achieve through the application of available technology. Manufacturers will have several years of lead time to select, design, and produce permeation emission-control strategies that will work best for their product lines. We expect that meeting these requirements will pose a challenge, but one that is feasible taking into consideration the availability and cost of technology, lead time, noise, energy, and safety. The role of these factors is presented in detail in Chapters 3 and 4 of the Final Regulatory Support Document.

The permeation standards are based on the effective application of low permeable materials or surface treatments. This is a step change in technology; therefore, we believe that even if we set a less stringent permeation standard, these technology options would likely still be used. In addition, this technology is relatively inexpensive and can achieve meaningful emission reductions. The standards are expected to achieve more than an 85-percent reduction in permeation emissions from fuel tanks and more than 95 percent from hoses. We believe that more stringent standards could result in significantly more expensive materials without corresponding additional emission reduction. In addition, the control technology would generally pay for itself over time by conserving fuel that would otherwise evaporate. The projected costs and fuel savings are discussed in Section VII.B.

VII. Environmental Impacts and Program Costs

The following section summarizes the emission benefits, costs, and cost per ton of pollutant reduced of the new motorcycle emission standards. Further information on these and other aspects of the environmental and economic impacts of this rule are presented in more detail in the Regulatory Support Document for this rulemaking.

A. Environmental Impacts

Emission estimates for highway motorcycles were developed using information on the emission levels of current motorcycles and updated information on motorcycle use provided by the motorcycle industry. Permeation emissions for highway motorcycles were developed based on known material permeation rates as a function of surface area and temperature. A more detailed description of the methodology used for projecting inventories and projections for additional years can be found in the Chapter 6 of the Regulatory Support Document.

Tables VII.A–1 and VII.A–2 contain the projected emission inventories for the years 2010 and 2020, respectively, from the motorcycles subject to this rulemaking. The inventories are presented for the base case which assumes no change from current conditions (*i.e.*, without the standards taking effect) and assuming the standards being adopted today take effect. The inventories for 2010 and 2020 include the effect of growth. The percent reductions based on a comparison of estimated emission inventories with and without the emission standards are also presented.

[51] Ethylene-tetrafluoro-ethylene (ETFE), tetra-fluoro-ethylene, hexa-fluoro-propylene, and vinyledene fluoride (THV).

TABLE VII.A–1—2010 PROJECTED ON-HIGHWAY MOTORCYCLE EMISSIONS INVENTORIES

[thousand short tons]

Standards	NO_X			HC		
	Base case	With standards	Percent reduction	Base case	With standards	Percent reduction
Exhaust	11	10	9	45	41	10
Permeation	....	....	....	16	13	22
Total	11	10	9	61	54	13

TABLE VII.A–2—2020 PROJECTED ON-HIGHWAY MOTORCYCLE EMISSIONS INVENTORIES

Standards	NO_X			HC		
	Base case	With standards	Percent reduction	Base case	With standards	Percent reduction
Exhaust	14	7	50	58	28	51
Permeation	....	....	....	21	3	85
Total	14	7	50	79	31	61

As described in Section II, there will also be environmental benefits associated with reduced haze in many sensitive areas.

Finally, anticipated reductions in hydrocarbon emissions will correspond with reduced emissions of the toxic air emissions referenced in Section II. In 2020, the projected reduction in hydrocarbon emissions should result in an equivalent percent reduction in air toxic emissions.

B. Motorcycle Engine and Equipment Costs

In assessing the economic impact of setting emission standards, we have made a best estimate of the technologies and their associated costs to meet the standards. In making our estimates for the final rule we have relied on our own technology assessment, which includes information supplied by individual manufacturers, and we have made revisions after considering information provided by commenters. Estimated costs include variable costs (for hardware and assembly time) and fixed costs (for research and development, retooling, and certification). We projected that manufacturers will recover the fixed costs over the eight 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 2001 dollars. Full details of our cost analysis can be found in Chapter 5 of the Regulatory Support Document.

Cost estimates based on the current projected costs for our estimated technology packages represent an expected incremental cost of vehicles 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 eight years of production. After the eighth year of production, we project that the fixed costs would be retired and the per unit costs could be reduced as a result.

For highway motorcycles above 50cc, the analysis also incorporates the expectation that manufacturers and suppliers will apply ongoing research and manufacturing innovation to making emission controls more effective and less costly over time. Research in the costs of manufacturing has consistently shown that as manufacturers gain experience in production and use, they are able to apply innovations to simplify machining and assembly operations, use lower cost materials, and reduce the number or complexity of component parts.[52] (see the Final Regulatory Support Document for additional information). The cost analysis generally incorporates this learning effect by decreasing estimated variable costs by 20 percent starting in the third 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 the motorcycles under 50cc because we expect manufacturers to use technologies that will be well established prior to the start of the program.

We project average costs of $30 per Class III highway motorcycle to meet the Tier 1 standard and $45 to meet the Tier 2 standards, incremental to Tier 1. We anticipate the manufacturers will meet the emission standards with several technologies, including electronic fuel injection, catalysts, pulse-air systems, and other general improvements to engines. For motorcycles with engines of less than 50cc, we project average costs of $44 per motorcycle to meet emission standards. We anticipate the manufacturers of these small motorcycles (mostly scooters) will meet the emission standards by replacing any remaining two-stroke engines with four-strokes. The costs are based on the conversion to 4-stroke because we believe this to be the most likely technology path for the majority of scooters. Manufacturers could also choose to employ advanced technology two-stroke (*e.g.*, direct injection and/or catalysts) designs. The process of developing clean technologies is very much underway already as a result of regulatory actions in Europe and the rest of world where the primary markets for small motorcycles exist. Chapter 4 of the Regulatory Support Document describes these technologies further.

[52] For further information on learning curves, see previous final rules for Tier 2 highway vehicles (65 FR 6698, February 10, 2000), marine diesel engines (64 FR 73300, December 29, 1999), nonroad diesel engines (63 FR 56968, October 23, 1998), and highway diesel engines (62 FR 54694, October 21, 1997).

We received comments that our costs appeared to be underestimated. We have considered these comments and, where further data and information was provided, we have made revisions to our cost estimates when they were appropriate. Chapter 5 for the Summary and Analysis of Comments provides our detailed response to comments. It is important to note that the above cost estimates are average costs and are based on both the current state of technology and projections of technology needed to meet standards. Our average cost estimates consider, for example, that almost half of current production is already equipped with fuel injection and about 20 percent of production is equipped with catalysts. To estimate average per unit costs, the costs associated with the increased use of emission control technologies due to the new standards are spread over all units produced. Costs for individual models would be higher or lower than the average depending on the changes manufacturers decide to make for their various models. Models already equipped with fuel injection, pulse air, and a catalyst are likely to have low incremental costs compared to models that are not currently equipped with these technologies. The averaging program for the standards provides manufacturers with flexibility in determining what technologies to use on their various models. Because several models are already available with the anticipated long-term emission-control technologies, we believe that manufacturers and consumers will be able to bear the added cost associated with the new emission standards.

We have also estimated a per unit cost for fuel tank and hose permeation control for motorcycles. About 10 percent of motorcycles sold have plastic fuel tanks which would be subject to the fuel tank permeation requirements. We project the additional cost per tank, assuming sulfonation treatment, to be less than $2 per fuel tank. This cost includes shipping, handling, and overhead costs. Weighting technology cost for plastic tanks with zero costs for metal tanks which will not need to apply permeation control, we get an average cost of less than $0.20 per motorcycle. Hose permeation costs are based on the costs of existing barrier-lined hoses products used in marine and automotive applications. We projected an incremental cost of less than $2 per motorcycle for barrier hoses. This cost includes upgrades to the hose clamps. Therefore, the average cost per motorcycle for permeation emission control is projected to be about $2.

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 9 gallons over the 12.5 year average operating lifetime. This translates to a discounted lifetime savings of nearly $7 at an average fuel price of $1.10 per gallon (non-tax). Therefore, we anticipate that the fuel savings will more than offset the technology costs.

C. Aggregate Costs and Cost-Effectiveness

The above section presents unit cost estimates for each of the standards being adopted for motorcycles. These average costs represent the total set of costs the engine manufacturers will bear to comply with emission standards. With current and projected estimates of vehicle sales, we translate these costs into projected direct costs to the nation for the new emission standards in any year. A summary of the annualized costs to manufacturers is presented in Table VII.C–1. (The annualized costs are determined over the first twenty-years that the new standards will be effective.) The annual cost savings for highway motorcycles are due to reduced fuel costs (from the <50cc motorcycle standards and the permeation controls). The total fleetwide fuel savings start slowly, then increase as greater numbers of compliant motorcycles enter the fleet. Table VII.C–1 presents a summary of the annualized reduced operating costs as well.

TABLE VII.C–1.—ESTIMATED ANNUALIZED COST TO MANUFACTURERS AND ANNUALIZED FUEL SAVINGS DUE TO THE NEW MOTORCYCLE STANDARDS

Standards	Annualized cost to manufacturers (millions/year)	Annualized fuel savings (millions/year)
Exhaust	$32.0	$0.2
Permeation	1.4	4.2
Aggregate [a]	33.4	3.7

Notes:

[a] Because of the different implementation dates for the exhaust and permeation standards, the aggregate is based on a 22 year (rather than 20 year) annualized cost. Therefore, the aggregate is not equal to the sum of the costs for the two standards.

We calculated the cost per ton of emission reductions for the standards. For these calculations, we attributed the entire cost of the program to the control of ozone precursor emissions (HC or NO_X or both). Table VII.C–2 presents the discounted cost-per-ton estimates for this action. Reduced operating costs offsets a portion of the increased cost of producing the cleaner highway motorcycles under 50cc. Reduced fuel consumption also offsets the costs of permeation control.

TABLE VII.C–2.—ESTIMATED COST-PER-TON OF THE EMISSION STANDARDS

Category	Effective date	Discounted reductions per engine (short tons)	Pollutants	Discounted cost per ton	
				Without fuel savings	With fuel savings
Highway motorcycles >50cc	2006	0.03	Exhaust HC+NO_X	$1,150	$1,150
Highway motorcycles >50cc	2010	0.03	Exhaust HC+NO_X	1,550	1,550
Highway motorcycles <50cc	2006	0.02	Exhaust HC	2,130	1,750
Permeation control	2008	0.02	Evaporative HC	103	($260)

Because the primary purpose of cost-effectiveness is to compare our program to alternative programs, we made a comparison between the cost per ton values presented in this chapter and the cost-effectiveness of other programs. Table VI.C–3 summarizes the cost effectiveness of several recent EPA actions for controlled emissions from mobile sources. Additional discussion of these comparisons is contained in the Regulatory Impact Analysis.

TABLE VII.C–3.—COST-EFFECTIVENESS OF PREVIOUSLY IMPLEMENTED MOBILE SOURCE PROGRAMS
[Costs Adjusted to 2001 Dollars]

Program	$/ton
Tier 2 vehicle/gasoline sulfur	1,437–2,423
2007 Highway HD diesel	1,563–2,002
2004 Highway HD diesel	227–444
Off-highway diesel engine	456–724
Tier 1 vehicle	2,202–2,993
NLEV	2,069
Marine SI engines	1,255–1,979
On-board diagnostics	2,480
Marine CI engines	26–189

VIII. Public Participation

A wide variety of interested parties participated in the rulemaking process that culminates with this final rule. This process provided opportunity for public comment following the proposal that we published August 14, 2002 (67 FR 53050). We held a public hearing on the proposal in Ann Arbor, Michigan on September 17, 2002. At that hearing, oral comments on the proposal were received and recorded. We published an additional notice for comment in two areas on October 30, 2002 (67 FR 66097). A written comment period remained open until January 7, 2003. Comments and hearing testimony have been placed in the docket for this rule. We considered these comments in developing the final rule.

We have prepared a detailed Summary and Analysis of Comments document, which describes the comments we received on the proposal and our response to each of these comments. The Summary and Analysis of Comments is available in the docket for this rule and on the Office of Transportation and Air Quality Internet home page at *http://www.epa.gov/otaq/roadbike.htm.*

IX. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to review by the Office of Management and Budget (OMB) and the requirements of this Executive Order. The Executive Order defines a ''significant regulatory action'' as any regulatory action that is likely to result in a rule that may:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, Local, or Tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

A Final Regulatory Support Document has been prepared and is available in the docket for this rulemaking and at the internet address listed under **ADDRESSES** above. Annual initial costs of this rulemaking are estimated to be well below $100 million per year, even when excluding annualized operating cost savings of approximately $3.7 million per year. Even so, OMB has informed us that it considers this rule to be a ''significant regulatory action.'' Thus, this action was submitted to the Office of Management and Budget (OMB) for review under Executive Order 12866. Written comments from OMB and responses from EPA to OMB comments are in the public docket for this rulemaking.

B. Paperwork Reduction Act

The information collection requirements in this final 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.* (ICR No. 0783.46). The reporting requirements in this final rule are not enforceable until the Office of Management and Budget approves them.

The information being collected is to be used by EPA to ensure that new highway motorcycles comply with applicable emissions standards through certification requirements and various subsequent compliance provisions.

The annual public reporting and recordkeeping burden for this collection of information is estimated to average 32 hours per response, with collection required annually. The estimated number of respondents is 46. The total annual cost for the first 3 years of the program is estimated to be $79,428 per year, including $23,686 in operating and maintenance costs and no capital costs, at a total of 1,449 hours per year.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, 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; adjusting the existing ways to comply with any previously applicable instructions and to 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.

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. When this ICR is approved by OMB, then we will publish a technical amendment to

40 CFR part 9 in the **Federal Register** to display the OMB control number for the approved information collection requirements contained in this final rule.

C. Regulatory Flexibility Act (RFA), as Amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.

We have determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. We have also determined that this rule will not have a significant economic impact on a substantial number of small entities.

For purposes of assessing the impacts of this final rule on small entities, small entity is defined as: (1) A small business that is primarily engaged in the manufacture of motorcycles, as defined by NAICS code 336991, with less than 500 employees (based on Small Business Administration size standards); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less 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.

In accordance with section 609 of the RFA, we conducted outreach to small entities and convened a Small Business Advocacy Review (SBAR) Panel prior to proposing this rule, to obtain advice and recommendations of representatives of the small entities that potentially would be subject to the rule's requirements. Through the Panel process, we gathered advice and recommendations from small-entity representatives who would be affected by the provisions in the rule relating to large SI engines and land-based recreational vehicles, and published the results in a Final Panel Report, dated July 17, 2001. We also prepared an Initial Regulatory Flexibility Analysis (IRFA) in accordance with section 603 of the Regulatory Flexibility Act. The IRFA is found in chapter 8 of the Draft Regulatory Support Document. The Panel report and the IRFA have been placed in the docket for this rulemaking (Public Docket A–2000–01, item II–A–85, and Public Docket A–2000–02, item III–B–01).

We proposed the majority of the Panel recommendations, and took comments on these and other recommendations. Since highway motorcycles have had to meet emission standards for more than twenty years, we have good information on the number of companies that manufacture or market highway motorcycles for the U.S. market in each model year. In addition to the largest six manufacturers (BMW, Harley-Davidson, Honda, Kawasaki, Suzuki, Yamaha), we find as many as several dozen more companies that have operated in the U.S. market in the last couple of model years. Most of these are U.S. companies that are either manufacturing or importing motorcycles, although a few are U.S. affiliates of larger companies in Europe or Asia. Some of the U.S. manufacturers employ only a few people and produce only a handful of custom motorcycles per year, while others may employ several hundred and produce up to several thousand motorcycles per year. These new emission standards impose no new development or certification costs for any company producing compliant engines for the California market. In fact, implementing the California standards with a two-year delay also allows manufacturers to streamline their production to further reduce the cost of compliance. The estimated hardware costs are less than one percent of the cost of producing a highway motorcycle, so none of these companies should have a compliance burden greater than one percent of revenues. We expect that a small number of companies affected by EPA emission standards will not already be certifying products in California. For these companies, the modest effort associated with applying established technology will add compliance costs representing between 1 and 3 percent of revenues. The flexible approach we are adopting to limit testing, reporting, and recordkeeping burden prevents excessive costs for all these companies. Thus, EPA has determined that this final rule will not have a significant economic impact on a substantial number of small entities.

Although this final rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities. We prepared a Small Business Flexibility Analysis that examines the impact of the rule on small entities, along with regulatory alternatives that could reduce that impact. This analysis would meet the requirements for a Final Regulatory Flexibility Analysis (FRFA), had that analysis been required. The Small Business Flexibility Analysis can be found in Chapter 8 of the Final Regulatory Support Document, which is available for review in the docket and is summarized below. The key elements of our Small Business Flexibility Analysis include:

—The need for, and objectives of, the rule.

—The significant issues raised by public comments, a summary of the Agency's assessment of those issues, and a statement of any changes made to the proposed rule as a result of those comments.

—The types and number of small entities to which the rule will apply.

—The reporting, record keeping and other compliance requirement of the rule.

—The steps taken to minimize the impact of the rule on small entities, consistent with the stated objectives of the applicable statute.

A fuller discussion of each of these elements can be found in the Small Business Flexibility Analysis (Chapter 8 of the Final Regulatory Support Document).

1. The Need for and Objectives of This Rule

The current HC and CO emission standards for highway motorcycles were set in 1978 and are based on 1970s technology. There are currently no NO_X standards for highway motorcycles. We expect that implementation of the standards will result in about a 50 percent reduction in HC emissions and NO_X emissions from highway motorcycles in 2020. These emission reductions would reduce ambient concentrations of ozone, and fine particles, which is a health concern and contributes to visibility impairment. The standards would also reduce personal exposure for people who operate or who work with or are otherwise in close proximity to these engines and vehicles. As described more fully in the Final Regulatory Support Document for this rule, many types of hydrocarbons are air toxics.

The reductions in emissions are a part of the effort by federal, state and local governments to reduce the health related impacts of air pollution and to reach attainment of the NAAQS for ozone and particulate matter (PM) as well as to improve other environmental effects such as atmospheric visibility. Based on the most recent data available for this rule (1999–2001), ozone and PM air quality problems are widespread in the United States. There are 111 million people living in counties with monitored concentrations exceeding the 8-hour ozone NAAQS, and over 65 million people living in counties with monitored $PM_{2.5}$ levels exceeding the $PM_{2.5}$ NAAQS.

2. Summary of Significant Issues Raised by Public Comment

We received a number of comments during the public comment process, these comments mainly focused on 8 specific areas of concern for commenters: (1) Impact on small/independent and aftermarket motorcycle shops, and the belief EPA did not fulfill its SBREFA obligations; (2) customer rejection of products; (3) fewer options for customers and lower sales; (4) cost of ownership will increase, and consumers will be unable to service their own motorcycles; (5) reduction/elimination of competition from aftermarket and specialty shops (for major manufacturers); (6) elimination of aftermarket supplies and services; (7) consumers will be forced to purchase only manufacturer-offered products; and (8) the Barcia Act/H.R. 5433. A detailed summary of the comments that we received regarding the NPRM can be found in the Final Summary and Analysis of Comments located in the public docket for this rulemaking.

3. Numbers and Types of Small Entities Affected

The following table provides an overview of the primary SBA small business categories potentially affected by this regulation.

TABLE IX.C–1—PRIMARY SBA SBA SMALL BUSINESS CATEGORIES POTENTIALLY AFFECTED BY THIS PROPOSED REGULATION

Industry	NAICS[a] codes	Defined by SBA as a small business If: [b]
Motorcycle manufacturers	336991	<500 employees.

Notes:
[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 or dollars in annual receipts are considered ''small entities'' for purposes of a regulatory flexibility analysis.

Of the numerous manufacturers supplying the U.S. market for highway motorcycles, Honda, Harley Davidson, Yamaha, Kawasaki, Suzuki, and BMW are the largest, accounting for 95 percent or more of the total U.S. sales. Harley-Davidson is the only company manufacturing highway motorcycles exclusively in the U.S. for the U.S. market.

Since highway motorcycles have had to meet emission standards for the last twenty years, we have good information on the number of companies that manufacture or market highway motorcycles for the U.S. market in each model year. In addition to the big six manufacturers noted above, we find as many as several dozen more companies that have operated in the U.S. market in the last couple of model years. Most of these are U.S. companies that are either manufacturing or importing motorcycles, although a few are U.S. affiliates of larger companies in Europe or Asia. Some of the U.S. manufacturers employ only a few people and produce only a handful of custom motorcycles per year, while others may employ several hundred and produce up to several thousand motorcycles per year.

4. Potential Reporting, Record Keeping, and Compliance

For any emission control program, we must have assurances that the regulated engines will meet the standards. Historically, EPA programs have included provisions placing manufacturers responsible for providing these assurances. The program that we are adopting for manufacturers subject to this rule include testing, reporting, and record keeping requirements. Testing requirements for some manufacturers may include certification (including deterioration testing). Reporting requirements would likely include test data and technical data on the engines including defect reporting. Manufacturers would likely have to keep records of this information.

5. Steps Taken To Minimize the Impact on Small Entities

The SBAR Panel considered a variety of provisions to reduce the burden of complying with new emission standards and related requirements. Some of these provisions (such as emission-credit programs and hardship provisions) would apply to all companies, while others would be targeted at the unique circumstances faced by small businesses. A complete discussion of the regulatory alternatives recommended by the Panel can be found in the Final Panel Report.

The following Panel recommendations are being finalized in this rule:

i. Delay of Proposed Standards

We are delaying compliance with the Tier 1 standard of 1.4 g/km $HC+NO_X$ until the 2008 model year for small manufacturers, and at this time, we are not requiring these manufacturers to meet the Tier 2 standard. The existing California regulations do not require small manufacturers to comply with the Tier 2 standard of 0.8 g/km $HC+NO_X$. The California Air Resources Board found that the Tier 2 standard represents a significant technological challenge and is a potentially infeasible limit for these small manufacturers. As noted above, many of these manufacturers market specialty products with a ''retro'' simplicity and style that may not easily lend itself to the addition of advanced technologies like catalysts and electronic fuel injection. However, the California ARB has acknowledged that, in the course of their progress review planned for 2006, they will revisit their small-manufacturer provisions. We plan to participate with the ARB and others in the 2006 progress review. Following our review of these provisions, as appropriate, we may decide to propose to make changes to the emission standards and related requirements through notice and comment rulemaking, including the applicability of Tier 2 to small businesses. The hardship provisions described below could be used to provide a small manufacturer with yet additional lead time if justified.

ii. Broader Engine Families

Small businesses have met EPA certification requirements since 1978. Nonetheless, certifying motorcycles to revised emission standards has cost and lead time implications. Relaxing the criteria for what constitutes an engine or vehicle family could potentially allow small businesses to put all of their models into one vehicle or engine family (or more) for certification purposes. Manufacturers would then certify their engines using the ''worst case'' configuration within the family.

This is currently allowed under the existing regulations for small-volume highway motorcycle manufacturers. These provisions remain in place without revision.

iii. Averaging, Banking, and Trading

An emission-credit program allows a manufacturer to produce and sell engines and vehicles that exceed the applicable emission standards, as long as the excess emissions are offset by the production of engines and vehicles emitting at levels below the standards. The sales-weighted average of a manufacturer's total production for a given model year must meet the standards. An emission-credit program typically also allows a manufacturer to bank credits for use in future model years. The emission-credit program we are implementing for all highway motorcycle manufacturers is described above. Some credit programs allow manufacturers to buy and sell credits (trade) between and among themselves. We are not implementing such a provision at this time, but such flexibility could be made available to all small manufacturers as part of the upcoming technology review.

iv. Reduced Certification Data Submittal and Testing Requirements

Current regulations allow significant flexibility for certification by manufacturers projecting sales below 10,000 units of combined Class I, II, and III motorcycles. For example, a qualifying manufacturer must submit an application for certification with a statement that their vehicles have been tested and, on the basis of the tests, conform to the applicable emission standards. The manufacturer retains adequate emission test data, for example, but need not submit it. Qualifying manufacturers also need not complete the detailed durability testing required in the regulations. We are incorporating no changes to these existing provisions.

v. Hardship Provisions

We proposed two types of hardship provisions, one specifically for small businesses and one available to all manufacturers. The first type of hardship provision allows a manufacturer to petition for additional lead time if the manufacturer can demonstrate that it has taken all possible steps to comply with the standards but the burden of compliance would have a significant impact on the company's solvency. The second type of hardship provision allows a company to apply for hardship relief if circumstances outside of the company's control cause a failure to comply, and the failure to sell the noncompliant product would have a major impact on the company's solvency.

6. Conclusion

After considering the economic impacts of today's final rule on small entities, EPA has concluded that this action will not have a significant economic impact on a substantial number of small entities. We have conducted a substantial outreach program designed to gather information as to the effect of this final rulemaking on small entities. This process included an SBAR Panel, which sought advice and recommendations from potentially affected small entities regarding ways to minimize their compliance burden. We published both an ANPRM and an NPRM which requested comments from potentially affected entities, as well as other interested parties in the public at large. We have determined, from the information that we have gathered during the SBREFA process, that there are 42 manufacturers that certified motorcycles in the year 2003. Of these, 30 manufacturers are small by the SBREFA definition given above. However, certification emission data indicates that essentially all of these 30 manufacturers are currently meeting the Tier 1 exhaust emission standard. Given small costs of complying with the permeation evaporative emission requirements and the lead time and other flexibilities that are being finalized in this rulemaking, these manufacturers will not be significantly affected by the rule.

Therefore, we have determined that this final rulemaking will not have a significant economic impact on a substantial number of small entities.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on state, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to state, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

This rule contains no Federal mandates for state, local, or tribal governments as defined by the provisions of Title II of the UMRA. The rule imposes no enforceable duties on any of these governmental entities. Nothing in the rule would significantly or uniquely affect small governments.

We have determined that this rule does not contain a Federal mandate that may result in estimated expenditures of more than $100 million to the private sector in any single year. We believe that this final rule represents the least costly, most cost effective approach to achieve the air quality goals of the rule. The costs and benefits are discussed in Section VII and in the Final Regulatory Support Document.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

Section 4 of the Executive Order contains additional requirements for rules that preempt State or local law, even if those rules do not have federalism implications (*i.e.*, the rules will not have substantial direct effects on the States, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government). Those requirements include providing all affected State and local officials notice and an opportunity for appropriate participation in the development of the regulation. If the preemption is not based on express or implied statutory authority, EPA also must consult, to the extent practicable, with appropriate State and local officials regarding the conflict between State law and Federally protected interests within the agency's area of regulatory responsibility.

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132.

Although Section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with representatives of various State and local governments in developing this rule. EPA has also consulted representatives from STAPPA/ALAPCO, which represents state and local air pollution officials.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 6, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' ''Policies that have tribal implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and the Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.''

This final rule does not have tribal implications. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175. This rule contains no Federal mandates for tribal governments. Thus, Executive Order 13175 does not apply to this rule.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that (1) is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, section 5–501 of the Order directs the Agency to evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to the Executive Order because it does not involve decisions on environmental health or safety risks that may disproportionately affect children.

The effects of ozone and PM on children's health were addressed in detail in EPA's rulemaking to establish the NAAQS for these pollutants, and EPA is not revisiting those issues here. EPA believes, however, that the emission reductions from the strategies proposed in this rulemaking will further reduce air toxics and the related adverse impacts on children's health.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This rule is not a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution or use of energy. The standards have for their aim the reduction of emissions from highway motorcycles, and have no effect on fuel formulation, distribution, or use. Generally, the program leads to reduced fuel usage due to the reduction of wasted fuel through evaporation.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This final rule involves technical standards. The following paragraphs describe how we specify testing procedures for engines subject to this proposal.

We are adopting provisions to test exhaust emissions from highway motorcycles with the Federal Test Procedure, a chassis-based transient test. There is no voluntary consensus standard that would adequately address engine or vehicle operation for suitable emission measurement.

For permeation emissions, we are adopting testing provisions which utilize consensus standards where applicable. For fuel hose testing we are adopting the hose permeation standard developed by the Society of Automotive Engineers. There is no voluntary consensus standard for testing permeation emissions from fuel tanks. Therefore, we are adopting provisions to use the permeation emission test procedures recently adopted for nonroad recreational vehicles.

J. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States before the rule is published in the **Federal Register**. This rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

K. Plain Language

This document follows the guidelines of the June 1, 1998 Executive Memorandum on Plain Language in Government Writing. To read the text of the regulations, it is also important to understand the organization of the Code of Federal Regulations (CFR). The CFR uses the following organizational names and conventions.

Title 40—Protection of the Environment

Chapter I—Environmental Protection Agency

Subchapter C—Air Programs. This contains parts 50 to 99, where the Office of Air and Radiation has usually placed emission standards for motor vehicle and nonroad engines.

Subchapter U—Air Programs Supplement. This contains parts 1000 to 1299, where we intend to place regulations for air programs in future rulemakings.

Part 1045—Control of Emissions from Marine Spark-ignition Engines and Vessels

Part 1068—General Compliance Provisions for Engine Programs. Provisions of this part apply to everyone.

Each part in the CFR has several subparts, sections, and paragraphs. The following illustration shows how these fit together.

Part 1045
Subpart A
Section 1045.1
(a)
(b)
(1)
(2)
(i)
(ii)
(A)
(B)

A cross reference to § 1045.1(b) in this illustration would refer to the parent paragraph (b) and all its subordinate paragraphs. A reference to ''§ 1045.1(b) introductory text'' would refer only to the single, parent paragraph (b).

List of Subjects

40 CFR Part 9

Reporting and recordkeeping requirements.

40 CFR Part 86

Administrative practice and procedure, Confidential business information, Labeling, Motor vehicle pollution, Reporting and recordkeeping requirements.

40 CFR Part 90

Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Labeling, Reporting and recordkeeping requirements, Research, Warranties.

40 CFR Part 1051

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Labeling, Penalties, Reporting and recordkeeping requirements, Warranties.

Dated: December 23, 2003.

Michael O. Leavitt,

Administrator.

■ For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as set forth below.

PART 9—[AMENDED]

■ 1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318 1321, 1326, 1330, 1342 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

■ 2. Section 9.1 is amended in the table by adding the entries under the existing center heading in numerical order to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control no.
* * *	* *
Control of Air Pollution From New and In-Use Motor Vehicles and New and In-Use Motor Vehicle Engines; Certification and Test Procedures	
* * *	* *
86.446–2006	2060–0460
86.447–2006	2060–0460
86.448–2006	2060–0460
86.449–2006	2060–0460
* * *	* *

PART 86—CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES

■ 3. The authority citation for part 86 continues to read as follows:

Authority: 42 U.S.C. 7401—7671q.

Subpart E—[Amended]

■ 4. A new § 86.401–2006 is added to read as follows:

§ 86.401–2006 General applicability.

This subpart applies to 1978 and later model year, new, gasoline-fueled motorcycles built after December 31, 1977, and to 1990 and later model year, new methanol-fueled motorcycles built after December 31, 1989 and to 1997 and later model year, new natural gas-fueled and liquefied petroleum gas-fueled motorcycles built after December 31, 1996 and to 2006 and later model year new motorcycles, regardless of fuel.

■ 5. Section 86.402–98 is amended by adding definitions for ''Designated Compliance Officer'', ''Motor vehicle'', and ''Useful life'' in alphabetical order to read as follows:

§ 86.402–98 Definitions.

* * * * *

Designated Compliance Officer means the Manager, Engine Programs Group (6405–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

* * * * *

Motor vehicle has the meaning we give in 40 CFR 85.1703.

* * * * *

Useful life is defined for each class (see § 86.419) of motorcycle:

(1) Class I–A—5.0 years or 6,000 km (3,728 miles), whichever occurs first.

(2) Class I–B—5.0 years or 12,000 km (7,456 miles), whichever occurs first.

(3) Class II—5.0 years or 18,000 km (11,185 miles), whichever occurs first.

(4) Class III—5.0 years or 30,000 km (18,641 miles), whichever occurs first.

■ 6. Section 86.407–78 is revised to read as follows:

§ 86.407–78 Certificate of conformity required.

(a) *General requirement.* Every new motorcycle manufactured for sale, sold, offered for sale, introduced or delivered for introduction into commerce, or imported into the United States which is subject to any of the standards prescribed in this subpart is required to be covered by a certificate of conformity issued pursuant to this subpart, except as specified in paragraph (b) of this section, or otherwise exempted from this requirement.

(b) *Interim personal use exemption.* An individual may manufacture one motorcycle for personal use without a certificate of conformity, subject to the following provisions:

(1) The motorcycle may not be manufactured from a certified motorcycle. The motorcycle may not be manufactured from a partially complete motorcycle that is equivalent to a certified motorcycle, unless the emission controls are included in the final product. The motorcycle must be manufactured primarily from unassembled components, but may incorporate some preassembled components. For example, fully preassembled transmissions may be used.

(2) The motorcycle may not be sold within five years of the date of final assembly.

(3) No individual may manufacture more than one motorcycle during his or her lifetime under this exemption. This restriction applies with respect to the person who purchases the components and/or uses the motorcycle, rather than to the person(s) who actually assemble(s) the motorcycle.

(4) This exemption may not be used to circumvent the requirements of paragraph (a) of this section or the requirements of the Clean Air Act. For example, this exemption would not cover a case in which an entity purchases a kit, assembles the kit, and then sells it to another party; this would be considered to be the sale of the complete motorcycle.

(c) *Interim display exemptions.* Uncertified custom motorcycles that are used solely for display purposes are exempt from the standards provided they conform to the requirements of this paragraph (c). Unless a certificate of conformity has been received for such motorcycles, they may not be operated on the public streets or highways except for that operation incident and necessary to the display purpose.

(1) No request is necessary for display motorcycles that will not be sold or leased.

(2) The following requirements apply for exempting display motorcycles that will be sold or leased:

(i) Manufacturers planning to sell motorcycles for display must notify EPA of their intent to do so before they sell any exempted motorcycles. They must also maintain sales records of exempted motorcycles for at least three years and make them available to EPA upon request.

(ii) No manufacturer may sell or lease more than 24 exempted display motorcycles in any single calendar year.

(iii) Anyone selling or leasing a motorcycle exempt under this paragraph (c) must ensure that the buyer or lessee agrees to comply with the display exemption terms in the regulations.

(3) Each motorcycle exempt under this paragraph (c) must include a label that identifies the manufacturer and includes the following statement: THIS MOTORCYCLE IS EXEMPT FROM EPA EMISSION REQUIREMENTS. ITS USE ON PUBLIC ROADS IS LIMITED PURSUANT TO 40 CFR 86.407–78(c). EPA may allow manufacturers to locate the label in a location where it is obscured or hidden by a readily removable component. For example, EPA may allow the label to be located under the seat.

(4) As described in 40 CFR part 1051, motorcycles that are not considered to be motor vehicles according to 40 CFR 85.1703(a) may be exempt under this paragraph (c) from the standards and requirements of 40 CFR part 1051. Such motorcycles shall be combined with the manufacturer's highway motorcycles with respect to the sales restriction described in paragraph (c)(2)(ii) of this section.

(5) This exemption may not be used to circumvent the requirements of paragraph (a) of this section or the requirements of the Clean Air Act.

■ 7. A new § 86.410–2006 is added to read as follows:

§ 86.410–2006 Emission standards for 2006 and later model year motorcycles.

(a)(1) Exhaust emissions from Class I and Class II motorcycles shall not exceed the standards listed in the following table:

TABLE E2006–1.—CLASS I AND II MOTORCYCLE EMISSION STANDARDS

Model year	Emission standards (g/km)	
	HC	CO
2006 and later ..	1.0	12.0

(2) Exhaust emissions from Class III motorcycles shall not exceed the standards listed in the following table:

TABLE E2006–2.—CLASS III MOTORCYCLE EMISSION STANDARDS

Tier	Model year	Emission standards (g/km)	
		$HC + NO_X$	CO
Tier 1	2006–2009	1.4	12.0
Tier 2	2010 and later.	0.8	12.0

(b) The standards set forth in paragraphs (a) (1) and (2) of this section refer to the exhaust emitted over the driving schedule as set forth in subpart F and measured and calculated in accordance with those procedures.

(c) Compliance with the $HC+NO_X$ standards set forth in paragraph (a)(2) of this section may be demonstrated using the averaging provisions of § 86.449.

(d) No crankcase emissions shall be discharged into the ambient atmosphere from any new motorcycle subject to this subpart.

(e) Manufacturers with fewer than 500 employees worldwide and producing fewer than 3,000 motorcycles per year in the United States are considered small-volume manufacturers for the purposes of this section. The following provisions apply for these small-volume manufacturers:

(1) Small-volume manufacturers are not required to comply with the Tier 1 standards applicable to Class III motorcycles until model year 2008.

(2) Small-volume manufacturers are not required to comply with the Tier 2 standards applicable to Class III motorcycles.

(f) Manufacturers may choose to certify their Class I and Class II motorcycles to an $HC + NO_X$ standard of 1.4 g/km instead of the 1.0 g/km HC standard listed in paragraph (a)(1) of this section. Engine families certified to this standard may demonstrate compliance using the averaging provisions of § 86.449.

(g) Model year 2008 and later motorcycles must comply with the evaporative emission standards described in 40 CFR 1051.110. Manufacturers may show compliance using the design-based certification procedures described in 40 CFR 1051.245. Manufacturers may comply with the tank permeation standards using the averaging provisions in 40 CFR part 1051, subpart H, but may not include any motorcycles equipped with metal fuel tanks in their average emission level. Manufacturers may not average between highway motorcycle engine families and recreational vehicle families.

■ 8. Section 86.416–80 is amended by revising the introductory text of paragraph (b) and adding paragraphs (a)(2)(viii) and (f) to read as follows:

§ 86.416–80 Application for certification.

(a) * * *

(2) * * *

(viii) Beginning with model year 2008, a description of the evaporative emission controls and applicable test data.

* * * * *

(b) New motorcycles produced by a small-volume manufacturer (as defined in § 86.410(e)) or by any other manufacturer whose projected sales in the United States is less than 10,000 units (for the model year in which certification is sought) are covered by the following:

* * * * *

(f) Upon request, the Administrator may allow a manufacturer to use alternate certification procedures that are equivalent in terms of demonstrating compliance with the requirements of this part.

■ 9. A new § 86.419–2006 is added to read as follows:

§ 86.419–2006 Engine displacement, motorcycle classes.

(a)(1) Engine displacement shall be calculated using nominal engine values and rounded to the nearest whole cubic centimeter, in accordance with ASTM E 29–93a (incorporated by reference in § 86.1).

(2) For rotary engines, displacement means the maximum volume of a combustion chamber between two rotor tip seals, minus the minimum volume of the combustion chamber between those two rotor tip seals, times three times the number of rotors, according to the following formula:

$$cc = (\text{max. chamber volume} - \text{min. chamber volume}) \times 3 \times \text{no. of rotors}$$

(b) Motorcycles will be divided into classes based on engine displacement.

(1) Class I—0 to 169 cc (0 to 10.4 cu. in.).

(i) Class I motorcycles with engine displacement less than 50 cc comprise the Class I–A subclass.

(ii) Class I motorcycles with engine displacement 50 cc or higher comprise the Class I–B subclass.

(2) Class II—170 to 279 cc (10.4 to 17.1 cu. in.).

(3) Class III—280 cc and over (17.1 cu. in. and over).

(c) At the manufacturer's option, a vehicle described in an application for certification may be placed in a higher class (larger displacement). All procedures for the higher class must then be complied with and compliance with emission standards will be determined on the basis of engine displacement.

■ 10. A new § 86.445–2006 is added to subpart E to read as follows:

§ 86.445–2006 What temporary provisions address hardship due to unusual circumstances?

(a) After considering the circumstances, the Director of the Office of Transportation and Air Quality may permit you to introduce into commerce highway motorcycles that do not comply with emission standards if all the following conditions and requirements apply:

(1) Unusual circumstances that are clearly outside your control and that could not have been avoided with reasonable discretion prevent you from meeting requirements from this chapter.

(2) You exercised prudent planning and were not able to avoid the violation; you have taken all reasonable steps to minimize the extent of the nonconformity.

(3) Not having the exemption will jeopardize the solvency of your company.

(4) No other allowances are available under the regulations of this part to avoid the impending violation, excluding those in § 86.446.

(b) To apply for an exemption, you must send the Designated Compliance Officer a written request as soon as possible before you are in violation. In your request, show that you meet all the conditions and requirements in paragraph (a) of this section.

(c) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(d) You must give us other relevant information if we ask for it.

(e) We may include reasonable additional conditions on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit or paying fees to offset any economic gain resulting from the exemption. For example, in the case of multiple tiers of emission standards, we may require that you meet the less stringent standards.

(f) Add a permanent, legible label, written in block letters in English, to a readily visible part of each motorcycle exempted under this section. This label must include at least the following items:

(1) The label heading ''EMISSION CONTROL INFORMATION''.

(2) Your corporate name and trademark.

(3) Engine displacement (in liters) and model year of the engine or whom to contact for further information.

(4) The statement ''THIS MOTORCYCLE IS EXEMPT UNDER 40 CFR 86.445–2006 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

■ 11. A new § 86.446–2006 is added to subpart E to read as follows:

§ 86.446–2006 What are the provisions for extending compliance deadlines for small-volume manufacturers under hardship?

(a) After considering the circumstances, the Director of the Office of Transportation and Air Quality may extend the compliance deadline for you to meet new or revised emission standards, as long as you meet all the conditions and requirements in this section.

(b) To be eligible for this exemption, you must qualify as a small-volume manufacturer under § 86.410–2006(e).

(c) To apply for an extension, you must send the Designated Compliance Officer a written request. In your request, show that all the following conditions and requirements apply:

(1) You have taken all possible business, technical, and economic steps to comply.

(i) In the case of importers, show that you attempted to find a manufacturer capable of supplying complying products as soon as you became aware of the applicable requirements, but were unable to do so.

(ii) For all other manufacturers, show that the burden of compliance costs prevents you from meeting the requirements of this chapter.

(2) Not having the exemption will jeopardize the solvency of your company.

(3) No other allowances are available under the regulations in this part to avoid the impending violation, excluding those in § 86.445.

(d) In describing the steps you have taken to comply under paragraph (c)(1) of this section, include at least the following information:

(1) Describe your business plan, showing the range of projects active or under consideration.

(2) Describe your current and projected financial standing, with and without the burden of complying fully with the regulations in this part.

(3) Describe your efforts to raise capital to comply with regulations in this part (this may not apply for importers).

(4) Identify the engineering and technical steps you have taken or plan to take to comply with the regulations in this part.

(5) Identify the level of compliance you can achieve. For example, you may be able to produce engines that meet a somewhat less stringent emission standard than the regulations require.

(e) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(f) You must give us other relevant information if we ask for it.

(g) An authorized representative of your company must sign the request and include the statement: ''All the information in this request is true and accurate, to the best of my knowledge.''

(h) Send your request for this extension at least nine months before new standards apply. Do not send your request before the regulations in question apply to other manufacturers.

(i) We may include reasonable requirements on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit. For example, we may require that you meet a less stringent emission standard or buy and use available emission credits.

(j) We will approve extensions of up to one year. We may review and revise an extension as reasonable under the circumstances.

(k) Add a permanent, legible label, written in block letters in English, to a readily visible part of each motorcycle exempted under this section. This label must include at least the following items:

(1) The label heading ''EMISSION CONTROL INFORMATION''.

(2) Your corporate name and trademark.

(3) Engine displacement (in liters) and model year of the motorcycle or whom to contact for further information.

(4) The statement ''THIS MOTORCYCLE IS EXEMPT UNDER 40 CFR 86.446 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

■ 12. A new § 86.447–2006 is added to subpart E to read as follows:

§ 86.447–2006 What are the provisions for exempting motorcycles under 50 cc from the requirements of this part if they use engines certified under other programs?

(a) This section applies to you if you manufacture engines under 50 cc for installation in a highway motorcycle (that is, a motorcycle that is a motor vehicle). See § 86.448–2006 if you are not the engine manufacturer.

(b) The only requirements or prohibitions from this part that apply to a motorcycle that is exempt under this section are in this section and § 86.448–2006.

(c) If you meet all the following criteria regarding your new engine, it is exempt under this section:

(1) You must produce it under a valid certificate of conformity for one of the following types of engines or vehicles:

(i) Class II engines under 40 CFR part 90.

(ii) Recreational vehicles under 40 CFR part 1051.

(2) You must not make any changes to the certified engine that we could reasonably expect to increase its exhaust emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for this exemption:

(i) Change any fuel system parameters from the certified configuration.

(ii) Change any other emission-related components.

(iii) Modify or design the engine cooling system so that temperatures or heat rejection rates are outside the original engine's specified ranges.

(3) You must make sure the engine has the emission label we require under 40 CFR part 90 or part 1051.

(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in highway motorcycles.

(d) If you produce only the engine, give motorcycle manufacturers any necessary instructions regarding what they may or may not change under paragraph (c)(2) of this section. Upon request, send EPA a list the motorcycle models you expect to be produced under this exemption in the model year (including motorcycles produced under § 86.448–2006), and the manufacturers of those motorcycles.

(e) If you produce both the engine and motorcycle under this exemption, you must do all of the following to keep the exemption valid:

(1) Make sure the original emission label is intact.

(2) Add a permanent supplemental label to the engine in a position where it will remain clearly visible after installation in the vehicle. In your engine's emission label, do the following:

(i) Include the heading: ''Highway Motorcycle Emission Control Information''.

(ii) Include your full corporate name and trademark.

(iii) State: ''THIS ENGINE WAS ADAPTED FOR HIGHWAY USE WITHOUT AFFECTING ITS EMISSION CONTROLS.''.

(iv) State the date you finished installation (month and year).

(3) Send the Designated Compliance Officer a signed letter by the end of each calendar year (or less often if we tell you) with all the following information:

(i) Identify your full corporate name, address, and telephone number.

(ii) List the motorcycle models you expect to produce under this exemption in the coming year.

(iii) State: ''We produce each listed model as a highway motorcycle without making any changes that could increase its certified emission levels, as described in 40 CFR 86.447.''.

(f) If your vehicles do not meet the criteria listed in paragraph (c) of this section, they will be subject to the standards and prohibitions of this part. Producing these vehicles without a valid exemption or certificate of conformity would violate the prohibitions in Clean Air Act section 203 (42 U.S.C. 7522).

(g) Upon request, you must send to EPA emission test data on the duty cycle for Class I motorcycles. You may include the data in your application for certification or in your letter requesting the exemption.

(h) Vehicles exempted under this section are subject to all the requirements affecting engines and vehicles under 40 CFR part 90 or part 1051, as applicable. The requirements and restrictions of 40 CFR part 90 or 1051 apply to anyone manufacturing these engines, anyone manufacturing vehicles that use these engines, and all other persons in the same manner as if these engines were used in a nonroad application.

■ 13. A new § 86.448–2006 is added to subpart E to read as follows:

§ 86.448–2006 What are the provisions for producing motorcycles under 50 cc with engines already certified under other programs?

(a) You may produce a highway motorcycle (that is, a motorcycle that is a motor vehicle) under 50 cc using a nonroad engine if you meet four criteria:

(1) The engine or vehicle is certified to 40 CFR part 90 or part 1051.

(2) The engine is not adjusted outside the engine manufacturer's specifications, as described in § 86.447–2006(c)(2) and (d).

(3) The engine or vehicle is not modified in any way that may affect its emission control.

(4) Fewer than 50 percent of the engine model's total sales, from all companies, are used in highway motorcycles.

(b) If you produce a motorcycle under this exemption, you must do all of the following to keep the exemption valid:

(1) Make sure the original emission label is intact.

(2) Add a permanent supplemental label to the motorcycle in a position where it will remain clearly visible.

(i) Include the heading: ''Highway Motorcycle Emission Control Information''.

(ii) Include your full corporate name and trademark.

(iii) State: ''THIS MOTORCYCLE WAS PRODUCED WITH A NONROAD ENGINE FOR HIGHWAY USE WITHOUT AFFECTING THE ENGINE'S EMISSION CONTROLS.''.

(c) This section does not apply if you manufacture the engine yourself; see § 86.447–2006.

(d) Upon request, you must send to EPA emission test data on the duty cycle for Class I motorcycles.

(e) Vehicles exempted under this section are subject to all the requirements affecting engines and vehicles under 40 CFR part 90 or part 1051, as applicable. The requirements and restrictions of 40 CFR part 90 or 1051 apply to anyone manufacturing these engines, anyone manufacturing vehicles that use these engines, and all other persons in the same manner as if these engines were used in a nonroad application.

■ 14. A new § 86.449 is added to subpart E to read as follows:

§ 86.449 Averaging provisions.

(a) This section describes how and when averaging may be used to show compliance with applicable $HC+NO_X$ emission standards. Emission credits may not be banked for use in later model years, except as specified in paragraph (j) of this section.

(1) Compliance with the Class I and Class II $HC+NO_X$ standards set forth in § 86.410–2006 (f) may be demonstrated using the averaging provisions of this section. To do this you must show that your average emission levels are at or below the applicable standards in § 86.410–2006.

(2) Compliance with the Class III $HC+NO_X$ standards set forth in § 86.410–2006 (a)(2) may be demonstrated using the averaging provisions of this section. To do this you must show that your average emission levels are at or below the applicable standards in § 86.410–2006.

(3) Family emission limits (FELs) may not exceed the following caps:

Class	Tier	Model year	FEL cap (g/km)
			$HC+NO_X$
Class I or II	Tier 1	2006 and later	5.0
Class III	Tier 1	2006–2009	5.0
	Tier 2	2010 and later	2.5

(b) Do not include any exported vehicles in the certification averaging program. Include only motorcycles certified under this subpart and intended for sale in the United States.

(c) To use the averaging program, do the following things:

(1) Certify each vehicle to a family emission limit.

(2) Calculate a preliminary average emission level according to paragraph (d) of this section using projected production volumes for your application for certification.

(3) After the end of your model year, calculate a final average emission level according to paragraph (d) of this section for each averaging set for which you manufacture or import motorcycles.

(d) Calculate your average emission level for each averaging set for each model year according to the following equation and round it to the nearest tenth of a g/km. Use consistent units throughout the calculation. The averaging sets are defined in paragraph (k) of this section.

(1) Calculate the average emission level as:

$$\text{Emission level} = \left[\sum_i (\text{FEL})_i \times (\text{UL})_i \times (\text{Production})_i\right] \Big/ \left[\sum_i (\text{Production})_i \times (\text{UL})_i\right]$$

Where:

FEL_i = The FEL to which the engine family is certified.

UL_i = The useful life of the engine family.

$Production_i$ = The number of vehicles in the engine family.

(2) Use production projections for initial certification, and actual production volumes to determine compliance at the end of the model year.

(e)(1) Maintain and keep five types of properly organized and indexed records for each group and for each emission family:

(i) Model year and EPA emission family.

(ii) FEL.

(iii) Useful life.

(iv) Projected production volume for the model year.

(v) Actual production volume for the model year.

(2) Keep paper records of this information for three years from the due date for the end-of-year report. You may use any additional storage formats or media if you like.

(3) Follow paragraphs (f) through (i) of this section to send us the information you must keep.

(4) We may ask you to keep or send other information necessary to implement this subpart.

(f) Include the following information in your application for certification:

(1) A statement that, to the best of your belief, you will not have a negative credit balance for any motorcycle when all credits are calculated. This means that if you believe that your average emission level will be above the standard (*i.e.*, that you will have a deficit for the model year), you must have banked credits pursuant to paragraph (j) of this section to offset the deficit.

(2) Detailed calculations of projected emission credits (zero, positive, or negative) based on production projections. If you project a credit deficit, state the source of credits needed to offset the credit deficit.

(g) At the end of each model year, send an end-of-year report.

(1) Make sure your report includes the following things:

(i) Calculate in detail your average emission level and any emission credits based on actual production volumes.

(ii) If your average emission level is above the allowable average standard, state the source of credits needed to offset the credit deficit.

(2) Base your production volumes on the point of first retail sale. This point is called the final product-purchase location.

(3) Send end-of-year reports to the Designated Compliance Officer within 120 days of the end of the model year. If you send reports later, EPA may void your certificate ab initio.

(4) If you generate credits for banking pursuant to paragraph (j) of this section and you do not send your end-of-year reports within 120 days after the end of the model year, you may not use the

credits until we receive and review your reports. You may not use projected credits pending our review.

(5) You may correct errors discovered in your end-of-year report, including errors in calculating credits according to the following table:

If . . .	And if . . .	Then we . . .
(i) Our review discovers an error in your end-of-year report that increases your credit balance.	The discovery occurs within 180 days of receipt.	Restore the credits for your use.
(ii) You discover an error in your report that increases your credit balance.	The discovery occurs within 180 days of receipt.	Restore the credits for your use.
(iii) We or you discover an error in your report that increases your credit balance.	The discovery occurs more than 180 days after receipt.	Do not restore the credits for your use.
(iv) We discover an error in your report that reduces your credit balance.	At any time after receipt	Reduce your credit balance.

(h) Include in each report a statement certifying the accuracy and authenticity of its contents.

(i) We may void a certificate of conformity for any emission family if you do not keep the records this section requires or give us the information when we ask for it.

(j) You may include Class III motorcycles that you certify with $HC+NO_X$ emissions below 0.8 g/km in the following optional early banking program:

(1) To include a Class III motorcycle in the early banking program, assign it an emission rate of 0.8 g/km when calculating your average emission level for compliance with the Tier 1 standards.

(2)(i) Calculate bankable credits from the following equation:

Bonus credit = Y × [(0.8 g/km − Certified emission level)] × [(Production volume of engine family) × (Useful life)]

(ii) The value of Y is defined by the model year and emission level, as shown in the following table:

Model year	Multiplier (Y) for use in MY 2010 or later corporate averaging	
	If your certified emission level is less than 0.8 g/km, but greater than 0.4 g/km, then Y = . . .	If your certified emission level is less than 0.4 g/km, then Y = . . .
2003 through 2006	1.500	3.000
2007	1.375	2.500
2008	1.250	2.000
2009	1.125	1.500

(3) Credits banked under this paragraph (j) may be use for compliance with any 2010 or later model year standards as follows:

(i) If your average emission level is above the average standard, calculate your credit deficit according to the following equation, rounding to the nearest tenth of a gram:

Deficit = (Emission Level − Average Standard) × (Total Annual Production) × (Useful Life)

(ii) Credit deficits may be offset using banked credits.

(k) Credits may not be exchanged across averaging sets except as explicitly allowed by this paragraph (k).

(1) There are two averaging sets:

(i) Class I and Class II motorcycles certified to $HC+NO_X$ standards.

(ii) Class III motorcycles.

(2) Where a manufacturer's average $HC+NO_X$ emission level for Class III motorcycles (as calculated under paragraph (d)(1) of this section) is below the applicable standard, the manufacturer may generate credits that may be used show compliance with $HC+NO_X$ standards for Class I and Class II motorcycles during the same model year. Use the following equations to calculate credits and credit deficits for each class or subclass:

Credit = (Average Standard − Emission Level) × (Total Annual Production) × (Useful Life)

Deficit = (Emission Level − Average Standard) × (Total Annual Production) × (Useful Life)

(l) Manufacturers participating in the averaging program of this section may modify FELs during the model year as specified in this paragraph (l).

(1) Upon notifying EPA, manufacturers may raise the FEL for an engine family and begin labeling motorcycles with the new FEL.

(2) Manufacturers may ask to lower FELs based on test data of production vehicles showing that the motorcycles in the engine family have emissions below the new FEL. Manufacturers must test the motorcycles according to 40 CFR part 1051, subpart D. Manufacturers may not begin labeling motorcycles with the new FEL until they have received EPA approval to do so.

(3) Manufacturers may not change the FEL of any motorcycle that has been placed into service or that is no longer in their possession.

Subpart F—[Amended]

■ 15. A new § 86.505–2004 is added to read as follows:

§ 86.505–2004 Introduction; structure of subpart.

(a) This subpart describes the equipment required and the procedures to follow in order to perform exhaust emission tests on motorcycles. Subpart E sets forth the testing requirements and test intervals necessary to comply with EPA certification procedures. Alternate equipment, procedures, and calculation methods may be used if shown to yield equivalent or superior results, and if approved in advance by the Administrator.

(b) Three topics are addressed in this subpart. Sections 86.508 through 86.515 set forth specifications and equipment requirements; §§ 86.516 through 86.526 discuss calibration methods and frequency; test procedures and data requirements are listed (in approximate order of performance) in §§ 86.527 through 86.544.

(c) For diesel-fueled motorcycles, use the sampling and analytical procedures and the test fuel described in subpart B of this part for diesel-fueled light-duty vehicles. PM measurement is not required.

■ 16.A new § 86.513–2004 is added to read as follows:

§ 86.513–2004 Fuel and engine lubricant specifications.

Section 86.513–2004 includes text that specifies requirements that differ from § 86.513–94. Where a paragraph in § 86.513–94 is identical and applicable to § 86.513–2004, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see § 86.513–94.'' Where a corresponding paragraph of § 86.513–94 is not applicable, this is indicated by the statement ''[Reserved].''

(a) *Gasoline.* (1) Gasoline having the following specifications will be used by the Administrator in exhaust emission testing of gasoline-fueled motorcycles. Gasoline having the following specifications or substantially equivalent specifications approved by the Administrator, shall be used by the manufacturer for emission testing except that the octane specifications do not apply.

TABLE 1 OF § 86.513–2004.—GASOLINE TEST FUEL SPECIFICATIONS

Item	Procedure	Value
Distillation Range:		
1. Initial boiling point, °C	ASTM D 86–97	23.9—35.0 [1].
2. 10% point, °C	ASTM D 86–97	48.9—57.2.
3. 50% point, °C	ASTM D 86–97	93.3—110.0.
4. 90% point, °C	ASTM D 86–97	148.9—162.8.
5. End point, °C	ASTM D 86–97	212.8.
Hydrocarbon composition:		
1. Olefins, volume %	ASTM D 1319–98	10 maximum.
2. Aromatics, volume %	ASTM D 1319–98	35 minimum.
3. Saturates	ASTM D 1319–98	Remainder.
Lead (organic), g/liter	ASTM D 3237	0.013 maximum.
Phosphorous, g/liter	ASTM D 3231	0.005 maximum.
Sulfur, weight %	ASTM D 1266	0.08 maximum.
Volatility (Reid Vapor Pressure), kPa	ASTM D 3231	55.2 to 63.4[1].

[1] For testing at altitudes above 1 219 m, the specified volatility range is 52 to 55 kPa and the specified initial boiling point range is 23.9° to 40.6° C.

(2) Unleaded gasoline and engine lubricants representative of commercial fuels and engine lubricants which will be generally available through retail outlets shall be used in service accumulation.

(3) The octane rating of the gasoline used shall be no higher than 4.0 Research octane numbers above the minimum recommended by the manufacturer.

(4) The Reid Vapor Pressure of the gasoline used shall be characteristic of commercial gasoline fuel during the season in which the service accumulation takes place.

(b) through (d) [Reserved]. For guidance *see* § 86.513–94.

■ 17. Section 86.515–78 is amended by adding paragraph (d) to read as follows:

§ 86.515–78 EPA urban dynamometer driving schedule.

* * * * *

(d) For motorcycles with an engine displacement less than 50 cc and a top speed less than 58.7 km/hr (36.5 mph), the speed indicated for each second of operation on the applicable Class I driving trace (speed versus time sequence) in appendix I(c) shall be adjusted downward by the ratio of actual top speed to specified maximum test speed. Calculate the ratio with three significant figures by dividing the top speed of the motorcycle in km/hr by 58.7. For example, for a motorcycle with a top speed of 48.3 km/hr (30 mph), the ratio would be 48.3/58.7 = 0.823. The top speed to be used under this section shall be indicated in the manufacturer's application for certification, and shall be the highest sustainable speed of the motorcycle with an 80 kg rider on a flat paved surface. If the motorcycle is equipped with a permanent speed governor that is unlikely to be removed in actual use, measure the top speed in the governed configuration; otherwise measure the top speed in the ungoverned configuration.

■ 18. Section 86.544–90 is amended by revising the introductory text to read as follows:

§ 86.544–90 Calculations; exhaust emissions.

The final reported test results, with oxides of nitrogen being optional for model years prior to 2006 and required for 2006 and later model years, shall be computed by use of the following formula: (The results of all emission tests shall be rounded, in accordance with ASTM E29–93a (incorporated by reference in § 86.1), to the number of places to the right of the decimal point indicated by expressing the applicable standard to three significant figures.)

* * * * *

Subpart I—[Amended]

■ 19. Section 86.884–14 is amended by revising the equation in paragraph (a) to read as follows:

(a) * * *

$$N_s = 100 \times (1 - (1 - N_m / 100)^{L_s/L_m})$$

* * * * *

PART 90—CONTROL OF EMISSIONS FROM NONROAD SPARK-IGNITION ENGINES AT OR BELOW 19 KILOWATTS

■ 20. The authority citation for part 90 continues to read as follows:

Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

■ 21. Section 90.1 is amended by adding paragraph (g) to read as follows:

§ 90.1 Applicability.

* * * * *

(g) This part also applies to engines under 50 cc used in motorcycles that are motor vehicles if the manufacturer uses the provisions of 40 CFR 86.447–2006 to meet the emission standards in this part instead of the requirements of 40 CFR part 86. In this case, compliance with the provisions of this part is a required condition of that exemption.

PART 1051—CONTROL OF EMISSIONS FROM RECREATIONAL ENGINES AND VEHICLES

■ 22. The authority citation for part 1051 continues to read as follows:

Authority: 42 U.S.C. 7401—7671(q).

Subpart A—[Amended]

■ 23. Section 1051.1 is amended by adding new paragraphs (g) and (h) to read as follows:

§ 1051.1 Does this part apply to me?

* * * * *

(g) This part also applies to engines under 50 cc used in motorcycles that are motor vehicles if the manufacturer uses the provisions of 40 CFR 86.447–2006 to meet the emission standards in this part instead of the requirements of 40 CFR part 86. Compliance with the provisions of this part is a required condition of that exemption.

(h) The evaporative emission requirements of this part applies to highway motorcycles as specified in 40 CFR part 86.

Subpart C—[Amended]

■ 24. Section 1051.245 is amended by revising paragraphs (c)(1)(i) and (e)(2) to read as follows:

§ 1051.245 How do I demonstrate that my engine family complies with evaporative emission standards?

* * * * *

(c) * * *

(1) * * *

(i) Calculate the deterioration factor from emission tests performed before and after the durability tests as described in § 1051.515(c) and (d) and using good engineering judgment. The durability tests described in § 1051.515(d) represent the minimum requirements for determining a deterioration factor. You may not use a deterioration factor that is less than the difference between evaporative emissions before and after the durability tests as described in § 1051.515(c) and (d).

* * * * *

(e) * * *

(2) For certification to the standards specified in § 1051.110(b) with the control technologies shown in the following table:

TABLE 2 OF § 1051.245.—DESIGN-CERTIFICATION TECHNOLOGIES FOR CONTROLLING FUEL-LINE PERMEATION

If the fuel-line permeability control technology is . . .	Then you may design-certify with a fuel line permeation emission level of . . .
(i) Hose meeting Category 1 permeation specifications in SAE J2260 (incorporated by reference in § 1051.810).	15 g/m^2/day.
(ii) Hose meeting the R11–A or R12 permeation specifications in SAE J30 (incorporated by reference in § 1051.810).	15 g/m^2/day.

* * * * *

Subpart F—Test Procedures

■ 25. Section 1051.501 is amended by revising paragraphs (d)(2) and (d)(3) to read as follows:

§ 1051.501 What procedures must I use to test my vehicles or engines?

* * * * *

(d) * * *

(2) *Fuel Tank Permeation.* (i) For the preconditioning soak described in § 1051.515(a)(1) and fuel slosh durability test described in § 1051.515(d)(3), use the fuel specified in Table 1 of § 1065.210 of this chapter blended with 10 percent ethanol by volume. As an alternative, you may use Fuel CE10, which is Fuel C as specified in ASTM D 471–98 (incorporated by reference in § 1051.810) blended with 10 percent ethanol by volume.

(ii) For the permeation measurement test in § 1051.515(b), use the fuel specified in Table 1 of § 1065.210 of this chapter. As an alternative, you may use the fuel specified in paragraph (d)(2)(i) of this section.

(3) Fuel Hose Permeation. Use the fuel specified in Table 1 of § 1065.210 of this chapter blended with 10 percent ethanol by volume for permeation testing of fuel lines. As an alternative, you may use Fuel CE10, which is Fuel C as specified in ASTM D 471–98 (incorporated by reference in § 1051.810) blended with 10 percent ethanol by volume.

* * * * *

■ 26. Section 1051.515 is amended by revising the introductory text of paragraphs (a) and (b), paragraphs (b)(8), (c), and (d) and adding paragraph (e) and Figure 1051.515–1 to read as follows:

§ 1051.515 How do I test my fuel tank for permeation emissions?

* * * * *

(a) *Preconditioning fuel soak.* To precondition your fuel tank, follow these five steps:

* * * * *

(b) *Permeation test run.* To run the test, follow these nine steps for a tank that was preconditioned as specified in paragraph (a) of this section:

* * * * *

(8) Subtract the weight of the tank at the end of the test from the weight of the tank at the beginning of the test; divide the difference by the internal surface area of the fuel tank. Divide this g/m^2 value by the number of test days (using at least three significant figures) to calculate the g/m^2/day emission rate. Example: If a tank with an internal surface area of 0.72 m^2 weighed 31882.3 grams at the beginning of the test and weighed 31760.2 grams after soaking for 25.03 days, then the g/m^2/day emission rate would be: (31882.3 g − 31760.2 g) / 0.72 m^2 / 25.03 days = 6.78 g/m^2/day.

* * * * *

(c) *Determination of final test result.* To determine the final test result, apply a deterioration factor to the measured emission level. The deterioration factor is the difference between permeation emissions measured before and after the durability testing described in paragraph (d) of this section. Adjust the baseline test results for each tested fuel tank by adding the deterioration factor to the measured emissions. The deterioration factor determination must be based on good engineering judgement. Therefore, during the durability testing, the test tank may not exceed the fuel tank permeation standard described in § 1051.110 (this is known as ''line-crossing''). If the deterioration factor is less than zero, use zero.

(d) *Durability testing.* You normally need to perform a separate durability demonstration for each substantially different combination of treatment approaches and tank materials. Perform these demonstrations before an emission test by taking the following steps, unless you can use good engineering judgment to apply the results of previous durability testing with a different fuel system. You may ask to exclude any of the following durability tests if you can clearly demonstrate that it does not affect the emissions from your fuel tank.

(1) *Pressure cycling.* Perform a pressure test by sealing the tank and cycling it between +2.0 psig and −0.5 psig and back to +2.0 psig for 10,000 cycles at a rate 60 seconds per cycle.

(2) *UV exposure.* Perform a sunlight-exposure test by exposing the tank to an ultraviolet light of at least 24 W/m^2 (0.40 $W\text{-}hr/m^2/min$) on the tank surface for 15 hours per day for 30 days. Alternatively, the fuel tank may be exposed to direct natural sunlight for an equivalent period of time, as long as you ensure that the tank is exposed to at least 450 daylight hours.

(3) *Slosh testing.* Perform a slosh test by filling the tank to 40 percent of its capacity with the fuel specified in § 1051.501(d)(2)(i) and rocking it at a rate of 15 cycles per minute until you reach one million total cycles. Use an angle deviation of +15° to −15° from level. This test must be performed at a temperature of 28°C ±5° C.

(4) *Final test result.* Following the durability testing, the fuel tank must be soaked (as described in paragraph (a) of this section) to ensure that the permeation rate is stable. The period of slosh testing and the period of ultraviolet testing (if performed with fuel in the tank consistent with paragraph (a)(1) of this section) may be considered to be part of this soak, provided that the soak begins immediately after the slosh testing. To determine the final permeation rate, drain and refill the tank with fresh fuel, and repeat the permeation test run (as described in paragraph (b) of this section) immediately after this soak period. The same test fuel must be used for this permeation test run as for the permeation test run performed prior to the durability testing.

(e) *Flow chart.* The following figure presents a flow chart for the permeation testing described in this section, showing the full test procedure with durability testing, as well as the simplified test procedure with an applied deterioration factor:

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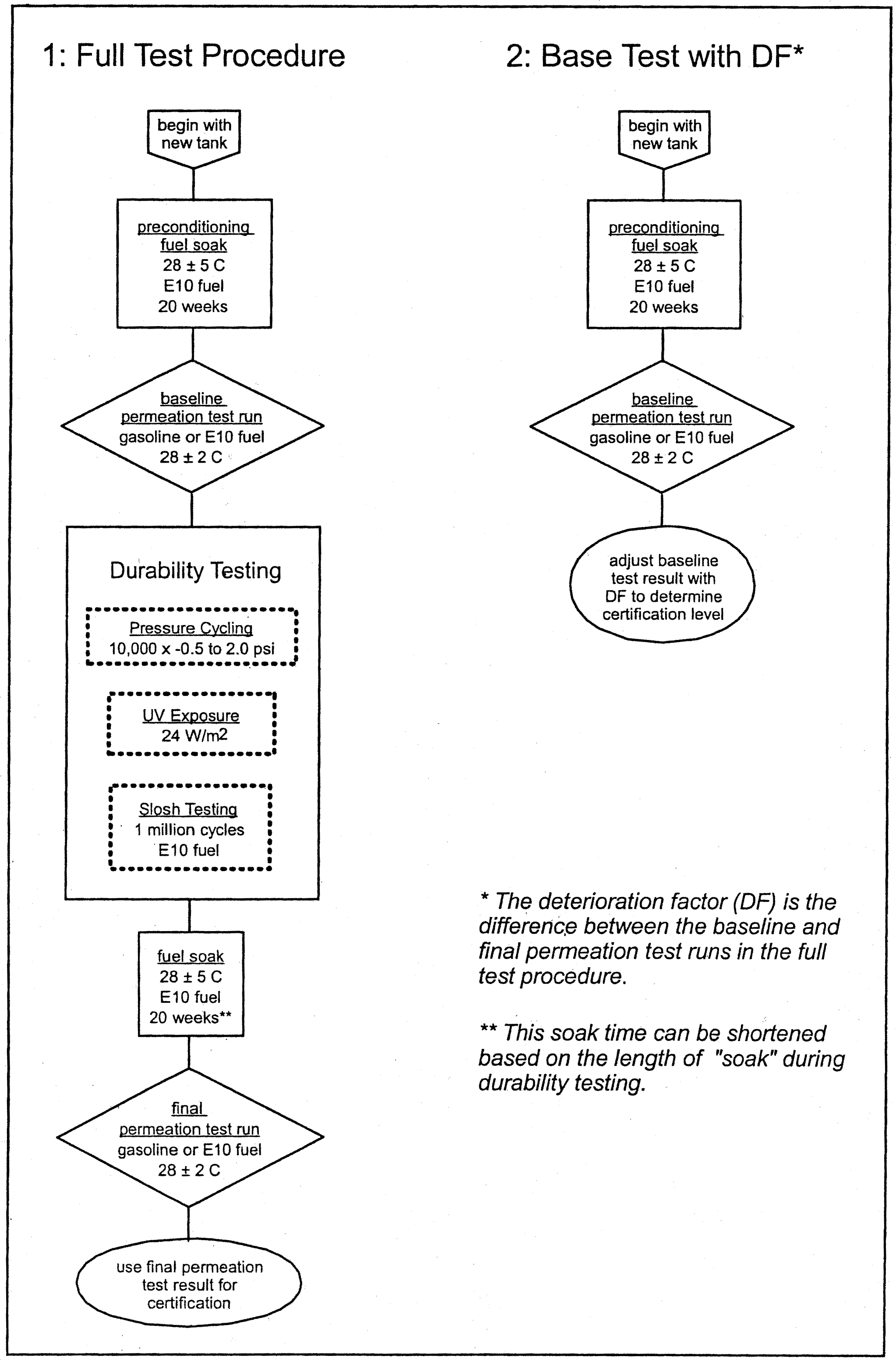
Figure 1051.515-1: Flow Chart of Permeation Test Procedure with and without DF Determination



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■ 27. A new § 1051.640 is added to subpart G to read as follows:

§ 1051.640 What special provisions apply for custom off-highway motorcycles that are similar to highway motorcycles?

You may ask to exempt custom-designed off-highway motorcycles that are substantially similar to highway motorcycles under the display exemption provisions of 40 CFR 86.407–78(c). Motorcycles exempt under this provision are subject to the restrictions of 40 CFR 86.407–78(c) and are considered to be motor vehicles for the purposes of this part 1051.

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