

Summary and Analysis of Comments: Control of Emissions from Highway Motorcycles

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Summary and Analysis of Comments: Control of Emissions from Highway Motorcycles

Assessment and Standards Division
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U.S. Environmental Protection Agency

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Introduction

On August 14, 2002, we published a Notice of Proposed Rulemaking (NPRM) for revised emission standards for highway motorcycles. In that notice, we proposed to largely align the federal exhaust emission standards with those of the California program, but on a delayed schedule relative to implementation in California. We also proposed exhaust emission standards for the currently unregulated category of motorcycles with displacements of less than 50 cc.

We held a public hearing on the NPRM in Ann Arbor, Michigan on September 17, 2002. At that hearing, oral comments on the NPRM were received and recorded. A written comment period remained open until January 7, 2003. A complete list of organizations that provided comments on the NPRM is contained in the following table. Abbreviations for the organization names are also included. In addition to the organizations shown in the following table, we received comments from several thousand individuals. All comments and hearing testimony have been placed in Air Docket A-2000-02.

This Summary and Analysis of Comments contains a detailed summary of all comments we received on the NPRM as well as our analysis of each comment and our response. The reader should also refer to the final rulemaking notice in the Federal Register as well as the Final Regulatory Support Document.

List of Commenting Organizations

Commenter

ABATE of Cheyenne
ABATE of Denton
ABATE of Illinois
ABATE of Kansas District #5
ABATE of Michigan
ABATE of Ohio
ABATE of Onondaga County
ABATE of Tompkins County, New York
ABATE of Wisconsin
Al's Honda/Yamaha
American Motorcyclist Association (AMA)
Badger's Bore and Stroke
Bluewater Network (BN)
California Motorcycle Dealers Association (CMDA)
Charlotte NC Concerned Bikers Association/ABATE
Creative Cycles, Inc.
Cycle Center of Fremont
Environmental Defense (ED)
Harley Davidson (Harley)
Harley Davidson of Anaheim-Fullerton
Keowee Motor Cycles
Idaho Coalition for Motorcycle Safety, Inc.
Malaguti USA, Inc.
Manufacturers of Emission Controls Association (MECA)
Michigan Department of Environmental Quality (MIDEQ)
Midwest Choppers
Motorcycle Industry Council (MIC)
Motorcycle Riders Foundation (MRF)
The Motorcycle Industry in Europe (ACEM)
Mountain Motorsports
New Hampshire Department of Environmental Services (NHDES)
New Mexico Motorcyclists Rights Organization (NMMRO)
Night Wing Motorcycle Works
Northeast States for Coordinated Air Use Management (NESCAUM)
Simi Valley Honda
State and Territorial Air Pollution Program Administrators and the Association of Local Air
Pollution Control Officials (STAPPA/ALAPCO)
Precision Cycle, Inc.

Pro Performance & Automotive Center, Inc.
Rider for Justice
RIX, Inc.
Royall's Performance Motorcycles
Scotty's Cycle & Machine
SKF Cycles

Public Hearing Testimony (Docket A-200-02, item IV-F-01) (September 17, 2002 Ann Arbor Michigan)

ABATE of Michigan - Region 19
American Motorcycle Association
California Motorcycle Dealers Association
Harley-Davidson Motor Company
Manufacturers of Emission Controls Association
Motorcycle Industry Council
Motorcycle Riders Foundation
David Pace (representing small businesses)

Chapter 1 - Exhaust Emissions Standards, Applicability and Timing

1.1 General

What We Proposed:

In general, we proposed to harmonize the federal exhaust emission standards for all classes of motorcycles with those of the California program, but delayed by two years relative to implementation in California. For Class I and Class II motorcycles, we proposed exhaust emission standards that apply today in California, and that all current Class I and II motorcycles are already meeting. For Class III motorcycles, we proposed the two tiers of exhaust emission standards that the California ARB has put in place for future model years (2004 and 2008 in California). The existing federal CO standard of 12.0 g/km would remain unchanged. The process by which manufacturers certify their motorcycles, the test procedures, the driving cycle, and other elements of the federal program would also remain unchanged. We also proposed standards for motorcycles with engines of less than 50cc displacement (scooters and mopeds). The proposed standards are shown in the table below.

Proposed Highway Motorcycle Exhaust Emission Standards

Class	Engine Size (cc)	Implementation Model Year	HC (g/km)	HC+NO _x (g/km)	CO (g/km)
Class I	less than 170	2006	1.0	—	12.0
Class II	170 -279	2006	1.0	—	12.0
Class III	280 and above	2006	—	1.4	12.0
		2010	—	0.8	12.0

What Commenters Said:

Motorcycle manufacturers were generally supportive of the proposed exhaust emission standards, with some reservations. The Motorcycle Industry Council (MIC) said that if EPA adopted final regulations by mid-2003, its members would not object to complying beginning in the 2006 model year. MIC also expressed no objection to standards for motorcycles with less than 50cc displacement engines or to permeation standards, as long as EPA considered some minor revisions in the final rule (these are discussed later in this document). Similarly, Harley-Davidson expressed support for the concept of harmonizing with the 2004 and 2008 California emission standards, and reiterated their view that a two-year delay relative to California would be appropriate to allow manufacturers to “ramp up the production of emission-related components

and designs that would have only been produced in lower volumes for California configuration vehicles prior to any harmonization.”

A number of state and local governments and environmental groups expressed support for the proposal, and some urged the EPA to reduce emissions further and/or faster than proposed. The Michigan Department of Environmental Quality expressed support for the proposal, stating that “...it is imperative that all reasonable and prudent control strategies be considered for future implementation to attain and maintain the National Ambient Air Quality Standards (NAAQS).” They also stated that highway motorcycles “contribute to ground-level ozone and PM formation, as well as exceedances of the NAAQS.” The New Hampshire Department of Environmental Services expressed general support for the proposal. NESCAUM expressed support, stating that the proposal “...represents an important step in the regulation of motorcycles...” STAPPA/ALAPCO also expressed support, concluding that “reductions from these sources will assist states and localities in achieving clean air goals.” Environmental Defense generally supported harmonization with California standards, but suggested an accelerated implementation schedule. They also stated that EPA has a legal duty to tighten CO standards for all motorcycles, pointing to the 2003 European Union standard of 5.5 g/km for CO. Bluewater Network supports EPA action to regulate motorcycle emissions, but argues that the proposal falls short of meeting statutory requirements by not requiring catalytic converters on all motorcycles.

Many motorcycle riders and motorcycle activist organizations opposed the proposal and expressed a variety of concerns, which are detailed in subsequent sections of this document. Many of these commenters, including the MRF, suggested that harmonizing with the California standards is inappropriate. Some suggested that EPA should pursue alternative standards that would still reduce emissions but at the same time accommodate the desires of motorcyclists, while others suggested that any change to the federal standard was unneeded and inappropriate. One commenter suggested that we should consider a middle ground by having the proposed standards take effect only after highway motorcycles account for four percent of the motoring public. The AMA and others questioned the feasibility of utilizing some automotive emission control technologies on motorcycles, pointing to the limited space on a motorcycle and the potential impacts on power and weight requirements. One commenter suggested that the proposed standards would dictate how a manufacturer must comply rather than what standard the manufacturer must comply with. ABATE of Onondaga County urged us not to apply the California standards nationwide, but they did not offer further explanation. Many of those opposing the proposal suggested that EPA was ignoring emissions from passenger cars, light-duty trucks and SUVs, heavy-duty diesel trucks, airlines, power plants and lawnmowers, choosing instead to go after the “easy” target of motorcycles. Several commenters questioned how we could consider further regulation of highway motorcycles at the same time that we were relaxing the requirements for power plants (an apparent reference to the revisions to the New Source Review requirements). Many of these commenters pointed out that motorcycles must be cleaner than passenger cars and light trucks because they have better fuel economy. One commenter suggested that we should regulate the emissions of race vehicles instead, pointing out that NASCAR vehicles drive 500 miles while emitting some of the rawest exhaust known to

internal combustion. Another commenter suggested that the real polluters are the tens of thousands of government vehicles which are exempt from regulation, such as police cars and school buses.

One commenter suggested that the EPA is an unelected body of government and shouldn't be making laws, pointing out that this job is left to the Senate and House of Representatives. Several commenters stated that the proposal is unconstitutional, but did not provide any rationale for that position. One commenter suggested the proposal was unconstitutional because we don't do anything about diesels, and that this smacks of selective enforcement.

About 1,300 commenters, in nearly identical emails, urged the adoption of strong emission standards for motorcycles, citing the high emissions of motorcycles relative to current passenger cars and light-duty trucks.

Our Response:

A large number of commenters - including motorcycle manufacturers representing near 95 percent of all motorcycles sold - expressed general support for our proposed program. We agree with the manufacturers that implementation of the new standards in 2006 is contingent on the availability of appropriate lead time. This rule provides two years of lead time for the 2006 exhaust emission standards, four years of lead time for the permeation standards and the Tier 1 exhaust emission standards for small manufacturers, and six years of lead time for the 2010 exhaust emission standards. Based on our review of current certification data, it appears that more than half of current families of large manufacturers will be able to certify for 2006 with little to no further development work, and further flexibility is available through emissions averaging.¹ The 2006 requirements can be met with existing technology that already has been incorporated in many motorcycle engine families. Thus, we believe this to be adequate lead time to meet the 2006 standards. Although certification data does not exist for motorcycles with displacements of less than 50cc, there are other indications that manufacturers are already well-prepared to meet new U.S. standards in 2006. Both MIC and ACEM did not object in their comments to new standards applicable in 2006. ACEM pointed out that the current European standards for the under-50cc category are among the most stringent in the world, at 1.2 g/km HC+NOx. ACEM reports in their comments that manufacturers are already in the process of developing technologies for meeting an upcoming increase in stringency in the European Union scheduled to go into effect in 2006. ACEM also confirmed that the European manufacturers intend to export to the U.S. the same motorcycles under 50cc developed for the European market, and that the NPRM (contingent on EPA adopting recommended provisions regarding the test

¹ This assessment is dependent on the NOx level of current Class III engine families, for which we have only a small amount of data. However, assuming 0.4 g/km NOx, the proportion of current motorcycles that essentially already meet the 2006 standard is near 60 percent. The proportion is still more than half at assumed NOx levels of 0.55 g/km.

cycle and useful life for the under 50cc category) would enable them to do so in 2006. As further detailed in Chapter 4 of the Regulatory Support Document, there are already a number of motorcycles in this category equipped with advanced two-stroke technologies or fuel-injected four-stroke technologies, which are the principal technologies expected to be used to meet the 2006 U.S. standards. For the 2008 and later standards, the rule provides four or more years, which provides considerable lead time to incorporate technologies that are known and that are transferable to motorcycles. We believe that this final rule promulgated in a time frame that we believe meets the needs of the manufacturers for an orderly and successful implementation in the 2006, 2008, and 2010 model years. Some commenters specifically urged more stringent emission standards and/or more rapid implementation (these comments are addressed below). We agree with the view expressed by states and local government organizations that the emission reductions of the proposed program would assist them as they strive to ensure attainment of the National Ambient Air Quality Standards. We also agree with the view that motorcycles are individually high-polluting vehicles per mile driven, particularly when compared to current and future passenger cars and light-duty trucks.

A number of commenters opposing the proposal expressed the view that motorcycles are less polluting than cars, and the fact that they burn less fuel was often cited as evidence of this. We do not agree with these commenters. It is simply not the case that highway motorcycles pollute less than cars. In fact, motorcycles are generally much more polluting than large sport-utility vehicles (SUVs). This is illustrated by comparing the current emission standards for motorcycles to those for other vehicles, as shown in the following table.

Class III Highway Motorcycle Emission Standards Compared to Other Highway Vehicle Emission Standards at Full Useful Life
(grams/mile)

	HC	CO	NOx	HC+NOx
Highway Motorcycles - current Federal	8.0	19.35	N/A	9.13 ^A
Highway Motorcycles - current California ^B	2.26	19.35	N/A	3.39 ^A
Highway Motorcycles - 2006 proposed		19.35		2.26
Highway Motorcycles - 2010 proposed		19.35		1.29
Passenger Car - current	0.09	4.2	0.2	0.29
Light-duty Truck 3 - current Federal (e.g., Dodge Durango 4x4)	0.46	6.4	0.98	1.44
Light-duty Truck 4 - current Federal (e.g., Ford Expedition 4x4)	0.56	7.3	1.53	2.9
Car/Truck Tier 2 - Bin 5 (fleet average requirement)	0.09	4.2	0.07	0.16
Car/Truck Tier 2 - Bin 8 (highest emissions permitted after phase-in)	0.125	4.2	0.2	0.325

Notes:

^A Estimated NOx emissions of 1.13 grams/mile.

^B California standard for Class III above 700cc displacement.

Note that the HC+NOx column in the table above has to rely on estimates of current NOx emissions for motorcycles since there is currently no applicable NOx standard. This estimate is based on test data. The final two rows report Tier 2 standards that apply to cars and light trucks (including SUVs) starting in the 2004 model year. Under the Tier 2 program when it is completely phased in, Bin 8 is the least stringent set of standards, and Bin 5 is the required corporate average. In other words, under the Tier 2 program the Bin 8 emission levels will represent the “dirtiest” vehicles - possibly some of the largest SUVs and large-displacement engine high-performance vehicles. Manufacturers certifying vehicles under bin 8 must average these emissions with engine families even cleaner than bin 5 levels to meet the bin 5 corporate average requirement. It is clear from this table that emissions from current motorcycles - even those that meet current California standards (which most do) - do not compare favorably with emissions from other passenger vehicles, including the largest SUVs.

While the above data demonstrates that most motorcycles pollute more than cars, trucks, and SUVs per mile driven (and will continue to do so in the future), we did not propose that motorcycle emissions be comparable to cars, nor do we believe that this is technologically appropriate at this point in time. As was made clear in the proposal, we fully understand that

motorcycles are not cars, and should be considered differently than cars, particularly with respect to integrating vehicle emission control technologies. Motorcycles do not have the abundance of space under the vehicle or under the hood, in locations isolated from the drivers, passengers, and the elements, that cars and trucks do. They tend to be more weight and space limited than cars and trucks. Therefore we agree with the AMA that motorcycles possess certain limitations relative to four-wheeled passenger vehicles, and our final rule carefully considered these limitations by not requiring large and ultra-sophisticated catalyst technologies, on-board diagnostic systems, sophisticated evaporative emission controls, and other technologies that are routinely found on passenger cars today. However, the widespread use of catalysts and electronic fuel injection on all styles of motorcycles today is an indication that manufacturers can successfully incorporate these emission controls into many motorcycle designs. There may indeed be some motorcycle models, styles, or designs where it may be particularly troublesome to integrate advanced emission controls, but we believe that the standards can be met by any type of motorcycle, and that the lead time prior to the Tier 2 standards will provide enough time for manufacturers to incorporate appropriate controls on all motorcycles. The averaging provisions in the final rule will also help manufacturers to install the emission control devices that are best suited for each model.

It should be apparent from this table that the EPA is not ignoring emissions from cars, trucks, and SUVs. In fact, with respect to this final point, cars, trucks, SUVs, and the gasoline or diesel fuel that fuels them, have been the subject of periodic and recent regulatory actions that significantly reduce their emissions. Passenger cars have been meeting emission standards since the early 1970's. The first Clean Air Act passed by Congress in 1970 required a 90 percent reduction in exhaust emissions from new passenger cars by 1975. These standards were subsequently amended and delayed, but by 1981 new cars were meeting the statutory standards of 0.41 grams/mile HC, 3.4 grams/mile CO, and 1.0 gram/mile NO_x. These standards essentially remained in place until new standards, required by the 1990 Amendments to the Clean Air Act, took effect starting in 1994. However, in the 1980's EPA phased out the use of lead in gasoline and imposed fuel volatility requirements to reduce evaporative emissions. The 1994 standards reduced HC, NO_x, CO, and PM, and increased the useful life over which the standards apply from 50,000 to 100,000 miles. The new standards, at 100,000 miles, were 0.31 grams/mile NMHC, 4.2 grams/mile CO, and 0.6 grams per mile NO_x. In 1998 the EPA, the automotive industry, and the Northeastern states reached an agreement to put cleaner cars on the road before they could be mandated under the Clean Air Act. The new cars were called National Low Emission Vehicles (NLEV). The first NLEVs under the agreement were released in New England in the 1999 model year and made available nationwide in 2001. These vehicles met standards of 0.075 g/mile HC, 3.4 g/mile CO, and 0.2 g/mile NO_x. In 1999, EPA announced more protective tailpipe emissions standards, marking the first time that SUVs and other light-duty trucks are subject to the same national pollution standards as cars. Standards are set at an average of 0.07 g/mile NO_x, 0.09 g/mile HC, and 4.2 g/mile CO, over an extended useful life period of 120,000 miles. In addition, for the first time, vehicles and fuels are considered one system. EPA announced lower standards for sulfur in gasoline, which will ensure the effectiveness of low emission-control technology and reduce harmful air pollution. Therefore, in

a series of steps taken since 1980, passenger car HC emission standards have decreased from the initial standard of 0.41 g/mile to 0.09 g/mile, or by about 80 percent. Passenger car NO_x emission standards have decreased by over 90 percent since the initial standards. Large light-duty truck and SUV emission decreases will be even more significant, since they have to meet the same standards as cars in 2004 yet their starting point is one with less stringent standards than passenger cars. Motorcycles, on the other hand, have not had to meet any new federal standards since 1980, and the existing motorcycle HC standard is about 90 times the average standard for cars and SUVs that takes effect beginning in 2004. Even after the second tier of motorcycle regulations take effect in 2010, motorcycle emissions standards will still be several times higher than those for cars and light trucks.

The reason for the common misunderstanding that motorcycles must be less polluting than cars because of their lower fuel usage is that such a view fails to take into account the extremely sophisticated emission controls now equipping cars and trucks. In particular, the closed-loop electronic feedback control fuel systems that allow for near-perfect control of the fuel-air mixture enable almost complete combustion, and the advanced catalytic converter systems in use today can result in extremely low levels of emissions out the tailpipe.

Despite the fact that the annual mileage of cars and trucks is 3-4 times that of motorcycles, annual HC emissions from the average motorcycle are almost six times that from a current passenger car, and the same or slightly less than an average SUV. When the Tier 2 standards for cars and trucks become effective, the annual motorcycle HC emissions become several times that of cars, trucks, and SUVs. Annual CO emissions for motorcycles are about the same as current passenger cars and Tier 2 cars and light trucks. And although annual motorcycle NO_x emissions are less than current passenger cars, trucks, and SUVs, they will be about two times that of an average passenger vehicle when future car and truck standards take effect. Clearly, even given their reduced annual mileage relative to cars and trucks, the emissions contribution of a motorcycle is typically comparable to or worse than cars and trucks, especially when compared to the cleaner cars and trucks that are on the horizon.

A number of commenters suggested that we should regulate a number of other sources before we further regulate highway motorcycles. We note that every type of vehicle or equipment mentioned in the comments is currently subject to federal emission standards.

Regarding issues raised concerning the problems caused by exempted vehicles, government vehicles such as school buses and police vehicles are not exempted from meeting the applicable emission standards. Thus, these vehicles are meeting the same standards as other vehicles, as just discussed. However, the Clean Air Act specifically exempts from emissions regulation vehicles that are used solely for competition. Thus, NASCAR racing vehicles are not required to comply with emission regulations, and we do not have the legal authority to regulate them.

We do not agree with commenters who suggest that any change in the standards is unneeded or inappropriate or that harmonization with the California standards is somehow inappropriate. Many regions in the U.S., including areas outside California, continue to experience significant air quality problems. We agree that highway motorcycles do not contribute as much to these problems as many other sources, but they clearly do contribute and they are part of the overall problem. We have mandated stringent emission standards for every other highway and nonroad vehicle, and we do not agree that there is a place for a motorcycle emission standard that is near 100 times the emission limits placed on the majority of other highway vehicles. Comments from states and local air pollution control officials confirm that incremental improvements in emissions from motorcycles will help them achieve their air quality goals. See also our response in Chapter 4.1 of this document.

We do not agree that harmonizing with California is inappropriate. We have demonstrated that the emissions of current motorcycles and the use of technology on current motorcycles can, with appropriate lead time, justify standards similar to those put in place by California. At the same time, we understand the significant disadvantages to manufacturers that could result from a set of standards that diverge significantly from those in California. As we noted in the NPRM, manufacturers have generally chosen to design and manufacturer motorcycle models that comply with the California standards and sell these models nationwide. In only a minority of cases have manufacturers found it beneficial to invest the resources required to split a model into California and 49-state versions. For example, in our database of motorcycles certified to emission standards we can identify approximately a dozen of 190 2003 engine families that have been split in this way. Manufacturers simply find the cost of doing this on a widespread basis outweighed by the efficiencies of producing one model for nationwide consumption.

While we agree that motorcycles generally achieve better fuel economy than passenger cars and light-duty trucks, we do not agree that these benefits outweigh the significantly higher emissions of a motorcycle. Commenters that suggested that significant fuel savings could be accrued if ten percent of the 1.5 trillion car miles were traveled by motorcycle were missing this point and ignoring the cost to society of replacing very low emission vehicles with very high emission vehicles. If these miles were in fact traveled by motorcycles instead of cars, the nation would be facing more than 300,000 tons of additional hydrocarbon pollution.² Clearly this would be an unacceptable tradeoff. Additionally, they provide no support for their supposition in their analysis that motorcycles achieve an average of 50mpg. We have no data to suggest a specific average fuel economy for motorcycles, but it is clear that even some of the largest motorcycles have superior fuel economy to most passenger cars (e.g., the Harley-Davidson Electra Glide Classic with fuel injection is rated by Harley-Davidson at 46mpg highway and 39mpg city). In any case, as discussed in Chapter 4, we do not believe that these standards will have an appreciable effect on motorcycle sales in the future.

² Memorandum from Roberts French to Docket A-2000-02, "Effect of Substituting Motorcycles for 10% of Passenger Vehicle Vehicle-Miles-Traveled," Oct. 15, 2003. Docket A-2000-02, document IV-B-05.

Within reasonable limits we believe that the final standards do accommodate the needs and desires of motorcyclists. Potential impacts on the areas of performance, safety, fuel economy, appearance, and sound are the most common concerns raised by motorcycle owners. As discussed in Chapter 7 of this document, we do not believe that the standards will have significant adverse effects on motorcycle performance, safety, or fuel economy. We also do not believe that the standards will affect the allowable noise levels or the aesthetic appearance of motorcycles. This is confirmed by the President of Harley-Davidson Motor Company, who has stated that “Harley-Davidson plans to meet the requirements of the proposed EPA standards and still make the motorcycles true to the look, sound and feel that you know and love.” The final rule does not make any changes to the regulations regarding allowable noise limits; manufacturers will be free to design, produce, and sell motorcycles that produce a range of noise levels and noise qualities within the allowable limits, just as they are today. However, to the extent that the desires of motorcyclists include being allowed to customize their motorcycle however they wish and with the aftermarket parts they wish, we do not condone those actions if they violate existing noise standards. This issue is further addressed in Chapter 7. Comments regarding effects on small businesses are addressed in Chapter 6.

We do not agree with Bluewater Network’s comments that the NPRM violates a statutory requirement by establishing standards “that are so lenient.” Their assertion that the standards will require catalysts on “a very small percentage of motorcycles, probably not more than 20 percent and perhaps even less” is incorrect. Approximately twenty percent of motorcycles are using catalysts today. With the Tier 1 standards effective in 2006 through 2009 we project that catalysts will be used on about 25 percent of motorcycles, depending on displacement. When the Tier 2 standards become effective in 2010 we project that catalyst use will be about 50 percent. Bluewater also cites section 213 of the Clean Air Act (Nonroad Engines and Vehicles) in their allegation that EPA is violating the statute. Section 213 of the Act does not apply to highway motorcycles.

There are several reasons why at this time we rejected emission standards which would require the application of catalysts on 100 percent of highway motorcycles. First, the costs of the program would increase, possibly dramatically, if we were to select a set of emission standards that is not aligned with California. Motorcycle manufacturers have frequently expressed their concerns regarding this issue. Second, while we considered the need to achieve equivalency of emission reductions between motorcycles and other motor vehicles, as required under section 202(a)(3)(E) of the Act, the variety of sizes and applications of motorcycles is much broader than that of passenger cars, making the consistent application of technology across the product mix much more difficult for motorcycles than for cars. Third, as described in Chapter 7, motorcyclists have significant concerns regarding the excess heat of a catalytic converter. Although we demonstrate in Chapter 7 that this heat can be managed in ways that essentially eliminate danger to motorcycle riders, we recognize that there are some applications where this may be an issue, and believe that the most appropriate approach is to provide an averaging standard that does not require catalysts on all motorcycles. This approach will allow the manufacturers to optimize the use of catalysts on models that for which they are best suited and

not use them on models where their application may be problematic. Finally, it may be difficult to apply catalysts at a reasonable cost to some smaller, lower priced motorcycles given that these models would require some engine redesign just to be able to utilize a 50 percent efficient catalyst. We believe that these issues may be surmountable in the long run, but at this time believe that the most appropriate approach is to set averaging standards which would not require the use of catalysts on all highway motorcycles. It is important to point out that the nature of the standards is such that the manufacturers can choose the technology mix that is most appropriate to meeting the standards on a fleet average basis. We are in no way mandating the specific technologies that must be employed to comply with the exhaust emission standards.

Section 202(a)(3)(E) of the Act requires that we “consider the need to achieve equivalency of emission reductions between motorcycles and other motor vehicles to the maximum extent practicable.” While this language requires us to consider and evaluate certain options, we do not agree that it compels us to establish more stringent CO standards, as suggested by Environmental Defense. We rejected a more stringent CO standard for several reasons. First, the costs of the program would increase, possibly dramatically, if we were to select a set of emission standards that is not aligned with California. Motorcycle manufacturers have frequently expressed their concerns regarding this issue. Second, further control of CO emissions has the potential to increase the heat output from a catalytic converter. In order to reduce CO, oxygen must often be added to the exhaust stream to promote complete combustion, which has the effect of generating higher exhaust temperatures. As described in Chapter 7, motorcyclists have significant concerns regarding the excess heat of a catalytic converter. Although we demonstrate in Chapter 7 that this heat can be managed in ways that essentially eliminate danger to motorcycle riders, we do not wish to further increase the difficulty of employing catalysts on motorcycles due to high heat levels, and nor do we wish to increase the possibility that riders will remove catalysts due to unacceptable or very noticeable heat output.

Further, because many motorcycles are already or will be equipped with electronic fuel injection which will better control the air-fuel ratio and thus promote better combustion, we would expect to see somewhat lower CO emissions from the motorcycle fleet. Prospectively, catalyst-equipped motorcycles will have lower CO emissions in-use due to the control of gasoline sulfur levels. Finally, the number of areas in the country violating the CO NAAQS has been steadily diminishing since 1979. Since 1979, the number of areas in the nation violating the CO NAAQS has decreased by a factor of almost ten, from 48 areas in 1979 to five areas (covering seven counties) in 1995 and 1996. In 1997, three counties, with a total population of nine million people, failed to meet the CO standard.³ In addition to the substantial reduction in the number of areas where the NAAQS is exceeded, the severity of the exceedances also has decreased significantly. Nationally, CO concentrations decreased 38 percent during the past 10

³ U.S. EPA. December, 1999. “Regulatory Impact Analysis - Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements.” United States Environmental Protection Agency, Office of Air and Radiation, EPA420-R-99-023. Docket A-97-10, document V-B-01.

years. From 1979 to 1996, the measured atmospheric concentrations of CO during an exceedance decreased from 20-25 ppm at the beginning of the period to 10-12 ppm at the end of the period. The trend in lower CO emission inventories is expected to continue as the light-duty vehicle and truck fleet turns over and low sulfur gasoline is put into widespread use. It is also the case that motorcycles are infrequently operated when CO emissions are most likely to be high (during the coldest winter months), which would tend to reduce the impact of motorcycle CO emissions on nonattainment. Nonetheless, we will monitor trends in technology and motorcycle CO emission rates and may propose a new standard if the EPA moves forward with the new World Motorcycle Test Cycle.

Our legal authority to set emission standards for motor vehicles comes from the Clean Air Act. As a federal law, it was developed and approved by Congress and signed into law by the President of the United States. The Clean Air Act directs EPA to set and revise emission standards for highway motorcycles, among other things. Thus, the suggestion that EPA should not be engaging in the setting of motorcycle emission standards because it is an unelected body of government is not correct. Also, given this discussion of our authority, we do not believe that any of the actions we are taking here are unconstitutional.

1.2 Class III Motorcycles

What We Proposed:

We proposed to harmonize the federal Class III motorcycle exhaust standards with the exhaust emission standards of the recently finalized California program. Specifically, we proposed to adopt the Tier 1 standard of 1.4 g/km HC+NO_x starting in the 2006 model year, and the Tier 2 standard of 0.8 g/km starting in the 2010 model year. Implementation on a nationwide basis would therefore 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 gain experience from implementation in California. We proposed that these standards could be met on a corporate-average basis.

What Commenters Said:

The California Motorcycle Dealers Association (CMDA) suggests that we should not adopt the California Tier 2 standard which goes into effect in 2008 because the California Air Resources Board (ARB) has agreed to perform a technology progress review in 2006. The CMDA equates ARB's agreement to perform a 2006 technology review as an indication that California has not finalized the Tier 2 standard, and they further suggest that a standard of 1.4 grams/kilometer HC would be more appropriate and less damaging to the motorcycle retail sector.

MECA supported our proposal to harmonize with the California Class 3 standards and stated that the standards are technologically feasible. However, they also suggested that we

consider harmonizing not just with the emission limits, but also with the implementation dates in California (i.e., not delaying federal implementation by two years relative to California). STAPPA/ALAPCO, NESCAUM, New Hampshire DES, and Michigan DEQ similarly suggested that we harmonize implementation dates with California. NESCAUM pointed out that by 2003 manufacturers will have generally already developed and evaluated the emission controls needed for the 2004 standards, which they have known about for some four years, and that implementation of the same standards in the same time frame federally could take advantage of economies of scale already applied to the California market. NESCAUM could see no technical or economic reason to not implement the standards in the same time frame as California. Environmental Defense argued that most motorcycles are already within reach of the Tier 1 standards, and given that most will not require advanced controls such as catalysts to meet Tier 1, federal implementation of the Tier 1 levels should take place in 2005. They also contended that 2008 provides enough lead time for Tier 2, especially since there are already motorcycles being certified that meet the Tier 2 levels.

ABATE of Cheyenne, endorsing the MRF position that California standards are not appropriate nationwide, argues that the new standards, by requiring advanced technologies, would mandate the disappearance of a century-old motorcycle configuration (“simple engines with carburetors, headers, and mufflers”). The MRF has used similar language, stating the standards would “ban venerated engine families.” They suggest that we consider a standard of 1.5 g/km HC or 1.9 g/km HC+NO_x, because such a standard would be achievable “with conventional air- and water-cooled motorcycle engine designs.”

Our Response:

We do not agree with the CMDA that the California Tier 2 standard has not been finalized. The California ARB finalized the regulations for Tier 1 (2004) and Tier 2 (2008) Class 3 motorcycle standards on November 22, 1999. While it is correct that the California ARB has made a commitment to conduct a technology progress review in 2006, this review does not negate the 1999 decision. 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...”⁴ It is clearly not, as CMDA suggests, to determine “if, and when, the Tier 2 standard will go into effect in California.” The purpose of the 2006 review is to enable the California regulators to adjust the program in the event of unforeseen circumstances, not to fill in the blanks in the ARB final rule. The California ARB also states that the 2006 technology review “may provide sufficient information to justify proposing a Tier-2 standard for small-volume manufacturers at a

⁴ State of California, Air Resources Board. Staff Report: Initial Statement of Reasons - Proposed Amendments to the California On-Road Motorcycle Regulation. October 23, 1998. Docket A-2000-02, document IV-A-52.

later date.”⁵ The Tier 2 standard is final and will remain valid California law unless ARB decides to revise it. We intend to participate in the California ARB 2006 review and work with them, intending to make any appropriate adjustments to the standards or implementation schedule we believe is warranted. Clearly, if there becomes a need to make adjustments to the program, a review conducted in 2006 will provide ample time before the Tier 2 standards take effect nationwide in 2010.

We do not agree with the CMDA that a final standard of 1.4 grams/kilometer is appropriate. This is the current standard in California for motorcycles with engines of greater than 700cc displacement, and a vast majority of motorcycles today will meet this standard. We believe that greater reductions can be achieved at a reasonable cost, and that such reductions are needed environmentally and are consistent with EPA’s responsibilities under the Clean Air Act. The comments from manufacturers indicate they will be able to meet these standards and continue to sell their motorcycles nationwide.

While we agree with those supporting harmonization with the California standards, we do not agree that it is appropriate or necessary to adopt the same implementation schedule. As proposed, we are finalizing a two-year lag in implementation relative to California, for several reasons. First, the introduction of 2004 models is already underway, and many have already been certified. It is therefore impractical to adopt the Tier 1 standards in 2004. However, because it has been the practice of many manufacturers to design most of their motorcycles to meet California standards and to sell them nationwide, we expect a large number of motorcycles sold outside California to actually comply with the Tier 1 standards starting in 2004. However, this strategy is not pursued by all manufacturers or for all engine families, and we believe that it would be useful to manufacturers to have two additional years to gain experience with the new emission control systems before being required to meet more stringent standards nationwide. We don’t believe manufacturers could easily reconfigure their manufacturing processes at this time to meet a 2004 deadline. This will help to reduce costs and enhance performance and customer acceptability. We believe that in some cases manufacturers may not be able to adequately accelerate product development and production from their suppliers to the necessary levels for nationwide motorcycle production. However, we do believe that implementing the regulations in 2006 will provide enough lead time, based on comments from the manufacturers regarding the time they need to ramp up their suppliers and manufacturing processes following implementation of the same standards in California. For this reason we believe a two-year lag relative to California is appropriate. In addition to the practical concerns regarding experience and supplier issues, a two-year lag in the Tier 2 standard ensures that we have adequate time to respond to information which arises in the 2006 technology review if any program adjustments are deemed necessary.

⁵ State of California, Air Resources Board. Final Statement of Reasons for Rulemaking - Proposed Amendments to the California On-Road Motorcycle Regulation. Docket A-2000-02, document IV-A-52.

We do not agree with comments that the standards will necessarily mandate the disappearance of “venerable” engine designs. It is true that there will be a technological shift in motorcycle designs (a shift that is largely already underway) in order to comply with the new standards, as well as to make continual improvements in performance, handling, and reliability. The shift towards greater use of catalysts, secondary air injection, and electronic fuel injection is desirable because of the benefits to the nation as a whole. Some of these technologies, such as fuel injection, can improve performance, fuel economy, and reliability relative to carbureted models.

However, we do not believe that the simple engine designs referred to by ABATE of Cheyenne will necessarily disappear. Under the program we are finalizing, manufacturers are not restricted from producing and selling some carbureted and air-cooled v-twin engines. First, small manufacturers will have until 2008 to meet the Tier 1 standard and are not required to meet the Tier 2 standard. There are existing large-displacement carbureted air-cooled v-twin engine motorcycles from a number of companies that likely already meet the Tier 1 standard. For example, consider the 2003 1750cc Big Dog motorcycles, the 1850cc Vengeance motorcycles, and the Panzer 1850cc motorcycles, all certified at 0.6 g/km HC, or the Pro-One 1600cc motorcycles certified to 0.7 g/km HC. While we do not have NO_x emission results for these engines, these motorcycles would easily meet the standard with an estimated NO_x level of 0.4-0.5 g/km. Once again, these are carbureted, air-cooled, classic v-twin configurations that make no use of secondary air injection or catalytic converters. Next, regarding the larger manufacturers, Jim McCaslin, President of Harley-Davidson Motor Company, has stated that Harley-Davidson “plans to meet the requirements of the proposed EPA standards and still make the motorcycles true to the look, sound and feel that you know and love” and that “the air-cooled V-Twin will continue to be the core of the Harley-Davidson motorcycle lineup for many years to come.” Moreover, manufacturers can use the averaging provisions to add flexibility in the technologies they use for particular motorcycle models. From 2006 through 2009 model years, manufacturers will be able to meet the Tier 1 standards and continue to sell motorcycles with emission levels up to 5.0 g/km HC+NO_x. Starting in 2010, manufacturers may meet the Tier 2 standards and be allowed to sell motorcycles with certification levels up to 2.5 g/km HC+NO_x. As long as the “simple” engines are balanced by some engines with more advanced emission controls, manufacturers can continue to provide the more classic designs to their customers. An emissions cap of 2.5 g/km HC+NO_x will clearly enable this; as we can see in the recent years of certification data there are numerous carbureted engines that can certify below a 2.5 g/km HC+NO_x cap. Thus, the statements made by the MRF and others that these engine families would be “banned” have no factual support, especially considering that a major manufacturer of air-cooled v-twin engines has said they can and will continue to produce them and that a number of smaller manufacturers are building motorcycles with these engines that are very close to meeting the Tier 1 standard, if not actually meeting it, today.

1.3 Class I Motorcycles 50 cc and Above, and Class II Motorcycles

What We Proposed:

We proposed that Class I and Class II motorcycles would have to meet the current California ARB 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 1.0 g/km HC and 12.0 g/km CO, as measured on the existing Federal Test Procedure (FTP) for motorcycles.

What Commenters Said:

NESCAUM commented that, because they have been in effect since 1982 and they do not appear to be technologically challenging, the current California Class I and Class II standards do little to promote improved air quality. They do not believe that these standards should be delayed until 2006, as proposed. They urge EPA to work with the California ARB and the European Union to develop new standards for these motorcycles, and to include NO_x requirements. STAPPA/ALAPCO and MECA similarly suggest that new Class I and II standards should be based on catalyst technology, or at a minimum, harmonized with European Union 2006 standards. The New Hampshire DES applauds EPA for harmonizing with the California standards and confirms that most Class I and II motorcycles already meet the proposed standards. The Michigan DEQ stated that the Class I and II standards should be implemented as soon as possible, but they did not suggest a specific date or model year. Environmental Defense pointed to the fact that all current Class I and II motorcycles already meet the proposed standards as a strong reason for EPA to accelerate implementation of these standards to no later than 2005.

MIC pointed out that the fact that all Class I and II motorcycles currently meet the proposed standards is a relatively recent occurrence, and that there may be models planned for production in the immediate future that will not meet the proposed standards with an adequate compliance margin. They suggest that manufacturers should have a reasonable lead time to meet more stringent standards, especially if they have been developing models in the context of the current standards.

Some commenters expressed concern that overly stringent standards could cause foreign manufacturers to withdraw from the U.S. market. These commenters highlighted the benefits of smaller motorcycles as economical means of short distance transportation, and they suggested that the small-displacement market may be the most vulnerable due to lower profit margins and lower absolute profits. These motorcycles were also pointed to as being good motorcycles for relative beginners.

Our Response:

We agree that harmonizing the Class I and II standards with the California standards does not appear to result in large actual emission reductions in the near term. Most current

motorcycles in these classes already meet these standards. However, we do agree with MIC's assertion that this is a recent phenomenon, and that an accelerated time frame is not necessary, and nor would such an approach offer additional reductions under the current compliance situation. However, when finally in place, the standards will establish certainty that the current motorcycles that meet the standards will continue to do so in future model years, and any new motorcycles that are introduced in these classes will also meet the standards. We agree with MIC that, were any current or planned motorcycles in need of further design changes in order to meet the standards or to provide an additional compliance margin, the manufacturer would need more lead time than an implementation date of 2004 or 2005 would provide.

In addition, to avoid undue complexity we see a benefit to synchronizing the implementation of the under 50cc category with the other Class I motorcycles, and clearly the under 50cc category, which has not been regulated before in the U.S., will require some lead time to meet new standards. We agree with the motorcycle manufacturers that it is necessary to introduce the standards for the under 50cc category no earlier than the 2006 model year. There is no significant detriment to emissions to formally implementing the standards for those Class I motorcycles over 50cc and Class II motorcycles at the same time.

The more significant issue is whether EPA should be considering more stringent - and perhaps catalyst-forcing - standards for Class I and II motorcycles. While we have considered this, we believe that harmonization with the California standards is the appropriate step at this time. Currently Class I and II motorcycles represent less than ten percent of motorcycle sales, making Class III motorcycles an appropriate focus at this time. In addition, and as stated in the proposal, we want to exercise special care with the respect to Class I and II motorcycles because of the potential risk of driving international manufacturers from the U.S. marketplace. The distinct possibility exists that even large international manufacturers (such as Piaggio), who represent more than 95 percent of the market for these motorcycles, would forfeit their position in the small U.S. marketplace for small motorcycles rather than deal with the costs of meeting U.S. standards. However, we do remain concerned that the proposed standards, which we have determined to finalize, do not address NO_x emissions from Class I and II motorcycles. Consequently, we are also adopting an optional HC+NO_x standard for Class I and II motorcycles. Use of this optional standard will be required if a manufacturer wishes to take advantage of an averaging program for Class I and II motorcycles. We believe an appropriate approach may be to look to international harmonization for regulation of these motorcycles, given that these motorcycles are much more prevalent in foreign countries. Since the European 2006 standards were not finalized until after our proposal, we were not able to adequately consider those standards. Although we are finalizing the standards as proposed, it is likely that we will reassess the possibility of more stringent standards that also address NO_x in the context of a rulemaking to consider the World Motorcycle Test Cycle (discussed in Section 7).

1.4 Class I Motorcycles Below 50 cc

What We Proposed:

We proposed that the definition of Class I motorcycles would be revised to include motorcycles under 50 cc. We proposed that all Class I motorcycles, including motorcycles under 50 cc, would have to meet the current California ARB exhaust emission standards on a nationwide basis starting with the 2006 model year. These standards are 1.0 g/km HC and 12.0 g/km CO, as measured on the existing Federal Test Procedure (FTP) for motorcycles. These standards have been in place in California since 1982, but not for motorcycles with an engine displacement under 50 cc.

We also requested comment on the cost and technology that would be associated with a HC (or HC+NOx) standard that ranged from 1.0 to 2.0 g/km. We stated that a standard in this range would be similar to standards in other countries where motorcycles under 50 cc are very common and would allow the use of similar technologies for U.S. standards.

What Commenters Said:

MIC said that they support the proposed under 50cc standards provided: 1) they have a shorter useful life (6000 km) and; 2) The certification test cycle is revised for vehicles with a top speed of under 36.5 mph such that the test speeds will be scaled to the vehicle's top speed (otherwise such vehicles would be operating at wide open throttle over test cycle). ACEM stated that they support standards that would allow European manufacturers to sell EU mopeds in the U.S. without special development for US market. Similarly, Maliguti USA commented that we should adopt the Euro 2 standards, stating that a single worldwide standard makes sense and would help companies that import scooters. ACEM supported the MIC comments regarding useful life and test cycle adjustment.

AMA stated that under 50cc models should not be covered by the proposed regulations. They felt that the costs required to meet the standards would cause the under 50 cc market's demise. They also felt that the addition of equipment (especially catalysts) ignores weight and placement issues. They do not support the elimination of the two-stroke engine as a viable solution to emission reductions in this price-sensitive segment.

Several states and environmental organizations expressed their support for our proposal. Environmental Defense also stated that support the use of four-stroke engines and the regulations should become effective prior to 2006.

Our Response:

With the exception of AMA, all of the commenters were supportive of our proposed standards. MIC and ACEM both were supportive of the standards, but felt that the useful life

period should be shortened from 12,000 km to 6,000 km. They also wanted the Class I motorcycle driving cycle to be modified to accommodate those under motorcycles 50 cc that aren't capable of meeting the top speed of the driving cycle. Data submitted by MIC from their 1998 Motorcycle Owners Survey on the mean annual miles traveled for motorcycles under 50 cc indicates that a useful life of 6,000 km is indeed more appropriate for these vehicles than the 12,000 km value that we proposed. We also concur with the comments regarding the Class I driving cycle. We will incorporate these changes in the final regulations. In Section 3.4, we discuss in further detail our response to MIC and ACEM's concerns over useful life and test cycle modifications.

ACEM stated that as long as we approved the modifications to the Class I motorcycle driving cycle proposed by MIC, mopeds and scooters tested over the EU test cycle and meeting the EU standards would be capable of meeting our proposed standards. Thus, they felt that they would be able to sell EU vehicles in the U.S. without special development for the U.S. market.

Environmental Defense commented that the regulations should take effect prior to 2006. We do not agree with this suggestion. Mopeds, scooters and other highway motorcycles with engine displacements under 50 cc have never been regulated federally or in the State of California. The transition from conventional two-stroke engines to clean two-stroke engines or four-stroke engines will not be trivial and will require years of lead time. These vehicles are not included in California's highway motorcycle program, so even though we are harmonizing with the California program, manufacturers of these smaller vehicles will not have the advantage of meeting the California standards prior to the federal standards that larger models will have. Therefore, we feel that it is appropriate to require highway motorcycles under 50 cc to meet our standards in the 2006 model year and not sooner.

AMA raised concerns over the increased costs for mopeds and scooters to meet the proposed standards. They stated that these vehicles are very cost-sensitive and that any increases in price would reduce demand in an already small market and possibly prompt manufacturers to stop offering these vehicles for sale in the U.S. They also argued that the potential use of catalysts would cause problems such as added weight and catalyst placement. Finally, they felt that the emissions contributions from these vehicles were too small to justify the elimination of two-stroke engines, which are the prevalent engines used in these vehicles.

While the majority of mopeds and scooters sold in the U.S. use two-stroke engines, there are a significant number of models that also use four-stroke engines. All Honda scooters sold in the U.S. use four-stroke engines, including their three under 50 cc models. There are also several scooters from Taiwanese and Korean manufacturers using four-stroke engines. There are a number of Italian scooter and moped manufacturers that sell two-stroke vehicles that use direct fuel injection (DFI) and are equipped with catalysts. In both cases, manufacturers have told us that the reason for the shift to clean two-stroke technologies and four-stroke engines has been prompted by tighter emission standards in Europe and Asia and the perceived benefits of these

technologies.⁶ The improved fuel economy, reduced exhaust smell and oil consumption of a four-stroke engine and the improved performance and durability, as well as reduced exhaust smell for a DFI catalyst equipped two-stroke engine are some of the benefits of four-stroke and DFI two-stroke engines over conventional two-stroke engines currently used in most models.

We do not believe that the cost increases to these vehicles for meeting our standards will be significant enough to cause concern with price increases. For example, Honda and Yamaha both have three under 50 cc scooter models available in the U.S. All three Honda models use four-stroke engines while all three Yamaha models use two-stroke engines. Both companies offer two models that are reproductions of older “vintage” models that look similar to Italian scooters from the 1960's and 1970's. The Honda and Yamaha models sell for the exact same price. Honda does have one model that is several hundred dollars more than the Yamaha models, but it is a high-end model that has many other features that may add to its price. We project an average cost increase for these motorcycles of \$44.

As stated above, several Italian scooter manufacturers have been building scooters equipped with catalysts for several years. They have not indicated any concerns with additional weight or catalyst placement, since the catalysts used are very small and typically located in the muffler. Therefore, we do not agree with AMA’s concerns about cost, weight, and catalyst placement for motorcycles under 50 cc.

1.5 Motorcycle Engine Manufacturers

What We Proposed:

We did not propose in the NPRM that the emission standards apply to motorcycle engine manufacturers as well as to motorcycle manufacturers. However, pursuant to comments received from Harley-Davidson at the public hearing, we requested additional comment on this issue in the Federal Register notice for extending the comment period published October 30, 2002.

What Commenters Said:

Harley-Davidson stated at the public hearing and in their written comments that EPA should follow California’s lead by specifically including engine manufacturers within the entities regulated by our proposed highway motorcycle regulations, including within the definition of “small volume manufacturer.” They argued that regulations should not be defined to exempt major engine manufacturers that produce thousands of highway motorcycle engines simply because they do not assemble many motorcycles. California’s regulations comprehensively apply

⁶ Memorandum, Roberts French to Docket A-2000-02, “Meeting with Erwin Segers, Honda Motor Company, and Federico Vitale, Piaggio - October 23, 2002,” October 28, 2002. Docket A-2000-02, document IV-E-16.

across the board to “motorcycles, motorcycle engines, and the manufacturers of either motorcycles or motorcycle engines.”

Our Response:

In order to properly respond to Harley-Davidson’s comment, we had several discussions with California staff and one of the larger motorcycle engine manufacturers to better understand how the California program worked with regard to engine manufacturers.⁷ The California regulations apply to “motorcycles, motorcycle engines, and the manufacturers of either motorcycles or motorcycle engines.” The California standards are vehicle-based requirements, like EPA’s, and do not allow for the certification of motorcycle engines to unique engine standards tested on an engine dynamometer. As such, an engine manufacturer has to install its engine into a motorcycle chassis that would represent a worst case vehicle configuration and test it over the FTP chassis test procedure.

California informed us that no engine manufacturers currently certify any of their engines. Instead, they apply for an Executive Order⁸ to sell some of their models as replacement engines for specific motorcycle manufacturers. For example, S&S engines has an Executive Order to sell some of their engine models as replacements for specific Harley-Davidson models. As the holder of an Executive Order, they are responsible for warranty and in-use compliance issues. The engines that are sold to motorcycle manufacturers (large or small) are installed in the complete motorcycles and the whole motorcycle model is certified by the motorcycle manufacturer. Since most of the motorcycle manufacturers who purchase engines from engine manufacturers specialize in customized designs, typically focusing on unique chassis designs and styles, they are reliant on the engine manufacturer to provide them with engines that meet the California standards. They typically purchase emission-compliant engines and engine deterioration factor data from the engine manufacturer and then certify the motorcycle with California.

Therefore, even though the California regulations appear to apply to engine manufacturers, none of them are certifying any engines since they tend to sell their engines to motorcycle manufacturers who certify them instead. The engines that are sold to individuals are sold as replacement engines. Replacement engines have to meet the same emission requirements

⁷ See Email from Steven Hada, California Air Resources Board, to Roberts French, EPA, “Re: Motorcycle Engine Manufacturers: Certification Questions,” May 15, 2003. Docket A-2000-02, document IV-G-05.

Memorandum, Roberts French to Docket A-2000-02, “Conference Call with S & S Cycle - May 13, 2003,” May 19, 2003. Docket A-2000-02, document IV-E-19.

Memorandum, Roberts French to Docket A-2000-02, “Phone Conversation with Tom Henline, S & S Cycle - May 14, 2003,” May 19, 2003. Docket A-2000-02, document IV-E-20.

⁸ In California, an Executive Order is a type of certificate that allows for the sale and use of aftermarket and replacement parts.

as the engines they are replacing. We do not see any reason why engine manufacturers wouldn't continue this same practice nationally once our new regulations take effect.

We understand the concern raised by Harley-Davidson, and we believe it merits further investigation and consideration. Among the issues to be assessed are the need for such provisions in the context of the way the market now behaves, if appropriate, the engine test cycle and equivalent emission standards in g/bhp-hr by Class, whether engine certification should be mandatory or set up as optional (in the way that the California manufacturers now behave) and small business issues. This could have the effect of "leveling the playing field" for all manufacturers and easing compliance for small motorcycle manufacturers. We believe that the vast majority of engines sold by engine manufacturers will go to small motorcycle manufacturers who will be required to certify the complete motorcycle. Most of the small volume manufacturers that sell motorcycles in the U.S. tend to be companies that sell custom cruiser models and have low sales volumes where the most stringent standards which now would apply are Tier 1 in 2008. If a motorcycle manufacturer has sales that exceed our small volume manufacturer criteria of 3,000 units, they would no longer qualify as a small volume manufacturer and would be required to meet whatever standards are appropriate. Though we do not believe it is necessary to promulgate regulations for engine manufacturers at this time, we plan to reexamine this issue as part of the 2006 technology review.

Chapter 2 - Permeation Emission Standards

2.1 Standards

2.1.1 Level of Standard

What We Proposed:

In the NPRM, we requested comment on setting permeation emission standards for motorcycle fuel tanks and hoses. For fuel tanks, we discussed in detail potential standards requiring a 95% reduction in permeation emissions. These reductions imply a tank permeability standard of 0.04 grams per gallon per day (g/gal/day) at 30°C or 0.4 to 0.5 grams per square meter per day (g/m²/day). For hoses, we considered a permeation standard of 5 g/m²/day at 23°C. This constitutes a 99% reduction in permeation when compared to the SAE R7 hose specification of 550 g/m²/day at 23°C. We focused on permeation emissions rather than on broad evaporative emissions standards, such as those established in California for motorcycles. In a supplemental *Federal Register* notice (67 FR 66097, October 30, 2002), we extended the comment period of the rule. In this notice we stated that if we were to finalize permeation requirements for motorcycles, that it is highly likely that the regulations would be modeled after those in the recreational vehicle regulations, which had been recently finalized. The recreational vehicle permeation standards are 1.5 g/m²/day for fuel tank permeation at 28°C and 15 g/m²/day for fuel hose permeation at 23°C both on a 10% ethanol fuel blend.

What Commenters Said:

MIC and AMA commented that fuel tank and hose permeation control is reasonable addition to the program, but the standards discussed in the proposal are too stringent and do not reflect the technology discussed in the Draft Regulatory Support Document (RSD). MIC recommended that the standards should be harmonized with the permeation standards for recreational vehicles stating that these controls would result in nearly as much reduction in emissions while being much more cost-effective. In addition, MIC stated that many of the on-highway motorcycle manufacturers also make recreational vehicles. AMA commented that broad evaporative emission standards such as required in California should not be adopted at this time.

STAPPA/ALAPCO, New Hampshire DES, NESCAUM, and Environmental Defense commented that we should establish evaporative emission standards for highway motorcycles. New Hampshire DES and NESCAUM commented that the evaporative emission standards should address the complete fuel system, including fuel line connectors and pumps, rather than just permeation from tanks and hoses. NESCAUM and Environmental Defense commented that, at a minimum, we should adopt the California evaporative emission requirements for motorcycles. Environmental Defense stated that the Section 202(a)(3)(E) of the Clean Air Act directs us to “consider the need to achieve equivalency of emission reductions between

motorcycles and other motor vehicles to the maximum extent practicable.” Environmental Defense commented that the fuel tanks in highway motorcycles are similar to recreational vehicle fuel tanks which are already regulated for permeation.

Our Response:

We are finalizing the same permeation emissions standards for motorcycles as are already in place for recreational vehicles. These standards are 1.5 g/m²/day for fuel tank permeation at 28°C and 15 g/m²/day for fuel hose permeation at 23°C on a 10% ethanol fuel blend.

We have identified several technologies that could reduce plastic fuel tank permeation emissions by 95% as discussed in the NPRM which would bring emissions below the final standard with a considerable margin of safety. Variation in material tolerances and in-use deterioration can reduce this effectiveness, especially for barrier treatments. For instance, in the slosh testing of sulfonated fuel tanks referenced in Chapter 4 of the Final RSD, the sulfonated fuel tanks were later determined to be using an ultra-violet (UV) light inhibitor that interferes with the sulfonation process. We believe that, given the lead time for the standards (see section 2.1.2), manufacturers will be able to provide fuel tanks with consistent material quality, and we believe that the surface treatment processes can be optimized for a wide range of material qualities and additives such as pigments, plasticizers, and ultra-violet (UV) light inhibitors. For instance, there are two other UV inhibitors, at roughly the same cost, that could be used in motorcycle fuel tanks that do not inhibit the sulfonation process.

We believe that the technology is available to ensure the durability of these products to meet our standards throughout the vehicles useful life. Durable low permeation technologies and materials design are discussed in more detail in section 2.1.3. Our test procedures require that manufacturers design their products to withstand sloshing, pressure-cycling, and UV exposure. Therefore, we do not expect a large deterioration in use. Chapter 4 of the Final RSD presents data on a sulfonated automotive fuel tank tested before and after five years of service that shows no measurable decline in permeation resistance. However, the Final RSD provides data on slosh testing on fluorinated and sulfonated fuel tanks (which may be harsher than typical motorcycle conditions) which suggests that some deterioration may occur. To accommodate variability and deterioration, we revised the standard to represent an 85% reduction in plastic fuel tank permeation at the end of the motorcycles useful life. It is our expectation that manufacturers will aim for a surface treatment 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.

The final hose standard is consistent with current SAE recommended practice. The standard is consistent with the permeation specification for SAE J30 R9 hose except that the test fuel is a 10% ethanol blend rather than Fuel C, which is similar in permeation characteristics to gasoline. Several materials are available today that could be used as a low permeation barrier in rubber hoses that are resistant to permeation on alcohol fuel blends. In fact, SAE J30 specified

R11 and R12 hose which are low permeability hoses tested on a 15% methanol blend. As discussed below, manufacturers using R11-A or R12 hose may choose to certify by design.

We believe that it is not necessary to adopt broad evaporative emission standards such as California's at this time. In addition, we did not discuss potential standards for non-permeation evaporative emissions in the NPRM. The fuel tanks are generally small in volume (most are ≤ 6 gal), resulting in diurnal and refueling emissions that we expect to be proportionately low. As described in the Final Regulatory Support Document, permeation from fuel tanks and hoses makes up more than two-thirds of the evaporative emissions from motorcycles. Diurnal emission rates are also reduced relative to permeation because many on-highway motorcycles are stored inside when not in-use. The use rates of motorcycles are likewise low compared to other sources and we expect that hot soak emissions will be relatively low as well. Also, focusing on the permeation rate of tanks and hoses significantly simplifies emissions testing. Diurnal and refueling emission tests require the use of a SHED which increases testing costs. If the standards were based on the motorcycle fuel system as a whole, each fuel system would need to be tested which would increase cost. Design-based certification may not be possible for standards based on the vehicle as a whole because of the added complexity of the system being considered.

We did not discuss the potential for diurnal emission control in the proposal. The primary diurnal control technology used for automotive applications is to collect the vapors in an activated charcoal canister then purge the canister to the engine during operation. This technology works well for automobiles which are operated nearly every day, but it is less clear how effective it would be for motorcycles that may sit for weeks at a time. Without engine purge, the canister would likely saturate after a few days and would no longer be able to collect HC vapor. In the context of a rule for marine evaporative emissions, we are investigating new approaches to achieving control of diurnal emissions. If, upon further investigation, these approaches prove to be feasible in applications such as motorcycles and recreational vehicles, we could address this issue in a future rulemaking.

Environmental Defense claims that EPA would be acting contrary to law if it did not finalize rigorous evaporative emission standards, but it is unclear what the basis is for that comment and what it means by rigorous standards. The comment notes that motorcycle standards should "consider the need to achieve equivalency of emission reductions between motorcycles and other motor vehicles to the maximum extent practicable," but then refers approvingly to the recently-promulgated evaporative standards for recreational vehicles, which it notes have tanks that are similar in size and design to tanks in motorcycles. These final evaporative regulations are equivalent to those standards. In addition, as discussed above, EPA did consider the need for standards regulating other types of evaporative emissions, and found that, for this application, such regulation is not necessary at this time because such emissions appear to be small and the emission reductions likely to result from such standards do not appear to justify the cost of the technology needed to reduce those emissions.

2.1.2 Implementation Date

What We Proposed:

We requested comment on promulgating permeation standards for tanks and hoses for all highway motorcycles beginning in the 2006 model year.

What Commenters Said:

Harley-Davidson commented that the permeation standards for recreational vehicles, which have already been finalized, will not be implemented until 2008. Therefore, they believe that it is unreasonable, and does not follow any logical basis, for the highway motorcycle regulations to begin in 2006.

Our Response:

We are implementing the permeation emission standards for motorcycles in 2008. This implementation date is consistent with that for recreational vehicles. Plastic fuel tanks and hoses used on motorcycles are of similar construction as those used on recreational vehicles. In addition, many of the motorcycle manufacturers also make recreational vehicles.

Several technologies are available that could meet the fuel tank standard. Surface treatments to reduce tank permeation are widely used 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, we believe it is appropriate to give manufacturers until the 2008 model year to the fuel tank permeation standards. 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 who choose to set up their own sulfonation or fluorination facilities in-house or for those who wish to assess the use of alternate materials.

We are implementing the low permeation hose standards in the same model year as the fuel tank standard. Lower permeation fuel hose are available today for automotive applications that would meet our standards. However, some lead time may be required to apply these hoses to motorcycles if hose connection fitting changes were required and as is true in many cases special forming is required for safety or aesthetic reasons. Also, manufacturers that do not use hose designed to SAE requirements have to develop and test their hose designs. While a single test may be performed in less than 2 months, optimizing hose design for use in motorcycles may take several iterations.

2.1.3 Technical Feasibility

What We Proposed:

We stated that we believe there are available technologies that can reduce permeation emissions to near-zero levels. The application of these technologies to motorcycles appears to be relatively straightforward, with little cost and no adverse performance or aesthetic impacts. In addition, the control technology would generally pay for itself over time by conserving fuel that would otherwise evaporate.

For fuel tanks, we discussed several technologies including barrier treatments such as sulfonation or fluorination, alternative materials such as nylon, and coextruded EVOH barriers. For fuel hoses we discussed the use of thermoelastomers or thermoplastics to create a low permeability barrier in the hose.

What Commenters Said:

MIC commented that they did not believe that requiring a 95% reduction in permeation on 10% ethanol fuel could be met with inexpensive technology such as fluorination or sulfonation. MIC stated that the control requirement adopted for off-highway motorcycles and ATVs would provide almost as much control and would be more cost-effective if EPA made the technical amendments provided (primarily dealing with the use of gasoline rather than 10% ethanol fuel for testing). AMA commented that a 95% reduction in plastic fuel tank permeation does not seem feasible based on the technology discussed in the NPRM. AMA also expressed concern that low permeability hose used for other motor vehicles may not be appropriate for motorcycles because the hose would need to be designed for elements such as location, exposure, and vibration that are unique to motorcycle design.

New Hampshire DES and NESCAUM commented that evaporative emission regulations have been in place for motorcycles since the 1980's, so evaporative emission control is technologically feasible with off-the-shelf technology. Environmental Defense commented that evaporative emission control technologies are long-proven for automotive gas tanks, consumer products in plastic containers, and portable gas cans.

Our Response:

Tanks

We have identified five technologies that could be used to meet the fuel tank permeation standard. These technologies are sulfonation, fluorination, coextrusion with a barrier layer, non-continuous barrier platelets (i.e. Selar®), and alternative materials. These technologies are discussed in detail in Chapter 4 of the Final Regulatory Support Document. This discussion includes test data on more than 150 fuel tanks and includes data on gasoline and alcohol blends.

The test data shows that the final standards can be met using any of these technologies. This data includes slosh testing on sulfonated and fluorinated fuel tanks that shows no significant deterioration after 1.2 million cycles as well as in-use data on a sulfonated automotive fuel tank showing no deterioration. We believe that these conditions are at least as severe as would be seen on motorcycles.

As discussed above in Section 2.1.1, we believe that by revising the standard to 1.5 g/m²/day, we are allowing for variability and deterioration, and we do not believe that it is appropriate to relax the standard further to accommodate less effective technology. Barrier treatment vendors are already working with fuel tank manufacturers to identify appropriate material specifications. Therefore, given the lead time for the standards, we believe that manufacturers will be able to provide fuel tanks with consistent material quality, and we believe that the surface treatment processes can be optimized for a wide range of material qualities and additives such as pigments, plasticizers, and UV inhibitors. MIC expressed concern about the effectiveness of surface treatments with the materials they use in their plastic fuel tanks. However, we believe that the fuel tank manufacturers and surface treatment specialists will be able to work together to identify materials and processes that can be used to meet the standards. For instance, the UV inhibitor known as HALS can reduce the effectiveness of the sulfonation process. Two other UV inhibitors, known as carbon black and adsorber UV, are also used in similar fuel tank applications. These UV inhibitors cost about the same as HALS, but have the benefit of not interfering with the sulfonation process. A list of resins and additives that are compatible with the sulfonation process is included in the docket.⁹ Acceptable levels of pigments and plasticizers are within the range of currently produced fuel tanks. Test data presented in Chapter 4 of the Final RSD on fluorinated and sulfonated fuel tanks shows that the materials can be optimized for both processes to meet our standards, even after slosh testing.

MIC also expressed concern about the feasibility of meeting the permeation standards using 10 percent ethanol fuel. However, as discussed in Chapter 4 of the Final Regulatory Support Document, data shows that there is no significant increase in permeation from sulfonated or fluorinated fuel tanks when alcohol blended fuel is used. This is not true for technologies relying on the barrier properties of nylon such as injection molded nylon tanks or nylon-based Selar®. In fact, the permeation rate of 10 percent ethanol fuel through nylon is more than ten times higher than the permeation rate of gasoline. However, ethylene vinyl alcohol-based Selar® has much better permeation resistance to alcohol fuel blends and could be used to meet the final standards. Also, multi-layer fuel tank construction with a low-permeation barrier (such as ethylene vinyl alcohol (EVOH) which is used in automotive applications) could be used to meet the final standards. Chapter 4 of the final RSD presents permeation data on these technologies.

Hose

⁹ "Resin and Additives - SO3 Compatible," Email from Tom Schmoyer, Sulfo Technologies to Mike Samulski and Glenn Passavant, U.S. EPA, June 19, 2002, (Docket A-2000-01, document IV-A-40).

Several materials are available that could be used to produce fuel lines and hoses that will meet our hose permeation standards. Automotive applications use thermoplastic fuel lines with short sections of low permeation barrier hose where excessive vibration or bending is a concern. The following discussion describes this low permeation technology and how it may be used in motorcycle applications. In addition, the Society of Automotive Engineers (SAE) includes several specifications for permeation rates in their recommended practices. We employed these recommended practices as a resource in promulgating the fuel hose requirements. However, these specifications generally vary from our standard in the level specified, the test temperature, and the test fuel. To compare the different SAE standards to our standards, we reviewed the effects of temperature and test fuel on the permeation rates of materials used in fuel hose construction. Chapter 4 of the Final Regulatory Support Document presents information including data for several materials used in hose constructions showing the effects of temperature and fuel on permeation rates.

Thermoplastic fuel lines for automotive applications are generally built to SAE J2260 specifications which include very low permeation levels. Category 1 fuel lines under SAE J2260 have permeation rates of less than 25 g/m²/day at 60°C on CM15 fuel.¹⁰ This permeation rate is four times lower than specified for SAE J30 R12 which, as discussed below, we believe is more stringent than the standard of 15 g/m²/day at 23°C on a 10% ethanol fuel blend. Data in section 4.2.2.3 of the Final RSD shows that, for most materials, permeation rates are higher on CM15 than CE10 and permeation increases exponentially with increases in temperature. In the recreational vehicle rule, manufacturers commented that plastic fuel line, such as specified in SAE J2260, would not meet the flexibility and durability requirements for their products. In this rule, AMA expressed concern that fuel line must be designed for elements such as location, exposure, and vibration that are unique to motorcycle design which uses rubber hose today. However, no data has been presented to EPA suggesting that fuel lines used on motorcycles would be subjected to more vibration or exposure than hose used in automotive applications. In any case, the motorcycle hose permeation standards can be met using flexible hose containing low permeation barrier layers such as SAE J30 R11-A and R12 hose.

SAE J30 R11 and R12 hose are intended for use as low permeation fuel feed and return hose. R11 has three designations known as A, B, and C. Of these, R11-A has the lowest permeation specification which is a maximum of 25 g/m²/day at 40°C on CM15 fuel. Because permeation rates are generally higher on CM15 than CE10¹¹ and because they are 2-4 times higher at 40°C than at 23°C, hose designed for this specification would meet our permeation requirement. R12 hose has a permeation requirement of 100 g/m²/day at 60°C on CM15 fuel. This is roughly equivalent in stringency as the R11-A permeation requirement. These hose specifications can be met without a significant change in the flexibility of the hose compared to

¹⁰ ASTM Fuel C refers to a blend of 50% toluene and 50% isooctane by volume. This fuel has similar permeation characteristics as gasoline. CM15 refers to a blend of 15% methanol and 85% ASTM Fuel C.

¹¹ CE10 refers to a blend of 10% ethanol with 90% Fuel C.

R9 or even R7 fuel hose used today on motorcycles. The low permeation hose is essentially constructed in the same way as current hose with the addition of a very thin permeation barrier. There is no evidence in the record that these hoses are in any way inappropriate for motorcycle use. Based on the data referenced above from the Final RSD, hose meeting the SAE J30 R11-A and R12 permeation limits would be expected to meet the new standard of 15 g/m²/day at 23°C on 10% ethanol fuel. Section 2.2.1 of this chapter gives an example of an analysis of how a sample hose construction meeting the SAE J30 R11-A standards would perform on our test procedure.

There are lower permeation fuel hoses available today that are manufactured for automotive applications. These hoses are generally used either as vapor hoses or as short sections of fuel line to provide flexibility and absorb vibration. Chapter 4 of the Final Regulatory Support Document presents data on several low permeation hose constructions that meet the motorcycle permeation standards. Based on samples used on our testing, these hoses are not significantly different, in look and flexibility, than the hose used in motorcycles today. Low permeation hose, using THV¹² or Teflon® as a barrier, is produced in mass quantities today for automotive applications and is readily available for use in motorcycles.

2.2 Certification and Compliance

2.2.1 Certification by Design

What We Proposed:

The NPRM did not explicitly discuss certification by design for highway motorcycles, but it did discuss allowing manufacturers to submit a statement at the time of certification that the fuel tanks and hoses meet standards, specified materials, or construction requirements based on testing results. The discussion used as examples certification based on fluorination or compliance with SAE specifications. It also referred to the discussion of evaporative emission requirements for marine vessels which did discuss certification by design. In the supplemental *Federal Register* notice (67 FR 66097, October 30, 2002), we stated that if we were to finalize permeation requirements for motorcycles, that it is highly likely that the regulations would be modeled after those in the recreational vehicle regulations, which had been recently finalized. In the recreational vehicle final rule, we stated that test data could be carried over from year to year, and across similar fuel tank designs. We allowed design-based certification for metal fuel tanks and for fuel hoses manufactured in compliance with the following SAE specifications: SAE J30 R11-A, SAE J30 R12, or SAE J2260 Category 1.

¹² Tetra-fluoro-ethylene, hexa-fluoro-propylene, and vinylidene fluoride (THV).

What Commenters Said:

Harley-Davidson suggested that manufacturers be able to get one-time certifications of low permeability materials so that hoses and tanks using these materials would not need to be retested for each size and shape. They stated that they should not have to test tanks and hoses that are made from inherently low permeability materials. Harley-Davidson commented that manufacturers should be able to certify to permeation requirements by certifying that they are using equivalent or lower permeability materials as are used on their motorcycles to meet the California evaporative emission standards.

Several months after the comment period closed, MIC presented their recommendation of how a design-based certification program should be structured for evaporative emissions from their products (including motorcycles, recreational vehicles, and personal watercraft). Under this approach, EPA would establish and publish a list of acceptable designs, treatments, and technologies that could be used for design-based certification. The covered emission control technology manufacturers would receive a letter of compliance. Vehicle manufacturers would only need to state that they are using emission control technology that is covered by a letter of compliance and would not be subject to in-use liability. In the case where a technology covered by a letter of compliance was found to be non-compliant, the letter would be repealed and the vehicle manufacturer would have the greater of 6 months or the start of the next model year to refrain from using this technology. In the case where a vehicle manufacturer was found to be using components not covered by a letter of compliance, they would have the option of offsetting the deficit through the use of ABT credits.

Our Response:

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 and carried across for similar designs if the worst case configuration was tested. For instance, if a certain level of sulfonation (i.e. measured SO₃ concentration on final product) is shown to meet the fuel standard for a fuel tank of a given material composition and wall thickness, this data could be used to certify similar fuel tank designs. A similar demonstration may be possible for fluorination. 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 mm², or the seals and gaskets would have to be made of a material with a permeation rate of 10 g/m²/day or less at 23°C as measured under ASTM D814.¹³

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), testing on a worst case configuration would initially need to be performed, but the data could then be used to certify other fuel tanks using the same material.

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 J2260¹⁴ Category 1 requirements could be design-certified to the standard. Although these fuel hoses and fuel line specifications are based on 15 percent methanol fuel and higher temperatures, we believe that fuel hoses and lines meeting these requirements would also meet our hose permeation standards based on the material property data presented in Chapter 4 of the Final RSD.

The following is an example showing how a potential hose construction designed to meet the R11-A standard would perform on our proposed standard. This methodology could be used to compare other hose constructions and emissions requirements to our standard by using data presented in Chapter 4 of the Final RSD. In this example, consider the use of a fluoropolymer known as ETFE as the barrier layer to meet the R11-A standard. Data in the RSD for one brand of ETFE tested on CE10 shows a permeation rate of 0.7 g-mm/m²/day at 40°C compared to 1.7 g-mm/m²/day at 50°C. This data can be extrapolated using Fick's Law of Diffusion,¹⁵ which describes the relationship between permeation and temperature. Using this relationship, we determined that ETFE would have a permeation rate of about 0.2 g-mm/m²/day at 23°C. On CM15, at 40°C, the permeation rate is 1.8 g-mm/m²/day. Based on this information, a hose just

¹³ ASTM Standard Test Method D 814 - 95 (Reapproved 2000), "Rubber Property–Vapor Transmission of Volatile Liquids," (Docket A-2000-01, document IV-A-95).

¹⁴ SAE Recommended Practice J2260, "Nonmetallic Fuel System Tubing with One or More Layers," 1996, (Docket A-2000-01, document IV-A-18).

¹⁵ Lockhart, M., Nulman, M., Rossi, G., "Estimating Real Time Diurnal Permeation from Constant Temperature Measurements," SAE Paper 2001-01-0730, 2001, Docket A-2000-01, Document IV-A-21.

meeting the R11-A specification (25 g/m²/day at 40°C on CM15) would have a permeation rate of about 3 g/m²/day at 23°C on E10 fuel, which is well below the 15 g/m²/day standard.

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. We would not consider hoses meeting SAE J30 R9 as meeting the standard by design because hoses meeting this standard are tested on a ASTM Fuel C which does not contain alcohol. On the 10 percent ethanol fuel specified in our permeation test procedures, R9 hose could exceed the standard.

We do not believe that the use of the same or lower permeation materials as for California certification necessarily guarantees that the motorcycle would meet our permeation standards. The California standards are based on diurnal testing of a complete motorcycle and do not necessarily require low permeation hoses and tanks nor are the standards or test procedures designed to drive the use of low permeation technology.

While we support the concept of design-based certification, the program recommended by MIC raises several issues. First, the MIC program does not include a requirement that the designs certified under this program would need to be stringent enough to meet, in all circumstances, the performance-based standards. Second, the proposal puts all of the compliance burdens on vendors supplying the vehicle manufacturers which could raise new small business issues and would substantially complicate the compliance program for these requirements. It also may make enforcement of the regulations more difficult. Third, the recommended procedures for enforcement, such as the 6 month delay to stop using noncompliant technology, lack of penalties for manufacturers holding a letter of compliance, and allowance of offsets for vehicle manufacturers would result in a weak or legally unacceptable compliance program. Finally, we would not be able to consider changes to the recreational vehicle rule without reopening that rulemaking. In summary, we do not see the MIC proposal to be workable as structured.

2.2.2 Averaging, Banking, and Trading

What We Proposed:

We did not discuss averaging, banking, and trading (ABT) for permeation emissions for motorcycles in the NPRM; however, the supplemental notice for an extended comment period (67 FR 66097, October 30, 2002), stated that if we were to finalize permeation requirements for motorcycles, that it is highly likely that the regulations would be modeled after those in the recreational vehicle regulations, which had been recently finalized. The final recreational vehicle rule contains ABT provisions for fuel tank permeation. We specified that a metal fuel tank may certify by design, but cannot generate credits for ABT.

What Commenters Said:

MIC commented that they would need to be able to average their emissions across their entire product line, including metal tanks, to meet a 95% permeation reduction requirement on 10% ethanol fuel.

New Hampshire DES commented that they do not support ABT for evaporative emissions because it would promote the use of poor performing evaporative systems.

Our Response:

We are finalizing an ABT program as a voluntary provision for non-metal fuel tanks in order to encourage early compliance and the use and of testing of permeation resistant materials. 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 of vehicles without metal fuel tanks.

As discussed above, 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. MIC commented that they would need these credits to meet the permeation standard as proposed. However, as discussed in section 2.1.3, there are several technologies that can be used to meet the final permeation standards without the use of ABT between metal and plastic tanks.

We do not believe that ABT would promote the use of poor performing evaporative systems. A 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. 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 volume of their fuel tanks uncontrolled or controlled to a higher level FEL. 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/m²/day. This level is a high-end estimate of uncontrolled emissions based on data presented in Chapter 4 of the final RSD.

2.3 Test Procedures

2.3.1 Test Fuel

What We Proposed:

We did not specifically discuss test fuel for motorcycle permeation standards in the NPRM. We requested comment on appropriate fuels in the marine sections including gasoline, 10% ethanol, and 15% methanol. The supplemental notice for an extended comment period (67 FR 66097, October 30, 2002), stated that if we were to finalize permeation requirements for motorcycles, that it is highly likely that the regulations would be modeled after those in the recreational vehicle regulations, which had been recently finalized. The final recreational vehicle permeation standards use a 10% ethanol fuel blend.

What Commenters Said:

MIC commented that the preconditioning soak for certification testing and emissions testing during durability testing should be based on fuel without alcohol and recommended a technical amendment to permeation standards for recreational vehicles to remove the requirement that the standards be met using 10% ethanol fuel.

Our Response:

We are requiring that the fuel used for permeation testing be a blend of 90 percent gasoline and ten percent ethanol (E10). This fuel is consistent with the test fuel used for on-highway evaporative emission durability testing and more importantly, E10 is commonly found in the motor vehicle fuel pool. In 2001, there were over 17 billion gallons of gasoline containing ethanol sold in the US. We believe that it is appropriate to base the standards on this fuel because higher permeation is seen on alcohol blends for many materials used in fuel systems, ethanol is commonly blended into fuels in-use, and alcohol fuels may be used more in the future in an effort to use renewable energy sources. For fuel tank permeation testing, the permeation weight loss test may be performed using gasoline; however, all of the durability testing and preconditioning must be performed using E10 fuel. Finally, as discussed in section 2.1.3, meeting the standard on a 10% ethanol blend is technologically feasible.

2.3.2 Durability Test Procedures

What We Proposed:

We did not specifically discuss durability test procedures for motorcycle permeation standards in the NPRM. The supplemental notice for an extended comment period (67 FR 66097, October 30, 2002), stated that if we were to finalize permeation requirements for motorcycles, that it is highly likely that the regulations would be modeled after those in the

recreational vehicle regulations, which had been recently finalized. The final recreational vehicle permeation standards state that the permeation standards must be met through the full useful life. For fuel tanks, several durability tests are required including fuel soak, slosh testing, UV exposure, and pressure cycling. For hoses, we reference several SAE designations as appropriate for design-based certification.

What Commenters Said:

Harley-Davidson commented that if SAE testing methods are used to determine fuel hose and tank permeability, it would imply that the useful life of these components must be 100,000 miles because the SAE testing methodology is intended for passenger car applications and assumes a 100,000 mile useful life. While Harley-Davidson believes use of SAE certification may be a superior alternative to a more complicated test regimen, the comment stated that EPA should work with the SAE committee to eliminate this ambiguity.

Our Response:

We are finalizing the same fuel tank durability test procedures for motorcycles as are required for recreational vehicles. These durability procedures include slosh testing, pressure-vacuum cycling, and UV exposure as measured in a bench procedure, not on a vehicle over a driving track. Although these procedures are based on a draft SAE procedure, they are not necessarily designed to represent 100,000 miles of automotive driving. The purpose of the deterioration tests is to help ensure that the technology is durable and the measured emissions are representative of in-use permeation rates. The standards apply to motorcycles for their regulatory useful lives (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). We believe that there should be no ambiguity regarding useful life because regulatory useful life is spelled out explicitly in the regulations.

Although we allow manufacturers to design-certify based on meeting certain SAE requirements, manufacturers are not required to meet any SAE standards to certify their hose. We do not specify durability tests for hose; however, manufacturers are responsible for ensuring that the hose passes the standard throughout the regulatory useful life of their motorcycles. We presume that hose meeting SAE requirements would meet the durability requirements associated with these standards.

2.4 Regulatory Impacts

What We Proposed:

We estimated that the standards discussed in the NPRM would result in a 95% reduction in fuel tank permeation and a 99% reduction in fuel hose permeation. In 2030, when essentially all motorcycles would be using the new technology, we projected an emission reduction of 25,900 tons per year. We estimated an incremental cost to meet low permeation fuel tank

requirements of \$4.10 for motorcycles with a plastic tank (no cost for a metal tank), and an incremental cost of \$2.00 for low permeation hoses. In addition, our analysis showed that the discounted average lifetime fuel savings would be higher than cost of the low permeation technology.

What Commenters Said:

Harley-Davidson commented that they believed the permeation requirements would be more expensive than estimated by EPA. EPA's estimate of \$3 per motorcycle is misleading because it is averaged across bikes with metal and plastic tanks. Because only 25% of motorcycles have plastic tanks the real cost would be \$12 using EPA's estimates. Harley-Davidson estimates that the costs of the permeation requirements would be \$5-28 per vehicle and notes that this cost would decrease if costly R12 hose is not required. They also commented that EPA did not adequately explain how the compliance cost estimates were estimated

New Hampshire DES and NESCAUM commented that evaporative emissions contributes significantly to hydrocarbon emissions. NESCAUM stated that permeation from motorcycles could be as high as 25,000 tons in 2030. NESCAUM also commented that there is evidence of evaporative emissions from couplings and pumps. Environmental Defense commented that evaporation will occur year-round in motorcycles stored with gasoline in their tanks.

Our Response:

Chapters 5 and 6 of the Final Regulatory Support Document (RSD) present our analysis of the costs and benefits of the permeation standards for tanks and hoses. Harley-Davidson commented that the \$3 average cost per motorcycle for permeation control is misleading because it averages motorcycles with plastic and metal fuel tanks; therefore the real cost is \$12. This is not the case. As stated in the preamble, the fuel tank cost was estimated to be \$4.10 and the hose cost was estimated to be \$2.00 for a total of \$6.10.

As described in the RSD, we have updated our costs and benefits. The cost estimates for the NPRM discussion were based on published pricing for fluorination. Since then, we have received the price that one company is paying for sulfonation today, which is lower than the cost used in the NPRM. In addition, we have adjusted the baseline fuel tank permeation rate based on new data that has become available since the NPRM. We have updated our estimate of the fraction of new motorcycles with plastic fuel tanks.¹⁶ The final analysis estimates that 15% of new motorcycles use plastic fuel tanks. For hoses, we added the cost of clamp upgrades that may be required with a barrier hose. Harley-Davidson did not provide detail on their estimated costs per motorcycle, so we can not directly respond to their estimates.

¹⁶ "Use of Plastic Fuel Tanks in Highway Motorcycles," Memorandum from Roberts French to Docket A-2000-02, June 5, 2003, Docket A-2000-02. Docket A-2000-02, document IV-B-06.

Based on the use of sulfonation and barrier hoses, we estimate the total per vehicle costs would be \$3.36 for motorcycles with plastic fuel tanks (tank + hose cost) and \$1.68 for motorcycles with metal fuel tanks (hose cost only). Weighting the costs across motorcycles with metal and plastic fuel tanks, we get an average cost of \$1.93 per motorcycle. In addition, we estimate that the reduction in these permeation emissions results in a discounted lifetime fuel savings of \$9.20 for motorcycles with plastic fuel tanks and \$6.23 for motorcycles with metal fuel tanks. Weighting the costs across motorcycles with metal and plastic fuel tanks, we get an average discounted fuel savings of \$6.67 per motorcycle. Therefore, this rule, on average will result in a lifetime savings of \$4.74 per motorcycle when the technology cost and fuel savings are both considered. This results in a discounted cost-effectiveness of \$105 without fuel savings and (\$258)¹⁷ with fuel savings.

Another technology that may be used to meet the tank permeation standard is to use coextruded plastic tanks with a continuous, low-permeation barrier layer such as used on automotive applications. Based on a production run of 150,000 tanks per year, we estimate that the cost would increase \$4.54 per tank compared to a cost increase of \$1.68 for sulfonation. Even at this cost, on average, the discounted fuel savings would outweigh the cost. Chapter 5 of the final RSD provides more detail on our cost analyses.

The comments from the environmental groups on permeation emissions are consistent with the emission inventory estimates in our final rule. NESCAUM did not provide any information on the evidence of evaporative emissions from couplings and pumps nor did they quantify the emissions. We do not have specific information on this potential source of emissions and did not include it in our emissions analysis.

2.5 Other Issues

2.5.1 Notice and Comment

What We Proposed:

The NPRM requested comment on potential fuel tank and hose permeation emission standards, including a detailed discussion on potential standards, emissions benefits, costs and available technology. The NPRM did not present potential regulatory text, but it did say that EPA expected any standards finalized would be similar in design to those proposed in the same NPRM for marine vessels. EPA requested comment on the form such standards should 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 is highly likely that the regulations would be modeled after those in the recreational vehicle regulations, which had been recently finalized. Interested parties wishing more detail on the type of regulatory program EPA

¹⁷ This value is negative because the savings outweigh the costs.

was considering were encouraged to review the recreational vehicle requirements. The comment period for the proposed rule was extended by 60 days, until January 7, 2003.

What Commenters Said:

Harley-Davidson commented that we proposed the permeation standards at a late date which is procedurally defective and unfair. They commented that the recreational vehicle standards were not finalized until 6 months after they were proposed, but that the motorcycle industry only has two months for public review and comment. Harley-Davidson believes that it is unlikely that this time period is long enough for EPA to fully review emissions and economic data and explore potential issues. They also commented that it is not clear how reviewing the regulations for recreational vehicle provides enough detail for them to comment on potential permeation requirements for on-highway motorcycles. They stated that they were not opposed to an appropriate approach to meeting permeation requirements for fuel tanks and hoses, but that they were concerned that the NPRM has not adequately and expressly considered potential issues associated with mandating certain types of fuel tanks and hoses. They state that recreational vehicles have different operational specifications, cost constraints, and sales data. “Even if EPA plans to adopt language directly from the recreational vehicle regulations, it has not discussed how (if at all) it proposes to modify or supplement this language in the highway motorcycle context.”

Our Response:

We disagree with the commenter’s discussion regarding timing. Commenters actually had substantially longer to comment on highway motorcycle evaporative standards than recreational vehicle standards, not shorter as Harley-Davidson implies. The period between the NPRM and signature of the final rule was over one year, substantially more than the six months noted by the commenter for the recreational vehicle rule. We provided clear public notice of the potential for permeation standards in the NPRM, and provided detailed analysis of the technologies, costs, emissions impact, and other factors relevant to promulgating such standards. We also noted that the regulatory text would be expected to be similar to that spelled out in the same NPRM for marine engines. We later supplemented the NPRM with further information noting that it was highly likely that any permeation regulations promulgated for highway motorcycles would be modeled after those recently finalized for recreational vehicles, including off-highway motorcycles.

We provided commenters almost five full months between the publication of the NPRM and the end of the comment period to provide comments. Commenters also had over two months from the publication of the supplemental notice to the end of the comment period. This period for public comment is longer than that provided in most similar rules. For example, it is considerably longer than the thirty days provided in the recreational vehicle rule. It is also longer than the thirty days following the hearing that is required under the Act. Commenters also had ample opportunity both during the comment period and after the comment period to discuss any

concerns they had with EPA directly and provide comments. We had several meetings with Harley-Davidson following the proposal, where these permeation standards, among other regulatory issues, were discussed.

We also disagree with the commenter's discussion regarding the adequacy of information provided for commenters and the use of the recreational vehicle regulations as a model for the highway motorcycle permeation regulations. The recreational vehicle regulations were fully provided in the recreational vehicle rule (which was available to the public on the EPA web site at the time of the supplemental notice and was published in the Federal Register on November 8, 2002). EPA also provided a detailed analysis and justification for such standards in that final rule. Harley-Davidson does not explain why the regulatory language in the final rule and the detailed discussions in the motorcycle NPRM and the recreational vehicle final rule did not provide enough information for it to provide informed comments. While Harley-Davidson mentions in summary terms possible distinctions between highway motorcycles and recreational vehicles, the comments do not explain what impact, if any, such general distinctions should have on the permeation requirements for highway motorcycles. In fact, the comments do not provide any facts at all regarding how permeation standards for highway motorcycles should be different than those for recreational vehicles, or why.

In contrast to Harley-Davidson's comments, the manufacturers represented in MIC had little trouble commenting on the specifics of this issue based on the information available, and stated that harmonization of the permeation requirements between recreational vehicles and highway motorcycles makes sense.

Chapter 3 - Compliance Provisions

3.1 Averaging Program

What We Proposed:

We proposed an emissions averaging program comparable to the existing California program. Under this program, Class III motorcycles could be certified at HC+NO_x levels above or below the applicable standard as long as a manufacturer's sales weighted emissions average was below the applicable standard. We also proposed that no single engine family could be certified to a Family Emission Limit (FEL) above 5.0 g/km HC+NO_x. This approach is consistent with our general approach to averaging programs, where we tend to set the FEL cap at the level of the previous standard. This would also allow the manufacturers the flexibility to maintain the small number of federally certified models that might otherwise have some difficulty meeting the 2.5 g/km cap in place in California.

In general, we did not propose an emissions banking and trading program for highway motorcycles. However, we did propose an early credits program similar to the one in place in California, with the timing adjusted due to the different federal Tier 2 standards implementation schedule. This early credits program would allow manufacturers to generate and bank credits prior to 2010 for motorcycles which meet the Tier 2 standards early. Credits would be calculated based on the amount that a motorcycle is below the Tier 2 standards, and could be used beginning with the 2010 model year. In order to provide incentives for the early introduction of Tier 2 motorcycles we also proposed that these early credits be increased 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.

We proposed that the averaging program be limited to Class III motorcycles. However, we requested comment on whether we should include Class I and II motorcycles in the averaging program, and outlined three possible approaches to doing this. Finally, we requested comment on whether there are any adaptations of the averaging program that would improve the flexibility for small volume manufacturers.

We did not propose an allowance for manufacturers to make post-certification FEL changes. We noted in the production line testing section that we would be unlikely to allow such post-production changes in the absence of production line testing.

What Commenters Said:

AMA, STAPPA/ALAPCO, NESCAUM and others all commented in support of the proposed averaging program. Conversely, ABATE of Cheyenne commented that sales-weighted averages should not be applied to emissions standards, as this would competitively favor large manufacturers with diverse product lines.

AMA commented in support of the proposed 5.0 /km HC+NO_x FEL cap. STAPPA/ALAPCO commented that the proposed FEL cap is insufficiently stringent and would not adequately protect against gross emitters, while NESCAUM suggested that we should review the technical arguments for the 5.0 g/km FEL cap and consider a more restrictive FEL cap closer to CARB's 2.5 g/km.

MIC commented in support of allowing Class III credits to offset Class I and II debits (accounting for differences in standards and useful life) using a scheme similar to California's Low-Emission Vehicle (LEV) Program. AMA also supported including Class I and II motorcycles in the averaging program, but instead suggested that simply adding them to the Class III averaging set would be the simplest approach. AMA pointed out that Class I and II motorcycles only accounted for seven percent of sales in 2002, and that this would be easiest approach. Finally, NESCAUM stated that it does not object to cross-class averaging, but commented that we need to be careful not to allow windfall credits when allowing Class III motorcycles to average with Class I and II motorcycles considering that Class I and II standards are less stringent than those for Class III. NESCAUM suggested we consider discounted credits to account for disparity of standards.

Our Response:

We do not agree with ABATE of Cheyenne that an averaging program would give a competitive advantage to large manufacturers with diverse product lines. Most of the manufacturers with truly limited product offerings would be considered small businesses. Such manufacturers will have special flexibilities made available to them, including a two year delay of the Tier 1 standards and no requirement to comply with the Tier 2 standards. We believe that these and other flexibilities offered to the small businesses will help them overcome any advantage that the averaging program might give large manufacturers. Thus, we are adopting an averaging program for highway motorcycles.

We believe that it is appropriate to retain our general historical approach to FELs caps by setting the Class III FEL cap at 5.0 g/km HC+NO_x, 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 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. We agree with commenters that the FEL cap should ultimately be set at a lower level. We are therefore adopting an FEL cap of 2.5 g/km HC+NO_x (the level of California's FEL cap) for Class III motorcycles, to be effective with the implementation of the Tier 2 standards in the 2010 model year. We believe this approach addresses concerns that a 5.0 g/km HC+NO_x FEL cap is not sufficiently stringent and would not protect against gross emitters. It is also consistent with our goal of aligning the federal and California requirements with respect to the technology mix required to meet both sets of standards.

We note that several commenters expressed support for adding Class I and II motorcycles to the averaging program, and we agree that doing so would provide additional flexibility to manufacturers. However, we share NESCAUM's concerns that the Class I and II emission standards are less stringent than the Class III standards. Thus, we believe the best way to include Class I and II highway motorcycles in the averaging program is to use the model of the California LEV program, as discussed in the proposal. Under this approach, credits from Class III motorcycles could be used to offset debits from Class I and II motorcycles. However, given that the Class I and II standards are less stringent than the Class III standards, we would not allow Class I and II credits to be used to offset debits from Class III motorcycles. This also addresses concerns 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. In addition to Harley Davidson, the list of Class III-only motorcycle manufacturers includes essentially all of the small motorcycle manufacturers in the U.S. This approach would also eliminate similar competitive issues regarding the importers of Class III motorcycles and importers of Class I and II motorcycles that do not also import Class III motorcycles. At this point, we are not allowing trading, and we received no comments requesting that we include trading in the final program. We recognize that any competitive advantage conferred to manufacturers and importers of Class I, II, and III motorcycles might have been mollified by a trading program. Note that we chose to set the Class I and II standards at levels that resemble those currently in place in Europe partly due to the absence of a trading program. We remain open to reconsidering the possibility of a trading program in the context of a rulemaking to consider the World Motorcycle Test Cycle (discussed in section 7.8).

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 size differences between the different motorcycle classes. Further, because the Class III standards are HC+NOx standards while the primary Class I and II standards are HC only, we will allow such averaging only if the manufacturer uses the optional HC+NOx 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+NOx standards in order to do so. This approach addresses the concerns raised by NESCAUM regarding possible windfall credits from Class I and II motorcycles. Consistent with our approach to FEL caps for Class III motorcycles, we are adopting 5.0 g/km HC+NOx 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.

As noted in section 3.3 of this chapter, we are not adopting a required production line testing (PLT) program. While we are not requiring a PLT program for highway motorcycles, 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 change. Presumably, a manufacturer would base its FELs on actual test data as well as some understanding of how much of a compliance cushion it would need to assure that its products would consistently emit at levels below the FEL. While an upward adjustment to an FEL would result in fewer credits being generated, a downward adjustment would result in additional credits being generated. We

believe that any downward adjustment to an FEL after certification would need to be justified in order to assure that the additional credits being generated are legitimate. Thus, we will not allow post-certification downward changes to FELs in the absence of supporting 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 to justify upward adjustments to FELs after certification because such an adjustment would result in fewer credits being generated.

3.2 Class III Useful Life

What We Proposed:

Useful life is the period over which a manufacturer must demonstrate the effectiveness of the emission control system. The current useful life for Class III motorcycles is 5 years or 30,000 km, whichever occurs first. Based on usage data supplied by an industry trade organization, we estimated that the average operating life of highway motorcycles is well above our current useful life definition. We requested comment on, but did not propose, extending the useful life by up to 10,000 km to reflect a value more consistent with actual use.

What Commenters Said:

MIC opposed a longer useful life for Class III motorcycles for three reasons. First, a longer useful life is not consistent with the stated goal of harmonizing with the California standards, and that a longer useful life would result in greater catalyst usage to meet the federal standards than would be required in California. Second, increased useful life isn't consistent with usage patterns of smaller Class III motorcycles. Finally, MIC commented that a 40,000 km useful life is based on the projected accumulated distance at 10 years, a point at which 34 percent of vehicles have already been retired from service. MIC stated that since motorcycles don't stay in service as long as passenger cars, it isn't equitable to define the useful life of both types of vehicles at the same, 10-year age.

Harley-Davidson opposes any changes to the Class III useful life. Harley-Davidson stated that California considered and rejected an increased useful life requirement in its December 1998 emission regulations. Extending the useful life would defeat the goal of harmonization with California and undermine manufacturers' efforts to meet those regulations. Harley-Davidson also commented that what little data exists on usage does not support an increased useful life and suggests that annual per motorcycle usage is less than 4,200 km. Finally, Harley-Davidson commented that while riders are increasing the miles they ride each year on highway motorcycles, multiple motorcycle ownership is also increasing, meaning that total vehicle miles are being spread over more motorcycles.

STAPPA/ALAPCO commented in support of increasing the Class III useful life to 40,000 km. NESCAUM also endorses increased Class III useful life as consistent with increased reliability, and increased useful life requirements for all vehicle types. NESCAUM noted that we have increased our useful life requirements for passenger cars and heavy-duty trucks. MECA commented that a 40,000 km useful life requirement is technologically feasible, noting that catalyst technology is currently used on passenger cars and light truck whose useful life requirements exceed 100,000 miles. Bluewater Network commented that we are under an obligation to raise useful life to 12.5 years/32,500 miles to reflect the real world and to be consistent with our approach to other categories. Finally, one motorcycle rider noted that his Harley-Davidson's useful life is several hundred thousand miles, noting that he rides his motorcycle more than the current useful life every year. This commenter also stated that current models, especially larger motorcycles, last at least as long as automobiles.

Our Response:

We believe that 50-state harmonization is very important to the success of the federal motorcycle regulatory program. Consistency with California was one of our stated goals in the proposal. While there is a case to be made for increased useful life, we believe that it would be inappropriate to extend the Class III useful life at this time. Extending the useful life would undermine manufacturers' efforts to comply with our requirements, because their compliance plans have been based on the California useful life. Such an increase in useful life would also result in inconsistent requirements between the California and federal programs, resulting in increased development and compliance costs. Therefore, we are not adopting any changes to the Class III useful at this time.

While we are not making any changes to the Class III useful life at this time, evidence supporting the need to further consider a change does exist. We do not believe that it would be appropriate to ignore this evidence, especially in light of the increases we have made to the useful life definitions for other vehicle categories. Thus, we intend to further explore this issue and may extend the useful life as appropriate when we incorporate the world motorcycle test cycle in the federal regulations (see Section 7.9) or at some other future date. Such an approach would address any current concerns about harmonization with California. It will also allow us additional time to better understand current motorcycle usage patterns, including those for smaller Class III motorcycles. MIC periodically performs surveys regarding the usage of their products, and has indicated to us that it is currently collecting survey data regarding the usage patterns of Class III motorcycles. However, the data collection and analysis will not be completed in time for us to consider it in the context of this rule. Thus, on balance, we believe that it is appropriate to defer action on increased useful life both in order to consider this latest data when it becomes available and to maintain harmonization with the California program.

3.3 Production Line Testing

What We Proposed:

We did not propose to add a production line testing for highway motorcycles. However, we did request comment on it, stating our belief that adding such a program would add little additional burden and could easily be incorporated into the existing production-line quality checks that many manufacturers routinely perform. We did state that in the absence of production line testing we would probably not allow post-certification changes to be made to the Family Emission Limits (FELs) applicable to a given engine family under the emissions averaging program.

What Commenters Said:

MIC is opposed to a PLT program. MIC pointed out that data collected by the California Air Resources Board shows that motorcycles are meeting emission standards in use currently in the absence of a PLT program, and that manufacturers have a good track record of producing motorcycles that comply with the standards they were designed to meet. MIC also believes that a PLT program will result in increased costs (primarily for new testing facilities, but also for hiring and training new personnel) but with no added benefit.

Harley-Davidson is also opposed to any new PLT program. Harley-Davidson commented that additional costs for PLT could be as high as \$600 per motorcycle, and would provide no meaningful additional benefit. Harley-Davidson also pointed out that we are developing other new motorcycle monitoring programs as it is and that manufacturers already self-monitor.

STAPPA/ALAPCO commented in support of the concept of PLT, which can be useful in ensuring that production engines are controlled at least as well as certification prototypes. NESCAUM also commented in support of PLT, stating that we made a compelling case for it in the NPRM, that it can serve as an “early warning system” against failures, and that we have finalized PLT for nonroad engines and vehicles.

Our Response:

We do not see a compelling need for a PLT program for highway motorcycles at this time. We have not had a PLT program for highway motorcycles throughout their history of federal regulation. While a PLT program may serve to strengthen the motorcycle compliance program on some level, we agree that the costs of new facilities and the hiring and training of new personnel to run a PLT program may not justify the benefits. Thus, we are not adopting a required PLT program for highway motorcycles.

While we are not requiring a PLT program for highway motorcycles, 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 changes (especially downward changes). Thus, as discussed in the averaging section at the beginning of this chapter we will not allow post-certification downward changes to FELs in the absence of a PLT program or other supporting data. However, we are providing an option for manufacturers to opt into a PLT program similar to California's if they wish to have the option to make downward running changes to their FELs.

3.4 Class I Below 50 cc Test Procedures and Useful Life

What We Proposed:

We proposed that Class I motorcycles, including motorcycles under 50 cc, be tested on a version of the FTP that has lower top speeds and reduced acceleration rates relative to the FTP cycle that is used for Class II and III motorcycles. The Class I drive cycle has a top speed of just under 60 km/hr (36.5 mph), whereas the Class II/III drive cycles has a top speed of just over 90 km/hr (55 mph).

Although we requested comment on whether the useful life period for Class I motorcycles should be extended, we did not propose any change from the existing Class I motorcycle useful life requirements of 12,000 km or five years.

What Commenters Said:

MIC said that they support the proposed under 50cc standards provided: 1) they have a shorter useful life (6000 km) and; 2) The driving trace is scaled back for vehicles with a top speed of under 36.5 mph (otherwise such vehicles would be operating at wide open throttle over test cycle). ACEM stated that they support standards that would allow European manufacturers to sell EU mopeds in the U.S. without special development for US market. They support the MIC comments regarding useful life and test cycle adjustment.

MIC submitted data from their 1998 Motorcycle Owners Survey that shows the mean annual miles traveled per year for motorcycles under 50 cc to be 715 miles. Over five years, that would be 3,575 miles or 5,800 kilometers, which is considerably less than the proposed value of 12,000 km.

MIC and ACEM also suggested that it would not be appropriate to require motorcycles with such low performance to operate over the same driving cycle as more powerful motorcycles equipped with engines between 50 and 170 cc. Their concern is that the top speed of the Class I driving cycle is 36.5 mph and that many motorcycles under 50 cc have top speeds less than this. They suggested that rather than develop a new drive cycle for these motorcycles, the Class I motorcycle driving cycle could be modified to accommodate this concern. They suggested that for motorcycles under 50 cc that have a top speed under the maximum Class I driving cycle speed of 36.5 mph, the cycle be adjusted by the vehicle top speed divided by 36.5. Using this approach, a vehicle with a 30 mph top speed would be adjusted by a multiplicative factor of

$30/36.5 = 0.822$. The top speed to be used would be determined by the highest sustainable speed of the motorcycle with a 150-lb rider on a flat paved surface, or the governed top speed if applicable. Any vehicle that has a top speed in excess of 36.5 mph would be unaffected.

Our Response:

We proposed a useful life of 12,000 km for motorcycles under 50 cc because that is the current useful life for Class I highway motorcycles and we did not have any data that suggested these smaller displacement motorcycles operated any differently than the larger displacement motorcycles found in the Class I category. However, the data submitted by MIC indicates that a useful life of 6,000 km is more appropriate for these vehicles than the 12,000 km value that we proposed. Therefore, for the final regulations, we will require Class I motorcycles with an engine displacement under 50 cc to meet a useful life requirement of 6,000 km.

MIC and ACEM's recommendation to modify the existing Class I motorcycle driving cycle to accommodate those motorcycles under 50 cc that have top speeds less than the top speed of the driving cycle appears to be a reasonable suggestion since it is not our intention to require these vehicles to be tested in a manner that represents operation that is not possible in real-world conditions. Modifying the driving cycle is also not unprecedented, since we allow a similar modification to the US06 driving cycle for light-duty vehicles and light-duty trucks that may not have sufficient power to meet the aggressive acceleration rates and top speeds found on the US06 cycle. We agree that it is inappropriate to require motorcycles under 50 cc that have top speeds less than the top speed of the Class I driving cycle to be penalized for their lower performance compared to the larger motorcycles with engine displacements up to 279 cc. Therefore, we will incorporate the suggested modifications to the Class I motorcycle driving cycle in our final regulations.

In their comments, MIC suggested that in order to determine what a motorcycle under 50 cc top speed is, that a 150-lb rider be used. To be consistent with our existing definition of loaded vehicle mass for motorcycles, we will replace the MIC recommendation of a 150-lb rider with the existing EPA loaded vehicle mass of 80 kg (176 lb)¹⁸.

ACEM stated that they would support standards that allowed European manufacturers to sell EU mopeds in the U.S. without special development for US market. They also stated that by EPA agreeing to a shorter useful life of 6,000 km and allowing the Class I test cycle modifications, as proposed by MIC, European manufacturers will be able to sell EU mopeds in the US without special development for the US market.

¹⁸ See 40 CFR, 86.402-78.

3.5 Nonconformance Penalties

What We Proposed:

We discussed nonconformance penalties (NCPs) and the criteria that must be met in order for us to offer them. We did not propose NCPs, pointing out that we do not believe the criteria could be satisfied for the Tier 1 standards, and that it is much too early to determine whether the required criteria for offering them would be met for the Tier 2 standards. However, we did request comment on whether NCPs would be a desirable option should conditions develop that would warrant them.

What Commenters Said:

MIC expressed general support for the concept of NCPs. AMA commented that NCPs should be an available option for manufacturers that cannot meet the standards for technological reasons. In particular, AMA commented, small volume manufacturers may encounter circumstances that prevent them from complying with the standards, and NCPs would provide such manufacturers an alternative to removing some products from the market or exiting the market altogether.

STAPPA/ALAPCO opposes the concept of extending NCPs to motorcycles. STAPPA/ALAPCO commented that an alternative option for compliance is unnecessary and inappropriate.

Our Response:

As discussed in the proposal, based on the available information, 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 either Tier of 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.

3.6 Hardship Provisions

What We Proposed:

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 business 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.

What Commenters Said:

AMA commented that the hardship provisions should be available for all manufacturers, not just small volume manufacturers.

Our Response:

We agree with AMA that the proposed hardship provisions regarding circumstances beyond a manufacturer's control should be available to all manufacturers as proposed. Thus, we are adopting this provision, to be available to all manufacturers. However, we disagree that the hardship provisions allowing a manufacturer to petition for additional lead time should be available to all manufacturers. Given the effort required and the lead time available, we do not believe the emission standards pose any significant technological hurdles which would result in a large business motorcycle manufacturer being unable to comply. As discussed in the preceding section on nonconformance penalties, we intend to 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.

3.7 Exhaust Test Procedures

What We Proposed:

We proposed to continue using the existing highway motorcycle exhaust test procedures. As discussed in section 7.8, we requested comment on a new World Motorcycle Test Cycle.

What Commenters Said:

One commenter stated that, since motorcycles are not cars, it is not fair to test motorcycles with the same test procedure as cars. Another commenter pointed out that we measure motorcycle emissions by the mile and all other motorized vehicle emissions in parts per million. This commenter questioned what would happen if we made it fair all the way across the board.

Our Response:

We have used the same test procedures for passenger cars and highway motorcycles ever since highway motorcycle emissions were first regulated more than 20 years ago. We believe that this is appropriate since both passenger cars and highway motorcycles tend to travel on the

same roads under similar conditions and operation. We note that the commenter did not explain what in particular is unfair about our current approach to highway motorcycle testing or what should be done to remedy the claim of unfairness. We do note that there are international efforts underway to develop a highway motorcycle-specific test cycle. Further discussion on these efforts and our future plans in this area can be found in section 7.8.

In general, we measure passenger car and light truck exhaust emissions on a per mile basis just as we do for highway motorcycles, as discussed in section 1.1. The only exception to this is the idle carbon monoxide standard, which is measured on a parts per million basis. This is done because one cannot measure emissions of an idling vehicle on a per mile basis simply because the vehicle is not moving. Thus, we believe that this comment has no merit and is not based in fact.

Chapter 4 - Emissions Inventory, Benefits, and Need for Emission Controls

4.1 Need for Controls

What We Proposed:

The proposed standards are the first new standards considered by EPA for on-highway motorcycles since the current standards took effect in 1980. Our analysis of emission inventories demonstrated that on-highway motorcycles currently contribute approximately 0.5% of the total mobile source HC emission inventory and 0.1% of the total mobile source NOx emission inventory. HC and NOx emissions react in the atmosphere to form ozone, the main ingredient in smog. There are many areas of the country which currently exceed the National Ambient Air Quality Standard (NAAQS) for ozone.

What Commenters Said:

STAPPA/ALAPCO supported the proposed motorcycle standards stating that the standards are needed due to the large number of ozone nonattainment areas. NESCAUM supported the proposed motorcycle standards noting the significant air quality issues faced by states and the need to reduce vehicle emissions from all sectors. The Michigan Department of Environmental Quality supported the proposed standards noting that given the current and forthcoming ozone nonattainment issues impacting many areas of the country, all reasonable and prudent control strategies be considered for future implementation to meet the NAAQS. Motorcycle emissions contribute to ozone and PM concentrations and motorcycles are used primarily in the summer months. The commenter states that though overall contributions are small, EPA must consider all opportunities to generate emission reductions, especially when they are currently achievable and cost-effective. Environmental Defense supported new standards for motorcycles pointing out that EPA's current standards are woefully out of date compared to California and other countries around the world. It notes that airborne contaminants from motorcycles contribute to many harmful impacts, including premature death and hospitalization, respiratory ailments, toxic effects, interference with delivery of oxygen into the blood, impairment of visual perception, and haze.

A number of commenters were opposed to the new standards citing a lack of need and the small contribution of highway motorcycles to the total pollution inventory. Several commenters stated that the inventory, and thus the rationale for rule, was overstated. ABATE of Cheyenne similarly states that EPA emission estimates in its draft RSD and NPRM are inconsistent so the validity of the air quality goals of the proposal cannot be determined. These groups believe a more accurate inventory will not justify new regulations. ABATE of Cheyenne also commented that the proposed regulations would not result in any substantial, meaningful reduction in emissions. Harley commented at the public hearing that it does not accept the premise that

motorcycles are a significant source of regulated pollutants. Several other commenters also said this in their written comments. AMA also took exception to the characterization of motorcycles as significant contributors. ABATE of Illinois and others commented that there is no need for further restrictions citing an estimate from CARB that motorcycles represent only 0.006% of emissions from highway vehicles. ABATE of Illinois noted that motorcycles are currently well below standards without aid of regulation. MRF commented that EPA did not demonstrate significant reductions in ground level ozone due to the proposed standards. Both ABATE of Illinois and MRF referenced a study by Garrett Vaughn that notes at least 25 states do not have a single nonattainment area. Garrett Vaughn stated that EPA has not demonstrated significant reductions in ground level ozone from the proposed standards and that motorcycles are unlikely to be used during those times of the week when ozone forming emissions are most troublesome. The Idaho Coalition for Motorcycle Safety commented that no justification has been shown other than the EPA standard has not changed in 20 years. Dave Christy commented that EPA is regulating not based on need, but to keep from getting sued.

Our Response:

Although on-highway motorcycles are only a relatively small part of the emissions inventory, they clearly contribute to the overall quality of air throughout the nation. Motorcycles emit both HC and NO_x emissions, which contribute to ground level ozone formation. Currently, there are 116 million people living in 56 1-hour ozone nonattainment areas covering 233 counties. Even more people live in areas with ozone levels above the levels of the eight-hour ozone NAAQS, though nonattainment areas have not been established officially for this NAAQS yet. Motorcycles are used nationwide, including in these nonattainment areas. Moreover, they are often used in warmer weather, when ozone concentrations are likely to be higher. Furthermore, under section 202(a)(3)(E) of the Clean Air Act, “In any case in which such standards are promulgated for emissions from motorcycles 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.” Given that it has been more than twenty years since the first (and only) federal emission regulations for on-highway motorcycles were implemented, and given that EPA has established several rounds of increasingly more stringent emission standards for other motor vehicles (e.g., light-duty vehicles and trucks) over the same period of time, we believe it is consistent with the Act to establish new emission standards for on-highway motorcycles.

While we have not modeled the impacts on ozone levels due to the new motorcycle standards, the new standards will result in HC and NO_x emission reductions throughout the nation. Because HC and NO_x are precursors to ozone, these reductions will be especially helpful for those areas that are in nonattainment of the ozone NAAQS or above the levels of the eight-hour NAAQS. Federal, state and local governments will need to reduce emissions from many different sources of ozone precursors to achieve the reductions needed to meet the NAAQS. Most of these sources are not by themselves large contributors to the percentages of ozone precursors in the air. However, taken together they represent a large source of potential emission

reductions that can reduce the number and severity of ozone exceedances. Neither EPA nor other governments can effectively and cost-effectively reduce emissions by regulating only a few large sources or source categories. Getting further emissions from sources that are already well regulated can often be much less cost-effective than reducing emissions from those sources that have not been as well regulated in the past. The need for emission reductions from many sources, particularly cost effective reductions, is clearly important to meet the ozone NAAQS. In the context of the context of the rulemaking revising the ozone NAAQS, the Agency compiled a list of numerous additional known technologies that could be considered in devising emission reduction strategies necessary to meet the revised NAAQS. The cost effectiveness of these technologies averaged approximately \$5,000/ton for VOCs and \$13,000/ton for NOx. These values indicate that future emission control strategies necessary to meet the ozone NAAQS are likely to be more expensive than the relatively modest cost per ton for this rule (estimated to be less than \$2,200/ton as detailed in Chapter 7 of the RSD). Thus, failure to regulate these engines would not necessarily reduce the costs of emission reduction, but would merely push costs to other sources, likely at a much higher cost per ton.

Moreover, we disagree with the apparent contention that the emission reductions from this rule are too small to be of any importance. We estimate that the new standards for motorcycles will reduce HC and NOx emissions by a total of nearly 135,000 tons over the first ten years the standards are in effect in a very cost-effective manner. While local areas can adopt certain pollution programs on their own, EPA alone has the ability to establish nationwide emission standards for motorcycles. The benefits from the motorcycle standards being adopted by EPA are not insignificant and achieve far greater emission benefits and are more cost-effective than many measures local areas have adopted or could adopt on their own.

In response to the comment that motorcycle emissions are currently well below the standard, EPA agrees that much of the technological advancement needed to meet the new standards has already been implemented in many current motorcycles. However, EPA believes that this emission performance cannot be assured in the future, certainly not for all motorcycles, without standards in place. Several motorcycle families still emit at levels above the Tier 1 levels and many emit above the Tier 2 levels. These standards will require emission reductions from these families. Moreover, the standards will ensure that manufacturers do not backslide on emission control or introduce new motorcycles with less control. For example, in 2002, no Class I or II motorcycle family certified at levels above the 1.0 g/km level. However, in 2003, some engine families were certified above that level, including two newly introduced models that certified at levels above 3.0 g/km. This indicates that emission standards need to be in place to assure that emission levels do not rise in the future.

Regarding the claim that 25 states do not have ozone nonattainment areas, this is somewhat misleading. While nonattainment areas have not yet been assigned for the eight-hour ozone standard, 10 of the 25 states listed by Dr. Vaughn (Arkansas, Florida, Kentucky, Michigan, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, and West Virginia) contain

areas that violated the eight-hour ozone NAAQS between 1999 and 2001.¹⁹ In addition, emissions in several of the states contribute, through ozone transport, to emissions in other states downwind of the state (e.g., West Virginia, Kentucky, and Michigan). See 63 Fed. Reg. 57356 (October 27, 1998) (the “NOx SIP Call”). In addition, 10 of the 25 states listed (Colorado, Florida, Kentucky, Kansas, Michigan, North Carolina, South Carolina, Tennessee, Utah, and Washington) contain maintenance areas, which had been in nonattainment and must continue to show attainment for ten years after redesignation.²⁰ These areas would also benefit from the reduction in motorcycle emissions. See also the discussion in Chapter 1 of the RSD for this rule.

In addition, emissions from motorcycles contribute to air pollution other than ozone, including fine PM, visibility impairment, acid deposition and air toxic emissions. Some of these other air pollution concerns affect areas other than the ozone nonattainment areas (e.g. visibility impairment is important in national parks) and others (like air toxins) are site-specific, and are thus not linked to specific areas. Areas with air pollution problems include the nation’s largest cities, their surrounding areas, smaller cities, rural towns and pristine natural areas. These regulations will reduce emissions that affect all of these areas. Moreover, attempting to regulate only in areas that have discreet air pollution concerns, possibly regulating only those pollutants of concern in those areas, will create a patchwork of regulation that has traditionally been strongly objected to by the manufacturers, dealers, and users affected by such a patchwork.

Most importantly, motorcycles are mobile sources of emissions that may be in an attainment areas one day (or minute) and a nonattainment area the next. Only through national regulations can we be assured that the motorcycles in areas of concerns are meeting the standards needed for pollution reduction.

With regard to the comment that motorcycles are not used during the times of the week when ozone is a problem, we believe that the HC and NOx reductions from the new motorcycle standards will help areas that are in ozone nonattainment irregardless of when the motorcycles are driven. Even if it is true that motorcycles are used more on the weekend (no data was submitted to support the statement), motorcycles are used throughout the week and contribute to emissions that cause ozone whenever they are used. In addition, there are weather patterns that can cause air to stagnate in a given area over a several day period. These patterns can occur any day of the week and may stretch over both weekdays and weekend days. Furthermore, NOx emissions can be transported over time as well. So, even if the emissions are not affecting a local area on a weekend day, it can show up downwind the next day and form ozone. Moreover, ozone nonattainment is not limited to weekdays and can occur on weekend days. Such conditions increase the importance of regulating pollution sources that may be more highly used on the weekend.

¹⁹ EPA Air Quality Data Update, 1999-2001 Ozone Air Quality Data. Available in Docket No. A-2000-02.

²⁰ EPA Green Book, Ozone Maintenance State/Area/County Report (as of June 23, 2003). Available in Docket No. A-2000-02.

In response to the comment on the contribution of motorcycles inventories, see the discussion below. Briefly, we estimate motorcycles contribute about 0.6% of HC emissions and less than 0.1% of NOx emissions from all mobile sources. When considering emissions from on-highway sources only, the contribution from motorcycles is currently about 1% of HC emissions and about 0.1% of NOx emissions. Without these regulations, we estimate motorcycle emissions will contribute 2.3% of VOC emissions from mobile sources and 0.3% of NOx emissions from mobile sources by 2020. Based on CARB's estimates of the 2001 emissions inventory, motorcycles contribute about 1.5% of on-highway hydrocarbon emissions and 0.2% of on-highway NOx emissions, consistent with EPA's numbers cited above.²¹ The number of 0.006% cited by the commenter and attributed to CARB is apparently in error.

4.2 Inventory and Emission Benefits

What We Proposed:

The NPRM contained an analysis of the emission inventories from highway motorcycles covering the years 2000 through 2030. The NPRM presented baseline inventories, assuming current regulations remain in effect, as well as control inventories, assuming the proposed standards took effect. The analysis relied on mileage accumulation and scrappage information provided by MIC and emission factors information developed by EPA using current certification information for motorcycles above 50cc and other in-use test results for motorcycles below 50cc.

What Commenters Said:

The Idaho Coalition for Motorcycle Safety commented that the emissions inventory has been exaggerated, but provided no data to support its claim. CMDA commented that the highway motorcycle inventory was overstated. CMDA also commented that the emission rates used in the analysis are about twice what the average in-use motorcycle emits and that the estimates of annual mileage are too high. Harley claimed at the public hearing that existing data suggests that annual motorcycle mileage is significantly less than 4,200 km, but did not provide any data in written comments. Dave Christy commented that the HC inventory is unbelievable and based on a model of mathematical complexity that is incomprehensible to the public layman. Dave Polacek raised concerns that our emission estimates may have been based on information from studies that included motorcycles with recreational 4-wheelers and outboard marine engines.

Some commenters suggested that EPA did not factor in the impacts new standards would have on the inventory. MRF and Dr. John Myers noted that California had a reduction in motorcycle registrations after regulating, even while the rest of the country had an increase. They also commented that the assumed growth rates were unrealistic given historical market

²¹ CARB's inventory is available on the internet at the following address:
www.arb.ca.gov/emisinv/emsmain/emsmain.htm.

fluctuations and the impact the regulations will have on sales. Dr. John Myers noted his belief that increased costs and lack of avenues for repair will turn bikers toward cars, using more gasoline. This will also increase PM emissions due to more tires on the road and bigger vehicles to stir PM into the air. MRF commented that with higher prices for the motorcycles meeting the standards, motorcycle riders may respond by retaining older vehicles longer resulting in a slower accrual of emission benefits. ABATE of Cheyenne commented that the proposal does not take into account many factors surrounding motorcycle use. ABATE of Cheyenne commented that inventory projections in Tables II.C-1 and II.C-2 are not fully documented and their validity can't be checked. ABATE of Cheyenne also pointed out what they believe are a number of discrepancies between the text and tables in both sections II and VI of the preamble, as well as between the preamble and RSD.

In a letter to EPA dated June 18, 2003, the MRF reiterated their belief that “over-regulation is the only plausible explanation for the variance between California and the other states.” In the letter the MRF cites the registration data presented previously in their written comments on the NPRM, and they also cite the experience in California with emission regulations for off-road motorcycles, ATVs, and personal water craft, where product availability was limited and dealers were adversely impacted. The letter also cites a story in Motorcycle Product News in which some small motorcycle manufacturers who dissolved operations in 2000 cited California regulations as one of the reasons for leaving the market.

Our Response:

While a number of commenters questioned EPA's estimate of emissions from on-highway motorcycles, none of the commenters submitted any data in support of their comments. We do not agree with the suggestion of CMDA and others that the emissions inventory is exaggerated and reflects an emissions rate twice the rate of the average in-use motorcycle. Our emission rates are based on the emission data that motorcycle manufacturers submit to EPA when they certify their motorcycles to emission standards. We receive this data annually from certifying manufacturers, and it represents the most current and most accurate determination of motorcycle emissions available. We are not aware of a better source of data or a better methodology, and CMDA did not make any specific suggestions to improve the analysis.

Our emission inventory analysis for the final rule is based on the same information used for the proposal, with some minor updates. The information is based on information specific to motorcycles and does not include other categories of vehicles such as 4-wheelers and outboard marine engines. As noted earlier, the information used in the modeling for annual mileage accumulation rates and scrappage rates comes from MIC, which gathers the information for the business use of their member companies. The mileage accumulation rates are based on a survey of motorcycle owners and therefore should be representative of actual operation of motorcycles. The scrappage rate information is based on a comparison of in-use populations by model year developed in motorcycle owner survey compared to sales estimates for the various model years. We have updated the baseline emission factor estimates based on the most recent on-highway

motorcycle certification results for model year 2003. As with the baseline emission factors used in the proposal, the updated emission factors show that baseline emission factors are significantly below the current standards.

We are continuing to use the same model for developing the inventories that was used in the proposal. While we agree that the model is a complicated model, it is based on EPA's MOBILE model which has undergone significant levels of review over the years by many parties. We believe it is the best available means for estimating the impacts of new standards on motorcycle emission inventories. In response to the comment that we have failed to consider the many factors surrounding motorcycle use, we believe the model does consider the most important aspects of inventory modeling, including accurate estimates of emission levels, mileage accumulation rates, and scrappage. The commenter did not cite specific factors we need to take into consideration, so we cannot respond in any specific manner to the comment.

In response to the comments that the inventory projections do not take into consideration that people will switch to cars or retain their bikes longer due to the increased costs, we do not believe that there will be any measurable impact on motorcycle sales or scrappage rates due to the new standards. As detailed in Chapter 5 of the RSD, the total estimated cost of the Tier 1, Tier 2, and permeation regulations is projected to be around \$75 per motorcycle. Based on the average cost of current motorcycle of approximately \$10,000 (see Chapter 2 of the RSD for the analysis supporting this estimate), the increase in cost due to all of the regulations is estimated to be less than one percent of the purchase price of a motorcycle. We do not believe this small of a cost increase is significant enough to have any measurable impact on sales or scrappage rates. Therefore, we do not believe there will be any increase in PM emissions from people switching from motorcycles to cars, as alleged in the comments. While the commenter submitted no information to support their contention that motorcycles stir up less road dust than cars, it can be noted that our current estimates for exhaust PM emissions show that cars actually have lower levels of exhaust PM than motorcycles.²²

In response to the comments on the impacts new standards will have on sales, we do not agree that emission regulations in California caused a decline in motorcycling in that state. In fact, we note that the MRF is careful in their wording to say that "Even a cursory look at the data suggests that government regulations explain much of the fall in California's motorcycle registrations" (emphasis added). The reason for this careful wording and for not directly stating that new emission standards caused a decline in motorcycling in California is because there is no evidence to support such a statement. They will only say that "a tighter regulatory environment reduces motorcycle sales and registrations." In fact, motorcycle activists, including the MRF, are widely on the record attributing a decline in motorcycling in California solely to the enactment of a helmet law in the state. An MRF document entitled "MRF TEA-03 Initiative #3" and available on the MRF web site states that "the mandatory-use law sharply reduced motorcycling, from

²² Figures 2 and 13 from "MOBILE6.1 Particulate Emission Factor Model Technical Description," (EPA420-R-03-001), January 2003. See Docket A-2000-02.

639,388 registered motorcycles in 1991... to 450,030 in 2000...” In 1996, then-Executive Director of ABATE of California Paul Lax, referring to the helmet law enacted in California, testified to the California Senate that California “once accounted for twenty-five percent of the street motorcycles in the country, and you crippled it.” Bikers Rights Online also cites California motorcycle registration data, stating that “The California's [sic] Motorcycle Helmet Law Has NOT Caused Lower Fatality and Injury Rates But it HAS Resulted in Drastically Lower Motorcycle Ridership, Ownership and Usage” and that “the helmet law has dissuaded 225,000 bikers from riding altogether.” Yet the same California registration statistics that the MRF and others have consistently and repeatedly used to attempt to defeat state helmet laws are now appearing in comments on our proposed emission regulations. In addition, Dr. Garrett Vaughn, author of the report submitted by the MRF, has acknowledged that California’s helmet law and regulations regarding off-road motorcycles have played a role in declining registrations in that state.²³ Furthermore, comments that suggest that California emission laws have resulted in decreased motorcycling ignore the fact that most motorcycles sold nationwide meet California’s emission standards. Any distinction between what has happened in California versus the rest of the U.S. can not be based on the assumption that the motorcycles sold to California customers are somehow different from the motorcycles sold to customers in the rest of the U.S., because in actual fact the majority of motorcycles sold in California are identical to those sold elsewhere in the U.S. In 1996 at the beginning of the decline in registrations cited by Dr. Vaughn, 75 percent of EPA certified motorcycle engine families met the California emission standards. And of the 25 percent that did not meet those standards, an indeterminate number were certainly sold in California as allowed under the averaging provisions of the California program.

In addition, there appears to be an error in the MRF’s calculations regarding a reported decline in sales in California. The MRF analysis, in attempting to project the potential impacts of the proposed standards, states that “...motorcycle sales begin to fall at a rate of 7 percent a year (as they have in California since 1996)...” However, they provide no evidence that California sustained adverse sales impacts at this rate. First, they only provide registration data, not sales data. Second, the registration data presented in Table 10 of the MRF analysis indicates a decline in registrations of 7.7 percent from 1996 to 2001 (or an average of about 1.5 percent per year). Consequently, we can not accept their statement regarding a sales decline in California. In fact, sales trends and patterns in California have closely mirrored sales in the rest of the U.S. for the period 1983 - 2002 for which we have data for both California and the U.S. total. In general, sales declined throughout the U.S. from the early 1980's until the early 1990's, but have been increasing since about 1991-1992. As can be seen in Figure 4.2-1 below, historical sales trends in California from 1983 to 2002 have closely mirrored sales in the rest of nation.

While sales appear to have been in a decline in 1988 when new Class III emission standards were implemented in California, this decline was already underway when the new standards became effective and was also occurring in the rest of the nation. In fact, sales in

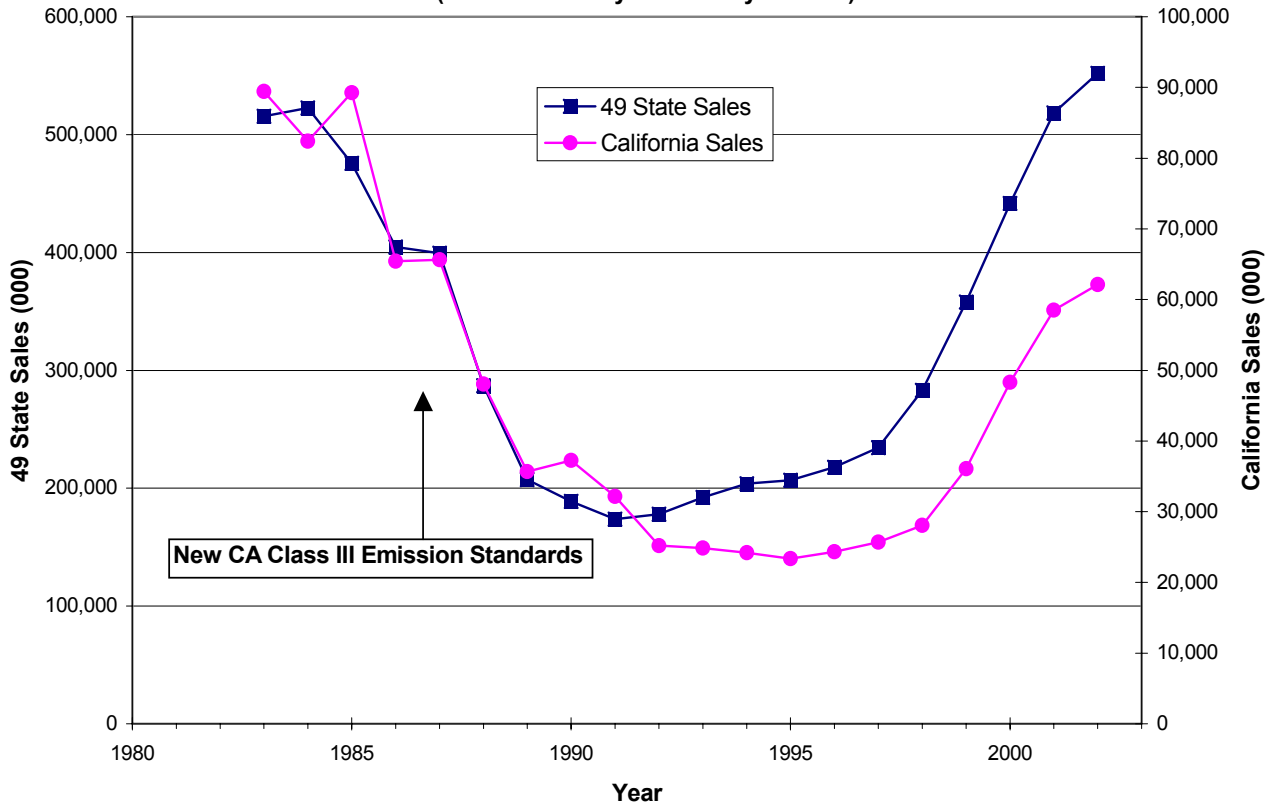
²³ Memorandum, Roberts French to Docket A-2000-02, “Conference call with Garrett A. Vaughn, Ph.D,” June 5, 2003. Docket A-2000-02, document IV-E-25.

California in the period 1987 - 1990 (the years nearest the 1988 change in emission standards in California), while falling, were not falling as severely as in the remaining 49 states in percentage terms. In the early to mid-1990's sales in California were not doing as well as in the rest of the U.S., but it is well-documented that a recession in that time period hit California particularly hard. For example, for the first time in several decades the growth in California's population was outpaced by the national population growth rate in the early to mid-1990's. However, while a multi-year decline in sales nationwide turned around into positive growth in 1992 in the U.S., this was not the case in California, which continued to experience declines through 1995. In 1992 in particular, sales dropped more than 20 percent in California. The California mandatory helmet law went into effect on January 1, 1992. Motorcycles meeting the newest 1988 California emission standards would have started selling in 1987. A decline in sales 5 years later can not reasonably be attributed to these emission standards, and the MRF is focusing on registration declines that occurred eight years after implementation of tighter emission standards in California. There is no reasonable basis to suggest that a decline in registrations in the period 1996-2001 had anything to do with emission standards that took effect in 1988. Recently, sales in California appear to be doing as well as the sales in the rest of the nation; in fact, highway motorcycle sales in California have grown at a rate equal to or significantly higher than the remaining 49 states since 1999. DealerNews (Vol. 38, No. 2, February 2002, p.304) reports that California sales of highway motorcycles grew by about 20 percent in 2001 relative to 2000, whereas the national average increase was about 17 percent. These figures are consistent with those provided by MIC.

Moreover, while motorcycle registration data may be an appropriate tool with which to analyze the impacts of a mandatory helmet law, we do not believe that it is appropriate to use such data to determine the effects of emission standards that affect only new motorcycles sold after a given date. A helmet law affects every motorcycle and every rider in its jurisdiction, including those considering buying a new motorcycle and those already riding motorcycles of any and every age. We would expect that the impact of a helmet law could be seen in registration data. This is not the case with emissions laws that affect only new motorcycles sold after the date of implementation of the standards. These laws have no effect on those who already own and ride a motorcycle, whether it is a two year old or twenty year old motorcycle. In the case of such laws, it would be more appropriate to analyze sales data. We note, although the MRF analysis cites a motorcycling decline in California "during the latter half of the 1990's," the last phase of on-road motorcycle emission standards in California became effective in 1988. California's mandatory helmet law took effect on January 1, 1992. We also note that sales in California have been increasing since 1995, sometimes outpacing sales growth in the rest of the country.

There appear to be several factors contributing to the nationwide decline in motorcycle sales that occurred during the 1980's. Federal emission standards were stable throughout the period, and California emission standards changed only in 1988, long past the start of the sales

Figure 4.2-1
On-Highway Motorcycle Sales
 (Source: Motorcycle Industry Council)



decline. However, the early 1980's were marked by two recessionary periods - from January to July of 1980 and July of 1981 to November of 1982²⁴ - which may have put a damper on motorcycle sales. In 1986 the Federal Trade Commission granted the “Harley Petition”, levying a tariff on imported heavy weight motorcycles. Also, the mid-to late 1980's saw an increase in the value of the Japanese Yen relative to the dollar putting upward pressure on prices at a time when demand was down. Finally, changes in demographic age categories and their associated interests also contributed to the decline in the 1980's and the subsequent rise throughout the 1990's. The effect that demographics can have on motorcycle sales (and even on the types and

²⁴ National Bureau of Economic Research, Business Cycle Expansions and Contractions, available on the internet at <http://www.nber.org/cycles.html>, or in Docket A-2000-02.

design of motorcycles) is well known.²⁵ Young 18-24 year-old members of the baby-boom generation are believed to have contributed to the rise of motorcycle sales that occurred in the 1960's and 1970's. By the time this generation reached the 1980's, which started with periods of economic uncertainty, baby-boomers were aging and settling into careers and family life, and many may have reduced or eliminated their participation in motorcycling, at least temporarily. However, this generation is now older with more discretionary income and is returning the roots of the motorcycling interest they had in their teens and 20's, contributing to the rise in sales that has occurred throughout the last ten years. Finally, the motorcycle market may have been saturated by the late 1970's or 1980, particularly due to aggressive marketing on the part of Honda. Because of this, used motorcycles may have been able to satisfy demand through the recessionary periods of the early 1980's. While no one can assure that this combination of events will not occur again, it certainly seems unlikely.

In addition, it appears that the MRF failed to take into account the fact that some states (including California) require registration of off-road motorcycles, and others do not. We do not dispute that California laws regarding off-road motorcycle use (red sticker/green sticker program) impacted off-road riding and perhaps sales of off-road motorcycles and ATVs, and because of California's registration requirements these impacts may be visible in registration data. However, the MRF should also note that the EPA chose not to harmonize with the California off-road user requirements and standards, and we do not believe that the California off-road experience has any relevance to either the California on-highway motorcycle requirements or to subsequent EPA actions regarding on-highway motorcycle emissions. There is no reason to believe that because the California off-road user requirements had a disrupting effect on off-road riding and related sales, the same thing will happen as a result of new on-highway motorcycle standards, especially when one considers the level of stringency and the manufacturers' general support for the on-highway motorcycle standards we proposed, and the harmonization between California and federal requirements. We suspect that the size of the California market was not large enough to drive the engine changes (2-stroke to 4-stroke) and emission control technology development needed to meet the California standards for these off-road vehicles. While California has a large population and large market for these vehicles in comparison to other U.S. states, these products are generally sold worldwide by large international manufacturers, who may have elected to forgo the California market for a period of time when there were no pending federal or worldwide requirements. These types of localized market impacts are an indication that a nationwide federal program may be more successful in introducing lower-polluting vehicles while minimizing the impacts on businesses and their customers. Nevertheless, we continue to believe that the California off-road experience is not relevant, and the commenter has not demonstrated that the parallels with the highway motorcycle program are sufficient such that highway motorcycle dealers and users will face a similar situation.

²⁵ Brown, Don, "Evolution: 2002 Market Forecast," in DealerNews, February, 2002, Vol. 38, No. 2. See Docket A-2000-02.

With respect to the Motorcycle Product News article cited by the MRF as evidence that California emission regulations have impacted motorcycling (and specifically, small motorcycle manufacturers), we are certain that the final rule does not contain requirements on the scale of those cited in the article. While we have been unable to obtain the article, it is summarized in a March 8, 2001 statement released by the MRF on their web site.²⁶ The MRF statement highlights statements from the owner of Wild Boar Motorcycle Manufacturing, one of several small manufacturers who ceased operations in 2000. He suggests that California regulations put him out of business, specifically pointing to requirements that his company annually submit a pre-production motorcycle of each model, along with \$60,000, to the California Air Resources Board for testing. The MRF alleges that the EPA “seeks to control the smallest of motorcycle makers in the same way.” We note that the owner of Wild Boar did not appear to mention the technical feasibility of meeting the standards as a barrier to doing business, only the regulatory framework under which he must meet the standards. The MRF allegations are simply untrue with regard to EPA’s program. First, EPA does not require that each manufacturer submit prototype motorcycles for testing. Although we have the authority to request such motorcycles, we do not do so routinely for any manufacturer, and we would not normally make this request of a small manufacturer. Second, while we do require a fee from each manufacturer to certify their motorcycles, it does not approach the \$60,000 cited by MRF. Our fee for certification for small manufacturers is structured such that it is the smaller of \$2200 or one percent of expected revenue per engine family. In other words, a company making 15 motorcycles and selling them for \$25,000 apiece would pay \$2200 per engine family. A smaller company, making 8 motorcycles per year at \$25,000 each would expect revenue income of \$200,000, and thus would pay \$2000 per engine family. Finally, the final rule contains provisions specifically designed to provide relief in the event of significant economic hardship, further protecting small manufacturers.

We do not agree with the contention that our projected growth rates are unrealistic and we are not ignoring the historical trends that we have clearly acknowledged above. No person or institution has the capability to predict the types of perturbations and their effects that the motorcycle market saw in the 1980's. We have consulted with industry to gain an understanding of the factors which contributed to the large decline in sales in the 1980's. Our conclusions are that there is no one governing factor which led to this change. As discussed above, key among those suggested were general economic conditions, market saturation, changing demographics, and competition with other types of recreational vehicles. In particular, the decade of the 1980's was a period of substantial growth in the sales of all-terrain vehicles, which may have resulted in further reduction in demand for on-highway motorcycles. Barring very unusual and unpredictable events, it is reasonable to expect some level of growth in most sectors of the U.S. economy, and this is especially true of the transportation sector. The U.S. economy, as measured

²⁶ Motorcycle Riders Foundation, “The Crash of Small Volume Motorcycle Makers: Does Environmental Regulation Share the Blame?” March 8, 2001. Available at <http://www.mrf.org/articles/2001/01NR08thecrashofsmallvolumemotorcyclemakersdoesenvironmentalregulationsharetheblame.htm>, or in Docket A-2000-02.

by the real gross domestic product (GDP), has only experienced three years of negative growth since 1980 (1980, 1982, 1991).²⁷ The average annual growth rate of the real GDP since 1980 has been almost three percent.²⁸ The U.S. population, of course, continues to grow, and growing numbers of consumers will impact the overall demand for consumer products. Personal income has almost quadrupled since 1980. Personal consumption of motor vehicles (in dollars) has increased more than 400 percent since 1980.²⁹ With respect to highway motorcycles, retail sales dollars have increased more than 300 percent since 1980, or an average rate of about 7.5 percent.³⁰ Data from the Bureau of Transportation Statistics on motorcycle vehicle miles shows that total motorcycle vehicle miles traveled (VMT) since 1970 (the first year that separate motorcycle data is available) has grown by over 250 percent, or an average rate of over 4 percent per year through 2000. Given the long-term nature of our projections (i.e., 20-30 years), it is not appropriate to focus on events that occurred within a few specific years, or even within a specific decade. If we go back before 1980 and look at registration data, then we see a significant period of growth in motorcycling that started in the mid-1960's and continued until a high in 1980-82. As is shown in Figure 4.2-2, the average annual growth in motorcycle registrations since 1960 is about 5.4 percent, with a total increase from 1960 to 2001 of over 700 percent. A long-term view is required, and the long-term historical view suggests that a modest percentage growth rate is in fact the appropriate choice. Given that no one is capable of predicting the future, and that the commenter did not suggest an alternative methodology, it is therefore reasonable to expect a modest level of annual growth in motorcycle sales and use. EPA uses a growth rate of only one percent per year. This is not only supported by growth in the economy and spending in the transportation sector, but is consistent with the MIC data in Figure 4.2-1 above which gives a growth rate of 0.5-1 percent per year over the last 20 years even with the perturbation in the 1980s. Indeed, one might consider EPA's estimates too low if the past decade's growth rate of 12 percent per year are an indication of the future.

Therefore, for the final rule, we are continuing to use the same small increase in sales and fleetwide vehicle miles traveled (VMT) estimates used in the proposal in our projections of

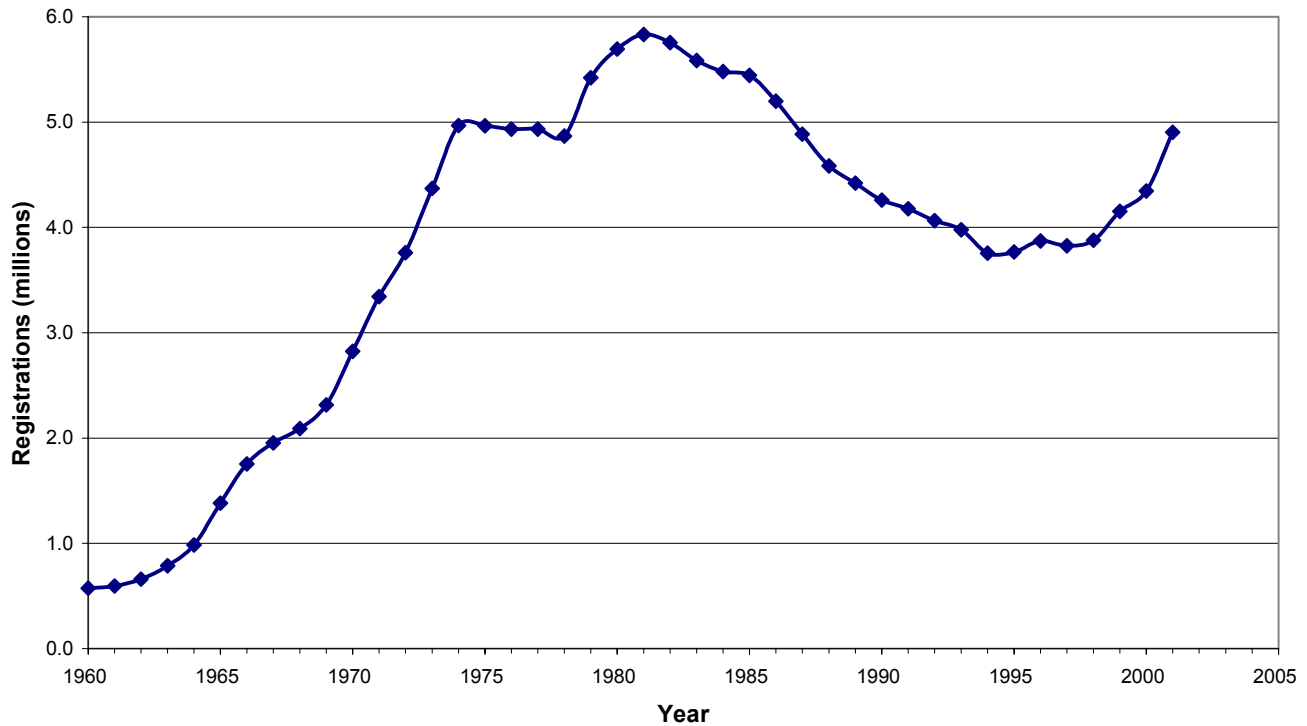
²⁷ U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Tables, Table 1.8 - Real Gross Domestic Product by Sector, <http://www.bea.doc.gov/bea/dn/nipaweb/SelectTable.asp#S2>. See Docket A-2000-02.

²⁸ U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Tables, Table 1.8 - Real Gross Domestic Product by Sector, <http://www.bea.doc.gov/bea/dn/nipaweb/SelectTable.asp#S2>. See Docket A-2000-02.

²⁹ U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Products Tables, Table 2.2 - Personal Consumption Expenditures by Major Type of Product, <http://www.bea.doc.gov/bea/dn/nipaweb/SelectTable.asp#S2>. See Docket A-2000-02.

³⁰ Motorcycle Industry Council, Statistical Annual 2002. Docket A-2000-02.

Figure 4.2-2
U.S. Motorcycle Registrations
 (Source: U.S. Department of Transportation Federal Highway Administration)



future emission inventories from on-highway motorcycles. While motorcycle sales have fluctuated over the years, motorcycle sales have been increasing significantly every year since 1991, with annual sales nearly tripling over the period from 1991 to 2002. Therefore, we believe our increases in sales and VMT are appropriate and actually may be conservative because they are much lower than the increase in sales seen over the last ten years.

In response to the comment on the inventories presented in Tables II.C-1 and II.C-2 in the preamble, the inventories for all of the categories other than on-highway motorcycles and marine SI (evaporative) were taken from our most recent final rulemaking that established standards for model year 2007 and later on-highway heavy-duty engines and were fully documented as part of that rulemaking. Only the inventories for on-highway motorcycles and marine SI (evaporative) were developed specifically for the highway motorcycle proposal. The reason for the differences between the preamble text and the numbers presented in Tables II.C-1 and II.C-2 of the preamble, are that the tables present only the exhaust emissions from on-highway motorcycles and the text is based on the total exhaust and evaporative emissions from on-highway motorcycles. Tables 1.4-1 and 1.4-2 of the draft RSD which present the total inventory for all categories are nearly identical to Tables II.C-1 and II.C-2 of the preamble except that the

inventory presented in Table 1.4-1 and 1.4-2 of the draft RSD include both exhaust and evaporative emissions for on-highway motorcycles.

4.3 Impact of Tampering on Emission Reductions

What We Proposed:

We did not propose any new tampering restrictions. However, there is an existing provision of section 203(a) of the Clean Air Act in which the U.S. Congress stated 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 or put to such use . . .

This means that dealers or owners of motor vehicles cannot legally make modifications that cause the emissions to exceed the applicable emissions standards, and they cannot remove or disable emission control devices installed by the manufacturer. Also, manufacturers may not produce parts or components that, when installed, would bypass, defeat or render inoperative emission control devices.

What Commenters Said:

MIC stated that emission standards based on widespread use of catalysts would result in less emission reductions than anticipated due to tampering. Specifically, they were concerned that owners would remove OEM exhaust systems equipped with catalysts with non-catalyst aftermarket exhaust systems.

Our Response:

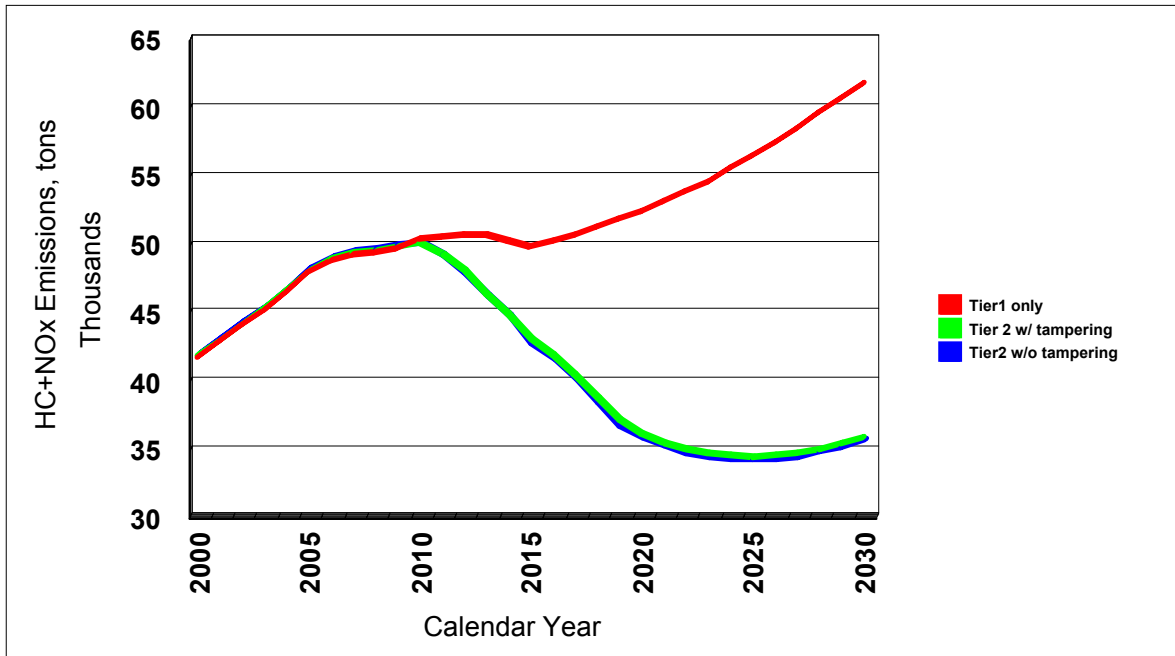
It is impossible to accurately predict the potential effect tampering will have on future emission reductions since we can't quantify the amount of tampering that will occur (if any), nor do we know in an absolute sense the effect on emission system performance due to tampering.

Until highway motorcycles are built that meet the new standards, we can't accurately identify the technology approaches used by each manufacturer, the emission reduction attributable to each approach, and the impacts that tampering could have on the emissions or the level of reductions that will occur from each technology or system. Depending on the type of tampering that occurs, the specific technology that has been tampered with may have a minimum impact on the emissions performance of the motorcycle.

MIC did not provide any estimates as to the level of tampering they believe occurs in the current highway motorcycle fleet, nor did they indicate which segments of the market or which users would be more inclined to tamper with emission control devices. However, even if they had, that information might be of limited value in estimating future practices. As described in section 7.1 of Chapter 7, we provided several reasons why we do not believe there will be significant levels of tampering (e.g., catalyst removal) when the Tier 2 standards take effect. First, catalyst technology is used on 36 out of 162 current motorcycle models and there has been no evidence presented that catalyst removal is common. Second, we expect the standards will result in the widespread use of fuel management and emission control technologies, such as fuel injection, catalysts, and pulse air systems. Removal or adjustments in these systems could not only have an adverse impact on emission rates, but also would adversely impact performance, maintenance, or durability. With the Tier 2 standards being required in California two years before they are required in the remaining 49 states, we expect that the adverse effects of tampering on performance will become common knowledge based on the manufacturers' education efforts and user experience. Third, we also anticipate and expect that during the design and development process motorcycle manufacturers will take into consideration the possibility of consumers removing emission-related parts in use and develop motorcycle models and corporate strategies that will help to ensure that tampering is discouraged and limited. Fourth, we expect that catalysts will be used on only about one-half of Class III motorcycles required to meet the Tier 2 standards. Finally, because it is illegal to manufacture, sell or install a part that the manufacturer, seller or installer knows or should know will be sold or used in a manner that defeats the emission control system, and given the economic desire of parts manufacturers and dealers to continue to sell their products, we believe manufacturers will build compliant aftermarket parts.

While we believe it is speculative to attempt to quantify the potential impact of tampering on the emission benefits of the new standards, we have performed a sensitivity analysis using conservative assumptions, for the sake of argument. We have conservatively assumed that ten percent of motorcycles are tampered with in the first year of the Tier 2 standards, five percent in the second year, and one percent in the subsequent years. We have assumed that the catalyst is removed from the motorcycle resulting in a doubling of both the HC and NO_x emissions. Given these assumptions, the estimate loss of benefits over the first ten years after the Tier 2 standards take effect is approximately 3,400 tons of HC+NO_x. This is about a five percent loss in benefits from the Tier 2 standards. Figure 4.3-1 presents the emission inventories showing the baseline (Tier 1 standards only), and the Tier 2 inventories assuming no tampering and assuming the tampering levels described above.

Figure 4.3-1
Potential Impact of Tampering on Tier 2 Emission Reductions



Chapter 5 - Cost and Cost Per Ton

5.1 Variable and Fixed Costs

What We Proposed:

We estimated the per unit costs associated with the various technologies that manufacturers are likely to employ to reduce emissions. Manufacturer variable costs were increased by 29% to estimate retail price equivalents. Projected R&D costs took into consideration that California standards would take effect two years before EPA standards. EPA estimates were incremental to R&D needed to meet California standards. Fixed costs were projected to be recovered by manufacturers over the first five years of sales using a rate of return of 7 percent. Also, fixed costs were amortized using estimated engine line sales of 25,000 units for motorcycles with engine displacements of less than 700 cc and 64,000 units for motorcycles over 700 cc. The estimated per unit costs from the draft RSD for various technologies are provided below.

	< 700 cc (600cc avg.)	> 700 cc (1200cc avg.)
engine modifications	\$6	\$8
carburetors	\$157	\$157
electronic fuel injection	\$340	\$348
mechanical pulse air	\$12	\$12
electronic pulse air	\$18	\$18
catalyst	\$58	\$61
oxygen sensor	\$27	\$27
certification	\$0.26	\$0.10

What Commenters Said:

The Motorcycle Industry Council (MIC) provided comments on the variable costs and research and development (R&D) costs associated with meeting the proposed standards and requested that we reconsider our cost estimates. MIC also provided additional supporting comments with information on how they derived their cost estimates. MIC collected data on fuel injection system costs from four manufacturers and shared a summary of this data with EPA as confidential business information. MIC commented that their fuel injection system cost of \$208 is within 8 percent of our incremental cost estimate of \$191. ABATE of Michigan commented that the OEM price for EFI systems would be \$200.

MIC also estimated the cost of a feedback system to be \$75 and the cost of a three-way catalyst to be \$75. MIC notes that the catalyst cost is not substantially different than the \$60 cost used by EPA. For air injection, MIC provides a cost estimate of \$60 (\$75 for 4 cylinder models) and comments that EPA did not consider all of the design changes needed for a durable pulse air system.

MIC also commented that the mark-up used by EPA of 29% is “far less” than is necessary to cover both the manufacturer and dealer level mark-ups. In supporting documentation that MIC provided for its analysis, MIC assumed that manufacturer overhead and profit was 20 percent and the dealer margin was 12 percent. No additional explanation was provided.

MIC commented that EPA substantially underestimated R&D costs for meeting the proposed standards. MIC commented that it is not appropriate for EPA to include only R&D that is incremental to that necessary to meet California Air Resources Board (CARB) standards which must be met two years previous, because manufacturers will spread those costs over 50 state sales. MIC acknowledges that EPA’s rationale may be theoretically defensible, but notes that member companies do not intend to amortize fixed costs over California-only sales. The following excerpt from MIC supporting analysis provides the assumptions used by MIC and their estimate of per vehicle cost increases due to R&D.

MIC’s estimate of incremental³¹ development and certification costs is based on the following assumptions:

1. All basic R&D costs on fuel-injection are reflected in vendor costs for fuel metering systems.
2. All basic R&D costs on catalysts are reflected in vendor costs for coated substrates.
3. Approximately 2/3 of all engines (5 per manufacturer) will require 2 additional person years of engineer and technician resources to optimize engine-out emission levels (bringing the average non-catalyst emission levels of the average engine closer to the levels currently achieved with the best engines).
4. Each new fuel-injected engine family (4 per manufacturer) will require an additional 2 person years of engineer and technician resources to develop calibration strategies and to optimize injector placement.
5. Another 4 person years of engineer/technician effort per engine family (6 per manufacturer) is projected for optimizing the placement and mounting of catalysts into the exhaust systems and ensuring their mechanical durability.

³¹ Cost estimates are based on the additional resources required beyond those necessary to certify a new engine family under the current standards.

6. Another 1 person year of engineer/technician resources per engine family is estimated to complete the certification process.
7. The cost of prototype hardware will be approximately \$175,000 per system that needs to be developed and \$75,000 per family that has to be certified to the new standards.

The required development includes both engine dynamometer and test track operation. In addition, a significant portion of the resources is spent on prototype system design and fabrication. These resources are assumed to cover the iterative improvement of prototype designs in response to prototype durability testing. Resource estimates are based on consultation with MIC member companies, some of whom have directly applicable experience.

A summary of the development cost estimates is shown in Table 3.

Table 3				
Development Cost Estimates Per Manufacturer				
System	Staff Years ³	Other Costs	Engine Families	Total Cost
Fuel Injection	2	\$175,000	4	\$1,660,000
Catalysts	4	\$175,000	6	\$3,930,000
Engine Mods	2	\$175,000	5	\$2,075,000
Certification	1	\$75,000	0 ⁴	\$0
Subtotal				\$8,505,000
Cost of Capital ¹				\$11,892,369
TOTAL				\$20,397,369
Cost per vehicle ²				\$50.99

1. Assumes 12% cost of capital, outlay 1-2 years before production start, 8-year production run.
2. Assumes 400,000 production.
3. Assumes fully burdened cost of \$120,000 per staff year.
4. Assumes certification of redesigned engines would be required under current standards.

MIC also commented that we have underestimated their cost of capital. Motorcycle manufacturers expect to receive a return on investment on up to 15 percent and MIC uses 12 percent in its analysis.

Our Response:

Variable Costs

We are not changing our incremental variable costs estimates for electronic fuel injection, given that MIC's estimate reasonably agreed with our estimate of \$191 (fuel injection costs minus carburetor costs). MIC costs are not provided in sufficient detail to allow us to analyze where any small differences exist in these estimations. It is unclear from MIC's comments if and how some manufacturers may have separated out fixed costs from their estimates, which could have resulted in somewhat higher estimates. Also, due to the lack of detail, it is also unclear in some cases what costs were subtracted out for the cost of carburetor systems which would be replaced by fuel injection. Given uncertainties in these estimates, we believe the two estimates agree reasonably well.

MIC estimated an electronic feedback system costs of \$75. This estimate does not appear to come from the information provided by the manufacturers and there is no explanation of what components are included in the estimate. We estimated separately a cost of \$27 for oxygen sensors. Other sensors are included in our cost of the fuel injection system as detailed in the RSD. MIC did not comment on the accuracy of the oxygen sensor cost estimate or provide a rationale for why this variable cost estimate may be too low. For these reasons, we are retaining our estimate.

For catalyst systems, the variable cost estimate provided by MIC is somewhat higher than our estimated cost (\$75 vs. \$60). In the draft RSD for the rule and the contractor cost report referenced in the RSD, catalyst cost estimates are provided in detail including catalyst size, precious metal loading, and materials costs. In reviewing this information, we found an error in the catalyst cost calculation for large displacement motorcycles. This discrepancy can be seen in Tables 5.2.2-5 and 5.2.2-6 of the draft RSD. When the appropriate catalyst cost to the manufacturer from Table 5.2.2-5 of \$53.13 is used to calculate overall costs for the catalyst for large displacement engines, the resulting total cost is \$74, rather than the \$61 shown in Table 5.2.2-6. We have made this correction for the final analysis, which brings the costs for large displacement engines in line with those provided by MIC. MIC did not comment on where they believe we may have underestimated costs or provide a similar break down of costs for comparison for smaller displacement engines. This makes it difficult to further adjust our costs. The difference in costs for catalysts for large displacement and small displacement engines is based on the need for a smaller catalyst for the smaller displacement engines. Given that the estimates agree reasonably well, that costs could vary up or down in the future depending on noble metal prices, and that we do not have a basis for adjusting our costs, we are retaining our original estimate of \$58 for the smaller displacement engines.

MIC provided a cost estimate for pulse air systems of \$60 (\$75 for four cylinder models) which is higher than our estimate of \$12 (\$17 for electronically controlled models). MIC comments that EPA has not accounted for "design changes necessary for a durable pulse air

system”, but does not elaborate or provide a break down of their cost estimate. We recognize that upgraded materials may be needed to handle the additional heat created by using secondary air. In comments provided to EPA on pulse air system costs for off-road motorcycles and all-terrain vehicles, MIC provided similar comments and provided some additional break-down in costs.³² MIC commented that EPA’s variable cost estimate for off-road motorcycles and ATVs of \$12 was not unreasonable but needed to be increased to include materials upgrades and shielding. Their estimate for total variable costs was \$27, with an overall cost, including fixed costs, of \$62. In response to these comments, we increased our cost estimate for off-road motorcycles and ATVs by \$10 to incorporate costs of upgraded materials (without shielding costs). MIC did not provide a similar cost break down for highway motorcycles. However, we believe that it is reasonable to increase our cost estimate to take into consideration the cost of materials upgrades for highway motorcycles as well. We have added \$10 to the variable costs, considering that the pulse air systems would be similar to those of off-road motorcycles, and no highway motorcycle specific detailed information was provided.

With regard to mark-ups from manufacturer costs to the retail price equivalent, we believe that the 29 percent compares very well with the estimate of 32 percent provided by MIC. MIC’s statement that EPA’s estimate is far less than is necessary appears inconsistent with the 32 percent estimate used in the MIC analysis. Considering that MIC states their mark-up estimates as assumptions and does not provide further supporting information as the basis for making a change to our estimates, we are retaining our estimate of 29 percent based on automotive experience.

It is important to note that manufacturers have stated that technologies are being employed nationwide in response to California standards. As discussed below, we are taking the conservative approach of attributing the costs for future emissions related technology changes to our new standards. In actuality, the increased use of some of these technologies would likely occur nationwide in the absence of new EPA standards. However, the extent to which this is true is not known and therefore not incorporated into the analysis.

R&D Costs

EPA’s analysis of fixed costs considered the facts that manufacturers have already developed and used advanced technologies such as fuel injection, electronic controls, and catalysts on some models and that manufacturers would develop emissions compliant vehicles in response to California standards which would go into effect two years before the new EPA standards. For these reasons, our estimates of fixed costs may have appeared low. The estimates included both staff time and laboratory support and durability testing.³³ MIC commented that we significantly underestimated R&D costs. MIC commented that it is inappropriate to attribute

³² Motorcycle Industry Council. Docket A-2000-01, Item IV-D-214.

³³ Arthur D. Little–Acurex Environmental. Memorandum from Lou Browning to Chris Lieske: On-Road Motorcycle Draft Final Cost Comparisons, June 22, 2001, Docket A-2000-01, Document II-G-145.

future R&D only to California standards because manufacturers will spread those costs over 50-state sales, even absent new EPA standards.

We believe it is appropriate to identify and include the cost increases due to the adoption of new EPA standards. One could argue that because the California standards were implemented in 1998 and EPA standards lag the California standards by two years, much of the R&D would take place before EPA standards had to be met and, therefore, that those costs should not be attributed to our standards. We believe that this argument is strong for costs incurred prior to our proposal. We would not necessarily assign costs to standards where those costs were incurred prior to the standards being proposed or the costs were incurred for some other reason or some other benefit ensued. In response to MIC comments, we understand that it is their stated business practice of their member companies to amortize future costs over 50 state production for models sold nationwide. This seems reasonable to us provided the benefits of such R&D are enjoyed by all riders. Now that we have finalized standards, manufacturers will incorporate the EPA standards into their product plans along with California standards. In response to MIC's comments that actual cost increases would be underestimated under the approach EPA used in the proposal to incorporate R&D costs, we have revised our analysis.

MIC's approach of estimating a total per manufacturer cost for R&D and then dividing by sales to estimate per vehicle costs makes sense. However, MIC's estimate of R&D costs appears unreasonably high for several reasons.

First, we would not expect manufacturers to develop each emission control system component separately with multiple staff years devoted to each component. Manufacturers have experience with the technologies being considered and these technologies are already being used on several models. We would expect that for each engine line there would be a systems approach where emissions controls would be developed in combination and optimized for each model.

Second, since the technologies are well known and have been applied to at least some models, we would expect that an average of 4 staff years per engine line would be more than a sufficient amount of development time. Manufacturers typically have about 8 engine lines, according to MIC, which would mean that each manufacturer would spend a total of about 32 engineering staff years (about \$3.8 million) to meet the standards. We believe that this is a conservatively high estimate given the state of technology today, with about 49 percent of sales already equipped with fuel injection and 46 percent of sales equipped with secondary air systems. Models already equipped with technologies such as fuel injection or pulse air would require much less work than more basic models. With regard to catalysts, catalysts systems are highly developed and have already been used on some motorcycles. We would expect some additional R&D for system optimization and would also expect R&D efforts to focus on durable system designs that discourage accidental removal and tampering.

Third, we would expect manufacturers to modify products in an orderly manner over time. Models that are modified later will benefit from the R&D experience from earlier models.

We believe this approach is likely both because several years of lead-time is provided for the Tier 2 standards and due to the averaging approach for the standards. Averaging allows manufacturers to balance emissions across their Class III product line. Averaging also allows Tier 1 and Tier 2 to be met using the same technological approaches, but on fewer models for Tier 1.

We have also included \$175,000 per line for equipment-related R&D costs. This would cover the costs of prototype hardware and test vehicles.

We use a rate of return of 7 percent in estimating the costs of funding fixed costs. Manufacturers would obviously prefer an investment with a higher return, but we believe this is sufficient to cover associated business costs. This discount rate is consistent with OMB guidance.

For the proposal, we amortized fixed costs over 5 years as a typical time for manufacturers to recoup their investment. MIC provided comment that 8 years is typical for highway motorcycle manufacturers and recommended that EPA use 8 years as the recovery period. In response, we have based the cost analysis for the Final Rule on an 8 year recovery period. Also, MIC spread the costs over per manufacturer annual average sales of 50,000 units. This would translate to total annual sales of 300,000 units (6 manufacturer*50,000 units) for the six major manufacturers. MIC estimates 2001 sales of on-highway motorcycles (including dual sport models) to be about 575,000 units, and they estimate that about 91 percent of all motorcycles are sold by the six large manufacturers.³⁴ These estimates are consistent with estimated sales projection data for the 2003 model year from our certification database submitted by manufacturers on a confidential business information basis. Based on the certification data, we have estimated that Class III sales are about 528,000 and we are using this to calculate a per manufacturer sales estimate for large manufacturers. For our analysis, we have used an updated per manufacturer sales estimate of 80,000 units per manufacturer (528,000*0.91/6).

What Commenters Said:

MRF submitted an economic analysis as part of their comments, which suggests that EPA's cost analysis ignores numerous smaller firms that are also members of the U.S. motorcycle industry. The report comments that EPA's engineering cost analysis implicitly assumes only five companies will meet the Class III standards in 2010 and this will make the market an oligopoly. MRF provides per vehicle fixed cost estimates for firms with much smaller output, assuming they would incur the same fixed costs per engine line as the large manufacturers. MRF commented that the number of units per engine line used by EPA was arbitrary and did not reflect smaller manufacturers output. MRF estimates that a manufacturer producing 14 units per year equipped with a 600 cc engine would incur a per unit fixed cost of \$19,095, and a manufacturer producing 36 units per year equipped with a 1200cc engine would incur a per unit fixed cost of \$1,495. MRF also provides estimates for 842 units and 2,158 units

³⁴ Motorcycle Industry Council, Statistical Annual 2002, pp.7-8. Docket A-2000-02.

per year. MRF also comments that if a similar analysis were completed for a monopoly where fixed costs were spread over all motorcycles, the costs would be at their lowest possible level.

MRF comments that when EPA estimated compliance costs, EPA similarly underestimated costs for small firms. Small firms would spread compliance costs over a much smaller number of units produced which would result in a much higher per unit cost. These per unit costs could be in the hundreds of dollars for a very small manufacturer.

MRF comments that EPA's low cost estimates result almost entirely from a decision to arbitrarily spread fixed costs over tens of thousands of units. MRF comments that small firms will be forced from the marketplace absent a permanent exemption from Tier 2 standards. They also comment that small firms that are large enough to be subject to the Tier 2 standards will have difficulty surviving in the marketplace against larger competitors.

MRF comments that EPA spreads fixed costs over 5 years when the Tier 1 standards are only in place for 4 years. Similarly EPA applies the learning curve twice over 6 years when the standards are in place for only 4 years. MRF questions how costs can be recovered over a period that is longer than the period in which the standards are in place and how the Tier 1 standards can have both near-term and long-term costs associated with them.

Our Response:

As discussed in our previous response, we have changed our approach to R&D costs in estimating the average per unit cost. MRF correctly observes that we are basing our average cost estimates on the costs that will likely be incurred by large manufacturers. There are 6 large firms that dominate the motorcycle market, accounting for over 90 percent of sales. We believe that it is appropriate to base our estimate of average per unit costs on estimates for these firms. Differing costs for other manufacturers are not expected to significantly change the average cost estimate, as explained below.

Large manufacturers are expected to meet the Tier 1 and Tier 2 standards using the same technologies, but on fewer models for Tier 1. This approach is facilitated by the averaging program, where low emissions can be achieved on some models while others exceed the standards, as long as the standards are met on average. It is also facilitated by the early banking program for Tier 2 and the lead time provided to manufacturers to meet the standards which allows them to plan out product development. We believe this approach makes sense for large manufacturers because the manufacturers would not invest in an engine line to meet Tier 1 and then revise the engine line again to meet Tier 2. MIC confirms this approach in their analysis of costs, where MIC does not differentiate costs between the two tiers of standards but looks at them as a combined standard. It is effectively the same approach as one would take if there were no Tier 1 standards but the Tier 2 standards were phased in earlier to achieve the same emissions reductions. This is also why it is appropriate to use a fixed cost recovery period longer than 4 years for the Tier 1 standards and to consider long-term costs associated with Tier 1.

Manufacturers will likely invest in engine lines only once during the course of meeting the Tier 1 and Tier 2 standards. Those investments continue to provide benefits long-term.

Based on certification records, we identified 18 small Class 3 motorcycle manufacturers that would not have to meet the Tier 2 standards at this time. These manufacturers would also benefit from longer lead time and other small business flexibilities. We believe, based on conversations with manufacturers and an examination of certification data, that these motorcycle manufacturers will take a much different approach to meeting Tier 1 standards than large manufacturers. Several Class 3 models are currently certified near or below the Tier 1 standards (see Chapter 6) with no electronic fuel injection or catalyts. These small manufacturers are expected to be able to meet the Tier 1 standards through engine modifications and calibration changes alone. As indicated by the certification data and the emissions levels, some of the engines have already been modified for emissions control and would likely meet the Tier 1 standard with little or no additional work. Also, it is important to note that several small motorcycle manufacturers purchase engines from engine manufacturers, such as S&S Cycle, who conduct the R&D necessary for their engines to meet the standards. This means that the R&D costs are spread over many more units than a single vehicle manufacturer would sell. These vehicle manufacturers would be expected to continue to purchase such engines, install them in their bikes, and then certify them, as they do now.

We identified that 12 of the 18 small motorcycle manufacturers purchase engines from separate engine manufacturers, such as S&S Cycle. There are 6 small manufacturers that do not identify a separate engine manufacturer and may make their own engines. Of these six manufacturers, only one manufacturer has certification HC levels above 0.7 g/km. This indicates that the small manufacturers will be able to meet the Tier 1 standards with relatively modest additional changes to their motorcycle engines and costs are likely to be minimal given the lead time provided to small companies for optimization. Additional lead-time allows manufacturers to consider emissions standards during the course of improving their products over time. It is also worth noting that these standards apply in California two model years before they apply in the rest of the US. Overall, we do not see a basis for expecting the Tier 1 standards to cause small manufacturers to be significantly adversely affected or to leave the market.

In order to fully respond to the comments, we have conducted a cost analysis for small manufacturers. The results of the analysis are provided in the table below. Taking the approach used for large manufacturers, described above, we have estimated one staff year of development per small manufacturer, \$43,750 (one-fourth the large manufacturer cost) for prototype hardware, and \$25,000 for certification. These R&D costs are the same as that projected for the large manufacturers for Tier 1. The R&D estimate is conservatively high considering the current state of technology and emissions performance noted above. The estimated tooling and variable costs for engine modifications are from the draft RSD and have not changed for the final RSD. Fixed costs are projected to be recovered over 8 years of average sales of 1,000 units per year. This estimate of average annual sales is based on current sales for small manufacturers. For purposes of estimating R&D costs, engine manufacturers are considered the primary manufacturer rather

than the vehicle manufacturer. As shown in the table, small manufacturers may experience higher per unit fixed costs but these are off-set by lower per unit variable costs associated with technology. The overall per unit cost estimate is somewhat higher for small manufacturers for Tier 1 (\$50 compared to \$30 for large manufacturers) but is less than the estimated large manufacturer costs for Tier 1 and Tier 2 combined.

	Cost per manufacturer	per unit cost
Variable costs	n/a	\$8
R&D	\$163,750	\$31
Tooling	\$35,000	\$6
Certification	\$25,000	\$5
Total		\$50

As described above, the per unit fixed costs estimated in the table are dependent on the sales per year for the manufacturer. As described above, we used average sales of 1,000 units per year in our analysis. Manufacturers with lower annual sales may experience proportionally higher than average per unit fixed costs, while manufacturers with higher than average sales may experience lower than average fixed costs. For example, a manufacturer with annual sales of 200 units would be estimated to have per unit R&D costs of about \$150 (assuming also that the manufacturer incurred an overall R&D cost of \$163,750), whereas a manufacturer with sales of 3,000 would be estimated to have a per unit R&D cost of about \$10. The median annual sales for small manufacturers making their own engines is about 550 units per year. Using this number in the above analysis of costs would result in an R&D estimate of \$57 and an overall cost of \$84 per unit. However, the R&D costs per unit will also depend on how much work will be involved in meeting the new standards for a particular manufacturer. Several motorcycles currently certified by small volume manufacturers have emissions certification levels that indicate they can meet the standards with little additional work, if any. In these cases, the estimated R&D costs described above would likely be overstated. Also, manufacturers with relatively high emissions engines may choose to switch engines rather than invest in reducing emissions from their current product. By providing additional lead-time, we believe we are giving manufacturers time to seek out the best overall option for their product.

In addition to the six large volume manufacturers and the small manufacturers discussed above, there are five large overseas manufacturers that sell a small volume of Class 3 motorcycles in the U.S., but must meet Tier 2 standards because they are large companies. (Three of these companies are members of MIC.) For these companies, the U.S. market is a secondary market compared to their primary European markets. Considering that Europe also has stringent emissions standards upcoming, we would expect these manufacturers to develop emission control technologies for their overall product lines rather than only for the U.S. portion of their sales. Their overall fixed costs would therefore not be expected to be considerably

higher on a per vehicle basis than those projected for large U.S. companies. These companies did not provide comments raising concerns about meeting the Tier 2 standards or the costs associated with them.

Finally, there are two U.S. companies with sales that fall between that of the 6 large manufacturer and the small business cut point of 3,000 units. These companies would be required to meet Tier 2 standards and theoretically may face somewhat higher per unit fixed costs than those estimated by EPA due to their lower sales volumes. We have not estimated a unique cost for these two companies because it would not significantly affect the average cost estimates we have projected and because we have not received additional comments or information for these companies. Both of the companies are members of MIC, which commented in support of the Tier 2 standards, and the companies did not provide additional comments.

Based on the comments we have received from manufacturers and our discussions with them, we believe our revised cost estimates reasonably represent the average costs associated with our new standards. We disagree with the comments that we have characterized the market as an oligopoly. The current motorcycle market is highly competitive and we do not believe our emissions standards will significantly change market competition. As discussed above and in Chapter 6, we have provided small businesses with significant flexibility in meeting new emissions standards with provisions designed to ensure our standards do not force them from the market.

5.2 Technology Use Projections

What We Proposed:

We used 2002 model year technology usage rates as our baseline, based on information and projected sales data provided to EPA by manufacturers as part of the current certification process. We projected increased usage rates for each technology for Tier 1 and Tier 2. Average per unit cost increases are based on the cost of the technologies (discussed above) and the projected increase in their usage rates. We attributed half the costs associated with the increased use of fuel injection to non emissions related improvements such as reliability and performance improvements. The usage rates used for the NPRM are provided below.

Technology Usage Rates Used in NPRM

	< 700 cc (600cc avg.)			> 700 cc (1200cc avg.)		
	baseline (2002)	Tier 1	Tier 2	baseline (2002)	Tier 1	Tier 2
engine modifications	66%	100%	100%	53%	100%	100%
carburetors	77%	60%	40%	53%	50%	40%
electronic fuel injection	23%	40%	60%	47%	50%	60%
mechanical pulse air	48%	60%	40%	37%	50%	40%
electronic pulse air	0%	40%	60%	0%	50%	60%
catalyst	15%	15%	50%	20%	25%	50%
oxygen sensor	1%	15%	50%	5%	25%	50%

What Commenters Said:

In MIC’s cost analysis, they used baseline technology usage rates from the 1998 model year whereas EPA used 2002 model year usage rates as the baseline. MIC ties the increased use of technologies nationwide between 1998 and 2002 to the 1998 CARB rulemaking. For fuel injection, MIC comments that “although it can be argued that increasing fuel injection use is occurring independent of upcoming emissions standards, it is not a coincidence that significantly increased use is beginning to occur after the 1998 CARB rulemaking.” MIC further commented, “if there were a market-based reason for its widespread use in the absence of more stringent emissions standards, it would have been installed on a higher percentage of production at the time CARB adopted its 2008 model year emissions standards. The recent increase in the use of fuel injection nationwide is largely due to the existence of CARB standards. EPA’s assumptions regarding the baseline use level...appears to be arbitrary.”

For catalysts, with regard to the increase in nationwide use, they comment that “it is obvious that the increased catalyst use is occurring to achieve early compliance with the upcoming California standards and to avoid the need to certify a large number of new emissions control systems at the last minute.”

Our Response:

We must conduct an analysis to estimate the costs associated with establishing the new EPA emissions standards. To conduct the cost analysis, we project the changes in technology that are likely to be necessary to achieve our new standards. As the baseline for our analysis, we apply the current use rates of the relevant technology, which we can determine from certification

data provided by manufacturers and believe to be reasonably accurate. We are not making assumptions about the baseline use of these technologies.

Manufacturers likely have chosen to employ this level of technology on current products for several reasons. According to MIC, one reason is that they are preparing to meet new CARB standards. If CARB standards are prompting the use of the technologies, manufacturers would be making a business decision to apply the technologies to production for all 50 states. We find it unlikely that new EPA standards which were not proposed until August of 2002 and would not take effect for several years would drive technology use in 2002 and earlier model years, especially for fuel injection which costs about \$200 per unit. It is possible that the advantages of producing a 50 state product outweigh the costs associated with the technology for some manufacturers. It is also possible that in some cases the technology offers performance advantages or provides manufacturers with more flexibility in meeting current EPA standards. Such an argument is less tenable for hardware such as catalysts and pulse air systems where there are no perceived performance benefits to outweigh costs and the EPA standards were not stringent enough to drive the application of this technology.

The technology employed prior to our proposal does not factor into the cost analysis. We do not believe that the use of the technologies on model outside of California in past model years has been prompted by EPA's proposal. In fact, it appears counterintuitive that manufacturers would add costs to their products (and risk reduced sales and profitability) in anticipation of future EPA requirements. Such an argument would suggest that there is no need for additional leadtime over that provided by California. The use of these technologies has taken place in the absence of new EPA standards and we do not believe it would be appropriate to attribute their use to the projected future standards. This is not to say that the technologies do not provide emissions benefits. The use of these technologies has lowered the average emissions levels of motorcycles and we have incorporated those emissions reduction into our baseline emissions estimates as well. However, just as for the costs, we do not attribute these emissions reductions to the standards we are only now finalizing and which do not take effect for several years. We believe that if we took the approach used by MIC, we would be overstating the costs involved with achieving the new EPA standards.

What Commenters Said:

MIC based their cost analysis on a mix of technologies that differed from the mix of technologies EPA projected for meeting the standards. The technology mix assumed by MIC compared to that projected by EPA is shown in the table below taken from MIC comments. The baseline technology estimates were discussed above.

Table 2				
Technology Use Assumptions				
Technology	EPA		MIC	
	Baseline (2002)*	2010	Baseline (1998)*	2010
Fuel Injection	43%	60%	20%	70%
Catalysts	19%	50%	10%	85%
Oxygen Sensors	4%	50%	2%	85%
Pulse Air	39%	100%	not considered	not considered

* Years have been added by EPA for clarification.

MIC comments that they assumed secondary air systems would not be used with 3-way catalysts. MIC notes that reductions can be achieved with a 3-way catalyst that are similar to reductions with secondary air and an oxidation catalyst.

Our Response:

Each manufacturer will take their own technology path in meeting the Tier 1 and Tier 2 standards. With an averaging program, it is possible, even likely, that the technologies and calibrations from model-to-model and manufacturer-to-manufacturer will vary widely. The technology mix assumed by MIC would likely produce a fleet mix more than capable of meeting Tier 2 emissions standards.

For our cost analysis, we need to project a technology mix that is reasonable, capable of meeting the emissions standards, and likely, given the state of technological development and use. We believe the technology mix projected for the proposal meets these objectives. MIC assumes a higher rate of use for catalysts and fuel injection and no use of secondary air systems. MIC's assumption regarding secondary air is inconsistent with current trends. The use of secondary air has increased from about 40 percent in 2001 and 2002 to about 46 percent in model year 2003. (The use rate of secondary air in the 2003 model year when Harley Davidson is removed from the analysis is 68 percent.) Also, MIC's assumption regarding the use of secondary air with 3-way catalysts is inconsistent with current industry practices. The certification data for model year 2003 indicates the use of secondary air with 3-way catalysts on at least 9 engine families. Also, MIC's comments regarding manufacturers preparing to meet CARB standards is inconsistent with their comments that secondary air will not be used to meet those standards. MIC did not address why manufacturers would choose to abandon the use of secondary air other than to say it would not be needed with 3-way catalysts. In any event, it is also worth noting that if we based our analysis on 85 percent use of catalysts, rather than 50 percent, and no use of pulse air, instead of 100 percent use, the changes in average costs in our

analysis would essentially off-set one another (catalyst cost of \$60*.35 = \$21 and pulse air system costs of \$22-\$27).

MIC does not differentiate between the technology approaches taken for Tier 1 and Tier 2. We believe this approach is appropriate because manufacturers are unlikely to change technological approaches for emissions controls between the two tiers. It is more likely that the Tier 2 standards would be met by increasing the use of technologies to more engine families. Averaging facilitates this approach to the standards. It is unclear when MIC believes manufacturers will abandon the use of secondary air. MIC does not appear to adjust their cost estimate to subtract the cost savings associated with removing the secondary air systems.

With the emissions reductions provided by the use of secondary air systems, we do not believe catalyst use beyond the 50 percent of the affected motorcycles projected for the proposal would be necessary. We also are continuing to project 60 percent use of fuel injection, though we note that market forces (as opposed to emissions standards) may drive higher use of this technology. Based on MIC's comments, discussed above, we are projecting significant R&D for emission control system optimization and we have provided two years of additional lead-time compared to California. Considering these factors, we believe it is reasonable to expect that manufacturers will be able to meet the standards with the technology mix we have projected. With a full array of technologies including secondary air, fuel injection, and a three-way catalyst, we expect NO_x+HC emissions to be in the range of 0.3-0.5 g/km. The group of motorcycle models without catalysts, which may include some models without fuel injection as well, are expected to be in the 0.6-1.2 g/km range. A discussion of technological feasibility analysis and certification test results that we believe justify the projected mix of technologies is provided in Chapter 4 of the RSD.

What Commenters Said:

MIC commented that attributing 50 percent of the cost associated with increased use of fuel injection to non-emissions-related factors does not appear reasonable. MIC comments that this is arbitrary and their concern is compounded by the development cost concerns noted above. MIC further comments that if there were market-based reasons for using fuel injection, it would have been installed at a higher rate of production prior to CARB's actions.

Our Response:

We believe there are non-emissions related reasons for the use of fuel injection. Even prior to CARB considering standards, fuel injection had been installed on about 20 percent of motorcycles. In 1998, BMW equipped all of their models, except for their dual sport, with fuel injection. The rate of use of fuel injection has grown to 49 percent for EPA certified motorcycles in model year 2003, in the absence of new U.S. emissions standards. Manufacturers continue to introduce fuel injection on new models for the U.S. market. We believe this progression in technology is being driven by market forces rather than new EPA standards. MIC provides

comments that fuel injection is generally more reliable than carburetors. This is one clear advantage of fuel injection over carburetors, and there can be others, such as more precise fuel control, increased horsepower, increased torque, improved fuel economy, and improved cold starting.^{35,36} Given the cost of these systems, it is difficult to believe manufacturers have installed the systems solely in preparation for upcoming emissions standards, especially for sales outside of California.

We continue to believe that it is appropriate to attribute half the cost of fuel injection to non-emissions-related factors such as increased reliability. While the new emissions standards will contribute to the increased use of fuel injection, we believe that in the absence of new EPA standards, the trends in fuel injection use would likely continue. BMW has already equipped its full highway motorcycle product line with fuel injection, and other manufacturers may choose to take a similar approach in the future. We believe fuel injection provides value to the consumer and to the manufacturer beyond emissions control and therefore it is appropriate to attribute half the cost of the systems to these other benefits.

What Commenters Said:

ABATE of Cheyenne commented that Chapter 5 of the draft RSD states:

“Many of the engine technologies available to manufacturers to control emissions also have the potential to significantly improve engine performance. This is clear from the improvements in automotive technologies. As cars have continually improved emission controls, they have also greatly improved fuel economy, reliability, power, and a reduced reliance on regular maintenance.”

They commented: “The implication here is that performance and reliability advances in automobile engine design and implementation are driven by emission control regulations. This is not entirely true. While a fuel efficient, reliable engine is also a clean burning one; many of these advances are market driven.”

Our Response:

We searched both the NPRM preamble and draft RSD and could not find the above statement. With regard to the statement in general, however, engine technologies such as improved in-cylinder components and improved fuel delivery systems are items that manufacturers often pursue to reduce emissions, as well as for other reasons. These approaches are aimed at providing more complete fuel combustion and more precise fuel control. Upgrades

³⁵Bennet, J. “The Complete Motorcycle Book, A Consumer’s Guide”, Checkmark Books, 1999, p.56, Docket A-2000-02, Item IV-A-11.

³⁶“V-Twin Fun Machine, Suzuki SV650 Upgraded for ‘03”, “American Motorcyclist”, July 2003, p.14, Docket A-2000-02, Item IV-A-12.

are also aimed at improving durability to ensure that vehicles meet emissions standards over their life cycle. These improvements also often provide these benefits in addition to emissions control noted above. We agree that manufacturers may add these advances for reasons other than, or in addition to emissions control.

5.3 Maintenance and Repair Costs

What We Proposed:

We are not expecting significant changes in maintenance and repair costs due to the incremental changes in technology. We did not estimate any changes in costs for maintenance and repair for the NPRM. We requested comment on the impacts of the technology changes on maintenance costs.

What Commenters Said:

AMA commented that increased repair and maintenance costs (in addition to new equipment costs) will drive cost of ownership up and out of reach of some. ABATE of MI commented that a repair bill for an EFI system would be \$1000 and that we need to assess costs over lifetime of vehicle to assess true economic impact.

MIC commented: “Catalytic converters and air injection systems do not require routine maintenance and generally do not limit access to other service items. As a result, the increased use of these systems is not expected to affect the cost or difficulty of routine maintenance. Although fuel injection systems are less amenable to repair by vehicle owners, they are generally more reliable than carburetors. In addition, fuel injection systems are no more difficult to adjust for idle speed or cylinder balance using tools that are commonly available to mechanically inclined owners. The net effect of increased fuel injection use is not expected to have a significant effect on the cost or difficulty of routine maintenance.”

Our Response:

We agree with MIC’s assessment of maintenance costs associated with the use of advanced technologies. We do not expect significant increased maintenance costs associated with the new standards. We also agree with MIC’s statement that fuel injection systems are more reliable than carburetors. The need for system adjustment to maintain proper operation should significantly decrease with the use of fuel injection, given that the systems are electronically controlled and often adjust for changing engine operating conditions.

Although we do not have, and commenters did not provide, data or information that would allow us to quantitatively assess the differences in life cycle repair costs between fuel injection and carburetion, we would expect the need for major repairs to be rare with fuel injection. We received several comments that motorcycle usage rates are very low relative to

automobiles, and we estimate average annual mileage to be about 2,900 miles and average lifetime mileages well under 50,000 miles. Given that fuel injection system technology has been designed for automotive applications with much higher mileage accumulation rates, we expect manufacturers to have little trouble designing a system that lasts the life of the motorcycle. While there will be premature failures of system components, we would expect those to be rare. We know of no reason to expect that motorcycles would experience complete fuel system failure noted by ABATE of Michigan. We would expect average life-cycle repair costs of fuel injection to compare favorably with carbureted systems given the durability of the components and the average use rates of motorcycles. Such an analysis would also need to consider the replacement rates for carburetors which can cost hundreds of dollars to replace. It is also worth noting that we and the manufacturers are projecting that some carbureted models will remain on the market, providing consumers with a choice of technologies.

5.4 Costs in General

What We Proposed:

For the NPRM, we estimated an average cost per vehicle of \$26 for Tier 1 and \$35 for Tier 2.

What Commenters Said:

Several commenters provided comments that our cost estimates were too low but did not provide supporting data or additional detail. (AMA, Peter Craig, ABATE of MI, Idaho Coalition for Motorcycle Safety, Inc.) ABATE of Michigan challenged our cost estimates of \$26 and \$35 for Tier 1 and Tier 2, respectively, considering that the cost of fuel injection alone is \$200.

Our Response:

It is important to note that our per vehicle cost estimates are average costs and are based on both the current state of technology and projections of technology needed to meet standards. Section 5.2 above describes the technology baselines and projections and provides our analysis of comments on technology usage rates. 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. For example, the average per vehicle cost of increasing the use of a \$191 fuel injection system from 50 percent to 60 percent of vehicles would be about \$19. The costs for emissions control may also appear low because we are attributing half of the cost of fuel injection to non emissions related benefits. The reasons we believe this is appropriate are provided in section 5.2, above. Chapter 5 of the draft and final RSD provides the detailed calculation of average costs.

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.

5.5 Costs for Motorcycles Under 50 cc

What We Proposed:

We estimated an average incremental cost increase of \$44 per unit, based on the increased use of 4-stroke engines in motorcycles under 50 cc to meet the proposed standards. We noted that the U.S. market for these vehicles is a small niche market for the world's major scooter manufacturers based in Europe and Asia. These major markets have emissions standards for these vehicles which will drive technology changes for emissions control. We are not expecting manufacturers to produce a unique product for the U.S. market.

What Commenters Said:

AMA commented that cost estimates for under 50cc bikes are overly optimistic. The scooters are a small niche market and attempting to introduce advanced emissions control technology on them will almost certainly assure their demise. Requiring the addition of complex exhaust emission control equipment, especially catalytic converters ignores the weight increase and placement issue faced by this class of vehicle.

Our Response:

As discussed in the NPRM, we recognize that the U.S. market for motorcycles under 50 cc (scooters) is a niche market and that most scooters are brought to the U.S. from the major scooter markets in Europe and South Asia. However, emission standards in the major scooter markets are also becoming more stringent. Our goal with this program is to establish standards that would be consistent with the standards for the major scooter markets to ensure that the US market benefits from the cleaner technologies being developed and used. We believe that the new standards can be met using a 4-stroke engine or using advanced two-stroke designs with direct fuel injection and/or catalysts. These are the primary technologies being used by scooter manufacturers to lower emissions. We received comments from scooter manufacturers (MIC, ACEM) that with some test procedure modifications (see Section 1.4), they would be able to meet the standards using technologies being designed for the major scooter markets. We have accepted their recommendations in a continued effort to ensure that the EPA standards will not require U.S. specific designs.

Manufacturers did not provide comments regarding our cost estimates. AMA also did not provide any detailed comments on the basis or methodology of our cost analysis or recommendations on how our cost estimates should be changed or improved. We do note that AMA's comments seem to be based on a belief that the standards would force the use of catalysts. While manufacturers could choose to use catalysts, we believe that the standards can be met using a well- designed 4-stroke engine, as discussed in Chapter 4 of the RSD. Our cost analysis is based on the estimated incremental cost difference between the small 2-stroke and 4-stroke engines used in scooters. For the final rule, we have no additional data to update the cost analysis and continue to believe the costs estimated for the proposal are reasonably accurate. Therefore, we have not made any changes to the cost analysis.

5.6 Cost Per Ton Estimates

What We Proposed:

In the NPRM, we provided per unit cost per ton estimates for the proposed emissions standards. Cost per ton estimates were calculated using the estimated discounted tons of emissions reduced by the standards over the lifetime of a vehicle and the per vehicle costs. The table below provides the cost per ton estimates from the NPRM. Comments on estimated emissions reductions are addressed in Chapter 4.

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+NOx	\$970	\$970
Highway motorcycles >50cc	2010	0.03	Exhaust HC+NOx	\$1,230	\$1,230
Highway motorcycles <50cc	2006	0.02	Exhaust HC	\$2,130	\$1,750

What Commenters Said:

Some commenters provided comments that our cost per ton (cost effectiveness) estimates were too low and that the standards are not cost effective. In some cases, commenters noted that the low cost per ton estimates were the result of cost estimates that were too low. (submitted by NMMRO, MRF, Dr. John Myers)

ABATE of Cheyenne commented that the cost per ton estimates in Table II.C-1 of section VI of the NPRM preamble does not appear to address the cost per ton estimates for street bikes, only scooters with engine displacements less than 50 cc (text addresses < 50 cc, while table addresses >50 cc).

Our Response:

Cost per ton estimates are calculated based on per vehicle costs and per vehicle emissions reductions. Comments on the cost estimates are discussed above. Comments on the emissions reduction estimates are analyzed in Chapter 4. We have revised our cost per ton estimates based on changes to our estimates of costs and emission reductions. Although our cost per ton estimates have increased as a result of these changes, we continue to believe that the standards will be cost effective. The RSD provides details of our cost, emissions reduction, and cost per ton estimates, including a comparison of the cost per ton estimates for this rulemaking with other mobile source rules.

Table II.C-1 of the NPRM preamble contains cost per ton estimates for motorcycles greater than 50cc (>50cc) but does not show cost per ton estimates for less than 50cc (<50cc). The text in the preamble preceding the table notes that for less than 50 cc, the increased costs are partially offset by fuel consumption savings. We appreciate the commenter noting the lack of the below 50 cc estimates in the preamble table. The last line of the table in the NPRM contained the estimate for <50cc but was mislabeled in the Federal Register Notice as >50cc. In response to the comment, this error has been corrected for the final rule (in addition to the full analysis in the RSD). The RSD for the NPRM provided a full cost per ton analysis for both above and below 50cc motorcycles.

What Commenters Said:

MRF comments that the cost per ton estimates are too low because engineering costs have been underestimated and because EPA assumes that the standards will not affect sales levels. EPA uses an annual growth rate of 1 percent per year even with new standards and does not consider that sales may slow down, providing fewer emissions benefits, even though fixed costs remain the same. MRF points out that historical motorcycle sales are cyclical and have varied substantially over past years. MRF believes that the standards will affect performance and price resulting in a change in motorcycle sales. If motorcycle sales slow down, emissions reductions will occur more slowly than expected but fixed costs will remain the same, resulting in higher cost per ton estimates.

MRF states that EPA expects an oligopolistic manufacturing sector, the result of which will be higher costs for the consumer. Also, emissions standards could result in only a handful of manufacturers, which have exclusive knowledge of the pollution control technology, having monopoly power in the market. Hence, the intense competition presumed by EPA may not materialize, leaving consumers to pay higher prices than EPA has estimated.

MRF, in its study, also comments that EPA amortizes fixed costs over a recovery period. However, consumers do not recover or retire fixed costs. From the consumers point of view, those fixed cost dollars are not recovered.

The MRF study comments that EPA's per vehicle cost per ton estimate does not consider the rate at which vehicle meeting the new standard replace old vehicles. The report comments that the public does not receive any clean air benefit until cleaner machines are actually brought into service and that this process of replacing old machines with cleaner ones takes a long time.

The study provides a cost per ton analysis that "takes into account the rate at which Tier 1 and Tier 1 motorcycles enter the fleet". MRF comments that if realistic costs are used, cost per ton numbers would cost from \$3,500 to more than \$7,500 per ton. MRF, in its study, provides three alternative cost per ton estimates, which they state, take into account the rate at which Tier 1 and Tier 2 motorcycles enter the fleet. The three analyses use three different cost assumptions:

1. EPA's \$35 per vehicle near-term cost
2. EPA costs modified for a motorcycle industry comprised of more than a few large firms
3. MIC estimated costs of \$226 per vehicle (and half \$113 for the four years that Tier 1 models are sold)

MRF's study concludes that the cost per ton numbers for analyses 2 and 3 are much higher than the EPA cost per ton numbers and well above the range for previously implemented mobile source rules. They also observed that the cost per ton numbers vary considerably by the motorcycle usage rate and also vary by the discount rate used. Changing the annual mileage by 400 miles varies the cost per ton by about \$1,000 under the second and third set of cost assumptions.

Our Response:

MRF raises concerns with our use of a nominal annual sales growth rate of 1 percent. It is important to note that this growth rate does not enter into our estimate of per vehicle costs or cost per ton. We use the nominal 1 percent growth rate in estimating future aggregate costs, which are estimated by multiplying sales by per vehicle costs. Section 5.1 above analyzes comments we received on per vehicle variable and fixed costs. We use these costs to estimate the cost per ton for the emissions standards. As discussed in section 5.1, fixed costs are spread over 8 years of engine line sales. Annual engine line sales estimates are based on current average sales per engine line and are not adjusted to include potential future growth. We believe it is more accurate to base estimates on current average sales per engine line rather than to attempt to predict future sales per engine line, because the number of engine lines may also vary in the future along with sales. In any event, the variation in sales per engine line would likely be small on average. The use of the 1 percent growth rate is discussed further in Chapter 4.

MRF comments that if sales go down from current levels, the fixed costs per vehicle would increase. This is based on the assumption that sales per engine line would decrease from current levels but the fixed costs would remain the same per engine line. In response, we do not believe the per vehicle cost increases will cause a significant decrease in sales. The estimated average per vehicle cost increase is less than one percent of the current average cost (about

\$10,000) of Class 3 motorcycles. This is less than most motorcyclists spend on post-purchase customization actions. As discussed in Chapter 4 of this document, motorcycle sales have increased at a rate of more than 18 percent a year for the past five years. And while we do not expect that rate of growth to continue and indeed there could be years of decreases in sales as has occurred in the past, a long term annual growth rate on the order of one percent reasonable. MRF is projecting a potential decrease in sales based on a concern that performance in future bikes will be less than desired. As is discussed in Chapter 7, we believe this concern is overstated; we are not expecting any significant negative impact on performance or sales. MRF did not provide any recommendations for an alternative growth rate (or sales rate decrease). We learned through discussion with Dr. Vaughn, that he also used a one percent sales growth rate in the cost per ton analysis presented in the MRF report and did not attempt to adjust sales in any way to account for increased costs.³⁷ In any event, even if sales declined slightly in the first few years of the program, the effect on overall average fixed costs would not be significant (Even a significant decline in engine line sales of 10 percent for the first eight years of sales, results in increased average costs of less than \$2 per vehicle).

MRF also comments that we assume an oligopolistic market structure and that the market will become monopolistic due to new standards. They believe this market shift to a more monopolistic market will allow manufacturers to charge more than EPA has estimated. In response, we do not assume an oligopolistic market structure or incorporate any projected shift in the market dynamics. As discussed in section 5.1, for Class 3, there are currently 6 manufacturers that account for over 90 percent of sales. However, in addition, we estimate there are 18 small firms which would qualify for the small business provisions of the rule, 5 large foreign manufacturers with smaller volume sales in the U.S, and 2 smaller U.S. firms which do not qualify for the small business provisions.

We believe the current motorcycle market to be highly competitive, with several smaller firms offering products. For all markets that are modeled, the analyst must characterize the degree of competition within each market. The discussion generally focuses on perfect competition (price-taking behavior) versus imperfect competition (the lack of price-taking behavior). The central issue is whether individual firms have sufficient market power to influence the market price. Just because there is some market concentration doesn't give larger firms the power to determine prices. We believe this market can be modeled as a competitive market because, in general, the manufacturers are price takers. There is a significant level of international competition within the market. Even in markets where a few firms dominate the market, there is significant excess capacity enabling competitors to quickly respond to changes in price. Thus, manufacturers can increase production to take advantage of any change in market conditions. Also, this is a discretionary market for consumers and if producers raise prices too high, consumers may not buy the motorcycles but, instead, purchase other recreational

³⁷ Memorandum, Roberts French to Docket A-2000-02, "Conference call with Garrett A. Vaughn, Ph.D.," June 5, 2003. Docket A-2000-02, document IV-E-25.

equipment. In fact, MRF makes this point by anticipating significant sales impacts due to what they believe will be significantly higher costs.

This rule was designed to not change the dynamics of the market structure and we do not expect any firms to drop out of the business. Therefore, it will not bestow any monopoly power on particular firms. We do not believe the availability of technology will be limited to a few firms. As discussed in Chapter 1, the technologies are available and currently being used on motorcycles today. Large foreign firms with smaller U.S. product offerings would certainly have access to these technologies and most likely already have experience with them due to stringent European standards. In addition, small manufacturers are not required to meet the Tier 2 standards and have access to additional flexibilities within the program (see the above discussion in section 5.1 and Chapter 7). These provisions are designed to help these small firms remain in the market.

As described in section 5.1, above, we estimated average per vehicle costs based primarily on the 6 large manufacturers (large in terms of their U.S. sales) which make up over 90 percent of sales. As also discussed in section 5.1 above, in general, we do not expect that smaller firms will experience costs that are significantly different than those of the larger firms. Because their overall per vehicle costs are not expected to differ significantly from those of the large manufacturer and their sales volumes are relatively small (less than 10 percent of overall sales), we believe it is reasonable to use estimates for the large manufacturers to represent the overall average per vehicle cost. It should be noted that by taking this approach, we do not mean to imply that we believe other smaller firms or foreign firms that have smaller volume U.S. sales will leave the market.

As discussed in section 5.1, we estimate per unit fixed costs by spreading fixed costs over the first 8 years of production. We estimated that R&D costs will be incurred on average three years prior to production on average and tooling and certification costs will be incurred one year prior to production. These fixed costs were then increased seven percent for each year prior to the start of production to reflect the time value on money. We also incorporate a rate of return of 7 percent over the 8 year recovery period. We continue to believe this is a reasonable representation of how a manufacturer may recover fixed costs and how the fixed costs would be spread over sales. This method allows EPA to assess the compliance burden in a metric that corresponds to the way these companies treat their costs (MIC also used this approach in their analysis of costs), so we can evaluate compliance costs in a way that is comparable to how industry views these costs. We used 8 years rather than 5 years as a reasonable amortization period for this industry based on MIC comments. We believe this approach is reasonable for purposes of an engineering cost analysis. The MRF report raises concerns that from a consumer or societal perspective fixed costs are not recovered because those dollars paid to manufacturers cannot be spent on other things, but it is unclear how this view might change the way the analysis of per vehicle costs is conducted. Manufacturers and consumers would experience fixed costs differently. Consumers do not have to pay the manufacturer cost in a lump sum in the first year

they are incurred by manufacturers. It is reasonable to expect manufacturers to spread costs over a number of units and over a period of time.

MRF comments that the EPA cost per ton estimates do not consider the rate at which new vehicles enter the market. They comment that emissions reductions accrue slowly as new vehicles replace old ones, but fixed costs are incurred up front before the program begins. Although we estimate cost per ton on a vehicle rather than a fleet-wide aggregate basis, we believe that the timing of when costs are incurred and benefits are realized is adequately addressed through discounting. Emissions reductions and variable costs accrue as cleaner vehicles enter the fleet and the rate at which the vehicles enter the fleet would not impact the cost per ton estimates for these factors. We have discounted future emissions reductions (tons per year) that occur over the life of the vehicle to reasonably account for the relative value of future reductions compared to near-term reductions. The treatment of fixed costs does impact near-term cost per ton estimates. If one assumes that fixed costs will be recovered in the first year of production, the cost per vehicle would be higher for that first year, than if one assumes fixed costs are spread over eight years. However, if fixed costs were recovered in the first year of production, the fixed costs for the second year of production and there-after would be zero. Therefore, the cost per ton would be lower. We would expect this to essentially average out over time. We have chosen to spread fixed costs over the first eight years of production and have adjusted the costs to account for the time value of money. We believe this is a reasonable approach for the motorcycle industry for the reasons described above. The impact of how fixed costs are treated for the cost per ton estimates on average over time should be minimal. We have also discounted future emissions reductions (tons per year) that occur over the life of the vehicle to reasonably account for the relative value of future reductions compared to near-term reductions.

MRF commented that we underestimated the cost per ton of the rule based on alternative analyses provided in Chapter 5.C. of their economic study. We have difficulty understanding several aspects of this analysis. We contacted Dr. Vaughn and discussed our concerns with him and requested copies of the spreadsheets and other underlying information that shows how the analysis was conducted.³⁸ Dr. Vaughn was optimistic that the spreadsheets and supporting information could be provided to EPA but we never received any further data or explanation to help us better understand and assess the comment.

Based on the explanation in the report, we cannot determine exactly what costs were used in the calculation of the cost per ton estimates or how the cost per ton calculations were done. There is no explanation of what tons estimates are used in the analysis. For the first scenario where EPA near-term costs were used, there is no explanation of how the cost per ton calculation was done. Without the tons estimate used in the calculation or total costs, it was not possible to

³⁸ Memorandum, Roberts French to Docket A-2000-02, "Conference call with Garrett A. Vaughn, Ph.D.," June 5, 2003. Docket A-2000-02, document IV-E-25.

reproduce the analysis. The results are reasonably similar to ours (within 11-16 percent) but it is not possible to analyze the differences in methodology.

For the second analysis, the report appears to attempt to build an aggregate cost for the industry based on the number of engine families that are likely to be produced for Tier 1 and Tier 2. Table 8 of the study (p. 22) provides the different costs that go into the aggregate cost estimate. The source of these costs is unclear in several cases. Some of the variable and fixed costs for various technologies match those in the EPA draft RSD for the proposal while several others do not match. No explanation of the costs, where they differ from EPA's, is provided. We did clarify in our discussion with Dr. Vaughn that the annual sales noted in the table is estimated overall total annual sales.

The analysis appears to be based on the assumption that there is no baseline use of any of the emissions control technologies, such as fuel injection and catalysts, and 100 percent use of those technologies to meet Tier 2 standards. This is not discussed in the report, but Dr. Vaughn believed this to be the case based on his recollections in our discussion with him. This would conflict with what we know baseline usage and technology projections to be, as discussed above in section 5.2. We know these technologies are being used currently on several different models. For example, about half of model year 2003 motorcycles are estimated to be equipped with fuel injection. By not considering current baseline technology usage rates and by projecting 100 percent usage of all technologies to meet standards, we believe the MRF report substantially overestimates incremental costs due to new standards. Also, the text states that pulse air is assumed to be used on half of the motorcycles for Tier 1 but variable costs are included for 100 percent of sales in Table 8. Finally, it appears from the table that certification costs for Tier 1 may have been unintentionally doubled. Without further explanation, we cannot tell how the costs in Table 8 are aggregated and used to calculate a cost per ton estimate. No summation of costs for the table is provided and no emission reduction tons estimate used in the calculation is provided. Therefore, we cannot fully evaluate the merit of the approach used or the outcome of the analysis. We do believe costs have been overestimated based on the technology projection used for the analysis.

The general point of this second analysis seems to be that EPA has underestimated fixed costs because we have not included fixed costs for small manufacturers and all engine families. MRF comments that there are 151 engine families reported by EPA and that EPA has not included the costs for all manufacturers. We disagree and believe that our estimate of per vehicle costs are reasonably representative of the overall industry. Fixed costs are estimated on an engine line basis which often consists of multiple engine families. Based on comments from MIC, we have estimated that large manufacturers have eight engine lines on average. Section 5.1 discusses average per vehicle costs including potential cost differences for small manufacturers and foreign manufacturers with lower U.S. sales. We believe our per vehicle cost estimates reasonably represent the overall industry on average. Even if firms with lower U.S. sales only offer a single engine family per engine line, their certification costs would not change the average cost significantly. For 2003 model year, there are about 162 Class 3 engine families and we

estimate overall Class 3 sales to be about 528,000 units. With certification costs of \$25,000 per engine line and average engine family size of about 3,300 units, the per vehicle certification cost would be \$1.36 per unit compared to the \$0.45 per unit average cost we have estimated for Tier 2. The difference of less than \$1 would not significantly change the average cost. Our aggregate cost estimates include overall industry costs (small and large manufacturers) because the per unit costs are multiplied by overall sales. We are not changing our approach to the cost per ton analysis based on the MRF comments.

For the third set of cost per ton numbers, the MRF report uses MIC provided per unit costs of \$226 for Tier 2, and a cost of \$113, half of \$226, for Tier 1. We believe MIC has significantly overestimated average costs associated with the new standards, as discussed in detail in sections 5.1 and 5.2, above. MRF has further overestimated costs by including another \$113 for Tier 1. MIC's cost estimates are incremental to baseline (pre-Tier 1) levels and are for Tier 1 and Tier 2 combined. As with the other two cost per ton estimates, detail of how these costs are used to calculate a cost per ton estimate are not provided in their comments. However, we believe the costs used in the analysis are too high and therefore reject the outcome of the cost per ton analysis.

We concur with MRF's observation that the annual mile traveled and the discount rate used in the cost per ton analysis affect the outcome of the cost per ton calculations. MRF does not suggest that the annual mileage estimate is inaccurate or provide comment or data supporting a change in the annual miles estimate. For the annual miles, we are continuing to use the annual miles traveled estimate of about 2,900 miles provided by MIC and did not receive comments that the estimate should be revised. We are also continuing to provide cost per ton estimates using both a 3 and 7 percent discount rate.

Chapter 6 - Small Business Issues

6.1 Small Volume Manufacturers

What We Proposed:

We proposed that small volume manufacturers would have until the 2008 model year to meet the Tier 1 level of standards. We did not propose the Tier 2 standards for the small volume motorcycle manufacturers at this time. In addition, we proposed special hardship provisions for small volume motorcycle manufacturers in order to reduce the potential economic burden in unusual circumstances. For the purposes of these special compliance provisions, we proposed to define a small volume motorcycle manufacturer as one with annual nationwide highway motorcycle sales of fewer than 3,000 units (combined Class I, II, and III motorcycles) and fewer than 500 employees worldwide. The figure of 3,000 was proposed because of data that showed that California accounts for approximately ten percent of U.S. highway motorcycle sales; therefore the proposed regulations were designed to correlate with the corresponding California regulations, which define a small volume manufacturer as one with sales of fewer than 300 units. The proposal was designed to treat small volume manufacturers as consistently as possible under both California and federal regulations. The 500 employee figure was drawn from the Small Business Administration definition of small business for this sector.

What Commenters Said:

Harley-Davidson stated that EPA had substantially departed from the analogous California requirements, and suggested in their hearing testimony that California accounted for approximately 13 percent of national sales, and thus the proposed limit of 3,000 was overstated. In addition, Harley-Davidson also suggested that the most appropriate definition of a small should be based purely on unit sales and not on the number of employees. They also pointed to some perceived ambiguity in the proposed definition in that it would apparently provide the small volume manufacturer benefits to some large foreign manufacturers with fewer than 500 employees and less than 3000 unit sales in the U.S. Harley-Davidson suggested that the sales limit should be based on global sales rather than national sales.

The AMA commented that small volume manufacturers should be afforded special consideration with respect to the Tier 1 standards and should be permanently exempted from the Tier 2 standards for Class III motorcycles. The AMA concurs with delaying compliance with the Tier 1 standard until the 2008 model year for small volume manufacturers, and they suggest that EPA consider an additional hardship provision that would enable a small volume manufacturer to continue selling highway motorcycles as long as the FEL is less than 5.0 g/km HC+NO_x, but only if the small volume manufacturer can demonstrate that compliance with the Tier 1 standards seriously threatens their existence. Small businesses cannot enjoy the economies of scale that large manufacturers can, and thus should be afforded special consideration.

A form letter submitted via the AMA website by almost 400 individuals commented that small volume manufacturers must be given the opportunity to thrive and expand in the marketplace, and that the challenging Tier 2 standards for Class III motorcycles could endanger small volume manufacturers. Others indicated that small volume manufacturers would be discouraged from meeting the new standards, thereby reducing consumer choices. ABATE of Illinois and others expressed the view that the proposal neglected to address the concerns of small manufacturers.

Many of those opposing the proposal commented that it contained no exemption for small volume manufacturers, and that such exemptions were critical to include in the regulations. Others stated that an application process for small volume manufacturer exemptions was meaningless and that EPA should grant exemptions outright and across the board for small manufacturers, without any application process. Some commenters suggested that EPA should allow small volume manufacturers until 2010 to meet the Tier 1 standards. Others said that small volume manufacturers should have no less than eight years of lead time to meet new standards. At least one commenter said that the admission of the California ARB that the Tier 2 standards may be infeasible for small manufacturers indicated California's willingness to eliminate small businesses from the market, and that the federal government should not impose such rules with such drastic impacts nationwide.

In a letter to EPA dated June 18, 2003, MRF pressed their concerns about the impact of the proposed rules on small volume motorcycle manufacturers. They supported the provisions proposed by EPA and the definitions we used for small volume manufacturer. However, they expressed serious concern that the SBREFA protections were provided to firms that make 100% of a motorcycle but not provided to firms "...that make 30%, 50%, 80% or more of a motorcycle ... " and "... that independent shops that make a motorcycle could not be considered a maker." MRF stated that "A very germane question is: at what point in a businesses development does a motorcycle maker become a motorcycle maker?" MRF referred to EPA's longstanding Memorandum 1A as providing good guidance to those active in the aftermarket. They also expressed support for the Tier 1 standards EPA proposed.

No small volume motorcycle manufacturer commented on the proposal.

Our Response:

We do not agree with Harley-Davidson that the 3,000 unit limit to qualify as a small volume manufacturer should be defined as global sales. As described below, this limit was selected with the goal of correlating with the California definition of small volume manufacturer, such that manufacturers that qualify as small volume in California would usually qualify as small volume manufacturer under the federal regulations, and vice versa. If we were to look at comparable global sales the number would need to be increased substantially. We understand that a motorcycle company with close to 500 employees world wide might be considered to be of a moderate size (e.g., Triumph Motorcycles was producing about 18,000 motorcycles per year

with 550 employees in the late 1990's), but we do not believe that there are “many large foreign manufacturers” that, according to Harley-Davidson, could qualify for the small volume manufacturer provisions in the rule. The issue comes down to whether or not one considers a motorcycle manufacturer with up to 500 worldwide employees as “small” and whether there are many such companies worldwide. As noted above, the SBA does in fact consider a motorcycle manufacturer with up to 500 worldwide employees to be a small business. However, it is important to note that the proposed small volume manufacturer definition stated that, in order to be eligible for the small volume manufacturer provisions, both criteria must be met (i.e., a manufacturer must have fewer than 500 worldwide employees and fewer than 3,000 total U.S. sales). Under such a definition we do not believe that many manufacturers can be large and therefore successful internationally without surpassing the employee size standard. In fact, we could not identify any manufacturers that represented the concerns expressed by Harley-Davidson. Triumph, as noted above, exceeds the employee threshold and would be considered a large manufacturer under the proposal. Ducati and BMW similarly have far more than 500 worldwide employees, as do Piaggio and Aprilia (which now also includes Laverda).

In our assessment we found that there are a variety of ways of looking at the issue of establishing a national unit sales limit that correlates with the California definition. The Motorcycle Industry Council data on state-by-state sales in their Statistical Annual shows that California accounts for 13.4 percent of national motorcycle sales. This is consistent with the suggestion made by Harley-Davidson. However, the data that leads to this conclusion includes sales of off-road motorcycles, which is inappropriate for this analysis. The MIC Statistical Annual also contains population data by state and by motorcycle type (highway, dual, off-highway). Combining the on-highway and dual-sport population data results in a California fraction of U.S. sales of 12.8 percent (dual-sports should be included because they are subject to regulations, whereas true off-road motorcycles are not), also consistent with the Harley-Davidson comments. However, population or registration data is only a useful proxy for sales data as a last resort if sales data are not available. MIC provided some sales data that covers the period from 1983 to 2002 for on-highway motorcycles including dual-sport motorcycles.³⁹ These data show that, for the entire period of 1982-2002 the California share on average was 12.5 percent. Evaluating only the last five years of the data (1998-2002) results in a California market share of 9.7 percent, and the last ten years results in an average market share of 10 percent. In 2002 the California share was 10.1 percent. Finally, some 2001 state-by-state sales data in the February 2002 issue of DealerNews shows a California proportion of 11 percent in 2001. The following table summarizes the small volume manufacturer unit sales definition that would result from these varying estimates.

³⁹ Pam Amette, Vice President, Motorcycle Industry Council, Inc., E-mail to Roberts French, EPA, OTAQ, OAR, ASD, Re: CA and US on-Hwy Motorcycle Sales w/attachment. Docket No. A-2000-02, document IV-G-14.

Estimated California Share of Highway Motorcycles	Calculated Small Business Manufacturer Unit Sales Limit
9.7	3100
10	3000
10.1	3000
11	2700
12.5	2400
12.8	2300
13	2300
13.4	2200

Consequently, as described above we believe that our proposed small volume manufacturer definition criterion, based on an estimated California market share of ten percent, was essentially accurate and is unchanged in the final rule. Market share varies from year-to-year, but ten percent represents a reasonable value for the California market. Thus we are setting the sales criterion to qualify as a small volume manufacturer at less than 3000 units nationwide per year including sales in all three motorcycle classes.

In the process of developing the final rule we carefully considered how we define “small volume manufacturer.” (This is different from the provisions in 40CFR86.406-78 (c) (2) for manufacturers selling less than 10,000 units annually). As noted above, our initial conclusion that California accounts for about ten percent of the U.S. motorcycle market led us to extrapolate California’s definition of small manufacturer (i.e., less than 300 units sold per year) to the proposed federal definition of less than 3000 units sold in the U.S. per year. Our definition also included a limit on the number of employees worldwide. The proposed limit of 500 employees is the U.S. Small Business Administration (SBA) size standard for small business motorcycle manufacturers (or, more specifically, for the North American Industry System Classification code of 336991 for “motorcycle, bicycle, and parts manufacturing). The SBA small business size standards are frequently used - both by the SBA and by other government entities - to determine the eligibility for federal programs designed for small businesses. The structure of the small volume manufacturer definition for the purpose of determining the applicability of certain provisions in the proposal was defined during the SBREFA process and agreed upon by all parties participating in that process.

We agree with the AMA and other commenters that the Tier 2 standards would be more challenging for small volume manufacturers, which often have limited research and development resources. Commenters who interpreted the proposal to indicate that EPA was

applying the Tier 2 standards to small volume manufacturers did not adequately understand our proposal, which clearly excludes small volume manufacturers from the Tier 2 standards at this time. Similarly, those who commented that there was no exemption for small volume manufacturers were incorrect, because the proposal clearly would not apply the Tier 2 standards to small volume motorcycle manufacturers.

The Tier 1 standards, on the other hand, are clearly feasible for small volume manufacturers and no exemption from the Tier 1 standards was proposed or is being finalized. In fact, we believe that many current small volume manufacturers of Class III motorcycles are producing motorcycles that are already meeting or are very close to meeting the Tier 1 standards. Consider the following table, which presents the current small volume manufacturers of Class III motorcycles that have certified engine families in the 2003 model year. All of these manufacturers are producing carbureted motorcycles with no use of emission controls beyond typical engine management techniques. Ten of these manufacturers - or well over half - currently are certified with HC emissions below 1.0. Depending on their NOx levels, which we estimate could be anywhere from 0.3 to 0.7 g/km, a number of these manufacturers may already be meeting the Tier 1 standards that they don't have to meet until 2008. Further, most of these companies are using engines from independent engine manufacturers (e.g., S & S, RevTech, or others). In discussions with S & S, we have learned that they are well on their way to developing an engine that meets the Tier 1 standards, and they report that they will be doing so without electronic fuel injection or catalyst technologies.⁴⁰ Based on these certification results and the progress reported by S&S we see no justification to add a special hardship provision for small volume manufacturers which would allow certification levels up to 5.0 g/km HC+NOx (see additional discussion below), nor is there any justification to need to provide leadtime beyond the 2008 model year as suggested by two commenters.

⁴⁰ Memorandum, Roberts French to Docket A-2000-02, "Conference Call with S & S Cycle - May 13, 2003," May 19, 2003. Docket A-2000-02, document IV-E-19.

Memorandum, Roberts French to Docket A-2000-02, "Phone Conversation with Tom Henline, S & S Cycle - May 14, 2003," May 19, 2003. Docket A-2000-02, document IV-E-20.

Manufacturer	HC Certification Results (g/km)
American Ironhorse Motorcycle Co.	0.9
Big Dog Motorcycles, L.L.C.	0.6
Big Mike's Choppers (BMC Motorcycle Co., Inc.)	1.1
Carefree Custom Cycles	0.9
Classic Motorcycles & Sidecars, Inc. (Ural America)	0.9
Focus Inc., dba (Independence Motorcycle Co.)	0.5
Force Chopper Design	2.1
Indian Motorcycle Co.	1.2
Iron Eagle Motorcycles	3.5
KTM SportMotorCycle USA, Inc.	0.6
Minneapolis Custom Cycle	2.5
Panzer Motorcycle Works, L.L.C.	0.6
Pro-One Performance Mfg., Inc.	0.7
Ridley Motorcycle Co.	0.7
Swift Motor Sports, Inc.	1.9
Vengeance Motorcycles	0.6

We are not yet prepared to assess and determine whether the Tier 2 standards are appropriate for small volume manufacturers. A decision on a permanent exemption from Tier 2 as suggested by AMA and its members is premature. As noted in the proposal, we will participate with the ARB and others in the planned 2006 progress review, and consider any adjustments that may be recommended as a part of that review process. The California ARB did acknowledge that the relief from the Tier 2 standards for small manufacturers may not be permanent, and that “reconsideration and modification of the small-volume manufacturer provision may be appropriate based on our findings from the planned 2006 technology review.”⁴¹ We are also not at this time requiring these standards to be met by the engine suppliers for these

⁴¹ State of California, Air Resources Board: Final Statement of Reasons for Rulemaking; Proposed Amendments to the California On-Road Motorcycle Regulation. Docket A-2000-02, document IV-A-52.

small volume motorcycle manufacturers. We will visit this question during the 2006 technology review. If as part of this review EPA concludes that it is appropriate to apply Tier 2 requirements to small volume motorcycle manufacturers or their engine suppliers, we would consider such an addition to these requirements in a future proposal.

We do not believe that an additional hardship provision beyond that which was proposed is needed for small volume manufacturers. The final rule includes hardship provisions to address unusual circumstances for motorcycle manufacturers (including one specifically applicable to small volume manufacturers), and these provisions - which are similar to the one suggested by the AMA - should be sufficient protection for small volume manufacturers that encounter difficulty with meeting the standards. In essence, AMA is suggesting that small volume manufacturers be able to produce and sell noncomplying motorcycles if complying with the standards would jeopardize the solvency of the manufacturer. This is allowed by the hardship provisions that we plan to finalize. Under these provisions we may require the small volume manufacturer to meet a less stringent standard, but perhaps more stringent than the 5.0 g/km suggested by AMA. Therefore, although we have additional criteria that must be satisfied in order to gain a temporary relief relative to the AMA's suggestion, we believe that our provisions provide the same benefit as needed to a struggling small volume manufacturer. Under these provisions we may extend the compliance deadline for a small volume manufacturer, and such a deadline may be reviewed and revised depending on the specific circumstances. We do find it interesting that many motorcycle riders and their organizations stated that the proposal would destroy the motorcycle industry, and especially the small volume motorcycle manufacturers, yet not one small volume motorcycle manufacturer commented that their business would be threatened.

Finally we turn to the concerns expressed by MRF in their letter of June 28, 2003. MRF supported the basic SBREFA provisions and the Tier 1 standards. However, they did not agree with the manner in which the SBREFA provisions were proposed to be implemented, suggesting they should be extended to aftermarket parts manufacturers and aftermarket customizers. In response, the current EPA standards and rules apply to those who manufacture or import motorcycles and under these provisions all motorcycles produced and entered into commerce must be certified. There are no blanket waivers or non-applicability provisions, nor are there maximum or minimum sales limits for this requirement. The provisions apply to a small independent maker of one custom bike per year as well as to a company whose production exceeds 100,000 per year. However, a small independent customizer who meets EPA's small volume manufacturer criteria and certifies its motorcycles as required is afforded flexibilities not provided to larger companies. Thus, to answer MRF's question, a maker becomes a maker (i.e., becomes subject to our regulations) when it produces a complete motorcycle and attempts to introduce it into commerce. The rules do not apply and SBREFA is not applicable to or needed by aftermarket "fractional manufacturers." SBREFA protections are needed by those who are subject to our regulations. Based on data currently available to EPA, it appears that all customizers who certify would meet EPA's small volume criteria and would be afforded the small business flexibilities including more time and a limit to only Tier 1 standards. Since MRF

supports Tier 1, their concern about the effect of these rules on customizers seems to be addressed by our regulations.

Regarding MRF's example of the manufacturer who turned his hobby into a custom manufacturing shop employing eighteen workers, this manufacturer is already covered by our regulations and would be accorded all of the small business protections that have been added in the final rule. In our SBREFA panel outreach, we identified several dozen small motorcycle manufacturers. Though MRF does not identify the manufacturer in the example, it is likely that the manufacturer would have been one of these identified by EPA in its initial efforts to identify motorcycle manufacturers to serve as small entity representatives in the SBREFA process. We attempted to contact as many as possible, in particular, through phone calls, letters, or the internet. Though most small manufacturers did not choose to become small entity representatives, we did have significant representation during the panel process. Our process included 27 small entities representing different industrial sectors that were expected to be covered by the proposal at that time, including four motorcycle manufacturers. Though a panel of small entity representatives cannot include every potentially effected entity, we believe that the information we received from the small entity representatives was very helpful in creating a program that provides considerable flexibilities to small manufacturers, including the manufacturer in the example.

With regard to motorcycle aftermarket parts manufacturers and dealers and those shops or dealerships which "customize" certified motorcycles, the statutory provisions regarding tampering and the guidance in Memo 1A are not affected by this rule. Customizers are not manufacturers since they do not introduce new complete motorcycles into commerce. Memo 1A provides guidance to those entities operating in the aftermarket to determine whether or not the parts they manufacture, sell, or use or the actions they prescribe or take would be considered tampering. MRF's contention that, based on language in Memo 1A, aftermarket dealers should be considered as new vehicle dealers (and presumably given consideration under our small volume manufacturer provisions) is illogical. The fact that new vehicle manufacturers are covered in Memo 1A is reasonable because they provide repair and replacement parts for sale into this market as do other non-new vehicle aftermarket parts manufacturers. It is an illogical reading of Memo 1A to say that because new vehicle manufacturers who sell into the aftermarket are covered by this guidance, then aftermarket parts manufacturers who are also covered by this guidance should be seen as new vehicle manufacturers. The guidance addresses aftermarket parts and their relationship to tampering; it does not address who is or is not a new vehicle manufacturer. Moreover, given that the regulatory requirements for new motorcycle manufacturers do not generally apply to customizers, who do not introduce new vehicles into commerce, we would expect that such entities would not want to be treated as manufacturers under our regulations. Finally, citing an unrelated Bureau of Alcohol, Tobacco, and Firearms (ATF) requirement regarding custom gunsmiths, MRF's letter seems to indicate that small business gunsmiths who make as well as repair firearms are afforded special consideration under the ATF provisions and that EPA should do the same. Our small volume manufacturer

flexibilities apply to all small businesses covered by our regulations (i.e., those who make complete motorcycles), and they are more generous than the provisions for larger companies.

6.2 Small Businesses, Dealers, and Aftermarket Parts Suppliers

What We Proposed:

We proposed a variety of special compliance provisions to reduce the economic burden on small businesses that manufacture highway motorcycles. Among these provisions were a two year delay of the proposed Tier 1 standards, no requirement to comply with the Tier 2 standards, and hardship provisions. We also proposed to continue existing provisions which allow small volume manufacturers to define engine families more broadly and reduced certification data submittal and testing requirements.

We did not propose any requirements on any parties other than motorcycle manufacturers.

What Commenters Said:

We received feedback from many commenters regarding small businesses, dealers, and aftermarket parts suppliers. These comments covered a wide range of topics which we categorized into 6 different subject areas (though, the majority of these comments focused on the belief that small businesses would be put at a disadvantage, or worse, out of business). The subject areas and comments are summarized below.

Subject area/issue:

- 1) Impact on the motorcycle industry, especially small/independent and aftermarket shops; 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; inability to service motorcycles
- 5) Reduction/elimination of competition from aftermarket and specialty shops, elimination of aftermarket supplies and services, and consumers will be forced to purchase only manufacturer-offered products
- 6) Barcia Act/H.R. 5433

The New Mexico Motorcyclists Rights Organization (NMMRO) opposes the NPRM and believes that it would adversely affect New Mexico's economy. They state that there are over 200 independent shops in the state and the rulemaking threatens the existence of these small businesses. NMMRO believes that the rule will result in the loss of jobs, a decrease in state revenue (and a subsequent increase in the number of citizens relying on public assistance), and the liability for unemployment taxes for small businesses will also increase.

The American Motorcyclist Association (AMA) believes that emission standards should not create significant technological barriers to small volume motorcycle and aftermarket parts manufacturers. Small businesses cannot enjoy the economies of scale that large manufacturers can, and thus should be afforded special consideration.

ABATE of Illinois believes that EPA has grossly underestimated that economic impact that this rule will have on consumers as well as small businesses, specifically that the concerns of small volume and aftermarket parts manufacturers were neglected. They state that a survey of motorcyclists showed that of approximately 1,000 respondents, over \$1.4 million dollars had been spent on modifications and improvements. ABATE of Illinois further believes that EPA did not fulfill its SBREFA obligations. They close by stating that the rule should “be withheld and/or suspended indefinitely, or at the very least until the need has been scientifically proven, presented and determined by Congress.”

Mr. David Christy believes that EPA has failed to address the overall economic impact of the proposed rule beyond the major manufacturer, specifically that there was no consideration given to the economic impact on small businesses.

The Idaho Coalition for Motorcycle Safety, Inc., following the study performed by Dr. Garrett Vaughn, believes that the rule will cause a significant negative impact with little environmental benefit, one of the concerns that they has was that small businesses will be forced to withdraw from the market, thus reducing consumer choice.

The California Motorcycle Dealers Association (CMDA) is mainly concerned about the proposed standards given the experience that the ATV regulations in California left many dealers with product shortages after old inventory was sold. They state that OEMs were unable to produce suitable replacements, and an exemption was added to the rule given the CMDA’s demonstration that the new rule was causing financial hardship on dealers. They are concerned that EPA is trying to harmonize with CARB’s 0.8 g/km HC+NO_x standard, which they believe was set too low, especially given the fact that the technology review has not occurred for this standard yet. They suggest establishing the lower standard of 1.4 maximum HC- which is a difference of a 0.002% emission inventory detriment, could eliminate the potential of devastating the motorcycle industry.

A form letter submitted by several commenters stated that without the aftermarket suppliers, competition will be reduced and the cost of ownership may significantly increase. These commenters state that small volume manufacturers must be given the opportunity to thrive and grow in the marketplace, and these businesses should not be threatened by excessively restrictive regulations. They believe that the proposed rule could endanger these businesses. Further, these commenters believe that the result of this rulemaking should not be the elimination of jobs for small businesses.

The Motorcycle Riders Foundation (MRF) believes that the proposal did not meet EPA's obligations under SBREFA and that EPA failed to consider dealers, shops, and aftermarket parts manufacturers whose existence is threatened by the rulemaking. In a report prepared by Dr. Garrett Vaughn for MRF, Dr. Vaughn states that "The EPA did not meet its obligations under ...SBREFA because its analysis of the proposed emissions considers only motorcycle manufacturers- and especially a handful of the large motorcycle manufacturers. EPA never considers the economic impacts that the proposed standards would have on the tens of thousands of small businesses that also belong to the U.S. motorcycle industry: franchised dealers, performance shops and aftermarket suppliers." Further, Dr. Vaughn states that these firms together number several thousand small firms, and that these phrases do not appear once in the Final SBREFA Report of the Small Business Advocacy Review Panel in contrast to the number of "hits" that he found doing internet searches for these terms. Dr. Vaughn also believes that EPA's estimation of the engineering costs related to the rule favor large, total motorcycle manufacturers. Along with this, Dr. Vaughn believes that this focus on large manufacturers ignores the role that these smaller custom shops play in making sure that motorcycles meet customer preferences; further stating that the proposed Tier 2 standards would criminalize much of what owners now do to personalize their motorcycles.

SKF Cycles, an independent motorcycle shop that sells accessories, provides maintenance, and customizes motorcycles, believes the rule will only allow manufacturer's dealers to perform work on motorcycles. They state that the ramifications of this will be disastrous to their business and all other similar independent shop owners.

Royall's Performance Motorcycles suggests that EPA read MRF's letter and adopt their proposed less stringent standards. Royall's is a small business that repairs aging motorcycles. They believe that if rule goes into effect in 10 yrs, there will no longer be motorcycles that they can rebuild (due to cost of having tools and equipment to rebuild engines so that they will still meet applicable pollution standards). Royall's also states that it appears that EPA broke the law in proposal, however no further information is given in regards to this statement.

Badger's Bore & Stroke believes that catalytic converters on motorcycles will be a deterrent to motorcycle sales and cause a loss of jobs/closing of many small shops.

Keowee Motor Cycles, a small motorcycle shop, believes that the rule will change the ability of the shop to stay in business. They state that motorcycles are already the most fuel efficient motor vehicles and that thousands of jobs and families will be disrupted with the possible closing of these independent shops.

Precision Cycle, Inc. states that thousands of jobs in small motorcycle manufacturing and aftermarket businesses will be lost without exemption for small manufacturers and that the standards are not reasonable, feasible, or necessary without crippling the industry. Precision Cycle cites that in 1999, the IL SBA reported that 98% of all new employees came from small businesses, and that this rule would stymie Illinois' share of a multi-billion dollar industry; they

further add that E.O. 12866 requires agencies to conduct studies on impact of rules on small businesses.

Riders For Justice states this rule will also eliminate jobs. They believe that the rule would stand to eliminate OEM and aftermarket parts for which motorcyclists typically spend millions of dollars annually. Riders For Justice believe that EPA must balance environmental needs with those of motorcycle enthusiasts, and states that the Agency must consider safety, cost, and performance in creating new standards.

Onondaga County ABATE believes that EPA's intention to tighten "Anti-Tampering" restrictions will put many small businesses and aftermarket parts manufacturers out of business.

Denton ABATE is also concerned about the impact that this proposal will have on small businesses. They state that there is a thriving aftermarket for services and equipment that allow motorcyclists the opportunity to enhance their bikes; and that after-market product manufacturers, distributors, dealers, and shops -- mostly classified as small businesses -- rely on these services and sales for their livelihood. They believe that many of these businesses will no longer be able to turn a profit due to the rule, and that this will result in the loss of thousands of jobs.

Denton ABATE also stated that they believe that efforts should be spent addressing "long outstanding non-compliances in areas more critical to the health of our environment", such as diesel engines, and that this rule is trivial in comparison. Further, they believe that this proposal will not effectively reduce air pollution and will only result in the loss of jobs.

RIX Machine, Night Wing Motorcycle Works, Scotty's Cycle & Machine all stated that their greatest concern is the elimination of the supply of after-market parts and service, specifically that small businesses will be out of business if they cannot market the improvements they develop to sell to dealers/distributors. They believe that this will result in consumers being forced to purchase only manufacturer-offered products. The companies also add that motorcycles contribute so negligibly to the total pollution inventory and that the imposition of these standards does not appear justified.

Pro Performance, a small auto/motorcycle repair and accessories provider believes that any implementation of the Barcia Act (HR #5433) will be detrimental to their business and possibly put them out of business. They urge EPA not to support HR 5433, as it is dangerous to business. They further state that motorcycles are the most fuel efficient form of transportation and this act would raise the costs, disenfranchise the beleaguered motoring public, and take a form of economical transportation out of reach for many.

Al's Honda/Yamaha, a small motorcycle shop, states that this rule would adversely affect their business. They also add that EPA should "get behind the Motorcycle and Motorcycling

Small Business Protection Act HR 5433", stating that it would save hundreds of jobs and increase motorcycling (thereby reducing fuel consumption, traffic congestion, and air pollution).

Our Response:

- 1) Impact on the motorcycle industry, especially small/independent and aftermarket shops; EPA did not fulfill its SBREFA obligations

The majority of the comments that we received focused on issue #1, the impact on small/independent and aftermarket shops and the belief that EPA did not fulfill the obligations of the SBREFA process. Comments from the NMMRO, the AMA, Mr. Christy, ABATE of Denton and Illinois, SKF, and the Idaho Coalition for Motorcycle Safety all raised the concern that the rule could put small entities out of business. Specifically, they are concerned that aftermarket parts manufacturers and small shops that specialize in customizing motorcycles will be put at a significant disadvantage due to the tightening of the standards. Although not explicitly stated, we presume this because of concerns that modifying or replacing exhaust systems could be construed as tampering and if so would be illegal under the Clean Air Act.

In regards to these comments, we note that the rule is not going to change the marketplace fundamentally. There are no new restrictions, nor are we tightening tampering regulations. The NPRM merely acknowledged the fact that there *are* prohibited acts and that we are now and will enforce the current anti-tampering restrictions. Technology improves and changes on motorcycles every year. Electronic fuel injection is fast replacing carburetion. Catalysts have been used for more than ten years on motorcycles and in 2003 manufacturers project that catalysts will be employed on about 20 percent of bikes sold. The market and the technology used are both evolving. Prospectively, some in the aftermarket may need to change some of its practices and products if they sell aftermarket parts such as exhaust systems for catalyst-equipped bikes. Very simply, if a motorcycle contains an OEM catalyst that is designed as an integral part of an exhaust system (e.g., not separable), then any replacement of the exhaust system must include a similar catalyst. Selling a "competition only" version is allowed, but EPA expects aftermarket dealers and retailers to use reasonable prudence so that abuse of this provision does not result in an act of tampering by consumers. Small customizing shops would be held to the same anti-tampering provisions as aftermarket part dealers and retailers. Once again, the customizers will be constrained not to tamper either through modifications of the system or the use of parts which affect emissions performance. As stated by the commenters, this is an important sector in the overall motorcycle business. As is now ongoing as the technology evolves, to some degree business practices and products may have to be modified to conform to the law. However, we believe that any changes will be minor and will not have a significant impact on such businesses.

It is important to note two facts here. First, the tampering prohibitions for businesses and users are not new. The vast majority of all customization actions taken by businesses and users do not affect emissions and are not affected by the Clean Air Act requirements. The commenters

provide no evidence to the contrary. With regard to concerns raised in the comments about exhaust system modifications, the anti-tampering provisions may be more relevant depending on the system design. Quite simply, neither a business nor a user can legally remove a catalyst system unless it either restores the catalyst after modifications or replaces the catalyst with a different one. Compatible OEM system designs or “conforming” aftermarket parts will be necessary. There are now six years before the Tier 2 standards must be met. Given this leadtime, the fact that motorcycle technology is evolving, and the fact that these standards are to be met two years earlier in California, EPA expects that compatible OEM designs will be implemented, conforming aftermarket parts will be available in most cases, and dealers and retailers will not be adversely affected.

The aftermarket parts industry is a substantial part of the motorcycle industry and can readily adapt to any changes that might result from this rule. We expect that the vast number of parts will be unaffected by this rule, as they are not directed at emissions. We also expect that, for motorcycles containing a catalyst, many of those motorcycles will be designed so that the exhaust system may be modified without the need to replace the catalyst, either by placement of the catalyst in an area unlikely to be modified or the ability to replace the catalyst in a modified exhaust system. Even in the unusual circumstance that a new catalyst needs to be placed in a modified system, we expect parts manufacturers will either include such a catalyst in its system or manufacture the system so that a separate compatible catalyst can be added, though in the latter case, such manufacturers to need make clear that a compatible catalyst would be needed. In either case, catalyst technology is readily available from many existing manufacturers and can readily be incorporated into the strategies of such parts manufacturers, with little disruption. Dealers, retailers, customizers and consumers should thus have conforming parts available for their customization. While there may be some situations where additional work may be needed to complete a customization, there appears to be no evidence that any substantial change in the practices of dealers, retailers, customizers or consumers will result from this rule.

Automobiles have contained catalysts for decades and that requirement has not prevented the automotive industry from having a thriving aftermarket. Moreover, the motorcycle aftermarket has had to abide by the tampering prohibition since the initial motorcycle standards were implemented, and there is no evidence that this had any effect on the viability of the aftermarket. The commenters have provided no evidence that the motorcycle aftermarket will be affected to any significant degree by this rule, which is directed towards manufacture of new motorcycles, nor do we have any evidence, or any expectation, that the aftermarket will be so affected.

In regards to the comments made about the Small Business Regulatory Enforcement Fairness Act (SBREFA) from MRF, EPA did in fact fulfill its small business obligations by participating in a SBREFA Panel process for this rulemaking. The Regulatory Flexibility Act (RFA) as modified by SBREFA, requires EPA to take certain steps to ensure that EPA has evaluated the effect of certain rules on small entities and considered alternatives that may provide flexibility to small entities. EPA met all of these requirements under the Act and provided the

report of the process proceedings and outcomes when the rule was proposed. Regarding the comments referring to effects on entities that are not vehicle or motorcycle manufacturers (like dealers, the aftermarket and end-users), these regulations do not impose any direct requirements on these entities. Case law on this matter indicates: “An agency is under no obligation to conduct a small entity impact analysis of effects on entities which it does not regulate.” Motor & Equipment Mfrs. Ass’n v. Nichols, 142 F. 3d 449, 467 (D.C. Cir. 1998). This rule promulgates new requirements only on manufacturers of new motorcycles. The tampering prohibition is a pre-existing section of the Act that is not changed by this rule. It is in any case, not a new direct requirement on the aftermarket. Because this rule does not subject these other entities to any new regulation, “EPA was not required to conduct a flexibility analysis as to small aftermarket [and other] businesses [not subject to regulation].” In any case, as noted above we have reviewed the comments and evidence regarding this issue and we find that the rule will not have a significant economic impact on a substantial number of small entities, even including these entities.

2) Customer rejection of products

One commenter, the CMDA, raised issue #2- the concern that the new standards would result in customer rejection of new products, impacting dealer sales and viability. We do not see any parallel between the future Federal highway motorcycle standards and the implementation of the ATV standards in California in 1997. We believe compliant products will be available by 2010, and we do not believe that the regulations will result in customer rejection of the new products. The technologies we expect to be used to meet the Tier 1 and Tier 2 standards have been phasing -in to the new motorcycle fleet to varying degrees over the past few years. At present, electronic fuel injection is used on about 50 percent of the new models, air injection on about 45 percent, and catalyst technology on 20 percent. The use of technologies is not being driven by current EPA standards. If such technology was not acceptable in the marketplace its use would not have continued, let alone increased, over the past several model years. At first, some consumers may choose to purchase older equipment which employs technology with which they are more familiar. However, as the new motorcycle technology becomes even more mainstream (and as riders begin to see products more frequently), we believe that motorcyclists will purchase the new equipment in the same manner as products are purchased currently. In their comments manufacturers have indicated that compliant motorcycles will have at least the same performance and appeal as past and current products, and design features such as electronic fuel injection will both enhance performance and reduce maintenance.

3) Fewer options for customers and lower sales

Similar to the issue raised above, the main concern with issue #3- raised by the AMA- is that commenters believe that there will be fewer options available and that this will lower sales. No evidence to support this concern was provided. At present there are over 40 companies which certified over 190 engine families in 2003. This is an increase of 15 engine families since the 2002 model year and 77 since the 1996 model year. As discussed above, there is, and has been, a trend in the market to move towards more advanced technology. These improvements in

technology have been coming, and are not solely driven by emissions control. These trends have actually increased consumer options as compared to previous years. The very fact that the expected technology is being used to various degrees within all three motorcycle classes demonstrates that industry is planning even now to ensure wide product availability. For the 2010 standards, manufacturers will have about six years of leadtime for research and development on compliant motorcycles and aftermarket parts. No manufacturers have indicated any intention to reduce the choices available to the consumer. In fact, EPA believes that a harmonized California/ federal program will enhance consumer choice.

Conceptually, an increase in price could at least directionally reduce sales. This effect is very hard to quantify in a market sector where the price paid for a product normally exceeds the cost and often even exceeds the “sticker price”; there is no direct relationship between cost and price. Sales have increased steadily over the past decade, at an average rate of 12 percent. While we do not expect such a growth rate to continue, we do not agree that the modest price increase associated with this rule would arrest this positive growth trend.

4) Cost of ownership will increase; inability to service motorcycles

Some commenters raised issue #4, the belief that the cost of ownership would increase due to the rulemaking. Some commenters felt that this increase would be a direct result of an increase in purchase price; other commenters believed that this would be the result of more complex additions/advanced emission controls (such as catalysts) to newer motorcycles, and these consumers and small business shop owners were concerned that this would hinder their ability to service motorcycles. As stated above, we believe that the cost to meet the new standards would be modest (<1% of current average selling price) and that any price increase associated with the new standards would be so modest as to not deter potential purchasers.

In response to those that were concerned about the ability to service their motorcycles due to catalytic converters and other advanced emission control systems, we note that comments from the Motorcycle Industry Council (MIC) state that “catalytic converters and air injection systems do not require routine maintenance and generally do not limit access to other service items. As a result, the increased use of these systems is not expected to affect the cost or difficulty of routine maintenance.” It is not apparent that any of the technologies that will be used by manufacturers would have any impact on motorcycle owners being able to perform maintenance on their bikes. The normal manufacturer-prescribed maintenance suggestions found in the owner’s manual should not be affected by the new standards. Emission-control technologies like catalysts, oxygen sensors, and electronic fuel injection should not require any additional maintenance over the motorcycle useful life. Catalyst systems require no maintenance; electronic fuel injection systems actually require less maintenance than carbureted systems.

It is possible, however, that diagnosis and repair of some motorcycle engine systems could become more complex. As engine control systems become more sophisticated with the use of electronic controls, motorcycle owners who are accustomed to working on mechanical control

engine systems, may find it more difficult or confusing to diagnose problems and perform repairs on these newer, less familiar systems and components. However, as the engine systems become more reliant on electronics, more diagnostic tools will become available that will allow owners to diagnose and repair problems with their engines that would have previously required time consuming and often frustrating trial and error methods. We believe that consumers will become more comfortable with these technologies and concerns over diagnosis and repair will diminish even as the need for maintenance is reduced with these more reliable systems.

For rebuilders/repairers, this is a prospective issue. It is important to note that a motorcycle need only meet the standards that were applicable for the respective model year of that motorcycle, which may not necessarily be these new standards. These requirements and standards are not retroactive and do not affect motorcycles built before the implementation model years for Tier 1 and Tier 2, respectively. The technology expected in the fleet to meet the Tier 1 and Tier 2 requirements is already in use in the fleet. About one-half of current new motorcycles use electronic fuel injection and a pulse air system. In addition, about 20 percent use catalyts. The technologies that the commenters fear will adversely affect rebuild and repair activities are already present and these entities will be dealing with them for several years before our Tier 1 and Tier 2 standards are implemented. Thus, we believe that this is more of a technology progress issue than a direct impact of our standards. Moreover, these technologies have been used for decades in other motor vehicle applications. Repair of such technology is thus well understood by the industry and should be transferrable to motorcycles.

- 5) Reduction/elimination of competition from aftermarket and specialty shops, elimination of aftermarket supplies and services, and concern that consumers will be forced to purchase only manufacturer-offered products

In response to the comments dealing with issue #5, the idea that the rule would eliminate competition between manufacturers and the aftermarket, we do not agree with these commenters. The aftermarket is comprised of the OEM suppliers and secondary suppliers. These businesses offer many different products. Often OEM aftermarket products are purchased and installed at the time a bike is new. Secondary supplier aftermarket parts can be installed when the motorcycle is new or during the useful life. Most parts sold through these outlets are not affected by emission control regulations and thus we do not expect a significant change in the current competitive positions of these market sectors. The part most likely to be affected is an aftermarket exhaust system. If the OEM system installed on the bike at the factory includes a catalyst, then any replacement system would also have to include a comparable catalyst and perhaps oxygen sensor related hardware. This could be achieved either through leaving the OEM catalyst in place or reinstalling it on the vehicle, or through the installation of an aftermarket part or parts that includes a new catalyst. Otherwise the replacement system is likely to be considered tampering.

We expect catalyts on only about one-half of all motorcycles. With the statutory prohibitions on tampering and our concern about tamper-prone designs, it is difficult to say how

many OEM designs will incorporate an aftertreatment system directly into the exhaust system. To the degree to which this does occur, we agree it would be technically easier for the OEM s to make “conforming” aftermarket parts. However, on balance we do not think this factor alone will have a significant effect on the competitive positions of secondary manufacturers and retailers in the aftermarket. There will be a large number of parts that are unaffected by this rule and even those parts that may be affected involve technologies that are well understood and available to secondary manufacturers.

With regard to the concern that the rule would eliminate aftermarket supplies/services, it is very clear that there is a significant demand for aftermarket parts- given the many catalogs and websites that exist for the sale of these products. We find no reason to believe that this demand will decrease due to new emission standards and the commenters provided no evidence to support this concern. Further, given the number of comments that we received stating that riders enjoy motorcycling because of the opportunity to ‘personalize’ and ‘customize’ their motorcycles, we do not believe that this sentiment will decrease or be eliminated due to the rulemaking. As discussed above, we also do not believe that the new standards will significantly diminish the ability of aftermarket parts manufacturers to build compliant parts or for aftermarket dealers to sell them. We do not believe that consumers will need to buy a less than fully satisfactory motorcycle nor will bike owners be unable to customize it. The regulations make no such restrictions and we are confident the aftermarket will continue to thrive.

The commenters’ concern that only manufacturer-offered products will be available stems from the fact that many commenters believed that the new standards would effectively put all small business aftermarket parts dealers out of business. Commenters seem to believe that small businesses won’t be able to produce conforming products due to the complexity of newer systems/bikes. As discussed above, we believe aftermarket products will be available. AMA may be correct in their assertion that small aftermarket parts manufacturers may at least initially be at a disadvantage relative to the OEMs. The OEM aftermarket sector may have the initial edge for some components, because they will know manufacturer designs and specifications for components such as catalysts. However, the secondary manufacturer aftermarket sector also has capability and will offer components in these sectors as well. In addition, the aftermarket will have access to the same vendors, such as catalyst manufacturers, who supply the OEM factory parts. Clearly there is a parallel experience in the automotive sector where the similar Clean Air Act provisions apply and catalysts and sophisticated emission controls have been used for years. Nonetheless, the aftermarket continues to thrive.

6) Barcia Act/H.R. 5433

Introduced in September of 2002 to the U.S. House of Representatives by Congressman James Barcia, the Motorcycle and Motorcycling Small Business Protection Act (H.R. 5433) proposed to amend the Clean Air Act in a variety of ways. It was subsequently referred to the House Subcommittee on Energy and Air Quality in October of 2002 where it remained until the close of the 107th Congress. According to the MRF, H.R. 5433 would “establish reasonable

emissions standards...” and would “increase motorcycling in America and thereby reduce fuel consumption, road wear, traffic congestion and air pollution.” In fact, the bill would have established an emission standard of 2.4 g/km HC, a standard that only ten of 192 certified engine families could not meet today. A second provision of H.R. 5433 would amend section 202(l) of the Clean Air Act to remove the authority of EPA to control hazardous air pollutants from highway motorcycles. Third, H.R. 5433 would have exempted highway motorcycles from the anti-tampering provisions of section 203(a) of the Clean Air Act, allowing motorcycle owners, riders, dealers, repair shops, and others free reign to defeat or remove emission controls installed by the manufacturer. In terms of advancing motorcycle emission control technology or reducing emissions of motorcycles the bill would have accomplished little or nothing. The bill would not have reduced air pollution. Even the commenters who addressed H.R. 5433 disagreed on its advisability.

Chapter 7 - Other Issues

7.1 Consumer Modification, Maintenance and Tampering

What We Proposed:

We did not propose any new requirements pertaining to consumer modifications or maintenance of highway motorcycles, nor did we propose any new tampering restrictions. However, there is an existing provision of section 203(a) of the Clean Air Act, 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...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 or put to such use...

This means that owners of motor vehicles cannot legally make modifications that adversely affect emissions performance, and they cannot remove or disable emission control devices installed by the manufacturer. EPA provides guidance on this matter in Memorandum 1A, entitled Interim Tampering Enforcement Policy, dated June 25, 1974.

What Commenters Said:

Numerous commenters expressed concern about the impact our proposed regulations on their ability to perform maintenance on their motorcycles or to make modifications, such as installing replacement exhaust pipes or carburetors. Some were even concerned that they wouldn't be allowed to paint their fuel tanks or chrome parts. ABATE of Illinois said that 75% of motorcycles are modified in the first year. We received numerous letters from private citizens stating that the addition of more emission control equipment on motorcycles would make it more difficult and less likely that individual motorcycle owners would be able to maintain their own bikes. They also stated that one of the great appeals of motorcycles is the ability to customize the bike to reflect an individual's personality and sense of style. They felt that the proposal would reduce this ability. They also argued that the ability to replace the factory exhaust pipes with louder aftermarket pipes is a safety benefit since drivers of automobiles can better hear oncoming motorcyclists.

MIC and MRF stated that widespread use of catalysts would result in less emission reductions than anticipated due to tampering. Specifically, they were concerned that owners would remove OEM exhaust systems equipped with catalysts with non-catalyst aftermarket exhaust systems. MIC even provided one data point which showed emissions from a tampered system would be higher than the previous standard. However, MIC stated that the net effect of increased use of catalytic converters, air injection and fuel injection should not affect the cost or difficulty of routine maintenance. While they support the standards, they suggested that we not set standards more stringent than California's, since this would require more use of catalysts.

AMA stated that maintenance and replacement parts would cost more as a result of the proposed regulations. They felt that the regulations shouldn't be overly burdensome or prevent owners from maintaining their bikes.

ABATE of Michigan stated that more complex engine control systems would make maintenance more expensive and less likely to be performed by owners, thus less maintenance would be performed as a result, which could cause an increase in emissions.

ABATE of Onondaga County interpreted the proposal as meaning that we intend to tighten anti-tampering restrictions. It pointed out that millions of motorcyclists modify their bikes for performance, safety and show.

In a letter to EPA dated June 18, 2003, MRF once again raised concerns to EPA about performance-related modifications. The thrust of their input in this area was that many consumers modify their stock bikes to meet the needs of their personal style and riding environment. They also expressed concern about the heat effects of catalysts and suggested indirectly that catalyst removal could be a problem.

Our Response:

We use the term "tampering" to refer specifically to actions that are illegal under section 203 of the Clean Air Act. This specifically relates to emission control. The term tampering, and the prohibition, do not apply generally to the wide range of actions that a motorcycle enthusiast can do legally to personalize their vehicle, only to actions that cause emissions to be adversely affected. Our enforcement policies generally measure such adverse effect against the applicable standards. See Mobile Source Enforcement Memorandum 1A. Our proposed regulations do not change this "tampering" prohibition. In fact, it is not within EPA's ability or discretion to change this statutory prohibition, which Congress put in place more than 20 years ago. Motorcycle owners would still be free generally 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 to which they are certified.

MIC and MRF state that the emission reductions associated with catalyst-based standards will be less than anticipated. This is because the application of aftermarket exhaust systems,

which they claim is a common practice, will at least in some cases lead to the removal of the catalyst and result in higher emissions. Some aftermarket exhaust systems provide additional engine performance and an enhanced engine sound, both of which can be desirable to some motorcyclist. They assume that these aftermarket exhaust systems would not be equipped with catalysts. Neither MIC nor MRF provided any information to support or quantify their claim of extensive OEM exhaust system removal. However, we do know that aftermarket exhaust systems are available for sale and we have received numerous comments from private citizens stating that this practice occurs among riders today.

However, we believe that it is inappropriate to conclude that OEM exhaust system replacement will invariably or even likely, result in catalyst removal, nor do we believe as MRF suggests that the possibility of removal should be used as a reason not to proceed with the Tier 2 standards. Several factors have to be considered when attempting to project the scope of this potential problem.

First, it should be noted that catalyst technology is used on 36 out of 162 current motorcycle models. Catalysts have been used on some highway motorcycles as far back as the 1991 model year. There has been no evidence presented that catalyst removal is common.

Second, manufacturers will need to use more sophisticated emission control strategies to meet the new standards. This will result in the widespread use of fuel management and emission control technologies, such as fuel injection, catalysts, and pulse air systems. Removal or adjustments in these systems could not only have an adverse impact on emission rates, but also would adversely impact performance, maintenance, or durability. This outcome would be completely counter to the users' motive for modifying the systems for performance as indicated in the comments. For example, removal of a catalyst and or oxygen sensor would adversely impact the feedback to the air/fuel ratio control degrading all aspects of engine performance. Furthermore, manufacturers and dealers (including the aftermarket) will not want to have to deal with unhappy customers whose bikes do not perform as desired and who blame these entities for this problem. Thus, we fully anticipate that manufacturers and the aftermarket will undertake various types of efforts to educate and inform their customers of the emission control strategies and technologies found on their bikes and the fact their modification or removal is a waste of their investment in these technologies and is both unlawful and would adversely affect performance. It is also possible that this will affect the owner's warranty. On this point, it is very important to note that the Tier 2 standards will take effect in California two years before they do in the rest of the country. To the degree to which emission control system tampering occurs in these bikes, the users will experience the adverse performance impacts and other experiences mentioned above. Undoubtedly, word of this experience will spread through membership associations and the internet, and will help deter future activities of this type.

Third, we also anticipate and expect that during the design and development process motorcycle manufacturers will take into consideration the possibility of consumers removing emission-related parts in use. For example, they may focus on using catalysts on those models

that they feel consumers would be more accepting of such technologies and not be tempted to remove them. They will also need to focus on designs which place the emission control technology in locations that aren't visible to the consumer and/or make the catalyst a stand alone piece which is not inherently a part of the exhaust system/muffler assembly or is more difficult to remove than the exhaust system itself. In general, we expect that manufacturers will develop motorcycle models and corporate strategies that will help to ensure that tampering is discouraged and limited.

This brings us to our final consideration which is related to the role of aftermarket part manufacturers and dealers. It is illegal to manufacture, sell or install a part that the manufacturer, seller or installer knows or should know will be sold or used in a manner that defeats the emission control system. In the past, aftermarket replacement of parts such as exhaust pipes and mufflers did not have a first-order affect on emissions since most control was achieved through engine modifications. The future effect will depend on whether or not a catalyst is used and, if so, where and how it is installed on the bike. For those models where the catalyst is part of the exhaust system, aftermarket or replacement systems will have to include a similar catalyst as part of the system. Catalyst use on bikes is increasing each year and the aftermarket is even now being forced to adapt to this change. With at least six model years of lead time plus full implementation in California in 2008, the aftermarket has ample opportunity to develop compatible aftermarket products and to address concerns about improper use of previous model year or competition only parts. Aftermarket manufacturers will be able to produce replacement and performance parts that will allow the bike to still meet the standards while at the same time meeting the basic need of the bike owner who otherwise wants to legally modify his/her motorcycle. Given the legal restrictions on tampering, and the economic desire of parts manufacturers and dealers to continue to sell their products, we believe manufacturers will begin to build parts that can be used in compliance with the tampering prohibition. This has happened in the automotive sector where emission standards have been continuously reduced over the years, resulting in the extremely stringent Tier 2 levels that will occur in 2004. Once compliant aftermarket parts are made available, the concern over the replacement of OEM parts with aftermarket parts should become a thing of the past.

MRF and others raised a concern that the complex nature of the emission-control technology that will be used to meet the standards will hamper maintenance practices. It is not apparent that any of the technologies that will be used by manufacturers would have any impact on motorcycle owners being able to perform maintenance on their bikes. The normal manufacturer-prescribed maintenance suggestions found in the owner's manual should not be affected by the new standards. Depending on design, there may be some additional maintenance requirements for air injection components, but other emission-control technologies like catalysts and fuel injection should not require any additional maintenance. Catalyst systems require no maintenance; fuel injection systems actually require less maintenance than carbureted systems.

While there is no reason to believe that general motorcycle maintenance will be hindered by our new standards, it is possible that diagnosis and repair of some motorcycle engine systems

could become more complex. For example, as engine control systems become more sophisticated with the use of electronic controls, motorcycle owners who are accustomed to customization for performance or style or are more comfortable working on mechanical engine systems (e.g., carburetors and breaker points) which have traditionally been found on motorcycles, may find it more difficult or complex to tweak calibrations, diagnose problems and perform repairs on these newer, less familiar systems and components. However, as the engine systems become more reliant on electronics, more diagnostic tools will become available that allow owners to diagnose and repair problems with their engines that would have previously required time consuming and often frustrating trial and error methods. We believe that, as for automobiles, as electronics and advanced technologies become more common on motorcycles, consumers will become more comfortable with these technologies and concerns over diagnosis and repair will diminish. We expect that reliability will increase and the need for maintenance will be reduced.

MRF expressed the view that many riders view customization as a key activity to address their needs for personal style and engine performance. The vast majority of modifications made by riders for style purposes, such as using chrome parts, painting the fuel tank, replacing handle bars, etc., are unaffected by this rule. Customization of the exhaust system will be unaffected as long as the new exhaust system doesn't adversely affect emission performance. Aftermarket and custom exhaust manufacturers and installers will simply need to ensure that exhaust systems are being developed and installed so as not to violate the tampering prohibition. With regard to engine performance, EPA believes the new technology required to meet our standards will directionally enhance performance and reduce the need to modify parts or tweak calibrations that traditionally enhanced performance. With the widespread use of advanced fuel injection in the near future, many of the situations that riders may have perceived as requiring a calibration tweak or other "modification" with a carbureted engine may not occur because of the more precise fuel management enabled through electronic fuel injection. For example the initial acceleration and low speed driveability concerns listed as examples in the MRF comments would be improved through this technology.

It is hard to say whether replacement and aftermarket parts would become more expensive as a result of our standards. This will depend on the technologies and system designs used by each manufacturer for each model. Exhaust systems that incorporate a catalyst will likely be more expensive. However, not all models will use catalysts and undoubtedly some will not build the catalyst into the exhaust system assembly. Furthermore, other technologies could actually be cheaper. For example, replacement carburetors are very expensive and depending on the number of cylinders the engine has, the consumer could have to buy multiple carburetors. For a motorcycle equipped with fuel injection, it is very rare that the whole fuel injection system ever needs to be replaced. Rather, only part of the system may need replacement, such as injectors or a fuel pressure regulator. Any of these items are considerably less expensive than a carburetor or multiple carburetors. The improved reliability and durability of fuel injection will make the need for replacement or repair to the fuel system less than it is today for most carbureted systems.

7.2 Performance and Fuel Economy

What We Proposed:

In the NPRM we stated our belief that the proposed standards would not have a significant impact on motorcycle performance or fuel economy.

What Commenters Said:

AMA stated their concern that lower exhaust emissions must not come at the expense of driveability, reliability, and fuel economy. They noted that many motorcyclists place a high priority on having enhanced performance relative to other motor vehicles with which they share the road. They linked good performance and reliability with safety, as did many other individual commenters. They noted that the better fuel economy relative to most other vehicles is an “incentive for greater motorcycle utilization in today’s transportation mix,” and cautioned that regulatory actions that discourage motorcycle use will contribute to increased fuel consumption and congestion.

One commenter stated that motorcycle fuel economy will decrease significantly as a result of our proposed regulations. This commenter offered no specific justification in support of his views.

At the public hearing, ABATE of Michigan stated that some methods of meeting emission standards can adversely affect performance by resulting in “rough idle and poor torque characteristics in the low and mid-speed range.” The ABATE representative presenting this testimony highlighted his own personal experience with a Harley-Davidson motorcycle which, that very morning, “ran so poorly, that it was literally unsafe.” He assumed that this was intentional on the part of the manufacturer as a means to control emissions.

Comments submitted by almost 400 individuals via a form letter available from the AMA suggested that technologies such as sequential fuel injection, secondary pulse air injection, and electronic engine management may introduce long-term reliability and driveability issues. These commenters also suggested that the additional weight and complexity of some of these technologies may also be a concern.

MIC, representing twelve manufacturers, testified at the public hearing that “With the lead time [in the proposal] and with this level of stringency of the standards, there isn’t any technological reason why motorcycles can’t be produced that are safe and that have driveability and performance that is excellent - as good as product being produced today and better than product produced in the past.”

In its written comments, Harley-Davidson stated that its engineers have been able to produce top performing engines while maintaining the essential neoclassical styling, beauty, and

accessability of an air-cooled V-twin engine that Harley-Davidson riders demand. Harley-Davidson is confident that these engineers will be able to maintain the “look, sound and feel” of a Harley-Davidson and include some of these new technologies needed to meet the proposed standards. Jim McCaslin, President of Harley-Davidson Motor Company, stated in a website release that “[T]he EPA's proposal promotes better air quality while balancing the interests of riders, the industry and society at large. We are prepared to meet the new standards through technologies that don't sacrifice the things you love most about your motorcycle.”⁴² This release was subsequently published in Harley-Davidson’s customer-based magazine, *Enthusiast*, which is distributed to the 650,000 members of the Harley Owners Group.

MECA commented at the public hearing that the key to successful use of catalyst technology is a systems approach, in which careful attention is taking to integrating the engine design, catalyst system, and fuel delivery system. They further comment that this approach can address some of the issues with regard to applying catalyst technology to motorcycles, such as durability, packaging constraints, safety, performance, and cost. MECA further commented that experience has shown that the challenges related to catalysts can be met, as demonstrated by 15 million motorcycles worldwide using catalyst technology.

Our Response:

We do not expect any of the possible technology changes to adversely affect performance or fuel economy. 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, fuel injection, and catalytic converters). There is no evidence to suggest that motorcycle performance has declined during that period, and in fact manufacturers have been able to continue to develop products that make continual improvements in performance. Automotive performance has likewise continued to increase while at the same time having to face increasingly tighter emission standards. 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. Although a new motorcycle model and not an update of a prior model, the Honda ST1300 sport touring bike is intended to replace the

⁴² See <http://www.harley-davidson.com/CP/EPA/epa.asp>. Available in the public docket for review.

ST1100. According to reviewers, the ST1300 addresses the few shortcomings of the ST1100, is faster, quicker, more responsive, and 20 pounds lighter than its predecessor.⁴³ It also meets the standards we are finalizing to take effect in 2010.⁴⁴ The 2003 Yamaha FJR1300, also in the sport touring category, is reportedly one of the lowest-priced and best-performing motorcycles in the category (winning the Rider Magazine 2003 Motorcycle of the Year award), and Yamaha claims that it is “one of the cleanest-running large-capacity motorcycle engines ever built.”⁴⁵ The Harley-Davidson V-Rod introduced in 2001, which has won numerous international awards, is also expected to meet the 2006 standards in near its current configuration, yet its performance in the cruiser category is frequently praised.⁴⁶ 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.

As stated above, none of the technologies expected to be used by manufacturers to meet the emissions standards should have a negative impact on fuel economy. In fact, the switch to leaner (i.e., less fuel) fuel strategies, either through electronic fuel injection or advanced carburetion, will result in less fuel consumption and greater fuel economy. Currently, most motorcycles are designed and calibrated for optimum engine performance durability. Fuel economy is not a major concern for most motorcycle designs. The technologies and emission control strategies that we anticipate to be used by most manufacturers will allow more emphasis on fuel economy.

With respect to the comment from ABATE of Michigan, we agree that some emission control techniques can be implemented poorly and in ways that lead to unsatisfactory operation. Although manufacturers generally have significant expertise in designing, engineering, and manufacturing vehicles, sometimes mistakes and errors in judgement are made and an unsatisfactory product is released to the public. This situation is not unique to emission control systems or to motorcycles, and an absence of emission standards would not prevent some poorly made, poor-performing, or ill-conceived vehicle designs from reaching the marketplace. The marketplace often quickly corrects errors of this nature through poor reviews, poor sales, loss of revenue, or vehicle recalls. The final rule does not mandate which techniques and technologies a manufacturer must use to achieve the emission standards. We expect each manufacturer to use their expertise to develop appropriate systems that both meet the emission standards and achieve acceptable performance, as they have said they can do. We also expect that there is not a “one-size-fits-all” solution, and that each engine type, size, and motorcycle style will require different

⁴³ RiderReport.com, Bike Tests: 2003 Honda ST1300 ABS, August 28, 2002. Docket A-2000-02 or <http://www.riderreport.com/output.cfm?id=131851>.

⁴⁴ Honda Motorcycles website, specifications of 2003 and 2004 ST1300, http://www.hondamotorcycles.com/motorcycles/Touring_Sport_Touring/model.asp?ModelName=ST1300&ModelYear=2003&ModelId=ST1300L3 or Docket A-2000-02.

⁴⁵ Yamaha Motor Corporation website, 2004 FJR1300, <http://www.yamaha-motor.com/products/unitinfo.asp?lid=2&lc=mcy&cid=27&mid=180>, or Docket A-2000-02.

⁴⁶ RiderReport.com, American Thunder: V-Rod Propelled Into Motorcycle Stardom, January 31, 2003. Docket A-2000-02 or <http://www.riderreport.com/output.cfm?id=183619>.

approaches. It is up to the manufacturer to determine what does and does not work for each motorcycle. As MECA suggested in their comments at the public hearing, a systems approach is necessary to achieve an acceptable result. A manufacturer who makes a single change to a motorcycle (e.g., adding a catalyst, increasing valve overlap, etc.) in a vacuum without considering other aspects of the motorcycle such as fuel delivery, air-fuel ratio, cylinder design, engine design, etc., is less likely to achieve an all-around satisfactory result than a manufacturer taking a true systems approach. As the previous discussion shows, numerous motorcycles manufactured with sophisticated emission control systems have shown superior performance characteristics compared to other motorcycles.

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 performance and fuel economy problems, not to mention in-use safety concerns, as some have alleged. However, the manufacturers have not raised concerns. In fact, more than a dozen manufacturers from Indian to Honda to 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. We share the view of motorcycle manufacturers that emission controls will not adversely affect vehicle performance.

7.3 Safety

What We Proposed:

We considered potential safety impacts of our regulation and discussed these issues in the NPRM. In particular, we considered the heat generated by catalytic converters and whether such emission control devices could be incorporated into motorcycle designs without risking injury to the motorcycle rider(s). We found that a number of motorcycle manufacturers had experience in the U.S. with developing, producing, and selling a variety of different types and sizes of motorcycles with catalytic converters, and that the experience worldwide was significant as well. We found that manufacturers had addressed catalytic converter heat dissipation issues through a variety of technological and packaging avenues. We also found that the worldwide experience with catalytic converters had not revealed any safety issues associated with the devices under real-world conditions. In the NPRM we stated that we believed that manufacturers could safely incorporate catalytic converters into their motorcycle designs, particularly given the lead time allowed for meeting the proposed standards and the two years of prior experience that the manufacturers will have meeting the standards in California.

What Commenters Said:

AMA stated that the safety of the rider and/or passenger must not be compromised by emission control equipment, and that catalytic converters may not be appropriate for use on

motorcycle styles where the exhaust system is near the legs or feet of a rider or passenger. AMA linked this concern to the necessity of performance-based exhaust emission standards, which would enable the manufacturer to select the emission control techniques appropriate and feasible for each specific motorcycle model.

MRF made a number of comments regarding safety in both the comments submitted by MRF and in the economic analysis prepared for the MRF by Garrett A. Vaughn, Ph.D. Their basic contention is that catalytic converters are not safe (“motorcycles equipped with catalytic converters may not be mountable” according to the MRF) and that the risks include burns to the rider(s), overall heat stress on the rider(s), and risks to children and other bystanders who may be tempted to touch a hot motorcycle catalyst. MRF cites a Cycle World magazine article regarding a 2003 motorcycle (a Ducati 999) in which the magazine reported that “Our infrared thermometer registered 140 degrees F when pointed at the top heat shield,” and suggested that such excess heat will encourage tampering. MRF also criticized the EPA’s use of the phrase “not insurmountable” when describing solutions to the issue of heat generated by the catalyst, and they concluded that there will be injuries and fatalities due to catalysts on motorcycles. The MRF reiterated some of these comments in a letter to EPA dated June 18, 2003, again referring to the Cycle World article in response to a direct request from EPA for information supporting their allegation that catalysts will cause injuries and deaths.

ABATE of Illinois echoed the concerns of the MRF, citing the same Cycle World article and concerns of increased risk of burn injuries, heat stroke, and accelerated dehydration. They also cited the testimony provided at the public hearing from a motorcyclist who claims to have had a portion of his boots melted from the heat of a catalyst near his foot peg.

Comments submitted by almost 400 individuals via a form letter available from the AMA supported the concern of the AMA that addition of some emission control devices such as catalysts may pose a hazard on certain styles of motorcycles. Many other individuals expressed general concerns regarding the safety of catalysts on motorcycles due to the high heat generation typical of the devices. One commenter pointed out that heat affects diabetics, often without warning if the heat is too intense.

Dr. John Myers stated, without clarification, that the high temperatures of catalysts pose an additional safety threat to riders involved in an accident.

ABATE of Michigan commented at the public hearing that the additional weight of a catalyst could upset the delicate balance of a motorcycle, which raises a potential safety issue.

MECA noted at the public hearing that the real-world experience with catalysts indicates that catalyst systems can be easily and safely applied to motorcycles. MECA noted that catalyst technology has been utilized successfully on motorcycles and mopeds for over ten years. The countries that have successfully implemented catalyst-based programs have not identified any special safety issues associated with the use catalyst technology on motorcycles and mopeds.

MECA acknowledged that safety is a critical design element, but one that can be addressed through proper design and engineering.

Harley-Davidson commented at the public hearing that the use of catalysts does raise some safety issues, but that their engineers have been able to successfully address these issues on the motorcycles they have produced for the California market with catalysts for several years now.

Mr. Chris Coleman suggested that fuel injection may be an unsafe technology because of the high operating pressures of the fuel delivery system and the potential for fires due to high pressure fuel leaks. He noted that he was not specifically opposed to fuel injection on motorcycles, but believes that consumers should be able to choose a carbureted motorcycle if that is what they desire.

Another commenter suggested that manufacturers have had some difficulty assuring a smooth and consistent throttle response - particularly under slower speeds and changing air temperatures - with fuel-injected motorcycles, and that this is a potential safety issue. The commenter notes that small to midweight motorcycles may be most affected.

Our Response:

We appreciate and understand the concerns raised by many motorcyclists regarding the potential safety issues of catalytic converters due to the heat that the devices can generate. In the NPRM we suggested that current experience with the installation of catalytic converters on motorcycles - both in the U.S. and worldwide - has demonstrated that catalytic converters are a safe emission control technology option for manufacturers. However, we were criticized by some commenters for not adequately addressing these issues. The economic impact study submitted by the MRF 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, particularly as it relates to the use of catalytic converters on motorcycles. Due to the serious nature of the concerns expressed by riders we have expanded and improved our assessment of the potential risks of using catalytic converters as an emission control device on motorcycles. We continue to believe that catalysts can safely be used as a motorcycle emissions control device.

We do not agree with ABATE of Michigan that the weight of the catalyst presents a potential safety issue. Perhaps this would be the case if motorcycle catalysts were comparable to automotive catalysts in size, weight, and volume, but this is not the case. Motorcycle catalysts do not and will not have to reach the high efficiency levels of current and projected automotive catalysts, and consequently their size relative to the displacement of the engine is often smaller. Current motorcycle catalysts are typically smaller than a 12 ounce can of carbonated drink - perhaps even half this size - and weigh no more. Thus, the weight addition caused by a catalyst will have hardly any effect on the weight of these vehicles. All other things held equal, the

addition of a catalyst to a motorcycle does add some small additional weight to the motorcycle. But all other things are rarely kept static and without evolution. As demonstrated above in the discussion regarding the 2003 Yamaha YZF-R6, it is possible, with the use of advanced materials and technologies, to add a catalyst and minimize the impact on the overall weight of the exhaust system.

The Cycle World article regarding the Ducati 999 is interesting, but it is not compelling evidence that catalysts present a safety hazard to motorcyclists. First, the characterization by the MRF that the catalyst is “tucked under the bike’s seat” is inaccurate. The exhaust system does exit under the seat and to the rear (as is the case with some other Ducati motorcycles as well as motorcycles from other manufacturers), but the catalyst on the 999 is in fact almost directly above the rear tire and behind the rider seating position. Second, other reviews of the 999 comment on the heat from the catalyst as well, but none (including the Cycle World article) refer to the heat from the catalyst as a rider safety issue. In their review of the 999, Street-biker Magazine stated that the muffler with integrated catalyst “gets very hot and is best avoided when examining the bike in detail,” but they did not suggest that compromised the safety of or threatened injury to the rider or passenger.⁴⁷ Cycle News Online reported the following:

“The rear seat on the Biposto (two seater) version of the bike gets really hot. This is, of course, due to the fact that the exhaust chamber resides right under that seat. The reason it gets so much hotter than the old 916-998s' under-the-seat-exhaust is that the new bike has a catalytic converter residing inside of it, and it gets exceptionally hot, and then radiates that heat out.”

Cycle News Online also noted that “The only other thing that I noticed was that the bike poured a ton of heat onto my legs from the engine. Now, so far this hasn't been a negative issue because it's the middle of winter, but I have a feeling that the bike is going to be on the hot side in the summer.” The Cycle News Online review concludes that “These real-world issues shouldn't discourage buyers from purchasing the 999, they are just a couple of observations that we felt you should be aware of in everyday riding situations.”⁴⁸ These reviews confirm that exhaust systems with catalysts can get hot, and can be noticeably so, but the reviews do not demonstrate that catalysts present a significant safety risk to the riders. Issues of heat exposure are not limited to the catalyst, and in the case of the 999 and probably many other motorcycles, the heat radiating from the engine - which is often under and in front of the rider - will be more noticeable than heat radiating from the exhaust pipes that are rearward of the rider. Lastly, we do not believe that 140 degrees F is an unusual temperature reading for an exhaust system. When EPA finalized new light-duty vehicle test procedures in 1996 that included a test that simulates ambient conditions on a day with a maximum temperature of 95 degrees F, General Motors supplied data indicating that pavement temperatures on such a day can reach 135 degrees F. After an hour under the specified ambient conditions the interior temperature of test vehicles

⁴⁷ StreetBiker, Issue #125, Oct-Nov 2002, Ducati 999: Redvolution. Docket A-2000-02 or <http://www.streetbiker-mag.com/sb0125/1.html>.

⁴⁸ Cycle News Online, Test: 2003 Ducati 999. <http://www.cyclenews.com/features/03-999.asp> or Docket No. A-2000-02.

approached 130 degrees F. Without additional context we can not evaluate the whether or not the 140 degree F reading taken by Cycle World is meaningful, but we can say that it does not appear to be unusually high.

It is indisputable that there are currently thousands of motorcycles with catalytic converters being ridden in the U.S. today. These catalyst-equipped motorcycles span the motorcycle categories of cruisers, touring, sport, standard, and even scooters. In particular, BMW has been using 3-way catalytic converters on all of their motorcycles since 1991. In recent years the sales of BMW motorcycles in the U.S. has exceeded 10,000 units per year, and their worldwide sales since 1997 are near 450,000 units. Harley-Davidson has been producing a number of different models with catalytic converters for the California market since 1995, and company estimates put the total number sold with catalytic converters since 1995 at around 45,000.⁴⁹

In addition to BMW and Harley-Davidson, in the last 5 years motorcycle models with catalytic converters have been sold by Aprilia, Cushman, Ducati, Genuine Scooter, Honda, Kawasaki, Kwang Yang Motor Co., Malaguti, Milwaukee Motorcycle, Roadstertec, Russian American Motorbike, Suzuki, Triumph, and Yamaha. Honda models with catalytic converters include the VTX-1800 and VTX-1300 (cruisers), the Gold Wing GL-1800 (touring), the ST-1300 (sport touring), and the Interceptor VFR-800 (sport). Kawasaki models include the Ninja ZX-9R (sport), the ZR-1000 (sport), the Ninja ZX-12R (sport), the ZR-1200 (touring), the VN-1500 Vulcan (cruiser), and the VN-1600 Vulcan (cruiser). Suzuki models with catalytic converters include the Burgmaster AN-650 (large scooter). Yamaha motorcycles currently equipped with catalytic converters include the YZF-R6 (super-sport), the YZF-R1 (sport), and the FJR-1300 (sport touring).

A conservative estimate based on confidential sales projections made by manufacturers when they certify their motorcycles to EPA standards, indicates that 80,000 to 100,000 2003 model year motorcycles equipped with catalytic converters could be sold in the U.S. If we estimate conservatively that there are 150,000 motorcycles on the road today in the U.S. with catalytic converters,⁵⁰ and each is driven 2,000-3,000 miles per year, then we can state that over 300 million miles have been ridden on catalyst-equipped motorcycles in the last year. The MRF commented that motorcycles with catalytic converters are currently in the minority, and we agree. However, we believe that twenty percent of the motorcycles sold in the last two years, or 100,000 (or likely more) currently on the road, ridden for hundreds of millions of miles, can be reasonably argued to be a significant and substantial in-use demonstration. This total would be far greater if we included the numerous motorcycles with catalysts being ridden in the several countries that

⁴⁹ Jerry Steffy, Harley-Davidson Motor Company, Regulatory Affairs Department. Docket A-2000-2, document IV-G-13.

⁵⁰ Sales of catalyst-equipped BMW and Harley-Davidson motorcycles alone since 1995 approach 100,000. According to BMW Annual Reports their U.S. sales in the last three years have exceeded 13,000 per year. Include Honda, which has some high-volume products with catalysts such as the Goldwing, and it becomes clear that 150,000 is a conservative estimate.

already have emission standards for motorcycles that manufacturers are meeting by using catalysts. In these terms it is abundantly clear that there is no shortage of experience with catalytic converters - both in terms of manufacturers and riders - in the U.S. Worldwide the experience is several orders of magnitude greater. This real-world evidence is entirely contrary to the statement made by the MRF that catalyst-equipped motorcycles “may not be mountable.” In fact, substantial factual evidence indicates that the safety concerns regarding heat generation from catalytic converters are surmountable (i.e., capable of being overcome). This evidence is not just theoretical or based on engineering principles and judgement - it is the real-world experience today.

Given the U.S. manufacturer and rider experience with catalytic converters, 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. We have already established that a significant number of manufacturers have engineered, produced, and sold a large number of motorcycles with catalytic converters. To assess the rider experience and any potential issues that may have arisen during the hundreds of millions of miles ridden with catalytic converters in the U.S., we analyzed the database of consumer complaints maintained by the National Highway Traffic Safety Administration’s Office of Defects Investigation. This database contains all consumer complaints filed since 1995 related to motor vehicles, child safety devices, and other equipment such as tires. The database is used by NHTSA to assist them in targeting investigations and potential vehicle recalls.

When the database was obtained by the EPA in February, 2003, it contained over 370,000 entries. About 2,000 records were specific to motorcycles, and 28 of these contained complaints specifically regarding the exhaust system. Five of these complaints (representing four different manufacturers) specifically regarded the catalytic converter. Two of these five complaints were regarding converters that had failed, another two complaints were regarding unusual or strong odors, and the remaining complaint was regarding a heat shield that fell off. None of the complaints suggested that heat from the catalytic converter was excessive, improperly managed, or unsafe. We then expanded our assessment of the database by reviewing the remaining 23 complaints related to exhaust system components. This was done to be sure that we did not overlook any catalytic converter concerns that may have been improperly categorized or diagnosed by the consumer filing the complaint. Of these 23, five were regarding issues with the fuel petcock or fuel check valve, or the oxygen sensors. Seven complaints were regarding a tailpipe that fell off, was broken, was dented, or somehow failed. An additional four of these complaints were regarding the following issues: an oil leak; a muffler bracket recall; handling issues with installation of long aftermarket pipes; and peeling paint.

The remaining seven complaints, which we describe here in greater detail, were specifically regarding excess heat coming from the exhaust system.

No.	Make	Model & Year	Complaint
1	Kawasaki	1988 Z Series	Passenger on motorcycle received burns on leg from hot mufflers.
2	Suzuki	1995	Muffler not designed with heat shield, causing burn injury to driver when motorcycle turned over.
3	Harley-Davidson	2000 FLHPI	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
4	Harley-Davidson	2002	Consumer states that when at a stop the exhaust pipe will glow red and this can cause injuries to the consumer. Dealer notified.
5	Harley-Davidson	2003 Electraglide	Exhaust system cross over pipe is located too close to seat, causing driver to be burned while driving, even if properly dressed.
6	BMW	2000 R1200C	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. BMW does not feel this is a problem, they suggested to consumer that he buy after market exhaust guards, which are expensive.
7	BMW	2001 K1200RS	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.

- Two of these were regarding burns sustained by riders from a hot muffler (one of which was sustained in a crash of the motorcycle and not during normal riding conditions). Both of these complaints were regarding motorcycles known not to be equipped with catalytic converters; one was produced before catalytic converters were used on motorcycles (a 1988 Kawasaki) and the other by a manufacturer that, to our knowledge, did not utilize catalytic converters on their motorcycles until the 2003 model year (a 1995 Suzuki). These complaints demonstrate that the catalytic converter does not introduce a new hazard to motorcycle riders; the very nature of a motorcycle is that the rider is always in close proximity to the engine and exhaust system, both of which can generate significant heat and can cause burns whether or not there is a catalytic converter present.
- Another complaint was regarding an exhaust pipe that glowed red at idle (a 2002 Harley-Davidson). We do not have enough information to determine whether this is a catalyst-equipped vehicle, but the fact that the complaint originated from an Ohio owner points to the likelihood of it being a non-catalyst model, because the catalyst-equipped Harley-Davidsons are in the minority and are generally destined for sale in California. We also do not know to what extent this motorcycle may have been modified and in what ways components or tuning characteristics may have been altered or replaced, which could potentially introduce an operating problem like this one. Clearly a pipe that glows red is not something that was intentionally engineered by the manufacturer and does not represent a normal situation, and is more likely due to a defect in the operation of the

motorcycle. With respect to this complaint and the following ones regarding Harley-Davidson motorcycles, Harley-Davidson notes in the Harley-Davidson 2003 Genuine Motor Accessories and Genuine Motor Parts that tuning characteristics, cam timing, carburetor jetting, overheating, and other factors can cause discoloration of exhaust pipes. It is entirely possible that these complaints are a result of some of these factors. In fact, since it occurred at idle when exhaust gas flow is at its lowest and catalyst efficiency is high this seems even more likely.

3. A 2003 Harley-Davidson generated a complaint regarding cross-over pipes that were reported to be too close to the seat, burning the rider. This complaint came from a New York owner, thus, like the Ohio report, may in fact be a motorcycle without a catalytic converter. In addition, this is the only complaint of this type for this model of motorcycle, and can not be considered to be indicative of a widespread problem. Again, we do not know to what extent the owner may have modified the exhaust system or the engine of the motorcycle, and there are potential modifications and defects unrelated to a catalytic converter that could increase the heat of the exhaust pipes, particularly near the engine as is the case with this complaint. Indeed, even if this motorcycle does have a catalytic converter it would be rearward of the seat concealed in the muffler or elsewhere and would not result in a complaint of this nature at this location on the motorcycle.
4. A similar complaint came from a 2000 Harley-Davidson owner, who noted that the exhaust manifold would get so hot that it gave off an orange glow. Like the previous complaint of hot cross-over pipes, it is highly unlikely that this phenomenon could be explained by the presence of a catalytic converter, which, if present, would be far rearward of the location where the exhaust exits the engine. Again, this is more likely the result of a defect or of some engine changes introduced by the user or mechanic, and not likely related to the presence of a catalytic converter. Clearly this is not a normal operating characteristic of Harley-Davidson motorcycles. Exhaust pipe heat is generated when unburned fuel from the engine is oxidized in the exhaust system in the presence of excess air. This happens frequently in to a minor degree in all exhaust pipes, but is only significantly if relatively large amounts of unburned fuel and air are present.
5. Finally, there were two complaints regarding 1200cc BMW motorcycles, one complaint each regarding the R1200C and the K1200RS. These complaints stated that the exhaust pipes positioned below the foot pegs can come into contact with the rider's clothing. Based on the configuration of the R1200C, it is possible that the catalytic converter is located in the exhaust pipe below the foot peg, and this is also possibly the configuration of the K1200RS as well. However, the nature of the complaints was not that there was an opportunity for potential physical harm to the rider, but to the rider's clothing (presumably the pant cuffs, since that is the only clothing that would be anywhere near a point lower than the motorcycle's foot pegs). This of course is a design issue which must be considered in the system, but is not an unresolvable concern as demonstrated by BMW's suggestion to the user.

We contacted Harley-Davidson and BMW and asked if they were aware of the complaints filed with NHTSA. We also asked for their own assessment of these complaints. Both manufacturers responded that they consider these to be isolated cases and not indicative of a widespread problem or safety issue. BMW noted that the complaints do not appear to be directly related to the catalytic converter, although they are aware of the fact that catalysts can contribute to overall heat generation. They also stated that a shorter than average person would be more likely to come into contact with the exhaust pipes, and BMW sells aftermarket protective guards for customers who might desire some additional protection. Obviously, it is difficult if not impossible to design a “one-size-fits-all” motorcycle that comfortably and adequately fits people of all sizes and stature. Harley-Davidson examined their own records and reported only two instances that might bear some relation to excess heat from catalysts, and neither record indicated the reporting of any health or safety concerns. They were not able to determine whether or not the NHTSA complaints involved catalyst-equipped motorcycles. They also added that they “educate our customers, through warnings in the Owner's Manual, about being careful not to contact any portion of the motorcycle's exhaust system.”

In summary, we do not believe that the data available from NHTSA and described above demonstrates that a catalytic converter constitutes a significant safety risk. In fact, of the complaints identified above where heat from the exhaust pipe was reported to be a problem, there appear to be more involving non-catalyzed systems than there were regarding systems with catalytic converters. In either case, the complaints represent a tiny minority of the complaints brought to NHTSA's attention; this would not be the case if there was a generalized problem with excessive heat from catalyst-equipped motorcycles. The data, however, does demonstrate that heat management from the exhaust system in general is a packaging and design issue for manufacturers, and the manufacturers are certainly aware of this need.

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. 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 proposed standards with no negative impact on safety or performance relative to motorcycles manufactured today. MIC stated in its oral testimony at the public hearing that “With the lead time that you're providing and with this level of stringency of the standards, there isn't any technological reason why motorcycles can't be produced that are safe and that have driveability and performance that is excellent...” Harley-Davidson echoed this view at the hearing as well, stating that “...the use of cats does raise safety issues for our engineers as they design motorcycles. However, we have been using cats on many of our motorcycles in California for several years now and have been able to address any major personal safety issues arising from the use of cats on bikes.” 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 and that, while the safe integration of catalysts is an engineering issue, it has been addressed in a

variety of different ways. 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. It is clearly an engineering issue, but one that can be addressed in any number of ways to protect the user from the additional heat of the device. 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 find the MRF comment regarding a potential risk to children or other bystanders from the heat of a catalytic converter on a parked motorcycle to be an unsubstantiated concern. Clearly, parked motorcycles represent a number of hazards to those who might approach them. Exhaust pipes and engines both with and without catalytic converters can generate significant heat and can remain hot to the touch for some time after the vehicle is parked. A parked motorcycle could tip over on a child or bystander if handled inappropriately. It should be obvious that - with or without catalytic converters - motorcycles should not be approached or touched by children or bystanders without the express permission and attention of the owner. As described above regarding the risk to motorcycle riders, we do not believe that the use of catalytic converters presents significant additional risks beyond those that already exist to bystanders or children, and the commenter has not presented any information that supports their claim. Finally, Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks) calls on government agencies to identify and address health risks and safety risks that disproportionately affect children. The commenter did not present any evidence that catalytic converters on motorcycles might present a disproportionate risk to children, and after consideration of all of the facts we do not believe such evidence or such a risk exists.

We do not believe that there are significant safety issues associated with the use of fuel injection technology. This technology has been in use on numerous motorcycles for many years, and on cars for perhaps even longer. Millions of passenger vehicles are using fuel injection today, and there is no evidence that shows that under-hood fires are more common with this technology than with the carbureted cars of the past. Unlike cars, however, if there is sufficient consumer demand for carbureted motorcycles it should be possible for manufacturers to provide these motorcycles under the emissions averaging program that we have finalized. These more-polluting motorcycles could be balanced out by others equipped with fuel injection and/or other emission control technologies.

Manufacturers did not indicate to us any safety concerns they have with throttle response on fuel-injected motorcycles. In fact, a trend towards replacing carburetors with fuel injection systems was apparent even before we initiated our rulemaking for new standards, and that trend continues today. We believe that it is unlikely that manufacturers would be moving in this direction if there were significant safety concerns. There are fuel-injected motorcycles in all three motorcycle classes that are getting very favorable reviews, for performance, rideability, and for performance at a specific price point. This indicates to us that manufacturers can calibrate these systems for optimal performance.

7.4 Blue Sky Standards

What We Proposed:

We did not propose a Blue Sky program for highway motorcycles. However, we requested comment on whether a Blue Sky program is desirable for highway motorcycles, and what standards would be appropriate for such a program.

What Commenters Said:

MIC commented that hearing testimony on the recently completed rule for off-highway motorcycles and all-terrain vehicles shows that certain groups hope to use Blue Sky standards as a means of restricting the use of motorized recreational vehicles. While this testimony was primarily aimed at off-highway recreational vehicles, MIC pointed out that new use restrictions on highway motorcycles are frequently proposed by a variety of local jurisdictions and organizations. MIC is strongly opposed to labeling requirements due to concerns that such requirements will create further problems with use restrictions.

AMA commented that there is little to gain through even stricter standards for highway motorcycles given that they are such a small part of the mobile source emission inventory. AMA commented that we should evaluate other, more significant contributors before proposing even stricter standards for highway motorcycles.

STAPPA/ALAPCO commented in support of the Blue Sky program to encourage voluntary early compliance and compliance with more stringent standards. NESCAUM also supports a Blue Sky program if the incentives to manufacturers are significant enough to make the program a reality. NESCAUM suggested having a “Blue Sky workshop” to allow all stakeholders to establish desirability and, if desirable, discuss what the program should look like. NHDES strongly supports Blue Sky, and suggested that we should go beyond Blue Sky and require consumer labeling to ensure informed consumer choice. Finally, MECA recommended that we establish Blue Sky standards to promote technology development and provide opportunities for additional emission control from highway.

Our Response:

After assessing comments, we do not believe that there is a compelling case to be made for developing a Blue Sky program for highway motorcycles at this time. For the majority of Class III motorcycles the Tier 2 standards are quite stringent. We do not believe that there is anything substantial to be gained by offering even more stringent optional standards for highway motorcycles, since there are already incentives within the credit emission program. Thus, we are not adopting a highway motorcycle Blue Sky program as part of this rule. However, it is important to note that we are including an early credits program as part of the averaging program, as discussed in section 3.1. The early credits program contains incentives for the early introduction of Tier 2 motorcycles.

7.5 Alternative Fuels

What We Proposed:

The proposed standards would apply to all motorcycles, regardless of fuel. In 1990 the emission standards became applicable to methanol-fueled motorcycles (see 54 FR 14539, April 11, 1989), and in 1997 the standards became applicable to natural gas-fueled and liquified petroleum gas-fueled motorcycles (see FR 48512, Sept. 21, 1994). We requested comment as to whether there are unique aspects to motorcycles fueled with other alternative fuels (e.g., diesel, natural gas, methanol, or propane) that would make the proposed standards particularly challenging or infeasible.

What Commenters Said:

MIC stated that they are not aware of current or planned production of highway motorcycles fueled by natural gas, methanol, or propane. They said that there is already one diesel-powered motorcycle in production, but that it is not certified for highway use in the U.S. They said that they did not anticipate any significant future production of diesel-powered motorcycles; however, diesel fuel is probably the most likely alternative fuel for us to consider. They suggested that we acknowledge diesel-powered vehicles require alternative HC measurement systems.

Our Response:

MIC's comments on potential alternative fuels used by highway motorcycles was very informative and helpful. The primary difference between diesel and gasoline HC measurement is that diesel requires the use of a heated flame ionization detector (FID) and sample lines. This reduces the condensation of heavy hydrocarbons on the burner assembly and sample line walls. In our final regulations, we will specify the use of the existing diesel-fueled light-duty vehicle sampling and analytical procedures. The final regulations will also specify that the light-duty diesel test fuel be used when testing diesel-fueled motorcycles.

7.6 Noise

What We Proposed:

We did not propose any revisions to the current highway motorcycle noise standards.

What Commenters Said:

Bluewater Network (BN) commented that we failed to consider noise as a criteria in setting emission standards, as required by section 213 of the Clean Air Act. BN stated that we are required by statute to establish more stringent noise standards for motorcycles. Finally, BN commented that we have an obligation to place noise labels on motorcycles, stating that we used to have a labeling program but abandoned it without explanation.

A number of motorcyclists commented that the ability to replace the factory exhaust with louder aftermarket exhaust is a safety benefit (i.e., other drivers don't tend to see motorcyclists unless they can hear them).

In contrast, one commenter suggested that we should put a stop to the Harley Davidson Company's practice of having their dealers install optional loud exhausts on street bikes with the cynical disclaimer of being intended only for race track use. Another commenter asked whether EPA is responsible for regulating noise pollution, pointing out that where he lives passing motorcycles often set off car alarms and rattle windows.

Our Response:

Section 213 of the Clean Air Act directs EPA standard-setting for nonroad vehicles, and is not applicable to highway motorcycles. Even if it were, section 213 of the Clean Air Act does not authorize standards regulating noise emissions. The Noise Control Act (42 U.S.C. 4901 et seq.) authorizes EPA to establish noise emission standards for motorized equipment. Under this authority, we established noise emission standards for motorcycles and three-wheeled ATVs in 40 CFR Part 205 (45 FR 86708, December 31, 1980). These regulations include voluntary "Low noise emission product standards" for motorcycles (see 40 CFR 205.152(c)), as well as labeling requirements for new motorcycles and for replacement exhaust systems (see 40 CFR 205.158 and 205.169).

The actions taken in today's rulemaking are related to our responsibilities and authority under the Clean Air Act, which does not authorize standards regulating noise directly. We did not propose, and are not taking action on, any regulatory provisions based on the Noise Control Act. Assuming appropriations authority, EPA may choose to take action with regard to noise control from these vehicles/engines in a separate rulemaking at some point in the future.

Because we did not propose and are not finalizing any changes to the existing noise standards it is not appropriate at this time for the EPA to address the fact that some motorcycle owners believe they are improving the safety of riding by installing loud and potentially illegal exhaust pipes. We remind the motorcycling community that it has been illegal since the noise standards for highway motorcycles took effect in 1982 to disable, remove, or render inoperative the noise control equipment installed by the manufacturer. The manufacturer's label placed on the motorcycle and the motorcycle owners manual are required to state that modifications that cause the noise standards to be exceeded are prohibited by Federal law.

There does not appear to be any evidence to indicate that more stringent exhaust emission standards will affect the noise from a motorcycle, or a manufacturer's ability to design a motorcycle to produce the noise desired by consumers, within the framework of the current noise standards.

7.7 Integration of Off- and On-highway Programs

What We Proposed:

Many motorcycle manufacturers produce both highway and off-highway motorcycles. For this reason we requested comment on whether we should integrate the two sets of requirements into a single part of the regulations. Such an integration could potentially eliminate differing or inconsistent paperwork or testing requirements for the different products. We did not, however, propose such an integration.

What Commenters Said:

MIC stated that it would not be opposed to some integration of highway and off-highway motorcycle programs, but noted that full integration would probably not be feasible over time. MIC did not offer any specific information regarding what aspects of integration it would support or why full integration would not be feasible. MIC also pointed out that the world motorcycle test cycle, when completed, will not have directly considered off-highway motorcycle use.

Harley-Davidson does not support integration for several reasons. The history of regulation is significantly different for highway and off-highway motorcycles. There is precedent for treating them separately, such as in the case of federal safety regulations. Further, while highway motorcycles having a long history of emission regulation, the first emission regulations for off-highway motorcycles were completed only recently. There are also significant differences in size, design and usage patterns between highway and off-highway motorcycles which lead Harley-Davidson to conclude that there would be no benefits associated with the integration of the two programs. Finally, Harley-Davidson points out that, given the differences between the two motorcycle types, technology transfer between them will be limited, further arguing for separate programs.

AMA also commented that highway and off-highway motorcycles should be kept separate in the regulations. AMA stated that there are many inherent differences between the two motorcycle types that mandate a separate evaluation process. The list of differences AMA cited include usage patterns, driving cycles, engine configurations, weights, driving surfaces, tires, and tuning and torque characteristics. Further, AMA pointed out, the riders of highway and off-highway motorcycles view the use of their motorcycles in very different ways.

Our Response:

We agree with the commenters that highway and off-highway motorcycles differ significantly both in their design and their use, and that integrating the two programs into a single part of the regulations would not be appropriate. Thus, we are not taking action to integrate the regulations for the two programs, with the exception of fuel hose and tank permeation test procedures, which are identical for the two types of motorcycles.

7.8 World Motorcycle Test Cycle

What We Proposed:

We noted that the United Nations/Economic Commission for Europe (UN/ECE) has efforts underway to develop a world motorcycle test cycle (WMTC). The purpose of the WMTC is to have a test cycle representative of highway motorcycle use that could be used to meet emission standards in many countries. While a draft WMTC has been developed, the completion and adoption of a final WMTC is still a couple of years away. Thus, we did not propose to adopt it in this rule. However, we requested comment on how best to transition to the WMTC, should conditions warrant such action in the future.

What Commenters Said:

MIC commented that immediate transition to a new global test cycle is not feasible. MIC pointed out that the stringency of a standard is linked to its associated test cycle, and that a comprehensive test program involving a wide range of motorcycles would need to be undertaken in order to adjust the standard for the new test cycle with the intent of maintaining equivalent stringency. MIC pointed out that, even after appropriately adjusting the standard for the new test cycle, we would need to allow several years of lead time because not all vehicles will respond to a change in test cycle equally, and some would require design changes to meet the adjusted standards.

Harley-Davidson agreed that it would be premature to adopt the WMTC for highway motorcycles at this time given its current draft status and the number of issues yet to be addressed. Harley-Davidson commented that we should wait until after the European Union adopts the WMTC before we consider adopting it. At that point we should consider how the WMTC correlates to the federal test procedure (FTP) currently used for motorcycle testing.

Harley-Davidson also pointed out that our future actions in this area should be consistent with the goal of harmonizing federal requirements with those in California. With this in mind, Harley-Davidson suggested that we should either adopt the WMTC as an alternative to the FTP or that we should coordinate with the California Air Resources Board to develop a phased transition to the WMTC for use with the Tier 2 standards.

AMA commented that any new motorcycle test cycle should be considered under a separate rulemaking if clear benefits can be shown for its adoption. AMA noted that careful consideration should be given to adjusting the emissions standards if a new test cycle is determined to more representative of actual motorcycle operation in the real world.

Our Response:

We agree that it would be premature to consider adopting the WMTC in its current draft form, and that doing so would create a number of new issues including that of harmonization with California. We also agree that the stringency of any emission standard is closely linked to its associated test cycle, and that changing the test cycle without appropriate adjustment to the standard may change the stringency of the standard. We have been and will continue to be involved in the development of the WMTC. If a final WMTC is adopted by the UN/ECE we will consider adopting it for the federal highway motorcycle program in a separate rulemaking action, paying particular attention to the issues of standard stringency and harmonization with California. It is also possible that, in the context of a new rulemaking action to propose adopting a new test cycle, we will make some additional proposals as well. For example, we may decide that with adoption of the WMTC it might be an appropriate time to revisit the useful life definitions for the highway motorcycle classes. Revising the useful life definitions that would apply only under the new cycle would not create some of the problems and concerns that doing so today would entail, such as creating an emissions control program that is not harmonized with the California program.

7.9 Executive Order 12866

What We Proposed:

We considered a variety of options for new highway motorcycle emission standards, including keeping the current standards, adopting some or all of California's highway motorcycle standards, and adopting standards more stringent than California's Tier 2 standards. In addition, we considered alternatives to the timing of our proposed standards. We submitted the proposal to the Office of Management and Budget for review, as is required for "significant regulatory actions" under Executive Order 12866.

What Commenters Said:

Both MRF and ABATE of IL commented that we failed to comply with Executive Order 12866, which requires us to look at less stringent alternatives. MRF cited the catalyst removal issue as a reason to consider less stringent standards. Dr. John Myers commented that the proposal fell short of the Executive Order 12866 mandate, citing language from the Executive Order that the American people deserve effective regulations that protect them without imposing unacceptable or unreasonable costs on society.

Our Response:

We do not agree with the comments stating that we failed to look at less stringent alternatives to the proposed standards. As discussed in the preamble to the NPRM, as well as Chapter 4 of the Draft Regulatory Support Document, we considered a wide variety of alternatives to the standards we proposed. These alternatives included no changes to the current federal standards, adopting California's current standards, adopting only California's Tier 1 standards, and adopting standards more stringent than California's Tier 2 standards. In addition, we considered other options for the timing of the proposed standards, including providing more than the proposed two years of additional lead time beyond the applicable dates of California's Tier 1 and Tier 2 standards. We also included alternative requirements for small business motorcycle manufacturers. Clearly, the majority of the alternatives we considered are less stringent than the standards we ultimately proposed.

We do not believe it would be appropriate to promulgate less stringent standards simply because of the potential for catalyst removal. As discussed in sections 4.3 and 7.1, the removal of a catalyst from a certified highway motorcycle is considered tampering, and as such is a prohibited act under the tampering prohibitions in section 203 of the Clean Air Act. It is difficult to know what level of catalyst removal might occur in the future, and what impact it may have on emission levels. For the reasons discussed above we believe the incidence of tampering with the catalyst will be very low. However, regardless of its frequency and impact, such activity is clearly prohibited, and we do not believe that it is appropriate to consider the possibility of illegal actions when considering what levels of standards to adopt. Moreover, as other emission control strategies are also subject to possible tampering, it is not at all clear that less stringent standards would eliminate such tampering.

We also disagree with Dr. John Myers' comment that our proposed regulations do not effectively balance need and effectiveness with costs to society. Our specific responses to concerns about the need for controls, the benefits of controls and the costs of controls, including the impact on small businesses, can be found in the sections of this document specific to those issues.

7.10 Used Motorcycles

What We Proposed:

We proposed emission standards applicable to new highway motorcycles manufactured after the applicable dates of the standards.

What Commenters Said:

New Mexico Motorcyclists Rights Organization (NMMRO) commented that there are no provisions or guarantees that older motorcycles could be sold without complying with the standards in place at the time of the sale, meaning that many used motorcycles will be worthless. Many other individual commenters raised this concern as well.

Our Response:

As noted above, our highway motorcycle standards are only applicable to new highway motorcycles and new highway motorcycle engines manufactured after the applicable dates of the standards. These standards do not apply to those manufactured prior to the applicable dates of the standards. Further, our authority to regulate the emissions from highway motorcycles comes from the Clean Air Act, which limits our authority to the regulation of new motorcycles and motorcycle engines. We are not requiring existing motorcycles to meet new standards or prevent the sale of used motorcycles. Thus, NMMRO's concerns that many used motorcycles will be worthless is unwarranted.

7.11 Conversion of Off-highway Motorcycles for On-highway Use

What We Proposed:

We requested comment on the current practices regarding the conversion of off-highway motorcycles for highway use, as well as the potential for this to occur in the future.

What Commenters Said:

AMA commented that the conversion of off-highway motorcycles for highway use is not a significant problem. Further, recent regulations for off-road motorcycle emissions make their contribution to total mobile source emission levels insignificant anyway.

Our Response:

We raised the issue of the potential for the conversion of off-highway motorcycles for highway use because some parties had raised the issue to us as a potential concern. However, we have no convincing evidence that there is widespread conversion of this type going on, and no reason to believe this will change in the future. Thus, we do not believe that there is a need to deal with the issue of these conversions in this rule.

7.12 Miscellaneous

What We Proposed:

This section addresses a variety of miscellaneous comments that we received on the proposal but that were not in response to any particular provisions of the proposal.

What Commenters Said:

Several commenters expressed concerns that the proposal would reduce consumer choice and negatively impact sales, which wouldn't be a good thing in this fragile economy. MRF and others stated that higher costs will drive riders to passenger vehicles, leading to more congestion and increased road wear. AMA stated that it would not be a desirable outcome of the regulations if increased costs resulted in replacing motorcycles with less fuel-efficient vehicles. Finally, ABATE of MI commented that motorcycles currently get 50 to 60 miles per gallon of gasoline, and that decreased motorcycle usage will result in an increase in fuel consumption.

Dr. John Myers said that motorcycles are the last bastion for tinkerers and customizers and their future discoveries will not trickle up through the automotive industry. He also said that the only reason major manufacturers support the rule is because they must stay in the good graces of the all powerful government agency and keep peace with the omnipotent government.

ABATE of Cheyenne felt that aspects of the proposal appear to be a deliberate attempt at obfuscation (i.e., reference to support document without providing full title and index number). They also said that conventional motorcycles are a fuel efficient, clean form of transportation and in normal use they do not contribute to traffic congestion that drives up emissions like cars and trucks.

One commenter stated that he had heard there is an "End of life" legislation that states that any vehicle older than 15 years would be unable to be licensed. This commenter did not explain where this provision was, but clearly stated that it applied to cars, and expressed concern about the inability to enjoy classic cars.

One commenter disagreed with the proposed regulations, pointing out that police have better things to do than scrutinize every motorcycle/motorcyclist.

Several commenters stated that they were against the decision on helmet use, injury damage reduction and health insurance benefits denial. These commenters offered no additional information on these views.

Several commenters stated that highway motorcycles are not recreational vehicles, but did not offer additional information on the subject.

Our Response:

Several commenters expressed concern that our regulations would reduce consumer choice and negatively impact sales. However, manufacturers have indicated to us that they fully expect all of their models to be able to meet our regulations and in fact a harmonized program will increase consumer choice. These standards are feasible for all types of motorcycles using technology that is readily available today and our emissions averaging program gives the manufacturers additional flexibility to help to ensure this availability. We cannot think of any reason that our standards would reduce consumer choice for motorcycle models available. Likewise, we are unaware of any reasons that our standards would perceptibly impact sales. We anticipate the cost of meeting our standards to be under \$100. As discussed more fully elsewhere in this document, we also fully anticipate that overall performance, safety, reliability, and durability will be at worst unchanged and likely improved as a result of the technologies that will be used to meet the standards. Therefore, we see no reason that our standards should cause any reductions in consumer choice or overall motorcycle sales.

NMMRO and MRF stated that higher costs for motorcycles resulting from our regulations will drive riders to switch to passenger vehicles, leading to more congestion and increased road wear. We disagree with both of these comments. We have received thousands of letters and e-mail messages from motorcycle riders telling us that they ride motorcycles for numerous reasons, such as for the enjoyment, exhilaration, convenience, and freedom, as well as a form of inexpensive transportation and a form of self-expression. We are convinced that if these are the reasons that a majority of motorcyclist ride, they are not going to stop riding because the cost of the bike has increased by less than a 1 percent. Motorcycles are still considerably less expensive than automobiles and light trucks. An increase of a hundred dollars or so in price would not normally be enough to persuade a rider to select an automobile or light truck over a motorcycle, especially considering that the average cost of a highway motorcycle in 2001 exceeded \$10,000. Many motorcyclists would argue that the reasons for riding cannot be met with an automobile, and small cost changes would not be enough to cause them to switch. This is highlighted by many owners of Harley-Davidson and BMW motorcycles. Both of these companies sell models that are as expensive, and in some cases more expensive, than some automobiles, yet they have a remarkable following of customers who are often willing to pay in excess of the manufacturers suggested retail price. Therefore, we do not believe that the cost of our regulations will cause motorcyclists to stop buying motorcycles and to start purchasing cars instead. For these same reasons we do not believe that these regulations will have a notable impact on national fuel consumption levels.

As for the ability of newly developed technology to make its way from motorcycles to automotive and other forms of transportation, we are unaware of any barriers that would preclude this from happening. Different technologies have always passed from one application to another

regardless of the technology or the application, whether it be computer technology being used for automobiles or a light-weight metal developed for racing motorcycle engines that is used in automotive engines. While our standards will require greater use of emission control technology, there is no reason that technology that is developed for motorcycle applications (especially technology that is not engine-related) cannot be expanded to other applications. In fact, some of the emission-control strategies that will be developed for highway motorcycles may ultimately be used for off-highway motorcycles, ATVs, snowmobiles, or garden tractors.

The major motorcycle manufacturers have dealt with regulation, whether it be safety or emissions, for many years and they know how important it is to reduce the amount resources they have to use to develop technologies, perform certification and durability testing, and perform paperwork for several different sets of emissions standards. The motorcycle manufacturers support the harmonization of the federal standards with the California standards for this very reason. The manufacturers also know that they have the technology to meet our standards and that in other parts of the world they may be faced with even more stringent standards.

Regarding ABATE of Cheyenne's comment, our rulemaking has been subject to free and full public access and comment. ABATE of Cheyenne does not suggest that we kept them from accessing the document, and, in fact, all of our supporting documents are easily available to the public.

Regarding the "End of life" legislation, we are not aware of any such actions being taken by any State or Federal governmental bodies. Our proposal only concerned highway motorcycles, and we proposed no provision which would prevent older motorcycles from being licensed. Further, we do not have any legal authority under the Clean Air Act to consider such actions.

Regarding enforcement of the proposed emission standards, police at the local, county and state levels have never been involved in the enforcement of federal motorcycle emission regulations. This function is carried out by our Office of Enforcement and Compliance Assurance. We did not propose to change the way we enforce the highway motorcycle emission standards, and these new regulations will in no way impact the duties of police at any level.

We proposed nor provisions relating to helmet use, injury damage reduction and health insurance benefits denial. Further, these areas lie well outside of our legal authority.

Whether an individual chooses to use a highway motorcycle for personal transportation, recreation, or some combination of the two has no bearing on the decisions we have made with respect to the regulation of their emissions.