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**NOISE EMISSION STANDARDS
FOR TRANSPORTATION VEHICLES**

**PROPOSED MOTORCYCLE
NOISE EMISSION REGULATIONS**

**DRAFT
ENVIRONMENTAL AND INFLATIONARY
IMPACT STATEMENT**

November 1977

**U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF NOISE ABATEMENT AND CONTROL
WASHINGTON, D.C. 20460**

EPA 550/9-77-202

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF NOISE ABATEMENT AND CONTROL

DRAFT
ENVIRONMENTAL AND INFLATIONARY IMPACT STATEMENT

for
PROPOSED MOTORCYCLE NOISE EMISSION REGULATIONS

November 1977

This document has been approved for general availability.
It does not constitute a standard, specification or regulation.

SUMMARY

- Agency: U.S. Environmental Protection Agency (EPA)/
Office of Noise Abatement and Control (ONAC).
- Action: Notice of Proposed Rulemaking (NPRM) to establish noise emission limits for newly manufactured street and off-road motorcycles and motorcycle replacement exhaust systems.
- Description:
1. Newly manufactured motorcycles will be required to meet increasingly restrictive sound emission requirements. For street motorcycles, a three-step standard down to 78 dB(A) effective in 1985 is proposed. The same schedule is proposed for small off-road motorcycles (170 cc and below). Large off-road motorcycles would be subject to a two-step standard down to 82 dB(A) effective in 1983. Moped-type street motorcycles would be regulated at 70 dB(A).
 2. Replacement exhaust systems intended for use on a regulated motorcycle must not cause any such motorcycle to exceed the applicable standard.
 3. Motorcycles and replacement exhaust systems must be built so as to not degrade above the standard for at least one year.
 4. Labeling and comprehensive enforcement requirements are also proposed.
- Impacts:
1. A 55 to 75% reduction in street motorcycle noise impact is expected.
 2. Off-road motorcycle noise area impact is anticipated to be reduced by 25 to 35%.
 3. Motorcycle purchase prices are expected to rise by an average of 7 to 10%.
 4. Some performance, weight and fuel economy penalties are predicted.
 5. Proposed lead times may strain smaller manufacturers and will be examined again in the final rule based on information received in the public docket.

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DRAFT
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PROPOSED MOTORCYCLE NOISE EMISSION REGULATIONS

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has issued proposed noise emission regulations for newly manufactured motorcycles and motorcycle replacement exhaust systems. These proposed regulations are intended to alleviate the problem of motorcycle noise not only in cities and on highways, but in off-road environments as well.

This draft Environmental and Inflationary Impact Statement (EIS-IIS) presents in summary form the benefits to be gained from the proposed motorcycle noise standards, and the economic implications of this action. Also presented are the principal regulatory options which were considered by EPA. The information contained in this document will provide an understanding of the issues involved with this proposed rulemaking, and of EPA's strategy in promoting a quieter, more livable environment for all Americans.

BACKGROUND DOCUMENT

In arriving at the proposed standards the Agency considered various regulatory options in the light of available quieting technology, potential health and welfare benefits, and the economic costs of compliance with each option. The regulatory decisions for the proposed rule were based on information gathered and analyzed by EPA and its contractors from manufacturers, published works and other sources. This information, including all information which is presented in this draft EIS-IIS, has been compiled and analyzed by EPA, and published in the form of a background document. This document, entitled "Background Document for Proposed Motorcycle Noise Emission Regulations," (EPA 550/9-77-203) may be obtained upon request from:

Mr. Charles Mooney
EPA Public Information Center (PM-215)
U.S. Environmental Protection Agency
Washington, D.C. 20460

For the sake of brevity and simplicity the information contained in this EIS-IIS is presented in summary form only. Persons wishing more detailed explanation and discussion of the facts and issues pertinent to this proposed motorcycle noise rulemaking are encouraged to refer to the background document.

The preamble and text of the proposed regulations and additional copies of this EIS-IIS can also be obtained from the above address.

PUBLIC COMMENT AND ADDITIONAL INFORMATION

Public comment is invited on this draft EIS-IIS and on the proposed motorcycle noise regulations. Comments should be addressed to:

Director, Standards and Regulations Division
Attention: Docket No. ONAC 77-10 (Motorcycles)
Office of Noise Abatement and Control (AW-471)
U.S. Environmental Protection Agency
Washington, D.C. 20460

All information received which is not identified as company proprietary in nature will be open for public inspection.

For further information related to the proposed regulations, please contact:

Mr. Scott Edwards
Program Manager--Motorcycles
Office of Noise Abatement and Control (AW-471)
U.S. Environmental Protection Agency
Washington, D.C. 20460

SUMMARY OF THE PROPOSED REGULATION

The following table presents the proposed noise emission standards and effective dates for street motorcycles and off-road motorcycles:

Proposed Noise Emission Standards

Street Motorcycles

<u>Effective Date</u>	<u>Sound Level (dB(A))</u>
January 1, 1980	83
January 1, 1982	80
January 1, 1985	78

Moped-Type Street Motorcycles

<u>Effective Date</u>	<u>Sound Level (dB(A))</u>
January 1, 1980	70

Off-Road Motorcycles
170 cc Displacement and Less

<u>Effective Date</u>	<u>Sound Level (dB(A))</u>
January 1, 1980	83
January 1, 1982	80
January 1, 1985	78

Off-Road Motorcycles
More than 170 cc Displacement

<u>Effective Date</u>	<u>Sound Level (dB(A))</u>
January 1, 1980	86
January 1, 1983	82

The regulatory standards refer to sound levels measured at 15 meters (49.2 ft) while the vehicle is accelerating, according to the measurement methodology prescribed in the proposed regulation.

The above standards also apply to motorcycle replacement exhaust systems. Any replacement system designed and marketed for Federally

regulated motorcycles will, when installed on a motorcycle for which it is intended, be required not to cause the motorcycle to exceed the above applicable sound level standard.

The above standards are required to be met by each product distributed in commerce. To insure compliance with such a not-to-exceed standard EPA expects motorcycles to be manufactured some two to three decibels below the standard.

To eliminate designs which may fail rapidly in use, the proposed regulations also require an acoustical assurance period. To comply with this requirement, manufacturers must design and build their products such that their sound control performance will not deteriorate to exceed the applicable standard for a specified period (AAP). For street motorcycles and street motorcycle replacement exhaust systems this period is one year or 6,000 kilometers (3730 mi); for off-road motorcycles and off-road motorcycle replacement exhaust systems this period is one year or 3,000 kilometers (1865 mi).

REGULATION OF MOTORCYCLE OPERATIONS

The proposed regulations would establish sound level limits for newly manufactured motorcycles and exhaust systems distributed in commerce. It is the responsibility of the manufacturer of the product to ensure that the standards are met at the time of sale and throughout the acoustical assurance period. The only Federal regulation applicable to the operator of a motorcycle is the prohibition against tampering with sound control devices.

The Noise Control Act, which gives EPA the authority to establish these motorcycle noise standards, specifically reserves all authority for regulation of the operation of motorcycles to state and local governments. In other words, it is EPA's responsibility to make sure that manufacturers sell products which meet prescribed sound level limits. Once a motorcycle passes to the customer, however, it is state and local responsibility to make sure that it is used properly and isn't tampered with. Accordingly, these proposed regulations do not include in-use motorcycle sound limits, time-of-day restrictions, or land-use requirements. Such in-use regulation, of course, is a necessary complement to these Federal standards if motorcycle noise is to be effectively controlled. EPA will be working with concerned states and localities to establish and enforce complementary in-use regulations. State and local governments will be encouraged to consider the following types of regulations: (a) Noise emission standards applicable to street motorcycle operation; (b) Stationary-test noise emission standards to detect tampering and exhaust system violations; (c) Inspection programs to ensure use of complying exhaust systems

on Federally regulated motorcycles; (d) Prohibition against using competition motorcycles in general recreational areas; (e) Operation permits or other land management systems to minimize impact of off-road motorcycle operation in residential and wilderness areas, etc.

HEALTH AND WELFARE

IMPACT OF MOTORCYCLE OPERATIONS

1. Street Motorcycles. Although street motorcycles account for less than two percent of total traffic mileage, the noise impact of new motorcycles, and especially of exhaust-modified motorcycles, constitutes a major noise problem. This problem is most evident in urban residential and suburban areas where motorcycles are not part of the greater traffic stream, and where noise from an individual motorcycle operation is a separately identifiable noise impact event. These noise intrusions interfere with normal activities and cause annoyance on the part of persons so impacted.

To examine the impact of street motorcycle noise on the public health and welfare, the Agency used a single-event activity interference analysis to give a picture of the annoyance caused by motorcycle noise. For the purposes of the analysis, two types of activity interferences were investigated as an index of this annoyance: numbers of outdoor speech interferences, and the numbers of sleep disturbances and awakenings occurring due to motorcycle noise. This analysis indicates that street motorcycles cause approximately 1.7 million outdoor noise impact events per day, and hundreds of thousands of indoor impacts.

In addition to examining street motorcycle noise in terms of single event impacts, the Agency also examined the contribution of motorcycles, both modified and unmodified, to overall traffic noise impact. This type of analysis is useful in measuring motorcycle noise as it compares with noise from the other transportation vehicles (such as trucks, buses

and automobiles) which occur in highly populated urban areas. Current unmodified motorcycles were not found to be a major contributor to overall traffic impact (traffic currently impacts almost 100 million people each day). As traffic vehicles get quieter in the future, however, unmodified motorcycles become a significant traffic source which would stand out without further sound reduction.

The Agency's analysis confirmed that a large part of the current street motorcycle noise impact is due to motorcycles with exhaust system modifications. Modifications include both tampering with quiet exhausts and ineffective replacement exhaust systems. Exhaust modifications of either type can cause a more-than-twenty decibel increase in a motorcycle's sound level. That reducing exhaust system modifications is essential to reducing the overall impact of motorcycle noise is illustrated by the fact that a reduction in the number of exhaust-modified motorcycles (now estimated to be almost 15% of the population nationwide) by one-half would accomplish the same reduction in impact as lowering new motorcycle sound levels by ten decibels. Although no accurate method of prediction exists, the Agency estimates that Federal replacement exhaust system regulations, combined with state and local in-use enforcement programs, can be expected to reduce the percentage of exhaust modifications to between one-half and one-fourth of their current numbers.

2. Off-Road Motorcycles. The Agency has also proposed noise emission regulations for pure off-road motorcycles. Concerned state and local government officials have reported that use of off-road motorcycles both in wilderness and near-residential areas is a significant noise problem. Not only are off-road motorcycles loud, they are used in areas

where any man-made motorized sound is unwanted (wilderness areas), or in areas where they disturb residents such as in backyards, vacant lots, along railroad tracks, etc. It is generally agreed that the main problem of off-road motorcycle noise is one of incompatible land use, and that reducing noise emission levels will only alleviate, not solve the problem. Although progress is being made in some areas, state and local officials report great difficulty in having proper in-use and land use restrictions established, and in properly enforcing them once established. These difficulties are exacerbated by the facts that off-road motorcycles are usually not licensed, that operators are often difficult to apprehend once observed in a violation, and that many jurisdictions cannot effectively exercise authority over juvenile offenders.

As with the case of street motorcycles, a large part of the total impact of off-road motorcycle noise is attributable to exhaust system modifications. It is estimated that almost 30% of all off-road motorcycles have modified exhausts. It is apparent that reducing these modifications is as important to reducing the impact of off-road motorcycle noise as it is for street motorcycles. Federal exhaust system regulations and in-use enforcement are expected to control the incidence of exhaust modifications to between one-half and one-quarter of their current levels.

The impact of off-road motorcycle noise is difficult to quantify in terms of the population impact criteria used in the street motorcycle analysis. In assessing the impact of off-road motorcycle noise, EPA used an analysis based on "detectability distance." In this analysis the distance at which the noise from off-road motorcycles can be detected in

typical off-road settings was calculated. This detectability distance was then combined with the estimated off-road mileage accumulated by these vehicles. With allowances made for multiple use of trails and other factors, it was estimated that over 33,000 square miles are impacted by off-road motorcycle noise each day. With reasonable assumptions about use patterns, this translates into one to two million people impacted daily.

3. Competition Motorcycles. In considering regulatory options for competition motorcycles, the Agency analyzed the health and welfare impacts associated with competition motorcycle noise from two standpoints: (a) As competition vehicles which contribute to noise disturbance from raceways; and (b) As vehicles which can be improperly used in off-road environments.

The noise impact of automobile and motorcycle raceways is an increasing problem as motorsports become more popular. Controlling raceway noise is a different problem than controlling motor vehicle noise, since raceways exist wholly within individual jurisdictions and can be required to meet local land-use or general environmental standards. Although exact statistics are not available, certain jurisdictions have reported raceway noise as a significant problem.

A more wide-spread problem appears to be the use of motorcycles intended for competition use in general off-road environments. Although more expensive than non competition off-road motorcycles, racing motorcycles offer increased performance (due in part to decreased silencing) and lighter weight. Whether used for practice or exclusively for recreational use, these motorcycles are appearing in great numbers in general off-road environments and are causing some significant noise disturbance, according to the state and local officials contacted by EPA.

REGULATORY OPTIONS

To reduce the array of possible motorcycle standards to a manageable few for analysis purposes, EPA chose several "study levels" for examination. The study levels ranged from current levels to the lowest levels that might be considered achievable over the next one or two decades. As will be seen, the lowest levels studied turned out to be more stringent than the level representative of "best available technology" as required by the Noise Control Act. The Agency, of course, was not bound to adopt any of the discrete steps listed below and could have chosen any intermediate level not specifically analyzed.

The regulatory alternatives considered by EPA during the development of this proposed rulemaking are as follows:

Street Motorcycles

- o Do not regulate. Leave source emission standards to concerned states and localities.
- o Eighty-three decibel ultimate standard.
- o Eighty decibel ultimate standard (83 dB(A) interim standard).
- o Seventy-eight decibel ultimate standard (83 dB(A) and 80 dB(A) interim standards).
- o Seventy-five decibel ultimate standard (83 dB(A), 80 dB(A), and 78 dB(A) interim standards).

Off-Road Motorcycles

- o Do not regulate. Rely instead on state and local new product standards, land use restriction, and in-use enforcement.

- o Eight-six decibel standard for large (over 170 cc) off-road motorcycles; standards for small (170 cc and under) off-road motorcycles the same as street motorcycles.
- o Eighty-three decibel standard for large off-road motorcycles; street standards for small off-road motorcycles.
- o Eighty decibel standard for large off-road motorcycles; street standards for small off-road motorcycles.
- o Street motorcycle standards for all off-road motorcycles.

Replacement Exhaust Systems

- o Do not regulate.
- o Establish noise standards.

Competition Motorcycles

- o Do not regulate.
- o Establish noise standards.

EPA evaluated these regulatory options by considering the quieting technology involved, the cost and economic impact, and the health and welfare benefits of each alternative. Since these regulations will set standards which will remain in effect for the foreseeable future, choosing from among the available regulatory options involves making public policy decisions which will have long range effects. In considering and arriving at these decisions the Agency must balance the short term economic consequences of noise control standards against their potential long term benefit to the public health and welfare.

IMPACTS OF ALTERNATIVE REGULATORY ACTIONS

The health and welfare and economic impacts associated with alternative regulatory levels considered for street motorcycles are summarized in Table 1.

Table 2 presents a summary of the health and welfare and economic impacts associated with the different study regulatory levels for off-road motorcycles.

It is apparent that although new vehicle sound level reductions accomplish some significant reduction in health and welfare impacts for both street and off-road motorcycles, the most substantial reductions will occur from controlling the numbers of exhaust-modified motorcycles.

The technological implications of the various regulatory levels studied are summarized in terms of the major model changes required for different motorcycle models to comply with the different standards. Major model changes, which require substantial redesign of engine/drive train components, include water cooling, switching to multi-cylinder designs (street motorcycles only), and conversion from 2-stroke to 4-stroke engines.

The economic impacts of the regulatory alternatives studied can be expressed by several different measures. Purchase prices of motorcycles are expected to increase as a result of the additional engineering design, development and production costs involved in applying sound reduction technology. Total annualized costs associated with quieting motorcycles are another measure of economic impact, and account for purchase price increases and increased operating and maintenance costs which would not otherwise be incurred by consumers in the absence of noise regulations.

Table 1

STREET MOTORCYCLES: SUMMARY OF IMPACTS

<u>Regulatory Level</u>	<u>Health and Welfare</u>	<u>Technology Major Model Changes Required***</u>	<u>Price Increase</u>	<u>Total Annualized Cost</u>
<u>dB(A)*</u>	<u>Reduction in Current Impact**</u>		<u>\$/vehicle (Fractional increase)</u>	<u>\$M/yr</u>
83	43%	None	\$ 16 (1%)	\$ 25
80	52%	some large displacement motorcycles	\$ 52 (4%)	\$100
78	56%	most motorcycles over 175 cc	\$140 (10%)	\$190
75	60%	all motorcycles over 100 cc	\$263 (18%)	\$245

*Test procedure proposed in the Notice of Proposed Rulemaking (NPRM).

**7% incidence of modified exhaust systems, reduced from current 12%. Current impact: 1.7 million outdoor impact events daily, 450 thousand indoor impact events.

***Use of liquid cooling or other major engine redesign.

Table 2

OFF-ROAD MOTORCYCLES: SUMMARY OF IMPACTS

<u>Regulatory Level</u>	<u>Health and Welfare</u>	<u>Technology Major Model Changes Required***</u>	<u>Price Increase</u>	<u>Total Annualized Cost</u>
<u>dB(A)*</u>	<u>Reduction of Current Impact**</u>		<u>\$/vehicle (Fractional increase)</u>	<u>\$M/yr</u>
86/78****	32%	0%	\$2 (1%)	\$ 5.0
83/78	35%	> 170cc: 10%	< 170cc: \$50 (6%) > 170cc: \$20 (2%)	\$ 8.5
80/78	39%	> 170cc: 100%	< 170cc: \$50 (6%) > 170cc: \$100 (9%)	\$15.0
78/78	42%	> 170cc: essentially infeasible	< 170cc: \$50 (6%) > 170cc: \$175 (14%)	\$21.0

*Test procedure proposed in the Notice of Proposed Rulemaking (NPRM).

**Off-road alone: 8% modifications (substantial reduction from current level).

***Percent of current models which would require two-stroke to four-stroke engine conversion or other major engine redesign.

****Two class standard: 86 dB(A) for large off-road motorcycles
78 dB(A) for small off-road motorcycles.

DISCUSSION OF THE PROPOSED REGULATION

The proposed regulation will establish noise emission standards for newly manufactured street and off-road motorcycles and for newly manufactured replacement exhaust systems designed for use on Federally regulated motorcycles. Competition motorcycles will be required to be labeled, but no noise emission standards are established. A one-year acoustical assurance period for new motorcycles and new replacement exhaust systems is also established.

1. Street Motorcycles. New vehicle regulations are considered by the Agency to be feasible and the most effective means of controlling the noise from newly manufactured street motorcycles. The decision to establish the 78 dB(A) regulatory level for street motorcycles was made by the Administrator after careful examination of the alternative regulatory levels investigated by the Agency. EPA fully appreciates the price, performance and styling impacts of the proposed standard, and the fact that the engineering development required to meet the 78 dB(A) level may make it difficult for some small manufacturers to remain in the U.S. market.

The more stringent 75 dB(A) standard for street motorcycles was not considered to be achievable using "best available technology" as defined in the Noise Control Act. Some manufacturers could undoubtedly produce certain models at this level, but the absence of demonstrated techniques to allow the manufacture of a full range of motorcycles eliminates this from consideration in EPA's motorcycle noise rule.

The 80 dB(A) standard was seriously considered as an option which would have most of the health and welfare benefits of the 78 dB(A) level,

with substantially fewer economic impacts. However, there is a clear showing that sound control technology is available to reach the proposed standard at a reasonable cost. Moreover, motorcycles are the loudest transportation vehicle type in the urban/suburban residential environment, since medium and heavy trucks are not frequently operated in these areas. Reducing street motorcycle sound emissions to the 78 dB(A) level will bring motorcycles closer to parity with sound levels of current automobiles and other vehicles operated in this environment.

2. Off-Road Motorcycles. To deal with the problem of noise from pure off-road motorcycles, several alternatives to new vehicle sound level standards (such as labeling only) were considered. Such options, however, would leave new product as well as in-use and land use regulation to states and localities. Although land use restrictions seem to be the most effective way to deal with off-road motorcycle noise, it is apparent that there is a need as well for new product regulations which will complement these in-use regulations.

The decision to establish a split-level classification scheme for off-road motorcycles was made on the basis of technology, cost and health and welfare considerations. The 78 dB(A) regulatory level was selected for small off-road motorcycles since the technology to reach this level is available at a reasonable cost and with minimum performance penalties. For large off-road motorcycles the Administrator considered regulatory levels stricter than the proposed 82 dB(A) standard. The performance penalties associated with stricter standards would, however, have a severe impact on the nature of the sport of off-road motorcycling as it is known

today, with limited additional health and welfare benefits. The Agency also considered standards less stringent than 82 dB(A) for large off-road motorcycles. A less restrictive level such as 86 dB(A) would have fewer economic impacts, with much of the health and welfare benefit of the proposed standard. However, with technology clearly available to achieve lower levels, and in consideration of the seriousness and the scope of the problem of off-road motorcycle noise, the Agency is persuaded that the Federal noise emission standard for large off-road motorcycles must be that level which minimizes the noise impact of these vehicles, and at the same time does not significantly alter the nature of the sport.

3. Competition Motorcycles. As discussed above, the Agency considered competition motorcycles both from the standpoint of raceway noise and improper use off-road. Reducing the sound levels of racing motorcycles is only one way to combat the problem of noise from motorcycle raceways. Federal regulations to reduce competition motorcycle sound levels were seriously considered, but these regulations would have to be diligently enforced at the raceway by raceway operators or local officials, since such vehicles are often completely disassembled between races. EPA has concluded that Federal standards for newly manufactured competition motorcycles are not the most effective method of dealing with motorcycle raceway noise problems.

EPA cannot solve the problem of competition motorcycles being improperly used in off-road areas without regulating competition motorcycles to the levels of off-road machines. Such a severe measure would essentially destroy serious off-road motorcycle competition, and would

not deter the few motorcyclists determined to use the highest performance vehicles in off-road areas. Clear labeling of competition motorcycles coupled with local enforcement appears to be the most effective Federal approach to this problem.

4. Moped-type Street Motorcycles. Moped-type motorcycles are currently sold in the U.S. in limited numbers but are experiencing rapid sales increases. Although current models are relatively quiet (most are less than 70 dB(A)), their expected increase in numbers, competitive trends to increase performance and the potential for significant incidence of owner modification argue for establishing a standard to prevent increased sound levels either from new products or from modified vehicles.

5. Lead Times. The proposed schedule of effective dates for these standards is based on the time required for rapid-but-orderly redesign of a major manufacturer's product line. Smaller manufacturers will likely need to initiate accelerated programs to comply with these dates. EPA is soliciting comment from manufacturers on the implications of these proposed lead times to determine if lead times, alone, might force any manufacturers out of the U.S. market that otherwise would be able to remain. If information submitted to the docket indicates that limited additional lead time may allow some firms to remain in the U.S. market which otherwise could not, the Agency might consider adjustments to the effective dates in the final rule.

6. Acoustical Assurance Period (AAP). The one year acoustical assurance period as required in the proposed regulation is established with the purpose of ensuring that the noise control componentry of the

regulated products are of good quality and design and will not fail rapidly with use. Data available to EPA indicate that the noise emissions of motorcycles do not increase appreciably with accumulated time and mileage. Accordingly, motorcycles which do not degrade during the initial period are expected to stay at or near the standard for their operational lifetime. Certain types of currently manufactured replacement mufflers, however, may not be able to satisfy the requirement. Otherwise, the acoustical assurance requirement is not expected to impose any additional costs.

HEALTH AND WELFARE BENEFITS

The proposed regulation will reduce individual new street motorcycle sound levels by an average of five to seven decibels by 1985. Sound levels of new off-road motorcycles of 170 cc displacement and less will be reduced by an average of approximately two to four decibels. Large off-road motorcycles (over 170 cc displacement) will experience sound level reductions of an average of seven to nine decibels.

At the 78 dB(A) regulatory level, the Agency estimates that outdoor speech interference impacts caused by motorcycle noise will be reduced from current levels by 55-75% (1 to 1.3 million outdoor events daily), and that the number of sleep disturbance impacts will fall by 50-65% (300 to 375 thousand). These figures assume that Federal regulation of replacement exhaust systems combined with state and local action will reduce the numbers of exhaust-modified motorcycles from the currently estimated twelve percent of the street motorcycle population (nationwide) to between three and seven percent.

The Agency also investigated the effect of lowered street motorcycle sound emissions on overall traffic noise levels and equivalent numbers of people impacted. This analysis concluded that, from current levels, with medium and heavy trucks regulated to 80 dB(A), reducing new motorcycle noise emissions (only) to the 78 dB(A) regulatory level will cause a relative reduction in overall noise impact of less than two percent (700 thousand equivalent noise impacts). However, a reduction of the incidence of exhaust modifications from the current twelve percent to three percent could achieve an additional 18% reduction in total equivalent noise impact.

With the advent of Federal noise regulations for the other major types of transportation vehicles, urban/suburban population noise impact from transportation vehicles is expected to be significantly lessened over the next several decades. From the viewpoint of this future noise environment, noise emission standards for street motorcycles are even more important than when viewed from current baseline levels. The Agency assessed the effect of lowered motorcycle sound levels in this future "regulated" noise environment, wherein the present vehicle population will have been replaced with quieter, Federally regulated vehicles (for analysis purposes, heavy and medium trucks are assumed to be regulated at 75 dB(A)). In this future situation, the impact of a 78 dB(A) street motorcycle standard would be a seven percent (2.4 million) reduction in total equivalent noise impacts. Reducing exhaust modifications to three percent would cause an additional 27% reduction.

EPA's analysis of the environmental impact of off-road motorcycle noise concluded that, at sound level standards of 82 dB(A) and 78 dB(A) for large and small off-road motorcycles, a 25-35% (80 to 115 thousand square miles) reduction in the total area impacted by off-road motorcycle noise is achieved. This figure assumes a 78 dB(A) regulatory level for dual purpose motorcycles, and a reduction in the proportion of exhaust system modifications to between eight and fifteen percent.

Although the current noise impact of moped-type street motorcycles is negligible, these regulations will prevent sound level increases and will establish a Federal prohibition against tampering with muffling devices.

OTHER ENVIRONMENTAL CONSIDERATIONS

1. Water Quality. No appreciable impacts on water quality are expected.

2. Air Quality. Noise regulations should not make it more difficult for manufacturers to comply with street motorcycle exhaust emission standards. In addition, noise regulations are not expected to significantly impact exhaust emissions from off-road motorcycles.

3. Raw Materials. In general, changes in the amount of raw materials used by motorcycle-related industries are not expected to be significant, although some slight increase in such use is foreseen.

4. Wildlife. Although there are differing opinions as to the significance of noise impact on animals, it is generally agreed that the impact is somewhat detrimental. Therefore, quieting motorcycles may have some beneficial effect on wildlife and domesticated animals, although the benefit can not be quantified.

5. Land Use. The regulation is expected to have no adverse effect on land use.

6. Solid Waste Disposal Requirements. No change in the amount of solid waste is expected. The scrapping of old motorcycles should not increase as a result of noise regulation. In fact, increased motorcycle prices and possible performance decrements should have, to a small degree, a reverse effect: users may be encouraged to retain old motorcycles longer.

IMPACT ON INFLATION AND OTHER ECONOMIC CONSIDERATIONS

Costs of applying sound reduction technology to meet the proposed regulatory levels and the associated increases in retail purchase prices vary according to the type and size of motorcycle models. Expected unit purchase price increases range from five percent for small displacement (under 100 cc) street motorcycles to thirteen percent for medium sized street motorcycles at the 78 dB(A) regulatory level. Unit prices of large off-road motorcycles are expected to increase an average of five percent at the 82 dB(A) level. Price increases of small off-road motorcycles range up to ten percent at the ultimate (78 dB(A)) level.

The total annualized costs of the proposed noise emission standards for street and off-road motorcycles are estimated to be approximately \$200 million. This figure, projected through the the year 1996, accounts for increases in purchase prices and the increased costs of operating and maintaining the vehicles due to noise control regulation.

Federal noise standards for replacement exhaust systems are expected to cause retail prices to rise to levels roughly comparable to those of stock replacement systems on quieted motorcycles, or approximately fifty percent more than the average price of current original equipment systems. Additionally, a significant shrinkage of the total market is forecast, since styling and performance advantages of many current exhaust systems will largely disappear.

A number of other potential economic impacts were assessed by EPA in determining the possible effects of noise control regulations on the

various segments of the motorcycle industry. These impacts, many of which cannot be easily quantified, are summarized as follows:

1. Impacts on Motorcycle Manufacturers. A net reduction in motorcycle demand is expected as a result of the proposed noise standards. Forecasting based on historical price-demand relationships indicates that the demand for street and off-road motorcycles combined would be about ten percent below that expected in the absence of noise regulations. Significant shifts in historic market shares due to Federal noise standards are not expected to occur among the major Japanese motorcycle manufacturers. Manufacturer profitability is likewise not expected to be impacted to any large extent. Cost increases due to noise control are expected to be largely passed on to consumers, and although higher retail prices will result in some lost sales, total industry sales in terms of both units and dollars are projected to significantly expand in the next decade.

The economic impact of the proposed 78 dB(A) standard on AMF/Harley-Davidson, the principal domestic manufacturer, is expected to be primarily manifested in terms of the ability of the firm to manufacture large displacement motorcycles which conform to EPA standards. For Harley-Davidson to achieve an 80 dB(A) standard it is apparent that, at the very least, major redesign of their current large engine types incorporating most known engine quieting techniques would be necessary. One attraction of Harley-Davidson motorcycles is an uniquely identifiable exhaust note which dominates other noise subources. Engine redesign could exact tonal characteristics and performance penalties that might, in themselves, impact demand for Harley/Davidson motorcycles. Further, a

regulatory level of 78 dB(A) is not considered achievable with modification to current Harley-Davidson engine designs. Complete redesigns, in addition to major exhaust and intake treatment, are likely to be necessary.

It is well accepted that Harley-Davidson motorcycles occupy an unique position in the U.S. motorcycle market. Harley-Davidson motorcycles have a devoted following and are expected to be relatively insensitive to small price rises. Consequently, if engine designs can be developed which meet the proposed standard and which are acceptable to potential purchasers, Harley-Davidson would be expected to be able to raise necessary capital from its large parent corporation, AMF, and to be able to sell the new designs at little sacrifice in profitability.

The other major North American motorcycle manufacturer of street motorcycles is Canada's Bombardier, Ltd., which manufactures high-performance dual purpose motorcycles based on off-road and competition models. The remaining street motorcycle manufacturers predominantly are European firms which export large displacement models on a limited scale to the United States, although several export a sizeable portion of their total production to this country. Most of these firms are considered capable of producing motorcycles at the 80 dB(A) regulatory level. However, it is questionable whether Bombardier or many of the European manufacturers would continue exporting street motorcycles to the United States with the establishment of the 78 dB(A) standard.

Japanese manufacturers of off-road motorcycles are not expected to experience serious difficulty in producing and marketing off-road motorcycles which comply with the proposed sound level standards. As discussed

above, the technology is well understood, although some weight and performance penalties may be unavoidable. Other manufacturers, however, are expected to experience considerable difficulty in maintaining their present market positions at the proposed levels, due to the considerable impacts to performance advantages of current models. The 82 dB(A) regulatory level for large off-road motorcycles is considered to be technically achievable for almost all current manufacturers without requiring conversion to four-stroke engines. However, the performance and cost impacts of this regulatory level may make it unprofitable for some of these firms to remain in the U.S. market.

Since no additional sound reduction is to be required, manufacturers of moped-type street motorcycles are not expected to be significantly impacted by these regulations.

2. Impact on Replacement Exhaust System Manufacturers. The proposed regulations will have a substantial impact on the replacement exhaust system industry. Of the more than one hundred firms currently in the market, most are small, low volume enterprises devoted exclusively to manufacturing motorcycle exhaust systems, with little or no capability for innovative product design or development. Such firms are not expected to be able to manufacture exhaust systems which comply with these regulations. Although some firms may continue to produce systems for motorcycles manufactured prior to Federal noise regulations, in the longer term most of these manufacturers will ultimately be forced to switch to alternate product lines, or go out of business.

Some ten to twenty replacement exhaust system manufacturers are expected to be able to produce systems which comply with Federal regulations. Although a net shrinkage in the replacement exhaust system market is forecast, these larger firms may actually experience increased sales volumes as other manufacturers exit from the market.

3. Impacts on Foreign Trade. Since motorcycles comprise substantially less than one percent of total U.S. foreign trade with Europe and North America, the impact of a Federal motorcycle noise regulation on the balance of trade with these areas is expected to be negligible. Motorcycles do, however, account for some fifteen percent of the approximately \$10 billion in annual imports from Japan. EPA does not, however, anticipate any substantial changes in net revenue to Japanese motorcycle manufacturers resulting from noise standards, and thus no appreciable change in the U.S.-Japanese balance of trade is forecast.

4. Impact on Exports. The small percentage of AMF/Harley-Davidson's domestic motorcycle production which is currently exported is not expected to change significantly as a result of noise regulations.

5. Impacts on Employment. If demand reduction forecasts based on historical relationships are applicable, eventual reductions in current U.S. motorcycle industry employment resulting from the proposed Federal noise standards could range between 3,000 and 5,000 positions from future employment in the absence of noise regulations. There is reason to believe, however, that this impact would be considerably less. Projected growth in the industry will more than compensate for any losses that do occur. However, if the standards or lead times established in the

final rule prevent Harley-Davidson from being able to remain in the market, their 3,000 motorcycle-related positions in Milwaukee, Wisconsin and York, Pennsylvania would be involved.

The aftermarket exhaust system industry is the only segment of the total industry expected to experience an actual net decline in employment.

6. Impacts on Gross National Product. The proposed regulation is not expected to have any consequential effect, either directly or indirectly, on the U.S. Gross National Product.

7. Impacts on Energy Consumption. Additional weight and other factors could negatively impact motorcycle fuel economy by some five to ten percent. A worst case impact would translate into a per vehicle increase in fuel consumption of three to four gallons per year. The superior carburetion required by air emission regulations, however, is expected to partially offset this loss.

RELATIONSHIP WITH OTHER FEDERAL, STATE AND LOCAL GOVERNMENT AGENCIES

1. Federal Government Agencies. The Department of the Interior (Bureau of Land Management) and the Department of Agriculture (U.S. Forest Service) will have responsibility for ensuring that motorcycles manufactured after January 1, 1979 which are operated on public lands and parks comply with EPA noise emission regulations.

2. State and Local Governments. Under subsection 6(b)(1) of the Noise Control Act, after the effective date of a Federal new product noise regulation, no state or political subdivision thereof may adopt or enforce any law or regulation which sets a limit of noise emissions from such new products, or components of such new products, which is not identical to the standard prescribed by the Federal regulation. Subsection 6(b)(1), however, provides that nothing in Section 6 precludes or denies the right of any state or political subdivision thereof to establish and enforce controls on environmental noise through the licensing, regulation or restriction of the use, operation, or movement of any product or combination of products.

The noise controls which are reserved to state and local authority by section 6(e)(2) include, but are not limited to, the following:

1. Controls on the manner of operation of products.
2. Controls on the time of day or night in which products may be operated.
3. Controls on the places in which products may be operated.
4. Controls on the number of products which may be operated together.

5. Controls on noise emissions from the property on which products are used.

6. Controls on the licensing of products.

7. Controls on environmental noise level.

EPA encourages state and local government authorities to adopt and enforce laws and ordinances which complement this Federal motorcycle noise rulemaking. The Agency is developing a model ordinance to assist state and local governments in using their authority to control the motorcycle noise problem within their respective jurisdictions.

PUBLIC PARTICIPATION

In developing the proposed motorcycle noise emission standards, EPA has conducted an intensive public participation program to gain the views of all interested parties. Representatives of every state government and numerous local governments had meetings with EPA or responded to a telephone program seeking their input. Similarly, environmental groups, motorcycle user and enthusiast groups and consumer advocacy groups were contacted. EPA carefully coordinated this effort with responsible officials in the Federal government, including: the U.S. Forest Service (Department of Agriculture); U.S. Bureau of Land Management (Department of Interior); Department of Transportation; National Bureau of Standards (Department of Commerce) and the Department of the Treasury.

EPA intends to continue this public participation program throughout the public comment and docket analysis periods in order to include all views and comments for the Agency's deliberations in the final rulemaking process. Addresses for submission of comments on this EIS-IIS or on the proposed rule, and contacts for additional information regarding the proposed rule are included on page 3 of this document.

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