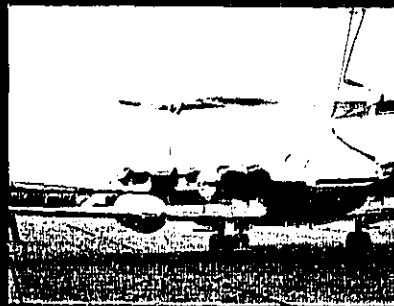




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Noise: A Challenge to Cities



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Like all pollution, noise is an unwanted by-product of our industrialized society. Unlike air and water pollution, noise pollution is tasteless, odorless, and invisible. Yet its effects on the cities and towns of America are no less pervasive than the effects of impure water or dirty air. Noise interferes with our health, our communication, our work, our rest and recreation, and our sleep.

Most of us have been disturbed by noise—a barking dog, a siren in the night, a garbage truck in the morning. Noise is all around us. And many people are subjected to almost constant levels of excessive noise in their homes or at work. Each of us contributes to the noise problem which is more acute where there are more of us—in our urban areas.

Nearly half the population is regularly exposed to levels of noise that interfere with normal activities, such as speaking, hearing, and sleeping. Noise is no longer just an urban problem. The suburbs near our urban centers are beginning to experience the same levels of traffic and industrial noise once confined to our cities and some higher levels as well; the noise of blaring stereos, clattering lawn mowers, low-flying aircraft. Even deep in the country's parks and forests where people go to escape the noise of the cities, quiet is often shattered by motorcycles, airplanes, snowmobiles, and chain saws.

An Age-Old Problem

Noise is not a new problem. In the first century B.C., Julius Caesar passed the first noise ordinance by banning chariots from the streets of Rome at night. In early America, wagons and horses clattering on cobblestone streets produced enough noise to annoy the citizens and move them to action. But it wasn't until the beginning of the In-



dustrial Revolution in this country that serious noise problems began to develop.

Since then, noise levels have been accelerating, and in the more than thirty years since World War II, the number of high-intensity noise sources has increased dramatically: more cars, trucks, motorcycles, and other vehicles on our highways than ever before; more office buildings and houses equipped with air conditioners; more industrial plants. Obviously, the noise problem is woven into the fabric of modern life. Although we enjoy a high standard of living, we pay for it in part with the noise our remarkable technological

society creates.

What Can We Do About Noise?

Most Americans do not adequately understand the noise problem. We are annoyed by noise, but we don't realize two important things about it. First, it has serious health consequences. Second, there are many things we can do to reduce noise. Some actions can give immediate relief; others will not produce tangible effects for years to come. Noise is a problem which most of us have seen as too big, too complex, and too remote from our daily lives to do very much about. It would seem that noise, like the



Noise Affects the Quality of Our Lives

The sounds we hear, whether or not they are considered noise, are measured in units called decibels. The human ear perceives a very wide range of sounds measured in decibels (see chart). Decibels are computed logarithmically; each step up the decibel scale represents a dramatic change in sound intensity or loudness. For instance, the amount of noise a dishwasher makes (70 decibels) sounds twice as loud as conversational speech (60 decibels), and four times as loud as the noise inside an average house (50 decibels). Decibels will be used to characterize the sound levels of various products throughout this supplement. By referring to the chart (on page 22) you can compare the decibel levels with the sound levels of familiar everyday sounds.

Hearing Loss

Noise loud enough to cause hearing loss is virtually everywhere today. Our jobs, our entertainment and recreation, and our neighborhoods and homes are filled with potentially harmful levels of noise. It is no wonder that 20 million or more Americans are estimated to be exposed daily to noise that is permanently damaging to their hearing.

Hearing loss usually occurs gradually. The first awareness of the damage usually begins with the loss of occasional words in general conversation and with difficulty understanding speech heard on the telephone. Unfortunately, this recognition comes too late to recover what is lost. By then, our ability to hear the high frequency sounds of, for example, a flute or piccolo or even the soft rustling of leaves will have been permanently diminished. As hearing damage continues, it can become a handicap for which there is no cure. Hearing aids do not restore noise-damaged hearing although they can be of limited help to

some people. The idea that hearing loss is solely the result of industrial noise is dangerously erroneous. Noise levels in many places and in some of the vehicles we use are well above the levels believed to cause hearing damage over prolonged periods.

Noise Interferes with Conversation

Losing the ability to speak at a normal level and be heard may be far more damaging than we realize. People who live in noisy places tend to adopt a lifestyle devoid of communication and social interaction. They stop talking, they change the content of the conversation, they talk only when absolutely necessary, and they frequently repeat themselves. These reactions are probably familiar to all of us.

Outdoors, a combination of continuous daytime noise (traffic, construction equipment, aircraft) interrupts speech and discourages conversation as well.

Intrusion at Work and at Home

Where excessive noise is present, the accuracy of work suffers. Errors in people's observations tend to increase, perception of time may be distorted, and greater effort is required to remain alert. Even when noise does not interfere with the work at hand, the quality of that work may suffer after the noise stops. Studies and reports from individuals also suggest that people who work in the midst of high noise levels during the day are more susceptible to frustration and aggravation after work.

Relaxing at home after a noisy workday may not be an easy thing to do. When the home itself is noisy, the tired, irritated worker may never be able to work out the day's accumulated stress during the course of the evening.

Industrial noise may have the

weather, is something everybody complains about but very few do anything about.

This special report will describe some of the ways in which people all across the country are seeking to find lasting solutions. Failure to begin now and continue vigorously to reduce noise is to consign future generations to a world even noisier than the one we inhabit now.

Charles L. Elkins

EPA director of noise programs

most pronounced effects on human performance and health. A coal industry study indicated that the intermittent noise of mining causes distraction which leads to poor work. Other studies have confirmed additional effects of exposure to noise including exhaustion, absent-mindedness, mental strain and absenteeism. In the words of Leonard Woodcock, former president of the United Auto Workers, "They (auto workers) find themselves unusually fatigued at the end of the day compared to their fellow workers who are not exposed to as much noise. They complain of headaches and inability to sleep and they suffer from anxiety. . . . Our members tell us that the continuous exposure to high levels of noise makes them tense, irritable, and upset."

Sleep

Noise can interrupt and prevent sleep. The effects of interrupted sleep may be no more serious than the feeling of fatigue the next morning. But repeated interruption of sleep over long periods of time, such as experienced by many persons living near highways and airports, may have more serious effects. Some experts believe that noise which is not loud enough to fully wake a sleeping person can have serious effects by interfering with dreaming. It has been established that long term interruption of a person's dreaming can cause serious mental and physical problems such as aches, pains, depressions, and even psychotic states.

The Body's Other Reactions

Growing evidence strongly suggests a link between noise and heart problems. The explanation? Noise causes stress and the body reacts with increased adrenaline, changes in heart rate, and elevated blood pressure. Noise, however, is only one

of several environmental causes of stress. For this reason, researchers cannot say with confidence that noise alone caused the heart and circulatory problems they have observed. What they can point to is a statistical relationship apparent in several field and laboratory studies.

The best studies come from industrial settings. Steelworkers and machine shop operators, laboring under stress of high noise levels, had a higher incidence of circulatory problems than did workers in quiet industries. A German study documented a higher rate of heart disease in noisy industries. In Sweden, several researchers noted more cases of high blood pressure among workers exposed to high levels of noise than among other workers.

Some laboratory tests produced observable physical changes. In one, rabbits exposed for ten minutes to the noise levels common to very noisy industries temporarily developed a much higher level of blood cholesterol than did unexposed

school children exposed to aircraft noise in school and at home had higher blood pressure than children in quieter areas. Because the danger of stress from noise is greater for those already suffering from heart disease, physicians frequently take measures to reduce the noise their patients are exposed to. For instance, a town in New Jersey moved a fire house siren away from the home of a boy with congenital heart disease when his doctor warned that the sound of the siren could cause the boy to have a fatal spasm. Another doctor ordered a silencing device for the phone of a recuperating heart patient. While the precise role of noise in causing or aggravating heart disease remains unclear, the illness is such a problem in our society that even a small increase in the percentage of heart problems caused by noise could prove debilitating to many thousands of Americans. "Although it has not been proven definitely that prolonged exposure to loud noise

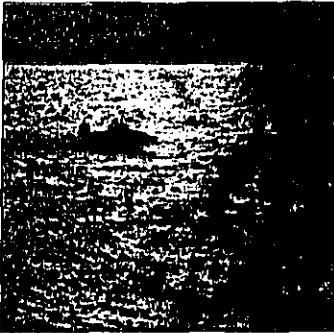


rabbits on the same diet. Similarly, a monkey subjected to a day-long tape recording of the normal street noises outside a hospital developed higher blood pressure and increased heart rate.

Among recent findings is the preliminary conclusion that grade

shortens the life span," says Jeffrey Goldstein, an Environmental Protection Agency (EPA) bioacoustical scientist, "it figures that if stress shortens the life span, and noise causes stress, noise can shorten the life span."

"To get ready for danger our bodies



pressure rises, heart rate and breathing speed, muscles tense, hormones are released into the bloodstream, and perspiration appears. These changes occur even during sleep.

The idea that people get used to noise is a myth. In studies dating

five-year study of two manufacturing firms in the United States found that workers in noisy plant areas showed greater numbers of diagnosed medical problems, including respiratory ailments, than did workers in quiet areas of the plants.

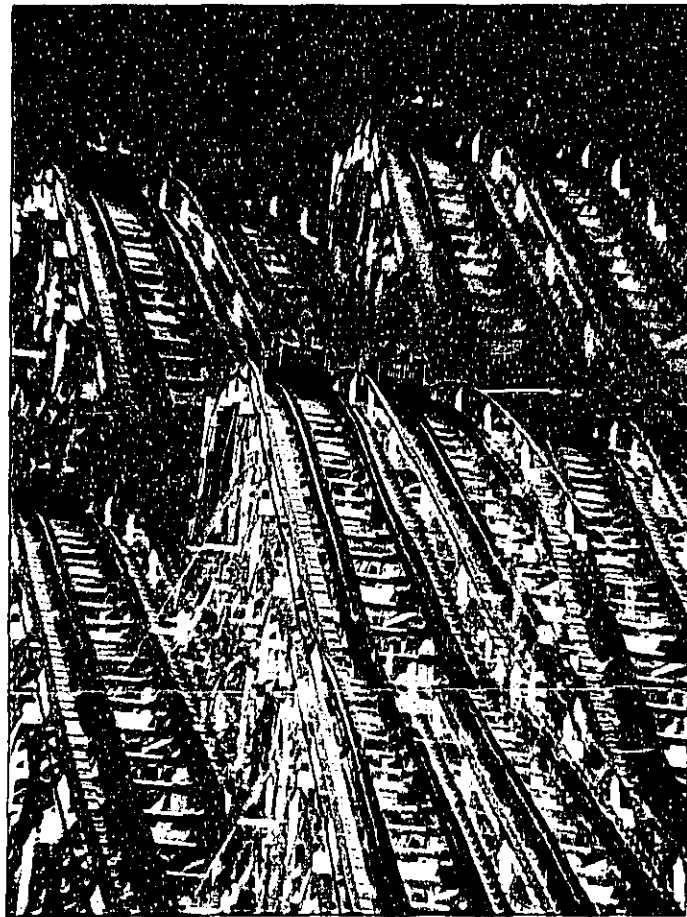
Newspaper files and police records report incidents that point to noise as a trigger of extreme behavior. A man shot one of two boys who refused to stop a disturbance outside his apartment. Sanitation workers have been assaulted, construction foremen threatened, and motorboat operators shot at—all because of the noise they were making. A study of two groups of people playing a game found that the subjects playing under noisier conditions perceived their fellow players as more disagreeable, disorganized, and threatening.

Several industrial studies indicate that noise can heighten social conflicts both at work and at home. And reports from individuals suggest that noise increases tensions between workers and their supervisors, resulting in additional grievances against the employer.

Although no one would say that noise by itself brings on mental illness, there is evidence that noise-related stress can aggravate existing emotional disorders. Research in the United States and England points to higher rates of admission to psychiatric hospitals among people living close to airports. And studies of several industries show that prolonged noise exposure may lead to a larger number of psychological problems among workers.

Noise and the Unborn

Even the womb offers no refuge from noise. While still in its mother's womb, the developing child is responsive to sounds in the mother's environment. Particularly loud noises have been shown to stimulate the fetus directly, causing changes in



make automatic and unconscious responses to sudden or loud sounds. Of course, most noise in our modern society does not mean danger but our bodies don't know that. They still react as if these sounds were a threat or a warning. In effect the body shifts gears. Blood

back to the 1930s, researchers noted that workers chronically exposed to noise develop marked digestive changes which were thought to lead to ulcers. Cases of ulcers in certain noisy industries have been found to be up to five times as numerous as what normally would be expected. A

the heart rate of the fetus.

For mothers who work in factories or other noisy places, it is possible that noise has a direct and negative effect on the fetus. High levels of noise may pose a threat to the hearing and other capacities of the unborn child. A Japanese study of more than 1,000 births produced evidence of a high proportion of low weight babies in noisy areas. These birth weights were under 5½ pounds, the World Health Organization's definition of prematurity. Low birth rates and noise also were associated with lower levels of certain hormones thought to affect fetal growth and to be a good indicator of protein production. The difference between the hormone levels of pregnant mothers in noisy versus quiet areas increased as birth approached.

Studies show that stress causes constriction of the uterine blood vessels that supply nutrients and oxygen to the developing baby. Additional links between noise and birth defects have been noted in a recent preliminary study of people living near a major airport. The abnormalities suggested included hare-lips, cleft palates, and defects in the spine.

Effects on Children

Adults long have worried about the effects of noise on children. In the early 1900s, "quiet zones" were established around many of the nation's schools to increase educational efficiency by reducing noises believed to interfere with children's learning and even to hamper their thinking.

Today, researchers looking into the consequences of bringing up children in this less than quiet world have discovered that learning difficulties are likely byproducts of the noisy schools, play areas, and homes in which our children grow up. Because they are just learning, children have more difficulty under-

standing language in the presence of noise than adults do. As a result, if children learn to speak and listen in a noisy environment, they may have great difficulty in developing such essential skills as distinguishing the sounds of speech. For example, against a background of noise, a child may confuse a sound of "v" in "very" with a "b" in "berry" and may not learn to tell them apart. Another symptom of this problem is the tendency to distort speech by dropping parts of words, especially their endings.

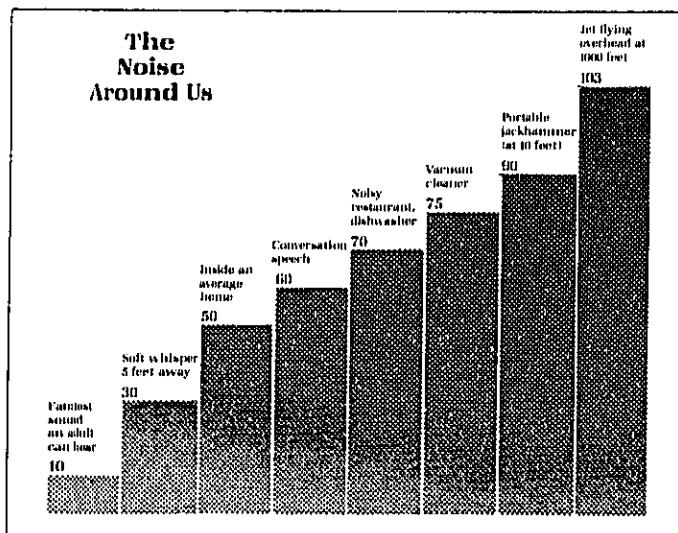
Reading ability also may be seriously impaired by noise. A study of reading scores of fifty-four youngsters in grades two through five indicated that noise levels in their four adjacent apartment buildings were detrimental to the children's reading ability. The influence of noise in the home was found to be more important than even the parents' educational background, the number of children in the family, and the grades the youngsters were in. The longer the children had lived in a noisy environment, the more pronounced the reading impairment.

Assuming a child arrives at school with language skills underdeveloped because of a noisy home, will he or she fare any better at school? In a school located next to an elevated railway, students whose classrooms faced the tracks did significantly worse on reading tests than did similar students whose classrooms were farther away. In Inglewood, Calif., the effects of aircraft noise on learning were so severe that several new schools had to be built. As a school official explained, the disruption of learning went beyond the time wasted waiting for noisy aircraft to pass over. Considerable time had to be spent after each flyover refocussing students' attention on what was being done before the interruption.

Noise Is All Around Us

Noise in modern offices often results in similar losses of concentration and is often at levels that can cause hearing impairment. The noise of typewriters, Xerox machines, telephones, and computers reaches nearly intolerable levels.

Even in the house, there are a



Cities Are Meeting the Noise Challenge



large number of noisy appliances—dishwashers, vacuum cleaners and garbage disposals. The combined din from household appliances may be literally deafening. The full extent of the noise problem is difficult to gauge. Only a relatively small percentage of people who studies show are bothered by noise actually register complaints about noise or otherwise act to control all the noise around them.

The noise problem in America is very real. And it is growing steadily worse. The EPA's Urban Noise Survey, conducted in 1977, disclosed that about half the U.S. population regularly is exposed to levels of noise that bother and annoy as well as interrupt normal activities. It is estimated that 15 million U.S. workers are exposed to noise potentially hazardous to their hearing. At least 100 million Americans are exposed to noise levels that may be detrimental to their health and welfare. Most serious, about one person in twenty—or more than 20 million people—have some degree of irreversible hearing loss. Something can and should be done about noise. The remainder of the report will present some ideas as to how cities and their citizens can seek solutions to the problems of noise.

Boulder, Colorado

Boulder, Col. has a noise ordinance because one man was disturbed by the increasing number of loud motor vehicles going up and down the street in front of his house. "Donald Billings is the kind of guy who likes to putter around in his yard and flower beds, and the noise really bothered him," says Jim Adams, environmental protection officer for Boulder. Billings decided to do something about the problem, formed a committee of citizens, and started working on an ordinance. His committee, composed of an acoustician, some professional engineers, and a few high school students, published a questionnaire in the local newspaper asking people which noise sources annoyed them most. The responses, in order, were motorcycles, traffic, barking dogs, and aircraft. The committee collected evidence for about a year and a half, including a survey on the health effects of noise. That survey revealed that noises over 70 decibels could result in up to a 20 percent loss of effectiveness in jobs that required concentration. "We have about 20,000 students at the University of Colorado, and they can't afford to lose 20 percent of their learning power," Adams says.

Billings contacted the city manager and city attorney and presented the committee's findings. An ordinance was drafted and the city council passed it in January, 1970.

The ordinance includes noise level standards for both vehicular and non-vehicular noise. The maximum acceptable level for vehicles under 10,000 pounds is 80 decibels at 25 feet distance and for vehicles over 10,000 pounds is 88 decibels at 25 feet.

When a violation occurs, the police department summons the offender either to appear in court or have his car repaired and inspected.

If the car then tests in compliance with the ordinance, the environmental protection officer can recommend dismissal to the court. The city is experiencing better than 85 percent dismissals and is writing an average of 800 summonses a year (almost 4,000 since 1972). Owners of vehicles not brought into compliance face up to \$300 in fines, depending on the level of violation. The louder the noise, the higher the fine. "We don't issue warnings, because we want the offending vehicle repaired," Adams says. "But the objective of our ordinance is to achieve quiet, not to collect fines. We call this the 'soft fuzz' approach," he says.

The Boulder ordinance provides that citizen complaints about noise be registered and a letter of warning be sent to the alleged violator. Anonymous complaints are not accepted. Non-vehicular noise is restricted according to zones. For instance, allowable levels between 7:00 A.M. and 11:00 P.M. are 55 decibels for residential areas, 65 decibels commercial and 80 decibels for industrial. Between the hours of 11:00 P.M. and 7:00 A.M. the levels are 50 decibels for residential, 60 decibels for commercial and 75 decibels for industrial. "We have answered more than 4,000 complaints of environmental noise, and have only had to issue six summonses because the problem was corrected," Adams says.

Noise enforcement is handled by Adams and two policemen. They monitor vehicular noise about twenty hours a week from a chase car equipped like a police car, except that it is green and white and is marked "Noise Control." The car has special noise monitoring equipment. The salaries of all three enforcement officers and the cost of their equipment come out of a \$36,000 budget.

Adams and his staff worked very closely with the EPA regional office in Denver, especially to amend and

improve the original noise ordinance in Boulder. "We drew a lot from the EPA model ordinance," Adams said.

After the ordinance was passed, Boulder launched a public education campaign. Adams and his staff taught classes from first grade all the way up to physics and environmental design courses at the University of Colorado. "We also have good relations with the local press and radio stations," Adams says. "We capitalized on that and developed several radio public service announcements which are still being broadcast," he says. They also developed a brochure which explained what the ordinance entailed, what noise levels were permitted, and what the fines were. "The local civic organizations have also been a big help," Adams says. "Every time we have the opportunity we speak to these groups."

Boulder's basic noise philosophy is to address noise problems as they arise. Adams is also involved in developmental reviews so he has an effect on land use and construction decisions. "We have good relations with our commercial neighbors," Adams says. "Several industries have cooperated voluntarily in noise control."

"The Boulder story illustrates the possibilities of citizen and community action to initiate noise control and enforce it," says Charles Elkins, director of noise programs for the EPA. "One person was able to make a difference."

New York City

"We're one of the cities that pioneered in noise abatement," according to Eithan C. Eldon, New York City commissioner of air resources. "The New York City noise control code was the first in the state, and our standards are stricter than those in many other areas of the country. Although we've experienced serious



cutbacks in manpower and fundings, we have a viable program and one we feel is successfully lowering noise levels," Eldon says.

The strategy of the city's forty-four-person Bureau of Noise Abatement is to identify sources of noises that affect the most people and then find technological solutions. One noise which affects about 4.5 million people every day comes from the subway. "We have many areas in the subway system where noise equals that of jet planes at takeoff," Eldon says. With the aid of the federal Urban Mass Transportation Administration, the New York Transit Authority has begun a ten-year program to lessen subway noise. "We are already beginning to see some progress," Eldon adds.

New York City tried an experiment a few years ago to see how serious the noise problem really was. The

Department of Air Resources sent a van around the city and tested the hearing of more than 2,000 people. The results showed a significant hearing loss in most people tested. Tests also were conducted on people before and after they rode the subway for half an hour and findings showed a temporary hearing loss.

The city regulates all kinds of construction equipment, including pavement breakers and air compressors. It specifies the types of equipment that can be used, and requires mufflers for most machines. "We work with the manufacturers and the operators of the equipment to determine technologically feasible solutions. We also build noise level standards into the law so that industry knows that in so many years its equipment has to be so many decibels quieter. This way you get everyone involved with the equipment into compliance," Eldon says.

An ambient noise zone law is being reviewed by the city council. The proposed law would establish one allowable day sound level for industrial areas and a much tougher allowable level in residential areas. A mixed-use zone would be somewhere between these two. Night levels would be even lower, a help in controlling noise from private garbage collectors.

Since early 1974, New York City has had a truck noise enforcement program, which Eldon believes is exceptionally effective. The state followed this example and passed a truck noise law last year, as did New Jersey, ensuring regional control over truck noise. "The citizens in our city don't have to be reminded that noise is a big problem, that it affects the quality of their lives. And, we're experiencing good cooperation because of that public awareness," Eldon says.

EPA noise program Director Elkins says, "Solutions to noise prob-

lems are technologically feasible and currently available. Even small communities can benefit from New York's experience. These methods work in communities of all sizes."

San Francisco

San Francisco has a noise task force comprised of the Police, the Public Works, and the Public Health departments. Public Works handles all construction noise during the day, Public Health handles fixed source noises, and the Police Department handles everything else including complaints about bars, discotheques, sporting events, garbage trucks, and motorcycles, says Joe Bodisco, San Francisco police officer and the community noise officer.

"I would say we handle 175 to 200 community noise complaints a month," Bodisco says. The Public Works and Public Health departments handle between forty and fifty complaints per month. Barking dogs used to account for an extra 350 complaints. That responsibility has been transferred to the animal control unit, which is run by the Police Department.

Each complaint results in both written and verbal warnings to the violator. The second complaint usu-

ally results in a \$25 fine, a third complaint \$50, and so on. A fifth complaint usually leads to misdemeanor charges. If the violator is a dog, the Society for Prevention of Cruelty to Animals might take the dog away.

Bodisco says, "The city people are wise to the effectiveness of our program, and keep the noise down. The majority of the people that have been cited for noise violations since 1976 are commuters." More than 90,000 vehicles cross the two bridges into San Francisco each day. Bodisco and his task force find most of the noise in areas adjoining the bridges.

EPA director of noise programs Elkins says, "A good noise program draws on the talents of many departments. The police, health, animal control, transportation and planning departments all have important roles to play."

Florida

"Our program is geared to local governments," says Jesse O. Borthwick, administrator for noise control for Florida. "Over the past five years we've helped more than 100 cities and counties to develop some types of noise program," he says.

The noise control section in the Department of Environmental Regula-

tions is staffed by two people, Borthwick and an assistant, and is limited by a very small budget. Yet in five years the office has trained more than 500 officials from more than 100 state and local agencies in various aspects of environmental noise or motor vehicle noise enforcement.

"If a city is interested in noise control we provide counseling and technical assistance. First we do an area-wide survey of the city to see what kinds of noise levels they have and where the problem areas are. On the basis of this survey we develop an ordinance or noise level standards to recommend to the city. We also provide training for police officers or other enforcement personnel. We train and certify these people and try to provide the necessary noise-monitoring equipment. After that we act as a consultant to the community until the program is well underway," Borthwick says. All of these services are provided to the community free of charge. "Noise is often a low priority," he says. "You almost have to pay people to get them involved. But once a community has been introduced to a noise program, the citizens usually become extremely interested, and become advocates for the program."

The department also has written a comprehensive plan to control motor vehicle noise. "Our first priority is to try to reduce noise at the source. Then we try to do something at the receiver end of the noise through land use planning. As a last resort we encourage building noise barriers along highways," he says. But Borthwick believes source control is the most effective method of controlling motor vehicle noise.

"We also have a law that went into effect in 1974 that sets standards for all new motor vehicles sold in the state. Every vehicle must meet specific standards," Borthwick's group provides the state Department of Motor Vehicles with a list of certified vehicles. "Before you can register a



new vehicle, you've got to be on that list," Borthwick says.

Florida also has a muffler certification program. All muffler and exhaust systems for motor vehicles sold in the state must be certified to meet certain noise standards.

"Regulations are the first step in handling the noise problem," Borthwick says. "The second step is having a strong enforcement program." The Florida Highway Patrol has provided a seven-man motor vehicle noise enforcement team. The enforcement team also provides instruction to other law enforcement officers in the state. "Our philosophy is that the problem is really a local one that can best be solved at the local level. So we've geared our whole program towards training and certifying local law enforcement officers," Borthwick says. There are currently more than 300 persons throughout Florida that have been trained and certified in a one-week school on motor vehicle noise enforcement. Each agency is required to provide monthly statistics on their enforcement actions.

Sixty-four percent of the respondents considered noise harmful to their health or well-being; 72 percent said they were aware of noise and sometimes bothered by it. Another 12 per cent said they were easily bothered by noise. Eighty-eight percent of the respondents believed that noise sources should be controlled by rules or laws. Of those, 65 percent felt local governments should handle the noise problem, 30 percent said state governments, and 21 percent said it should be the job of the federal government.

Borthwick's office is doing research to determine average noise levels throughout the state. More than 30,000 vehicles have been monitored by his office with help from several Florida universities which serve as consultants. Truck noise also is being monitored. "Since

1974, when our regulation went into effect, we have experienced a three-decibel reduction in noise from trucks. We also have experienced a reduction in the number of violations of the truck noise standards. About 20 percent of the trucks monitored at the start of our program were in violation of the law. That number is now less than 5 percent," Borthwick says.

Florida is just beginning to plan to prevent future noise problems. "A lot of the problems we have are a result of poor planning," Borthwick says. "When you develop a residential area under a flight pattern, or when you build a hospital next to an eight-lane interstate, you are creating noise problems." The Florida Noise Office has just provided host positions for two "older American" workers made available under Title IX of the Older Americans Act which is administered by the U.S. Department of Labor. The program provides employment for retired or unemployed persons over fifty-five years old. The noise office plans to utilize these people to help make decisions on where to put new industry and other heavy noise makers.

"People just don't think of noise as a problem," Borthwick says. "We've

lived with it for a long time and have grown to accept noise as something that goes along with modern technology. But we don't have to live with it; we can control noise and improve the quality of our lives."

"States can play a very helpful role in assisting local communities to get a noise control program started," says EPA noise programs Director Charles Elkins. "The local interest is there. Often all it takes is an experienced state noise official to tell community leaders what similar communities have been able to do."

Colorado Springs, Colorado

The biggest noise problem in Colorado Springs is caused by motor vehicles—cars, motorcycles, and trucks. "It's a difficult challenge. Our town is growing every day and so are noise levels," said Joe Zunic, administrator of the city's noise abatement program.

But Zunic believes he's making some headway. "We have three enforcement officers who issue summonses to violators and test the vehicles for compliance," Zunic said. "We issued 645 summonses last year," he said. To help reduce motorcycle noise, Zunic thinks he has a solution. "We are going to put an officer on a dirt bike toff-road



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motorcycle) clearly marked, with the officer in uniform, and we're going to send him into drainage ditches, railroad right-of-ways, and big lots. These are areas where we get a lot of complaints about motorcycles and minibikes," Zurich says.

The public seems to be appreciating Zurich's efforts. "People have a place to go now when they have a noise problem," Zurich says. "Even the city councilmen are calling us now and asking us to help solve problems. I believe we've become a permanent fixture in this city's government."

"The most successful noise programs today are those that identify the noise problems that really 'bug' the citizens and get those problems solved first," says Elkins, EPA noise programs director. "Once they show they can produce results, community leaders are willing to back programs when they take on more difficult noise problems."

El Segundo, California

El Segundo, Calif. has tried a dif-

ferent approach—purchasing only quiet equipment whenever possible. According to City Councilman Dick Nagel, "When quiet equipment is available, we specify noise levels, and if the horsepower and size of the engine are sufficient, we buy the quietest product available." (Standards for most vehicles average under 75 decibels, 25 feet from the vehicle, 5 feet above ground). "When we're shopping for a product, we ask the vendors who are bidding to indicate the noise level of their product. For instance, we recently contracted for quiet garbage trucks by adding noise qualifications to the bid specs and prohibiting trash pick up before 7:00 A.M. in residential areas," Nagel says. All seven bidders said they could meet the qualifications, so El Segundo chose the lowest bidder.

EPA noise programs Director Elkins says, "The best noise control is that which is designed into a product, not just added on as an afterthought. Communities can use their purchasing power to induce manufacturers to produce quieter products for all."

EPA is Helping

The U.S. Environmental Protection Agency is helping cities and states cope with noise problems. Through the Noise Control Act of 1972, Congress directed EPA "to promote an environment for all Americans free from noise that jeopardizes their health and welfare." It specified that EPA regulate new products in commerce that are "major sources of noise" and also work with state and local governments to create a quieter environment.

Although much of their recent activity has been directed toward regulation of new products, the EPA noise office has begun emphasizing state and local programs. Activity in noise control at the local level is increasing, with the number of local programs more than doubling in the last several years.

While the primary responsibility for noise control rests with local governments, EPA offers technical assistance to cities and communities and has started two anti-noise programs: the Quiet Communities Program (QCP) and Each Community Helps Others (ECHO).

Quiet Communities

The Quiet Communities Program is a pilot project intended to show how to apply the best available techniques to control noise at the local level. The emphasis is on action by the local government aided by technical assistance and support from EPA in an all-out effort to control noise.

Allentown, Penn. was chosen to be the first Quiet Community. The city has a wide variety of noise problems that are considered to be manageable; its citizens expressed a strong concern for reducing noise and the city government actively sought participation in the program. According to Allentown's QCP coordinator, Jeffrey Everett, "Allentown runs the gamut as far as noise prob-

tems are concerned: highway, industrial, and airport. Our primary problems are traffic-related or from domestic sources. That's where we get the most complaints." In the twelve-month period July 1, 1976 to June 30, 1977, there were 1,600 domestic complaints registered—everything from loud parties to barking dogs.

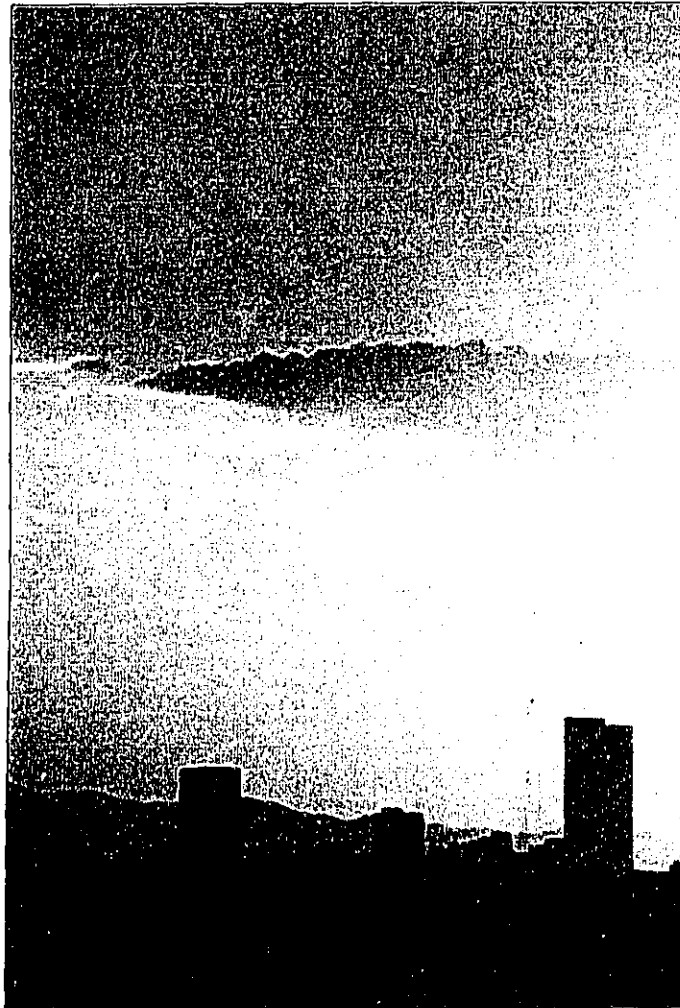
In the next two years several other communities will join the QCP each of which will be supported by EPA for two years. With technical assistance provided by EPA, each Quiet Community will develop and implement noise control strategies through local ordinances, legislation, public information and education. Emphasis will be on involving citizens, neighborhood groups, and social and civic organizations in reducing their noise problems.

Each Community Helps Others

Another program designed to assist communities in solving their noise problems is EPA's Each Community Helps Others (ECHO) program. Communities will share their experiences in noise control with other cities and towns. Community noise advisors, who have been selected by EPA, will assist certain communities in solving particular noise problems.

A noise advisor might help community residents locate the sources of noise, determine which noises are most annoying or harmful, and assist in reducing noise by helping draft legislation and ordinances. The program will not provide the community with a solution to every noise problem, but will help with individual problem solving.

Several cities and towns that have employed noise control experts endorse this concept as an important asset to communities trying to initiate or improve noise programs. "A well-trained noise advisor can be a tremendous help and can benefit



several communities through a sharing process," says Sally Parsons, president of the Littleton Col. City Council.

EPA has accepted applications from several communities with serious but manageable noise problems and has assigned a community noise advisor to each. Some of these communities are: Council Bluffs, Iowa; Norfolk; Charleston; Des Moines; Sioux Falls; Tempe, Ariz. and Anchorage. By the end of June, 1978, at least twenty more communities will have been matched with qualified noise advisors.

Standards and Regulations

Congress also assigned the EPA

the task of setting noise standards and regulations for new products sold in commerce. This part of the noise control effort attacks the major cause of noise problems—the basic noisiness of many products and types of equipment. This effort is a necessary complement to state and local efforts to manage the noise problem.

Federal action ensures uniformity of standards and provides local officials the means to solve their noise problems. The EPA encourages public participation in the rule making process and is also considering the costs to manufacturers.

Quieting the Noise Makers

Sources and Resources: Use What You Have

Noise control programs at all levels of government are notoriously underfunded and understaffed.

How can city governments with limited budgets locate the people and money to conduct a noise control program? The simplest and best way to bypass that problem is to use what you have.

Because noise-monitoring equipment is easy to operate, using it could become a function of the local police department. City officials can be responsible for administering and supervising the program.

A successful noise control program in a city with major noise problems was carried out in El Segundo, for less than \$25,000. The city tapped local resources and avoided hiring new staff by using appointed city officials to administer the program. In Florida, the legislature directed the state's Department of Environmental Regulations to establish standards for environmental noise. "But the legislature didn't give the department enough resources to enforce statewide standards," according to Jesse Borthwick, Florida administrator of noise control. So the department contracted with five universities in the state to assist in the areas of research and development. "Our goal was to help cities and towns develop their own local noise programs," he says. The universities provided technical assistance, expertise, labor (by graduate students), and a lot of equipment.

A noise control program should emphasize public education and support. An effective liaison to the public is the local intermediary group—civic, religious, business, and professional. The program should also provide outlets for interested citizens and groups to control noise.

Several resource programs are

available from federal agencies, and cities can take advantage of these programs. The EPA provides technical assistance for any city or community that is working to develop a noise control program. Tools are available such as model building codes, mechanical equipment codes, model enforcement procedures, equipment loans, model state noise legislation, and public education materials. Assistance often involves a federal official working directly with communities to train local officials or help them solve specific problems.

Workers are available from such programs as Comprehensive Employment and Training Act Programs (CETA) and programs for the aging. CETA programs are managed by Department of Labor approved prime sponsors to provide job training and employment opportunities for economically disadvantaged, unemployed, and under-employed people. Programs for the aging are administered by the Department of Labor and the Department of Health, Education and Welfare's Administration on Aging. These programs are designed to mobilize the millions of older Americans and retired people who have the time and talent to contribute to community and state noise programs. For example, additional people were hired for the ten EPA regional noise offices through the Senior Environmental Employment (SEE) program, one of several programs which are part of an interagency agreement between the EPA and the Administration on Aging. EPA has published a booklet describing these programs and indicating how local officials can obtain these resources for their noise control programs.

Although grant money is not available, EPA can guide communities through the necessary steps in developing a noise control program.

Noise is a constant source of complaints for government officials in large cities and small. But even where state, local, and regional noise programs are active, controlling noise has proven a difficult task to accomplish. It is safe to say that state and local efforts alone, though imperative, are not sufficient to solve the problem. Although noise is at heart a community problem, its ubiquitous nature makes it a significant national problem, meriting federal attention.

This report illustrates some of the ways state and local government officials have dealt with noise issues in their communities. Their strategy generally has been to govern by law the actual operation of a variety of noisy products, including construction equipment, motorcycles, automobiles, and trucks. Other everyday noise sources, as well as people and animals, also are the subject of such "in-use" noise laws in many communities in this country. But, as necessary as these operational controls are, they do not solve the basic cause of noise problems: the inherent noisiness of many products and types of equipment. Community noise abatement strategies generally attack the problem after it has been created.

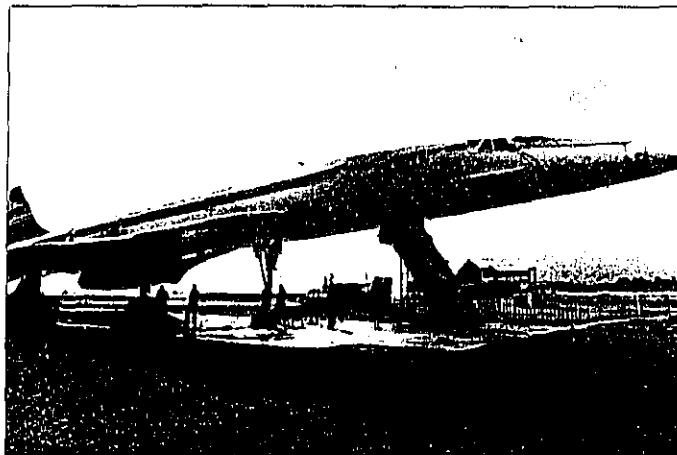
The Noise Control Act of 1972 directed the EPA to identify and regulate major noise sources most detrimental to the public's health and welfare. The EPA has authority to regulate only newly-manufactured products, but using it will ensure national uniformity of treatment and can be the most cost-effective way of reducing noise at the point of its manufacture. States and local governments retain responsibility for controlling the operation of noisy products.

Since 1972, the agency has identified nine products as major noise sources. They are: portable air compressors, medium and heavy trucks,

wheel and crawler tractors (used in construction), truck refrigeration units, garbage trucks, motorcycles, buses, power lawn mowers, pavement breakers (or jack hammers), and rock drills. Initial standards for air compressors and trucks become effective January 1, 1978. In late 1977, proposed regulations were issued for wheel and crawler tractors, garbage trucks, and buses. The public comment periods have ended and the EPA is reviewing the public docket in preparation for issuing final rules within the year. Regulation for motorcycles and their replacement mufflers were proposed March 15, 1978 and a final rule is expected in mid-1979, although motorcycle manufacturers would not be required to meet initial standards until 1980.

Several other products are being investigated by the EPA to see if their noise levels warrant regulation. They include automobiles and light trucks, tires, mufflers, snowmobiles, chain saws, air conditioners, guided mass transit, motorboats, and earth moving equipment. The agency also has undertaken several programs to examine the feasibility of noise labeling requirements for a variety of products, including air conditioners, vacuum cleaners, chain saws, mufflers, and snowmobiles.

Under a separate category of the Noise Control Act, EPA has set in-use standards for interstate railroads and motor carriers. These standards preempt state and local in-use as well as federal standards which must be met before products are sold. Congress chose to impose this preemption because of the interstate nature of these two classes of noise sources. Other sections of the act assign EPA limited regulatory responsibilities, such as recommending aviation noise standards to the Federal Aviation Administration (FAA). In general, the FAA has chosen not to implement EPA's proposals.



Aircraft and Airport Noise

Noise is an integral part of aviation and the busy airports that serve countless communities across the country. But every day, many people living near airports suffer excessive levels of noise which are not only annoying, but also may be harmful to their health and welfare.

As airports and air traffic continue to grow, the aviation noise problem is becoming more severe. No ideal solutions are known, particularly where airports are already surrounded by hundreds of thousands of people, but many communities are discovering they can work together with the airport proprietor and reduce noise.

The FAA has primary responsibility for aircraft noise and has established noise level standards for all newly-manufactured aircraft. But often the problem stems from such sources as the pattern of surrounding land uses. City officials and interested citizens can help by effecting noise abatement programs and land use programs. If the community and the airport join together to present a plan to the FAA, they can promote comprehensive noise abatement planning and control.

Citizens have had success in gaining a voice in the planning process for operation procedures at airports. For instance, in Minneapolis, the Metropolitan Aircraft Sound Abatement Council, a group composed of citizens, airport operators, and industry representatives, has dramatically reduced aviation noise around the Minneapolis-St. Paul airport. The EPA worked with airport authorities during the development of EPA's airport noise evaluation process (ANEP), a method for determining how much noise aircraft add to an area.

The ANEP involves determining the general noise in the area of the airport and estimating aviation noise in the same area. By comparing aviation noise to total noise, an effective airport noise abatement and land-use plan can be developed.

In El Segundo, citizens lobbied for quieter planes, and worked directly with the airport to bring about changes in operations, take-off, and landing. "We've had a fair amount of success with the problem," according to city Councilmember Dick Nagel. "We're putting pressure on industry and other groups to get quieter planes and we've had pretty good success. Most newly-pur-

chased planes are meeting quieter standards," Nagel said.

By changing flight patterns, a city ordinance in Tempe, Ariz. has significantly reduced noise that was disturbing the community. The Phoenix-Sky Harbor Airport is monitored continually by a noise abatement committee that includes several citizen representatives.

There are limits to aircraft noise abatement. Noise is a part of aviation. Airplanes are subject to physical laws which restrict the manner in which they fly. Safety is and must be the primary concern. But excessive noise caused by airplanes and airports can be reduced. Cooperative effort by the community and the airport to explore the possibilities for noise abatement is an important first step in conquering the problem.

Motorcycle Noise

Motorcycles are one of the greatest sources of citizen noise complaints in this country. For example, in a recent EPA urban noise survey, respondents cited automotive noise sources, particularly motorcycles, as the most annoying of all noise sources. A 1977 statewide survey conducted in Florida disclosed that noise from motorcycles and minibikes annoyed more people (41 percent) than any other noise source. (Next behind motorcycles were airplanes and helicopters cho-



son by 9 percent of the respondents.) In San Francisco, a 1967 newspaper survey found motorcycle noise to be the number one source of citizen annoyance.

Motorcycle noise affects almost everyone. People living in urban and suburban areas complain about the annoyance. Excessive noise from motorcycles is even polluting wilderness areas where appropriate use restrictions are not enforced. A large part of the problem comes from motorcycles that have been modified by their owners to make even more noise than they did when they came from the factory. Many bike owners are under the mistaken impression that they can achieve better performance by tampering with their mufflers. What is usually achieved is merely more noise—not just for the rider but for everyone else. Some motorcyclists even desire noisier bikes than can be bought new from retail stores. As a result, a large market has grown up over the years dealing in the manufacture and sale of noisier replacement mufflers considerably less effective than the originals.

Whose responsibility is it to solve the problem of motorcycle noise? The federal government's? The states? The cities? The answer is that the problem will be solved only through the combined efforts of both local and federal governments. Each level of government can achieve different results. State and local governments are ideally suited to enforcing in-use noise laws, many of which already have been adopted. The federal government is ideally suited to requiring manufacturers to reduce the noise of new motorcycles and replacement mufflers before they are sold.

The EPA proposed a regulation for motorcycles and replacement mufflers on March 15, 1978. The proposed rule addresses the problem of owner modification as well as the noise levels of several types of new motorcycles. The proposed standards will require street motorcycles and off-road motorcycles to be quieted from current levels by some 2-9 decibels over a six-year period. (See chart.) The standards also will apply to replacement muffler systems.

Mufflers intended for use on motorcycles built after 1980 would have to meet the new standards. However muffler manufacturers can continue to build noisy systems for older bikes that are not subject to the regulation and it is likely that some of these noisy systems will appear on 1980 and later models. To counter this, the proposed regulation would require mufflers intended for older, non-federally regulated bikes to be labeled as not meeting EPA standards. This label would enable police or other enforcement personnel to detect mufflers which are used on the wrong motorcycles.

Requiring quieter motorcycles and mufflers will not, by itself, solve the problem, of course. State and local governments will have to complement these proposals with active

Type of Motorcycle	Proposed Regulation			
	By 1980	Quieting Standards		By 1985
		By 1982	By 1983	
Street Motorcycles	83 Decibels	80 Decibels		78 Decibels
Small Off-Road Motorcycles and Minicycles	83 Decibels	80 Decibels		78 Decibels
Large Off-Road Motorcycles	86 Decibels		82 Decibels	
Mopeds	70 Decibels			

NOTE: These levels are measured according to a rapid acceleration test. Normal acceleration levels would be 2 to 3 decibels lower and cruise operation levels could be anywhere from 5 to 15 decibels lower.

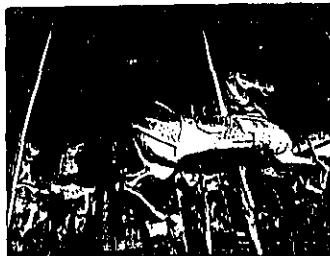
enforcement if they want to realize significant noise reduction. Tampering with quieted products is a violation of federal statute, but there is no federal police force to identify tamperers.

The EPA proposal contains several tools that are intended to make the state and local enforcement job a lot easier. Several labels are required to be placed on motorcycles and mufflers. One is a compliance label indicating that a motorcycle is in conformance with EPA standards. It also tells whether a motorcycle is a street, off-road, or competition bike. A label on the muffler states which individual models it can be used on or that it is intended for older motorcycles and should not be used on motorcycles manufactured after 1979. Finally the motorcycle will carry a label indicating that model's sound level on a simple stationary test (not the acceleration test that defines the standard). An enforcement officer can run this same test in a field with a sound level meter. If the sound level significantly exceeds the level on the label, he has objective evidence that tampering or severe deterioration has taken place.

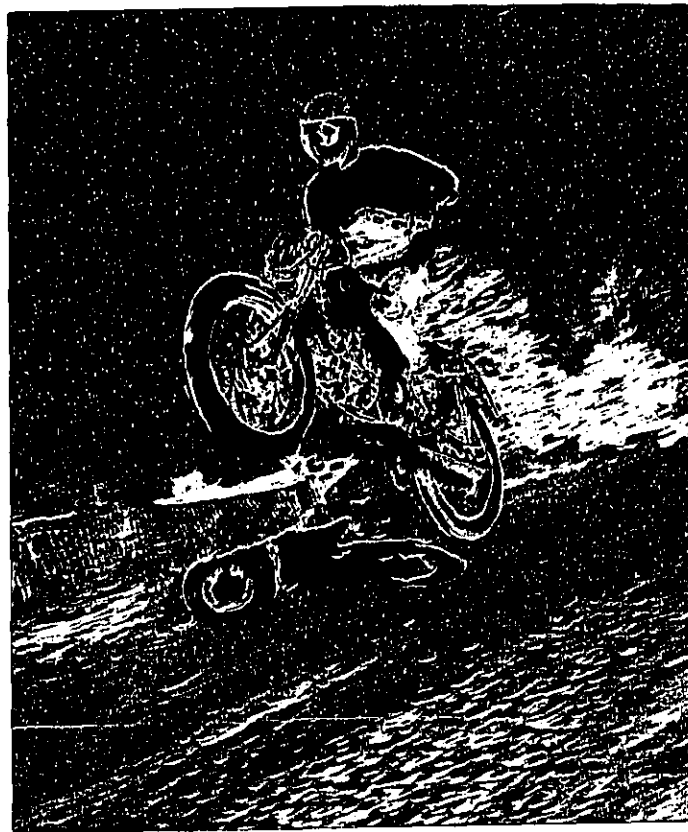
The proposed regulation will result in a significant reduction in motorcycle noise. In combination with state and local enforcement efforts, the regulation is expected to result in a 55-75 percent decrease in street motorcycle noise. Off-road motorcycle noise should be reduced by 25-33 percent. The health and welfare benefits to the community are obvious. Millions of Americans are exposed each day to motorcycle noise levels that can cause stress, tension, and other physiological and psychological reactions. Much of this excessive noise will be reduced by the proposed regulation and its enforcement.

Become Involved

The EPA is especially anxious to



be supported by interested state and local agencies. Whether you are for or against EPA regulatory and technical assistance programs, the agency wants to know what you think. Only through involvement of all interested parties can the EPA ful-



have all segments of the public participate in its noise control programs. There are many opportunities to be involved in the decision making process, since the agency is strongly committed to working with state and local officials and the American public in its rule-making.

Now is the time to help the EPA design a viable federal program to answer your needs. To be successful, the EPA noise control program must

fill its mandates to reduce the levels of environmental noise. For more information on how to become involved, write to your EPA Regional Noise Representative or to:

Noise Office
EPA (AW-470)
Washington, D.C. 20460

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