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Issues That Need to Be Considered
In Formulating Strategies to
Reduce Aviation Noise

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Before the
Subcommittee on Transportation, Aviation
and Materials
Committee on Science, Space and Technology
House of Representatives



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Mr. Chairman and Members of the Subcommittee:

We appreciate this opportunity to summarize our work on aircraft noise and to provide our observations on research being done to mitigate it. As you know, passage of the Airline Deregulation Act of 1978 led to an increase in the number of aircraft operations. Unfortunately, when operations increase, there is a corresponding increase in aircraft noise. Airport operators have reacted to community complaints about aircraft noise by adopting noise restrictions that may, in many instances, restrict access to airports. The increasing number of local restrictions has raised concerns about the effect that controlling noise has on air commerce.

Presently, the responsibilities for controlling aircraft noise are shared between airports and the Federal Aviation Administration (FAA). Airports are responsible for controlling aircraft noise and for mitigating its effects in the immediate airport vicinity. Through its aircraft certification regulations, FAA ensures that aircraft in operation do not exceed established noise levels. Furthermore, under the Aviation Safety and Noise Abatement Act of 1979, as amended, FAA assists airports in developing noise mitigation programs that are consistent with safe air traffic operations. State and local governments, while not directly responsible for controlling aircraft noise, are often consulted when airports develop noise reduction programs.

Our observations today are based on both our on-going and completed reviews. At the request of the Chairman of the Subcommittee on Aviation, House Committee on Public Works, we are currently reviewing the impact of local noise regulations on airport and airline operations. In addition, as requested by the Subcommittee for today's hearing, we are providing information on aircraft noise research. Our reports have identified airports' efforts to mitigate noise and examined the impact of noise created

by major airspace changes. Today, we will discuss the impact of not having sufficient federal guidance on how to address the aviation noise problem, the issues needing resolution before an adequate national aircraft noise policy can be is formulated, and FAA's research on aircraft noise. We will make three points:

- First, the Department of Transportation's (DOT) February 1990 National Transportation Policy does not provide sufficient guidance on how the different groups involved can work together to reduce aircraft noise. These groups include the federal government, aviation industry, state and local governments, and affected community groups. As a result, airports such as Los Angeles are planning to impose noise restrictions that the airlines vigorously oppose. Because guidance is insufficient, local airport access regulations vary from airport to airport across the country. The resulting "patchwork quilt" style of regulation has caused carriers to adjust schedules or reduce service.

- Second, in formulating a national aircraft noise policy, FAA and DOT need to resolve several key issues, chief among them being when to ban operations using noisier aircraft, what further actions to take in addition to banning such operations, and whether the federal government should be responsible for mitigating noise beyond the immediate vicinity of an airport.

- And, third, FAA's research on aircraft noise could be more effective if the agency established project priorities and linked these projects to specific objectives that contribute to reducing community exposure to aircraft noise. Such priorities and objectives are currently not linked.

We will now discuss these points in detail.

CONSEQUENCES OF INSUFFICIENT
FEDERAL GUIDANCE

Aircraft noise has become a significant national issue in several respects. On the one hand, noise lessens the quality of life for millions of people who live near airports. On the other hand, local noise restrictions have caused airlines to alter schedules or curtail service to many cities. Unresolved noise disputes threaten the continued growth of airports and their ability to serve the growing demands of air travellers. DOT's commitment to addressing these problems is contained in its National Transportation Policy. In our opinion, however, this policy's statement on aircraft noise is too general to resolve the core issues surrounding the aircraft noise problem. Similarly, FAA's recently issued "Strategic Plan", the agency's blueprint for meeting the aviation challenges of the 1990s, provides minimal information regarding FAA's plans to address aircraft noise issues. The plan states only that the agency will provide strong leadership in mitigating the adverse environmental impact--principally from noise--that aviation has on the public. FAA acknowledges that it needs to develop an action plan to implement this strategy.

The practical effect of insufficient guidance is that airports, airport operators, and state and local governments are confused over what to do. According to the transportation policy, the federal government should work with the aviation industry, state and local governments, and community groups to encourage the development of local tools--such as land use planning--to mitigate the noise problem. At the same time, the policy also states that the government should work with local communities and airport users to "deter local actions that unreasonably interfere with system efficiency or increase system costs." The difficulty is that no explanation is given about which local tools cause unreasonable interference or increase system costs or about how reasonableness should be measured.

The absence of clear direction has had an impact on airports. Airports continue to impose local noise restrictions, such as requiring the use of quieter aircraft during specific times of the day. Noise emissions standards are established in 14 C.F.R. part 36. These regulations prescribe noise emission standards for manufacturing and certificating aircraft. They, in effect, identify three stages of noise standards, with Stage 1 being the loudest and Stage 3 the quietest. For example, Boeing 707s (without engine modifications) flown in the 1960s and 1970s are Stage 1 aircraft. Today's Boeing 757s operated by many U.S. airlines meet Stage 3 noise standards. Access restrictions that are uncoordinated and airport-specific have created what many describe as a "patchwork quilt" of noise regulations.

At the request of the Chairman of the Subcommittee on Aviation, House Committee on Public Works, we are reviewing the impact of noise restrictions on airports and airlines. We testified on our preliminary analysis this morning.¹ Our work shows that 3 of 140 airports surveyed currently have local bans on the use of Stage 2 aircraft. Furthermore, by the year 2000, 77 airports are likely to ban Stage 2 operations.

Recent actions by the Los Angeles International Airport and by other Southern California airports--notably Ontario and Van Nuys--illustrate this trend of local restrictions. Los Angeles and Ontario are planning to require that all Stage 2 operations be phased out by the year 2000, and Van Nuys would be even more restrictive by imposing this requirement by the year 1998. On the one hand, the number of dwelling units within Los Angeles' noise-impacted area are estimated to have decreased from 100,000 in 1972 to 26,600 in 1989, and it may decrease to 15,000 after the total Stage 2 phaseout in 2000. On the other hand, prohibiting a wide

¹Aviation Noise: A National Policy Is Needed (GAO/T-RCED-90-112, Sept. 27, 1990).

cross-section of most airlines' fleets from operating at these airports will cause serious scheduling problems for airlines and cargo carriers. About 60 percent of the U.S. fleet is composed of Stage 2 aircraft. Existing noise restrictions have already caused some air carriers to reduce service to such locations as Orange County, San Francisco, and Boston.

Aircraft operators also are affected by inadequate federal guidance in other ways. Sometimes local noise restrictions have led to the inefficient use of aircraft. For example, airlines have used the quieter Boeing 757 (Stage 3) aircraft to meet noise restrictions when smaller Boeing 727 (Stage 2) aircraft would be better suited to traffic levels in the market. Similarly, when an evening flight using a Stage 2 aircraft is delayed by bad weather, locally imposed nighttime noise curfews sometimes cause the flight to be cancelled or redirected to an alternate airport not subject to a Stage 2 curfew. In addition, without federal guidance on a firm date on which a Stage 2 ban would take effect, aircraft owners--lessors in particular--are uncertain over when to make the financial commitments needed to either buy newer and quieter Stage 3 aircraft or modify their Stage 2 aircraft by installing new engines or devices to reduce the noise of existing engines. The latter technique is known as hushkitting.

While FAA and DOT express concern over the impact of local restrictions, such as those contemplated by Los Angeles, they have not provided guidance on critical issues such as when Stage 2 operations will be banned. In reaction to the proposal from the Los Angeles and Ontario airports, FAA has asked airport authorities to respond to a list of 15 questions, many requiring extensive economic analysis. For example, FAA is asking the authorities to quantify "the estimated direct, indirect, and induced economic impacts of each [noise reduction] alternative on the local and national level, in areas such as jobs, income, and earnings." DOT officials have told us that the Secretary is

considering several noise policy proposals, although no details are now available.

ISSUES IN ESTABLISHING AN AIRCRAFT NOISE POLICY

In our view, a national aircraft noise policy would provide the federal guidance needed. In our testimony today before the House Committee on Public Works, we discussed the need for such guidance. However, such a policy must balance the concerns of local communities, airports, and airlines. Therefore, before formulating this policy, three key points need to be resolved. These are (1) when to ban operations using noisier aircraft, (2) what further actions to take in addition to banning such operations, and (3) whether the federal government should be responsible for mitigating noise beyond the immediate vicinity of an airport.

How Soon Should Stage 2 Aircraft be Phased Out?

Federal regulations used in certificating aircraft do not restrict use of Stage 2 aircraft. However, after 1977, any new transport aircraft design submitted to FAA for certification must conform to more stringent Stage 3 noise standards. Some local airports have imposed their own regulations and banned all Stage 2 operations. With the potential increase in the number of airports requiring a greater percentage of Stage 3 operations, a key question is whether or not the federal government should establish a firm date after which all Stage 2 operations are banned.

According to airline and aircraft industry officials, phasing out Stage 2 aircraft before the year 2000 is not feasible. Most passenger airlines indicate that they plan to phase out Stage 2 aircraft voluntarily between the years 2000 and 2010. As part of our work for the House Committee on Public Works, we recently

completed a survey of 140 airports. Responses suggest that, in the absence of any federal action, a large proportion of the nation's largest airports are likely to prohibit the use of Stage 2 aircraft by the year 2000. In these circumstances, the airline officials we spoke with believe that a de facto Stage 2 ban will result because airlines will not be able to use Stage 2 aircraft at enough airports to operate such aircraft efficiently.

Therefore, if more airports implement these restrictions and no federal action is taken, Stage 2 aircraft would be effectively phased out by the year 2000. Federal policy, supported by regulation, could delay this phaseout by preventing airports from adopting new noise restrictions that would lead to a Stage 2 ban by the year 2000. However, once the federal government preempts local regulation, the potential liability for the noise and the financial risk this entails could become a federal responsibility. If the government chooses to preempt local regulation, then the policy issue is whether to (1) adopt the year 2000 as a reasonable date for phasing out Stage 2 aircraft or (2) prevent airports from adopting this or some earlier date.

What Other Actions Are Needed?

Two methods are available to reduce noise: noise abatement, such as a ban on Stage 2 aircraft, which reduces noise at the source; and noise mitigation strategies, which focus on lessening the impact of noise on the people who are exposed to it, such as by soundproofing homes and schools and improving land-use planning.

Noise abatement is more cost-effective and sometimes easier to implement than noise mitigation when an airport is located in an urban area where large numbers of people are affected by aircraft noise. With noise abatement, the cost per person is low for a large number of people. By contrast, the cost per person of reducing noise exposure--by, for example, soundproofing homes in a

large metropolitan area--is so large that it is not usually a viable alternative to noise abatement.³ Furthermore, noise mitigation is sometimes difficult to implement. As we found in our report on noise reduction activities at eight airports,⁴ making the use of land around airports more compatible with aircraft noise generally required cooperation from local communities and substantial funding. At Atlanta's Hartsfield International Airport, for example, land-use measures--primarily large-scale purchase of homes--have been implemented extensively.

There are limits to a noise abatement strategy. Aircraft manufacturers do not believe it is possible to make aircraft significantly quieter than the quietest aircraft being built today while also retaining fuel efficiency. Even these relatively quiet aircraft expose people who live close to the airport to a high level of noise. FAA estimates that 1.1 million people will continue to be exposed to excessive noise levels even if Stage 2 planes are banned.

Reducing aircraft noise to reasonable levels close to an airport therefore requires both noise abatement and noise mitigation measures. To ensure that land use is compatible with aircraft noise, including the establishment of local zoning regulations, long-range planning probably will continue to be needed--even if a Stage 2 ban is adopted.

³For example, it is estimated that about 1 million people living in 200,000 dwelling units reside in noise-affected areas around New York's La Guardia airport. Assuming that quieting engines costs about \$2 million per aircraft, it would cost about \$360 million dollars to convert the roughly 180 Stage 2 aircraft that fly daily into and out of La Guardia to Stage 3 standards. On the other hand, at about \$5,000 each, it would cost about \$1 billion to soundproof the impacted dwellings around La Guardia. And once the aircraft are converted, they would have obvious noise reduction benefits at the other airports that they serve.

⁴Aircraft Noise: Eight Airports' Efforts to Mitigate Noise (GAO/RCED-89-189, Sept. 14, 1989).

Should Planning for Land Use Compatibility
Be Available to More Communities?

A major issue to be resolved before establishing a national aircraft noise policy is whether areas located beyond the immediate airport vicinity should be included in federally sponsored noise mitigation efforts. An integral component of that issue is the way aircraft noise exposure is currently measured.

To implement the Aviation Safety and Noise Abatement Act, FAA developed the Part 150 program for airport operators to plan and be funded for making land use near their facilities compatible with airport operations. The program's purpose is to encourage airports to prepare noise exposure maps showing areas of land uses incompatible with high noise levels and to propose a program to reduce this incompatibility. After FAA accepts the proposed program, the airport is eligible for federal funding to implement projects such as land acquisition and soundproofing.

The measurement of noise exposure has been a contentious issue among FAA, airports, and local communities. Currently, noise exposure is quantified by the "day-night sound level" measure, a practice used by several federal agencies. This measure, Ldn, represents an energy-averaged sound level for a 24-hour period measured from midnight to midnight, with noise occurring from 10 p.m. to 7 a.m. counting ten times as much as noise at other times. This difference occurs because little background noise exists to mask aircraft noise during this period, and people also are more sensitive to noise when they are trying to sleep. Connecting locations on a map with the same Ldn levels produces lines called "noise contours," much like a weather map shows isotherm lines of the same temperature. An Ldn value of 65 decibels is the threshold above which FAA and other agencies consider land incompatible for residential use, including schools or hospitals. As a result, the area bound by the Ldn 65 noise contour is considered "noise-impacted" and is eligible for Part 150

assistance. From fiscal years 1982 through 1989, FAA obligated over \$720 million under the Part 150 program.

Expanding the definition of a noise-impacted area to, for example, the Ldn 60 contour, has operational and financial implications. Under this definition, airports and FAA would need to develop noise mitigation measures to account for the impact of aircraft noise in these outlying areas. For instance, the effect of new jet routes and altitudes would need to be assessed over a much larger geographical area. From a financial perspective, expanding Part 150 eligibility to areas outside of Ldn 65 will increase existing program costs. For example, while the number of people residing within Ldn 60 contours has not been established, the Environmental Protection Agency estimated in 1979 that 45 million people lived in Ldn 55-65 areas while 5 million lived in areas of Ldn 65 or greater.

FAA's Expanded East Coast Plan, for example, was implemented without addressing the effect of aircraft noise in areas beyond the immediate airport vicinity. This plan was implemented in response to air traffic delays at the New York City Metropolitan area's three major airports and was a major revision of air traffic control routes and flight procedures in the Eastern United States. In evaluating the plan, we found that many people living up to 40 miles away from the New York area airports complained repeatedly and bitterly about aircraft noise.⁵ In response, FAA said that little could be done for residents outside the Ldn 65 noise contour, and according to the Ldn measure, the average noise they were exposed to did not entitle them to federally funded relief.

⁵Aircraft Noise: Implementation of FAA's Expanded East Coast Plan (GAO/RCED-88-143, Aug. 5, 1988).

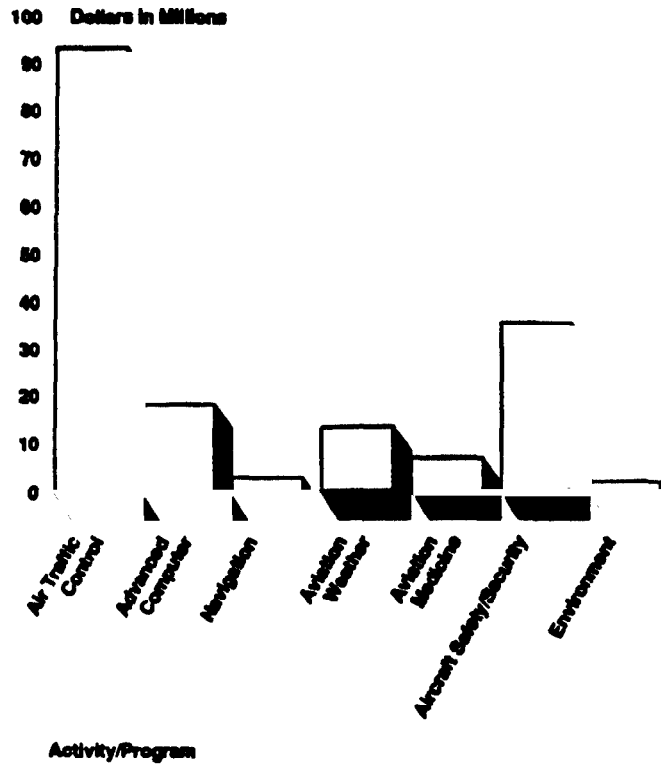
FAA'S RESEARCH EFFORTS IN MITIGATING AIRCRAFT NOISE

In view of the long-term nature of the aircraft noise problem, research can be a critical component in improving noise abatement and mitigation techniques. FAA has identified projects it would undertake if provided with additional funding. The effectiveness of future noise research could be enhanced by establishing project priorities and linking projects to specific objectives. Currently, FAA's noise projects are not subject to such priority setting.

Current Noise Research

FAA's fiscal year 1990 budget for research, engineering, and development (RE&D) is approximately \$170 million. About \$2 million of this amount is for environmental research, of which about \$1.5 million is committed to aircraft noise research. Figure 1 shows the relative funding levels in FAA's fiscal year 1990 RE&D budget for its research activities or programs. As can be seen in figure 1 below, funding for environmental research ranks the lowest among all activities and programs.

FIGURE 1: FISCAL YEAR 1990 RE&D APPROPRIATIONS BY ACTIVITY/PROGRAM

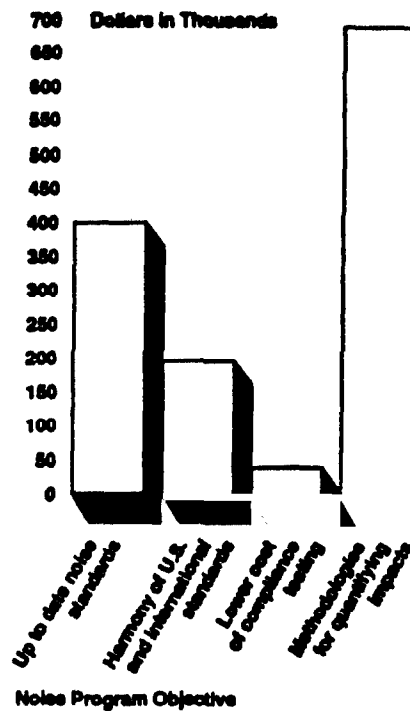


Note: Noise research is conducted under the Environment Program. In FY90, noise research and information processing shared with emissions research was funded at about \$ 1.5 million.

Source: FAA Fiscal Year 1991 Budget in Brief

FAA has several projects currently underway in aircraft noise research. Projects fall into four broad areas, according to FAA program officials responsible for managing aircraft noise mitigation research. These are (1) keeping noise standards up-to-date, (2) keeping U.S. and international noise certification standards in harmony, (3) lowering the cost of compliance testing, and (4) developing methodologies for quantifying the impact of aircraft noise. Current projects include, for example, studies on the impact of high altitude noise, the financial benefits of noise reduction at airports, and the adequacy of Ldn for determining the impact of aircraft noise on a community. As shown in figure 2 below, approximately half of the noise research funding in fiscal year 1990 was allocated for developing methodologies for quantifying the impact of noise.

FIGURE 2: FISCAL YEAR 1990 NOISE FUNDING DISTRIBUTION BY PROGRAM OBJECTIVE



Source: FAA Office of Environment

Future Research Plans

This Subcommittee has recommended increasing the funding of environmental projects--which includes aircraft noise--from about \$2 million in fiscal year 1990, to \$4.4 million in fiscal year 1991, and to \$5.4 million in fiscal year 1992. FAA program officials told us that they would undertake several initiatives if additional funding was provided. For instance, they would contribute funding to the National Aeronautics and Space Administration's (NASA) research in aircraft noise. While FAA focuses its research activities on the impact of aircraft noise on communities and how to minimize it, NASA's research aims to assess the feasibility of reducing noise by developing new aircraft technology, such as quieter engines and airframes with higher lift

capabilities. FAA officials believe that an annual \$1-million contribution will enhance FAA's ability to influence NASA's program priorities. Other research initiatives program officials identified included developing new training techniques for improving the way FAA staff deal with the public on noise issues and enhancing planning tools, such as a data base on airport noise mitigation measures.

Research Priorities

In April 1989 testimony before this Subcommittee on FAA's overall research and development program, we stressed the importance of setting project priorities. We said that FAA had not established priorities for its fiscal year 1990 research budget.⁶ Without priorities, projects could not be distinguished in importance. As a result, there was no assurance that scarce resources were effectively allocated.

In our opinion, the Subcommittee's proposal for increasing funding of environmental research by \$2.4 million in fiscal year 1991 highlights the need for FAA to develop a plan which (1) establishes project priorities and (2) links these projects to specific objectives that contribute to reducing community exposure to aircraft noise. With such a plan, the benefits of an airport noise mitigation data base, for example, could be weighed against other noise research activities, such as new air traffic control techniques to permit quieter flight profiles.

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In summary, reducing aircraft noise in the future will require federal guidance and a focused research program. In the short-

⁶FAA Research, Engineering, and Development Issues (GAO/T-RCED-89-21, Apr. 12, 1989).

term, a national aircraft noise policy must be formulated that balances community noise concerns with the air transportation system's responsiveness to the travelling public. In the long-term, FAA's noise research could be more effective if FAA established priorities among projects and linked these projects to specific objectives.

That concludes our statement, Mr. Chairman. We will be pleased to respond to any questions that you or members of the Subcommittee may have at this time.