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AIRPORT NOISE CONTROL— CAN COMMUNITIES LIVE WITHOUT IT? CAN AIRLINES LIVE WITH IT?

Joseph F. Vittek, Jr.*

The impact of aircraft noise on communities surrounding airports is a matter of local and national concern. After reviewing conflicting views concerning the proper solution to the noise problem, Mr. Vittek argues that application of present technology can drastically reduce the detrimental impact of aircraft noise, while striking a balance between the interests of the community and the air industry. To achieve this solution, Mr. Vittek recognizes the necessity of uniting the disciplines of law, science, politics and economics into a singular effort. Mr. Vittek presents a unique proposal for creating federal standards of allowable noise impact levels, or "airport noise classes." In addition, the author's proposal enables local communities to participate by selecting the class of noise of the particular airport; thus there is the flexibility and balance between local and national interests that is essential if present technology is to be utilized in a politically acceptable and economically feasible system of airport noise reduction.

AIRPORT noise control has become an issue of both local and national importance. Local communities object to the detrimental impact of present noise levels and fear future increases. Since these objections and fears have gained increased political support in many areas of the country, the development of new airports and the expansion of present facilities has been stopped. To alleviate these problems, noise control legislation has been introduced that would require major investments by the airlines or drastic curtailment of services. Thus the issue becomes: how are

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the concerns and interests of the community and air industry to be balanced?

The proper application of existing techniques can drastically reduce the impact of noise on the neighborhoods around airports over the next decade. This reduction heavily relies on technology, but, since the problem is multidimensional, the skills of the lawyer, politician and economist must also be utilized.

Unfortunately, these disciplines have difficulty communicating at a common level of understanding. Since any solution relying solely on one discipline is bound to be less than optimum in the eyes of the others, and thus be less than optimum for society as a whole, it is imperative that a dialogue be opened. Each area must have a basic understanding of the tools available to the others so that the best over-all solution can be constructed.

I. TECHNOLOGY

A. Noise and Its Measurement

Stated simply, noise is an unpleasant sound; it consists both of a physical phenomenon (sound) and a subjective judgment (unpleasantness). The "noise impact" is the sum of the effects of the noise on the surrounding community.¹

The production of the noise can be considered as the result of three processes: (i) Generation—the physical activity producing the sound at its source; (ii) Transmission—the passage of the sound from source to receiver; and (iii) Reception/Reaction—the psycho-physical process by which the receiver recognizes the sound and subjectively classifies it as noise. Accordingly, noise can be reduced by lessening or eliminating any one or a combination of these processes.

¹ The measurement of noise is a highly technical area and even experts disagree with respect to how it should be done. To save the reader from the often confusing world of decibels, sound pressure levels and the like, all noise relationships are given in terms of the qualitative subject response expected—i.e., one noise seems "one-half as loud" or "twice as loud" as another to the average listener. For the basis of the conversions from quantitative technical measures to qualitative subjective ones, see Stevens: *The Measurement of Loudness*. 27 J. ACOUSTICAL SOC. AM. 815 (1955).

For a general description of the various measurements and measuring techniques, see *Serendipity, Inc., A Study of the Magnitude of Transportation Noise Generation and Potential Abatement*, VOL. II—MEASUREMENT CRITERION NOV. 1971 (Dept. Transp. Rep. OST-ONA-71-1).

Since noise is both a physical and emotional phenomenon, it must be measured in those terms. Noise measurement must consider both the physical intensity of the sound and the particular characteristics of the sound that may make it annoying, such as pitch or duration.

Measurement of noise impact, on the other hand, is based not only on the quality of the sounds, but also on the number of noises, the time of day and the activity with which they interfere. To date, attempts to quantify the impact from factors such as fear, change in land use and the like have been unsuccessful.

B. Techniques of Noise Reduction

1. Reduction at the Source.

The jet engine is the prime generator of modern aircraft sound. The majority of this sound is produced by either the interaction of the high-speed jet exhaust gases with the relatively still air through which the plane passes, or by the compressor blades inside the engine. The interaction of the exhaust gases with the still air is characterized by the roar at takeoff, while the noise from the compressor blades is most noticed as a high-pitch "whine" during landings. Effective noise reduction must control both sources.

2. Hardware Changes.

Exhaust sound is primarily a function of the speed of the gases. Early attempts to reduce this sound through the use of nozzles and suppressors slowed the exhaust and thus lowered the over-all noise level. These early attempts, however, also raised the pitch of the sound into a range that is more sensitive to the ear. Consequently, there was little reduction in annoyance.²

The most successful approach to lessening exhaust noise in recent years is through the use of the "high-bypass" engine³ in which a certain amount of air passes through the engines without being combined with fuel and ignited. The ratio of this "bypassed" air to that used in the combination process is called the "bypass ratio" and for engines designed in the 1950's and 1960's is typically one or two to one. In the "high-bypass" engine, this ratio is increased to

² See R. Russell and J. Kester, *Aircraft Noise, Its Source and Reduction*. February 1971 (Society of Automotive Engineers' Paper 710308).

³ This high bypass engine is being introduced on the Boeing 747, the Douglas DC10 and the Lockheed L1011.

six or ten to one resulting in more air passing through the engine but at lower exhaust velocity. Since exhaust speed is reduced, exhaust sound is less in the new engines than from an engine of equal power using 1960 technology. Thus, the larger "wide-body" jets are quieter than the smaller B707 or DC-8 class planes currently in general service.⁴

Presently, Hamilton Standard Division of United Aircraft Corporation is designing an engine with a bypass ratio of twenty-five or thirty to one. This type of engine could be operational in the late 1970's and would significantly reduce exhaust sounds.⁵

There are also techniques for reducing the compressor sound of an engine, which is produced by the interaction of the air stream in the engine with the rotor blades and vanes of the compressor. The effect is similar to that used in sirens. Significant noise reduction can result from varying the location and number of these components and the turning speed.⁶ This technology was used in the high-bypass engine of the 747 and resulted not only in lower sound levels, but also in a less annoying, lower-pitched sound.

Although technology has produced quieter engines for aircraft presently entering service and promises further noise reduction in the future, the bulk of the existing fleet consists of jets designed without these improvements. Some of these aircraft are ten years old or older and will be retired from major airline service as more jumbo jets are purchased. However, a large number of planes in the fleet have many useful years of service remaining.⁷ To force retirement before the older aircraft have paid for themselves, would represent major economic waste when the industry can least afford major refinancing and re-equipment programs.

An alternative to early retirement of these older airplanes is a program that would re-equip the present fleets with the new technology engines. Because of their large size, however, the engines used on the wide-body class of aircraft could not be installed in

⁴ See note 2 *supra*.

⁵ See Rosen, *An Engine for Quiet STOL Propulsion*, AERONAUTICS AND ASTRONAUTICS, Dec. 1971.

⁶ See R. Russell & J. Kester, *Aircraft Noise, Its Source and Reduction*, Feb. 1971 (Society of Automotive Engineers' Paper 710308).

⁷ Scheduled carriers are expected to have 533 narrow-bodied four engine jets remaining in their fleets in 1975, and 428 in 1980. See Judge, *Noise—The Worst Has Already Come*, AIRLINE MANAGEMENT, March, 1972.

present aircraft without major structural changes. A better solution would be to design an engine that employed the new techniques but was also compatible with present aircraft structures. Unfortunately, it would be four to five years before a new engine could be certified as safe by the Federal Aviation Administration. By that time, more of the existing planes would be close to retirement by the trunk carriers. Although older planes may fly many years after their retirement from mainline passenger service, either as freighters, charters or primary equipment for smaller carriers, the use of these aircraft at the major airports where the most serious noise problems exist may drastically decrease. Therefore, re-engining would serve little purpose.

A second approach would be to redesign the fan assemblies of present engines to reduce the "whine." This approach would do little to reduce exhaust noise, however, and again might require time delays for recertification of the engine.

Another technique is treating the engine housing and mounts with sound-proofing material. The National Aeronautics and Space Administration has sponsored several programs to study this approach and apparently substantial noise reductions are possible. It is not clear, however, whether the costs of this sound-proofing would justify the effort or whether the resulting sound levels would sufficiently reduce community annoyance, particularly in the immediate vicinity of the airport.⁸

3. Operational Changes.

The major operational change that reduces aircraft noise is a power cutback. Although the pilots opposed this procedure in the early 1960's because of safety considerations, power cutbacks over densely populated areas are standard today, unless the pilot considers it unsafe because of adverse conditions.⁹

The power cutback, however, reduces the plane's rate of climb. In addition to adding to operational costs, this technique spreads a lower noise over a larger area. At full power, the plane would make more noise close to the airport but would have climbed high enough not to affect outlying areas. With the cutback, there is some

⁸ The cost to the airlines for such a program has been established to be between \$800 million and \$2.5 billion. *Id.* at 19.

⁹ See J. Powers & T. Ball, *Noise Reduction Operational Procedures*, Feb. 1971 (Society of Automotive Engineers' Paper 710307).

relief close to the airport but areas that did not previously have a problem are exposed to higher noise levels. In effect, the noise burden has not been lessened, but has shifted to a larger segment of the community.

4. *Reduction of Transmission.*

There are two ways of reducing sound by affecting its transmission. The first is by putting more distance between the source and the listener and letting natural dissipation decrease the sound level. The second is by blocking the transmission through sound-proofing techniques.

Distance: The energy of sound falls off proportionately to the square of the distance between the source and the listener. For example, if the distance is doubled, the energy decreases by one-fourth, and if the distance is tripled, the energy is decreased by one-ninth. Nonetheless, a person perceives that the sound level has merely been halved when the energy has actually been decreased to one-tenth its prior level.¹⁰ Thus, a distance increase of more than a factor of three will generally halve the sound (even though wind direction, the nature of the terrain and atmospheric conditions may vary this effect). Since air does not transmit the more annoying high-pitched tones as readily as lower ones, the annoyance may decrease at a more rapid rate than the actual sound level.¹¹

Land acquisition is the most successful way to increase the distance between the aircraft and the listener. Ideally the airport should buy enough land to allow the airplanes using the facilities to reach an altitude that will allow most of the noise to be dissipated before the aircraft crosses the airport boundary. Although this technique has been used for new airports in open areas (e.g., Montreal's new airport has a land area of over 40,000 acres), it is prohibitively expensive for older airports in developed areas.¹² Moreover, the taking of large tracts of land in existing communities

¹⁰ See Stevens, *The Measurement of Loudness*, 27 J. ACOUSTICAL SOC. AM. 815 (1955).

¹¹ See C. Buell, *Variability of Sound Propagation Prediction Due to Atmospheric Variability*, Jan. 1968 (National Aeronautics and Space Administration Report CR-61187).

¹² E.g., the cost of the Los Angeles Airport for the purchase of property subjected to high noise levels has been estimated to be \$1.6 billion. Lindsey, *Jet Noise Dooming Homes Near Los Angeles Airport*, New York Times, July 21, 1971, at 1, col. 4.

might actually increase the "noise" impact since the required condemnations may split a community, uproot families and in general change the nature of the area.

In addition to land acquisition, changes in the flight path of the plane approaching and departing the airport will also lessen sound levels.¹³ By routing the planes over water, undeveloped land or industrial areas, the distances to nearby houses is increased. Unfortunately, this technique depends on the availability of these alternatives. At many of the older airports the runways were constructed before noise problems were considered, so even if there is water or vacant land nearby, it may not be operationally possible to route planes over it because of runway alignments.

Steeper "climb-outs" may be a helpful alternative in some circumstances by enabling the aircraft to reach higher altitudes before it crosses inhabited areas. This possibility requires more power for longer periods, however, and is in direct contrast with the power cutback procedures previously described.¹⁴ In addition, the use of steeper climb-outs is most effective when there is a noise buffer zone between the airport runway and the community.¹⁵

Similar to the climb-out procedure, steeper landing approaches also increase the altitude over nearby inhabitants. Moreover, this technique requires less power than normal landing approaches; thus there is a double noise benefit. By using this technique, the pilot descends on the steeper angle at a faster rate of descent than on the standard approach. At a short distance from the runway, the pilot slows his descent and adopts the standard approach angle for which the plane has been designed. NASA experiments have shown that this method of landing is feasible, but further instrumentation and landing aids would be needed both on board the plane and on the ground before this technique would be safe enough for commercial use under all conditions. The increased rate of descent and the transition maneuver greatly amplify the dangers from pilot error

¹³ See R. Broun and J. Miller, *Land Use Strategies for Aircraft Noise Alleviation*, Feb. 1971 (Society of Automotive Engineers' Paper 710316).

¹⁴ See note 9 *supra*.

¹⁵ Northwest Airlines has used this procedure since jets were introduced into its fleet. The additional fuel consumption is estimated to cost over \$1 million annually. Judge, *Noise—The Worst Has Already Come*, *AIRLINE MANAGEMENT*, March 1972.

In September 1972 all airlines adopted this procedure whenever possible. *Aviation Daily*, Sept. 11, 1972 at 43.

or equipment failure during the crucial seconds prior to landing.¹⁶

Soundproofing: Depending on construction techniques and whether windows are open or closed, the sound levels inside an average home may seem one-fourth to one-eighth less than the outside levels. Through the installation of storm windows and insulation materials, the apparent sound level may be halved again. However, even the resulting noise level may be intolerable when the resident is attempting to sleep or concentrate. A direct jet overflight would still seem four times louder than what are considered acceptable indoor noise levels.

In new buildings, various acoustic treatments, designs and materials can be used to further improve the sound dampening, but the cost would be appreciable. It would add about ten per cent to the building costs (plus an additional ten per cent for air conditioning since the windows would have to be sealed)¹⁷ to reduce noise levels by another half.

Although these techniques could be justified for industrial or commercial buildings since access to an airport could be a valuable asset that would offset the cost increase, it is doubtful whether these techniques would be sensible for residences both because of the costs and because they would not lessen the noise in outdoor areas around the house.

5. Reduction of Reception / Reaction.

Once the sound has been transmitted, there is little that can be done to reduce it. Ear plugs or acoustic earmuffs, which could also be considered as devices that block transmission, might be used in industrial areas to protect workers but would hardly find widespread acceptance in commercial or residential settings.

The use of background music or constant noise levels has also been shown to reduce the awareness of single noise events.¹⁸ These techniques might be useful in situations in which the peak noise was not excessively above the general background level. By raising the

¹⁶ See H. Quigley, R. Innis & E. Fry, *Flight Investigation of Methods for Implementing Noise-Abatement Landing Approaches*, Oct. 1968 at 377 (National Aeronautics and Space Administration Report SP-189).

¹⁷ See ARDE, Inc., *A Study of the Optimum Use of Land Exposed to Aircraft Landing and Takeoff Noise*, March 1966 (National Aeronautics and Space Administration Report CR-140).

¹⁸ See Robinson, *Toward a Unified System of Noise Assessment*. 14 J. SOUND VIBRATION 279 (1971).

background levels, the peaks stand out less and consequently are less distracting. This technique would be worthless, however, when the increased background level would itself interfere with speech or other activities taking place.

Reaction: Tests through the years have shown that the annoyance attributable to sound is created by more factors than just volume and pitch. These additional factors are difficult to quantify or predict, but may be the most important considerations that are subconsciously weighed when a subjective decision is made whether a sound is "noisy." Thus, anything to de-emphasize these factors will help reduce the negative reaction to the sound of aircraft.

Frequency and Time of Flights: Tests have shown that one flight per minute is more annoying than one flight per hour, or a flight in the middle of the night is more annoying than one in the afternoon. In addition, the number of complaints increase the longer the time an approach or departure path is used. When the flight path is changed the complaints rapidly decrease only to start up along the new route. Accordingly, various operational techniques have been utilized to reduce the number of complaints.

The oldest procedure is the preferential runway system.¹⁹ Within the various weather and traffic constraints, the airport assigns priorities to various runways by considering the usage of the affected land. During the day a runway might be used that routed flights over homes rather than schools or industry. At night, the preference would be reversed. These systems are designed to cause the least impact to the over-all area, although a given community might still have a substantial noise problem.

Recently, experiments have been conducted with a rotating preference system. The noise is spread over all areas rather than being concentrated in the area of the least impact.²⁰ Every few hours, the aircraft are routed over a new area to prevent noise levels from reaching the saturation point. While the first area returns to normal and before the second community gets too upset, a change is made to a third. At this juncture, however, it is difficult to appraise the effectiveness of this technique in reducing long-term community annoyance.

¹⁹ New York Times. May 12, 1960, at 29.

²⁰ See J. O. Powers & T. Ball, *Noise Reduction Operational Procedures*, Feb. 1971 (Society of Automotive Engineers' Paper 710307).

Fear: Fear is one of the most underrated causes of annoyance.²¹ Carefully conducted tests have shown that an initial reaction of fear is common when a person hears an aircraft approaching. Often this fear ends when the plane passes, but a certain indignation may remain that can develop into anger, frustration, calls to airport authorities and the like.

Fear can best be attacked through education. Local programs could be arranged to show how aircraft and their systems operate. Reliability and safety should also be stressed. If a community believes a system of lighted posts near their homes would warn aircraft of their presence, then they should be installed even if they actually do little to improve safety. In short, fear should not be underestimated or treated lightly.

Injustice: Many people argue that the airport is important to the economic growth and prestige of a community and that noise is a necessary side-effect that must be tolerated. But a direct set-off of benefits cannot be made. Only the traveller or shipper who uses the air service or the person employed who might not otherwise have a job directly benefit. The less tangible benefits of a better economy are spread throughout the area.

In contrast, the major dis-benefits of noise, as well as pollution, street congestion and the like, are highly concentrated in close proximity to the airport. A large number of persons who live in this area neither travel nor are employed in the air industry and therefore participate only in the ill-defined secondary benefits that generally accrue to the public. Thus it is reasonable for them to feel that the disparity between their real burdens and intangible benefits should not be tolerated for the general public good.

Therefore, the grossly inequitable distribution of burdens and benefits must be attacked if the community is to accept an airport.²² One method that is finding some success in the courts is the granting of easements through inverse condemnation proceedings: giving money awards for the right to make noise. Another method of giving tangible benefits to the area would be for the airlines and airport to show preference for local residents when hiring. Airlines

²¹ See generally *Tracor, Inc., Community Reaction to Airport Noise*, July, 1971 (National Aeronautics and Space Administration Report CR-1761).

²² See R. Simpson, *Summary and Recommendations, NASA/MIT Workshop on Short Haul Air Transport*, Oct. 1971 at 65 (Massachusetts Institute of Technology, Flight Transportation Laboratory Report R71-4).

could periodically offer trips on a low-cost seat-available basis to people in high-noise areas. Many airports have incorporated recreational areas into their planning that could improve the neighborhood. While none of these techniques actually lessen the sound, the persons who must listen to the noise are offered some compensation.

Distrust: Although the original controversy may be because of noise, it is often replaced by a general distrust and antagonism toward the airport operator because of broken promises, unilateral action affecting the community without consultation or warning or other acts that the community has interpreted as deliberate deception. Unpublished plans, reports or studies somehow leak out. Pay raises are granted to airport officials in the midst of a dispute. Consequently, every act of the airport operator is viewed skeptically, and even the most thoughtful plans are challenged and become political issues.

Since federal law now requires a hearing on environmental impact before federal funds for airport development can be expended,²³ the confrontations between operator and community will occur more often. If these confrontations are emotionally charged with large anti-airport turnouts, the chances of the airport getting the funds it needs are nil.

The only approach that can possibly succeed is for the airport to announce its intentions well in advance, openly fund studies by consulting and planning groups, make their reports public and get members of the local community to help in the evaluation and planning.²⁴

Even when these efforts at conciliation and cooperation have been attempted and the local community and airport authority have come to an agreeable plan, nevertheless national conservation groups have intervened to block the project.²⁵ This potential inter-

²³ Airport and Airway Development Act of 1970 § 16(d), 49 U.S.C. 1716(d) (1970) states: "(d) Hearings (i) No airport development project involving the location of an airport, an airport runway, or a runway extension may be approved by the Secretary of Transportation unless the public agency sponsoring the project certifies to the Secretary that there has been afforded the opportunity for public hearings for the purpose of considering the economic, social and environmental effects of the airport location and its consistency with the goals and objectives of such urban planning as has been carried out by the community."

²⁴ For case histories of noise problems at several major airports, see G. Lantner, *Community Opposition to Airport Development*, Jan. 1972 (Massachusetts Institute of Technology, Department of Civil Engineering Report R72-1).

²⁵ See the case studies for the new Miami and Palmdale airports. *Id.* at 45, 80.

ference by various groups or persons is a risk that must be taken, for without honesty, publicity and community involvement, there will be no progress.

II. POLITICAL SOLUTIONS

There is a class of solutions that does not directly involve the airport operator, the airlines or the aircraft and lie outside the scope of technology. These are the processes of the local governments that compare the rights of the citizens near the airport to the over-all economic benefit that accrues from air service to the area. Depending on the location of the airport, the problems may involve several independent jurisdictions that must work together to effect an area-wide solution.²⁶ The tools of the governmental process are the police powers to protect the general health and welfare of the citizenry coupled with techniques of land use and transportation planning.

A. Alternate Services

To accomplish any long-term solution to the noise problem, other alternative solutions should be considered. For example, a decision could be made to either stop or limit air service and replace it with other modes of transportation, such as improved rail (including advanced air-cushion devices) or highways.²⁷ This type of planning, however, creates several problems.

First, neither rail nor highway transportation is free from noise. Airports create "islands of noise" in their immediate vicinity with little noise impact on other areas. On the other hand, highways and tracked vehicles create "alleys of noise" along their entire length. Where there are existing rights-of-way, the effect from this noise has probably been discounted over the years. But, when new rights-of-way are needed either to install new services or improve present service (i.e., by straightening curves, etc.), new noise impact areas would be created. In addition, for distances over 100 miles the land

²⁶ It has been estimated that on a clear day one can see 1300 separate political jurisdictions from the top of the Empire State Building. A. SCHRIEVER and W. SEIFERT, *AIR TRANSPORTATION 1975 AND BEYOND: A SYSTEMS APPROACH* 5 (1968).

²⁷ For an example of this multi-modal planning, see UNITED STATES DEPARTMENT OF TRANSPORTATION: *RECOMMENDATIONS FOR NORTHEAST CORRIDOR TRANSPORTATION* (1971).

area sterilized by noise for a city-to-city rail system exceeds that of the airports at both ends, which are also used by service from all cities connected to the original pair.²⁸

Second, the costs of acquiring the land and constructing new highways or rail systems is prohibitive in all except the high-density corridors, since many passengers must be carried to offset these high fixed costs. In addition, population centers in these corridors must be stable, since ground systems cannot easily be shifted to follow new growth patterns. In contrast, the initial investment in air facilities is relatively low. The major investment is in vehicles, which are purchased only in proportion to the number of passengers in the market. This small investment for air facilities, coupled with the airplane's freedom from ground restraints, results in an air system that is cheaper and more flexible in all but the most dense markets in which the costs of a large number of vehicles could exceed ground right-of-way costs for the other modes of transportation.²⁹

Third, a ground system cannot match the speed of the aircraft on long-range service, nor could it provide any transoceanic alternative. Thus, there will always be a need for air service between the major cities of this country and of the world, and the only places in which air service could be totally eliminated would be between smaller cities, or between small cities and major centers. It is in these lower density markets, however, that the air system provides the greatest economic advantage and flexibility.³⁰

Finally, transportation systems are no longer local in nature. Although a small city might decide to terminate air service to the city and close its airport, it can only obtain the rights-of-way needed to connect with a distant hub by rail or highway through cooperation with many governmental subunits having the common goal.

B. Relocation

Many cities have closed their older in-city airports and built new facilities in less populated areas. This alternative has usually been motivated by a need for an enlarged airport and increased passenger and freight capacity rather than for noise reduction. Although some

²⁸ R. Simpson, *Summary and Recommendations, NASA/MIT Workshop on Short Haul Air Transport*, Oct. 1971 at 14 (Massachusetts Institute of Technology, Flight Transportation Laboratory Report R71-4).

²⁹ *Id.* at 17.

³⁰ *Id.* at 21.

regions have been successful in acquiring new sites, most have been blocked by the local residents in the selected area. When land acquisition has been successful, the new airport has been located many miles from the downtown hub that generates much of the traffic.

Even when a new airport has opened, the old one may not have been permanently closed as originally planned.³¹ For example, the increased demand for commuter services may necessitate the need for both airports.

On the other hand, a new airport does divert a large portion of the city's service to the remote location thereby providing limited relief, particularly from the larger aircraft used in long-distance flights.³²

C. Renovation

A less expensive alternative to constructing a new airport is for a city to renovate its present facilities, particularly when the available land area is sufficient for the city's needs or is easily obtainable to meet service and runway requirements. Some cities have obtained additional land by harbor fills or limited condemnations, as occurred in Boston. Increased neighborhood objection, however, is inevitable since there will probably not be enough land to allow dissipation of the noise before it has an impact on the residential areas and since more aircraft will use the expanded facilities. Therefore, the costs of the increased injury to the locality must be a factor in making the decision to renovate.

D. Zoning

Zoning in the vicinity of the airport can be used as a planning device to assure land use that is compatible with the noise.³³ For

³¹ Dallas-Ft. Worth, and Los Angeles-Palmdale are examples of remote airports with large land area, and Chicago's Midway Airport is an example of a closed airport being reopened. In contrast, the New York Port Authority has been blocked from developing a fourth airport anywhere in the region, even at remote locations.

³² An example of this can be seen in the Washington, D.C. area where long haul flights were transferred to Dulles and Friendship airports, and service at Washington National restricted to flights of less than 650 miles. See the case history of Washington National, G. Lantner, *Community Opposition to Airport Development*, Jan. 1972 at 213 (Massachusetts Institute of Technology, Department of Civil Engineering Report R72-1).

³³ "Forty-two States have adopted express enabling legislation providing for airport zoning. The National Institute of Municipal Law Officers states that there

example, residences, schools and hospitals should be prohibited, while manufacturing and recreation areas should be encouraged. This technique is most helpful in conjunction with new airport development, but has little application around older airports because existing uses of property cannot be zoned out of existence.³⁴

To be effective, regional zoning must be employed since the noise usually affects many surrounding communities in addition to the political unit in which the airport is located. The zoning should also be coupled with stringent building codes that minimize noise inside structures by requiring soundproofing whenever needed.

Although zoning appears to be a powerful tool, there are legal problems associated with it that limits its use. These problems will be discussed later in the article.

E. Limitations and Curfews

Attempts have been made to impose artificial constraints on the type of aircraft that can use a facility, the number of operations permitted and the time of these operations in addition to the technical constraints of runway capacity and the air traffic control system. Because of legal reasons, however, these constraints have been successful only when imposed by the operator of the airport.

There is a greater impact because of these constraints than the immediate noise reduction in the vicinity of the airport. For example, limitations on the type of aircraft that can operate out of an airport can effectively eliminate any long-distance flights that require large planes. In addition, many of these restrictions are imposed only if there is another available airport that does not have any similar restrictions; consequently when flights are transferred from one airport to another an increased level of noise necessarily results at the second airport.

Moreover, limitations on the number of flights in and out of an airport have a direct impact on the airports at the other end of those flights—even if those distant airports do not have a noise problem. When the limitations are completely in force, for example during a night-time curfew, and when additional major airports impose

are over 500 airport zoning ordinances of one type or another currently in effect in the United States." S. GOLDSTEIN, *JET NOISE NEAR AIRPORTS—A PROBLEM IN FEDERALISM, PROPERTY RIGHTS IN AIR SPACE AND TECHNOLOGY* 9 (1966).

³⁴ B. MCQUILLIN, *MUNICIPAL CORPORATIONS* § 25.180 (3d ed. 1947); 101 C.J.S. ZONING § 189.

similar rules, then the total effect on the air system is greatly magnified. The combination of flight time and time zone changes greatly limit the number of arrivals and departures that can be scheduled.³⁵

Another type of constraint is a limitation on either the noise of any particular aircraft operation or on the cumulative noise impact of all operations at the airport.³⁶ To enforce these limitations, violators would be subject to fines or other penalties including the revocation of the right to operate an aircraft from the airport in question.

There are two major problems with this type of approach. First, it is difficult to define how the noise is to be measured. Technologists do not agree on which qualities of sound should be considered or the relative importance of these qualities. In addition, there is debate over the equipment to be selected to take the measurements, where it should be placed and who should operate and control it.

Second, after the measurement technique is adopted, the actual limits must be set. The selection of the maximum sound levels is based on the value judgments of the decision makers with respect to what is good for the population as a whole and is subject to political pressures. At the local level, the desire to please the voters would cause a tendency to undervalue the national importance of commerce and overvalue community impact. At the national level, on the other hand, organized industry lobbies may effect decisions adverse to community interests since local groups can only offer scattered and divergent viewpoints in contrast to the united front of the lobby.

³⁵ In *Lockheed Air Terminal Inc. v. The City of Burbank* 318 F. Supp. 914 (D.C. Cal. 1970), *aff'd* 457 F.2d 667 (9th Cir.), *cert. granted*, 41 U.S.L.W. 3165 (Oct. 11, 1972), the court considered the effects that an 11:00 p.m. to 7:00 a.m. curfew would have if imposed nationally. After noting that 48% of the air mail and 42% of the airfreight is moved at night, the court discussed the impact on schedules and aircraft utilization.

The Ordinance on a national basis would increase costs by 25% . . . by reason of the loss in the utilization of aircraft as well as the required purchase of new planes to meet the concentration of flights within the permitted hours of take-off, if, in fact, the re-scheduling of flights so eliminated could be accomplished from a practical standpoint. Additional maintenance shops would also have to be established by all airlines to accomplish the required maintenance at necessary locations for proper and efficient use of their planes.

318 F. Supp. 914, 927.

³⁶ See CAL. PUB. UTIL. CODE, § 21669 (West Supp. 1972) and the regulations passed in accordance which will be discussed later in this article.

F. *Taxation*

Another possible political solution is to impose airport taxes based on noise levels and then use the funds to finance community development projects such as recreation areas or schools. The tax would be proportionate to the noise so that the tax is reduced in proportion to the noise level. There are, however, inherent problems with this plan.

First, most airports are operated by government units and thus are tax exempt. Consequently, state legislatures would have to change this exempt status to permit the local community to assess the airport operation.

Second, the airport is frequently located in a different political subdivision from those people most affected by the noise. Accordingly, taxes raised in one subdivision would have to be transferred to another thereby creating administrative problems. As a corollary, funds paid to the tax base benefit everyone in the political subdivision regardless of their proximity to the airport or the associated noise burden.

Rather than tax the airport and distribute the income, another alternative would be for the communities to give tax relief to people located near the airport. This solution would seem to be more efficient and would directly compensate those directly affected by the noise, pollution and congestion.

III. LEGAL SOLUTIONS

There has been much litigation in recent years to attempt to determine who should bear the cost of excessive airport noise. These actions can be classified into three categories: (i) attempts by the individual affected to protect his interests; (ii) attempts by the local community to act for all its citizens; and (iii) attempts by the airport operator to control the actions of those using his facility.

A. *The Rights of the Individual*

The most frequently litigated claim has been that of the property owner subjected to the noise. Since class actions and the widespread impact of jet noise are recent occurrences, the early cases were primarily between the airport or airplane operator and the adjacent property owner. Accordingly, most of these actions were

based on legal theories of trespass, nuisance or inverse condemnation.

1. *Trespass*

For trespass actions to be successful, there must be an actual unprivileged and unpermitted physical invasion of the property of the party bringing the suit.³⁷ There is some question whether a flight through the airspace above a person's land constitutes a physical invasion. Although some courts have granted relief in trespass for invasion of the airspace by projectiles,³⁸ recovery has been primarily confined to those cases in which the invasion was close to the ground. The development of the airplane, however, caused the setting of upper limits on the ownership of the airspace above the land to prevent stifling the use of aircraft by constant litigation arising from overflights. Congress and state legislatures passed statutes that claimed the airspace above certain minimums to be in the public domain and open to the passage of all.³⁹ Some courts, however, continued to recognize at least a "technical trespass" for flights below the preempted altitude minimum unless the flight is an emergency.⁴⁰ Accordingly, these courts awarded at least nominal damages and in some cases injunctive relief against the operator of the plane.⁴¹

2. *Nuisance*

In contrast to a trespass, a nuisance may arise without a physical invasion if the activity unreasonably interferes with the use and enjoyment of the property.⁴² Nuisances are usually classified into two types: (i) a private nuisance affecting a limited number of parties,⁴³ and (ii) a public nuisance that has wide-spread effect on the general health or welfare of the public.⁴⁴ In the case of damage

³⁷ See W. PROSSER, *LAW OF TORTS* 63-98 (3d ed. 1964).

³⁸ *E.g.*, *Herrin v. Sutherland*, 74 Mont. 587, 241 P. 328 (1925).

³⁹ Air Commerce Act of 1926, ch. 344, 44 Stat. 568 (repealed by Act of August 23, 1958, Pub. L. 85-726, tit. XIV, § 1401(d), 72 Stat. 806); CONN. P.A. 1925, Sec. 10, Chap. 249; Mass. St. 1922 C. 534, 1.

⁴⁰ *Smith v. New England Aircraft Co.*, 270 Mass. 511, 170 N.E. 385 (1930).

⁴¹ *Vanderslice v. Shawn*, 26 Del. Ch. 225, 27 A.2d 87 (1942) *Burnham v. Beverly Airways, Inc.*, 311 Mass. 628, 42 N.E.2d 575 (1942).

⁴² See W. DEFUNIAK, *HANDBOOK OF MODERN EQUITY* 59-74 (2d ed. 1956).

⁴³ *Id.* at 59.

⁴⁴ *Id.* at 71.

to the public, private parties cannot bring an action in their own right unless they can show some special damage not suffered by the public as a whole.⁴⁵ Otherwise, the government must seek abatement.⁴⁶

In general, courts will either award damages for loss of value, issue an injunction to stop the offensive conduct or grant both. Injunctive relief will not be granted, however, when the harm to the landowner is outweighed by the benefit to the offender or to the public in general.⁴⁷

If an activity is considered vital to the public, then presumably it takes on the status of a "legalized" nuisance. Damages arising from the proper operation of this activity are considered incidental, and compensation need not be given unless negligence is shown.⁴⁸ Relying on this theory, the United States Supreme Court has denied injunctive relief or damages arising from the non-negligent operation of a railroad even though the adjacent property was affected by noise, vibration and smoke.⁴⁹

As a result, there has been only limited success in blocking new airports by injunctions based on nuisance;⁵⁰ recovering damages from an operating facility on this theory has been very rare.⁵¹

⁴⁵ *Id.* at 60.

⁴⁶ "Suits to enjoin public nuisances ordinarily are provided by statute to be brought by the state attorney general or other designated officer in the name of the state or the people of the state. Usually the suit may not be brought by and in the name of individuals. . . ." *Id.* at 74. This could be a problem when the local government who must bring the action also operates the activity being challenged.

⁴⁷ "Where substantial redress can be afforded by the payment of money and the issuance of an injunction would subject the defendant to grossly disproportionate hardship, equitable relief may be denied although the nuisance is indisputable." *City of Harrisonville v. W.S. Dickey Clay Mfg. Co.*, 289 U.S. 334, 338 (1933).

⁴⁸ See W. DEFUNIAK, *HANDBOOK OF MODERN EQUITY* 69 (2d ed. 1956).

⁴⁹ *Richards v. Washington Terminal Co.*, 233 U.S. 546 (1914). Although no recovery was allowed for noise and smoke damages arising from the passage of trains, a right to recovery for smoke damage from a tunnel ventilating fan was recognized since ". . . the acts of Congress . . . do not authorize the imposition of so direct and peculiar and substantial a burden upon plaintiff's property without compensation to him." *Id.* at 557.

⁵⁰ *Swetland v. Curtiss Airports Corp.*, 55 F.2d 201 (6th Cir. 1932). In this case, the airport was not yet fully developed, and alternate sites were available. These factors were given heavy weight by the court in granting the injunction.

⁵¹ Recovery is sometimes granted if the harm imposed on the plaintiff is "greater than reasonable to require [the plaintiff] to bear under the circumstances, without compensation." *RESTATEMENT (SECOND) OF TORTS* § 822 (Tent. Draft No. 17, (1971)). The key seems to be whether the activity giving rise to the

3. Inverse Condemnation

Most airport operators are branches of the local government and have the power of eminent domain. Accordingly, these operators are allowed to take land for the public good, providing just compensation is paid. If a property owner believes there has been a taking without adequate compensation, he can bring an action of inverse condemnation to force payment for the loss.⁵²

Inverse condemnation has enjoyed wide-spread acceptance since the Supreme Court decision in *Causby v. United States*.⁵³ The plaintiff lived near the end of a runway at an airbase where bombers repeatedly came over his land at an altitude of less than 100 feet. Consequently, some of the plaintiff's chickens were literally scared to death.

The Court distinguished *Causby* from the legalized nuisance cases by finding an actual invasion of the property of the plaintiff.⁵⁴ Although the right to the public to free passage in the upper space without liability is recognized by the Court,⁵⁵ low and frequent flights over private land that interfere with the enjoyment and use of the property were held to be as much an appropriation of property as a conventional entry.⁵⁶

nuisance is essential to the overall operation. *Ferguson v. Keene*, 188 N.H. 409, 238 A.2d 1 (1968); *Ferguson v. Keene*, 111 N.H. 246, 279 A.2d 605 (1971).

A major change in this policy, at least in California, may be indicated in *Nestle v. City of Santa Monica*, 6 Cal. 3d 920, 496 P.2d 480, 101 Cal. Rep. 568, *reh. den.* (1972). The lower court dismissed a nuisance count in the suit on the theory that the city as airport operator was granted governmental immunity under the CAL. GOVT. CODE, § 815 (West. 1966).

The State Supreme Court held the section did not apply and therefore the court should have been allowed. Although the issue is limited, the language of the Supreme Court of California indicates that the court would not look unkindly on a nuisance claim when properly raised.

⁵² Stoebe, *Condemnation by Nuisance: The Airport Case in Retrospect and Prospect*, 71 DICK. L. REV. 207, 233-34 (1967).

⁵³ *United States v. Causby*, 328 U.S. 256 (1946).

⁵⁴ "It would not be the case of incidental damages arising from a legalized nuisance as was involved in *Richards v. Washington Terminal Co.* [citation omitted]." *Id.* at 262.

⁵⁵ "The air is a public highway, as Congress has declared. Were that not true, every transcontinental flight would subject the operator to countless trespass suits. Common sense revolts at the idea. To recognize such private claims to the air-space would clog these highways, seriously interfere with their control and development in the public interest, and transfer into private ownership that to which only the public has a just claim." 328 U.S. at 261.

⁵⁶ "We have said that the airspace is a public highway. Yet it is obvious that if the landowner is to have full enjoyment of the land, he must have exclusive

Therefore, the Court held the passage of the planes through the airspace could constitute the taking of an easement if it were so near the ground that there was an interference with the use and enjoyment of the underlying land.⁵⁷ Damages were awarded on this basis, even though the causes of the damage were recognized as the noise and the lights associated with the passage of the aircraft⁵⁸ and the invasion itself⁵⁹—the types of wrongs usually associated with nuisance or trespass actions.⁶⁰

Although this reasoning did justify compensating the plaintiff for an obvious inequity, nevertheless, *Causby* had an important undesirable side effect. Since the recovery was based on the taking of property, compensation has been restricted to those cases in which there is an actual invasion of the airspace above the land.⁶¹ Therefore, a property owner whose land is not directly beneath the flight path cannot collect compensation even though the impact of the noise and vibration is severe.⁶² This leads to the inequitable

control of the immediate reaches of the enveloping atmosphere." 328 U.S. at 264.

⁵⁷ "Flights over private land are not a taking, unless they are so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land. We need not speculate on that phase of the present case. For the findings of the Court of Claims plainly established that there was a diminution in value of the property and that the frequent, low-level flights were the direct and immediate cause. We agree with the Court of Claims that a servitude has been imposed upon the land." 328 U.S. at 267.

⁵⁸ "The noise is startling. And at night the glare from the planes brightly lights up the place. . . . Respondents are frequently deprived of their sleep and the family has become nervous and frightened." 328 U.S. at 259.

⁵⁹ "We think that the landowner, as an incident to his ownership, has a claim to the airspace and that invasions of it are in the same category as invasions of the surface." 328 U.S. at 265.

⁶⁰ "In short, those acts which would give rise to various trespass or nuisance claims when committed by private defendants may give rise to actions for a taking of private property for public use without compensation when they are committed under government authority." Note, *Jet Noise in Airport Areas: A National Solution Required*, 51 MINN. L.R. 1087, 1091 (1967).

⁶¹ *Batten v. United States*, 306 F.2d 580 (10th Cir. 1962), cert. denied, 371 U.S. 955 (1963). Although the property owners claimed a 40-55% decrease in value (*Id.* at 583), the court held this was not enough. Without an overflight, the owner must be deprived of all or most of his interests before compensation is required. *Id.* at 585.

⁶² "It is my opinion, as a matter of law from the evidence presented, that plaintiff has not been deprived of 'all or most of her interests' in the subject property, so as to constitute a 'taking,' although there was, indeed, a substantial interference with the use and enjoyment thereof . . . while the jet engine trim pad was located in relatively close proximity to her home and rental apartments." *Leavell v. United States*, 234 F. Supp. 734, 739 (D.S.C. 1964).

result that a person living close to the runway, but to the side of the flight path, cannot collect for noise damage, while a person who lives further from the airport and experiences less noise may recover if he is "fortunate" enough to have even a small portion of his land directly beneath the flight path.

Many state courts have been able to avoid this harsh result when the state constitution requires compensation for a "taking or damaging" of property since damage can be caused by noise and vibration without a physical overflight.⁶³ Federal courts and courts in states without a requirement to compensate for damages, however, still apply the overflight requirement.⁶⁴

B. Community Restrictions

1. Federal versus State

In many cases the local government has attempted to act for all its citizens by regulating or stopping the amount of noise impinging on the community.⁶⁵ These attempts are usually based on the police powers of the local authority to promote and protect the general health, morals and welfare of its citizenry.⁶⁶

Under the United States Constitution, however, the states yielded to Congress the "power to regulate Commerce with foreign nations, and among the several states,"⁶⁷ while also agreeing in the "Supre-

⁶³ *Thornburg v. Port of Portland*, 244 Ore. 69, 415 P.2d 750 (1966); *Martin v. Port of Seattle*, 64 Wash. 2d 324, 391 P.2d 540 (1964), *cert. denied*, 379 U.S. 989 (1965).

⁶⁴ *Town of East Haven v. Eastern Airlines, Inc.*, 331 F. Supp. 16 (D. Conn. 1971); *see also* *Avery v. United States*, 330 F.2d 640 (Ct. Cl. 1964); *Aaron v. United States*, 311 F.2d 798 (Ct. Cl. 1963); *Ferguson v. City of Keene*, 108 N.H. 409, 238 A.2d 1 (1968); *Bowling Green-Warren County Airport Board v. Long, Ky.*, 364 S.W.2d 167 (Ky. 1962). Roughly one-half of the states fall in each category. *See* OREGON STATE HIGHWAY DEPARTMENT: NOISE LITIGATION STUDY 12 (1965).

⁶⁵ States have passed a variety of noise control legislation. For example, in Massachusetts there are laws governing noisy drunks, MASS. GEN. LAWS ANN. ch. 272 § 44 (1968), library noise, MASS GEN. LAWS ANN. ch. 272 § 41 (1968), and noisy motor vehicle equipment, MASS GEN. LAWS ANN. ch. 90 § 16 (1967).

⁶⁶ For example: "Government is instituted for the common good; for the protection, safety, prosperity and happiness of the people; . . . therefore the people alone have an incontestable, unalienable, and indefensible right to institute government; and to reform, alter or totally change the same, when their protection, safety, prosperity and happiness require it." MASSACHUSETTS CONST. Part 1, Art. 7. "All political power is vested in and derived from the people; all government, or right, originates from the people, is founded upon their will only, and is instituted solely for the good of the whole." COLO. CONST., art. 2, § 1.

⁶⁷ U.S. CONST., art. 1, § 8.

macy Clause" that "this Constitution and the Laws of the United States which shall be made in Pursuance thereof . . . shall be the supreme Law of the land . . . any thing in the Constitution or Laws of any State to the contrary notwithstanding."⁶⁸ Thus, when the attempts of the local government to regulate noise start to impose undue burdens on commerce among the states, a conflict arises between the state and federal spheres of control. Although it is not impossible for both federal and state governments to regulate the same subject matter through powers arising from different sources, federal control is exclusive when a conflict does arise and the area would be pre-empted by the national government under the supremacy clause.

In the 1824 case of *Gibbons v. Ogden*,⁶⁹ the New York legislature had granted exclusive license to Ogden to use steamboats on the Hudson River, barring Gibbons from operating between New Jersey and New York although his steamboats had been federally licensed. New York vigorously argued it had the right to regulate commerce until Congress chose to pre-empt the field.⁷⁰ Supporters of a strong federal government argued that Congress alone had this power, and its failure to act was evidence of a policy that there should be no governmental regulation in this area, thus excluding state action.⁷¹ The Court chose not to approve either argument, but found instead for Gibbons on the basis that Congress had pre-empted the area by imposing the federal license requirements. Since Congress had acted, New York was clearly in conflict.⁷²

⁶⁸ U.S. CONST., art. VI.

⁶⁹ *Gibbons v. Ogden*, 22 U.S. (9 Wheat) 1 (1824).

⁷⁰ "[T]his power is concurrent; and as such, may be exercised by the states, subject, like all other concurrent powers, to the power of Congress, when actually exercised; . . ." 22 U.S. (9 Wheat) at 65 (Argument of Oakley for respondent).

⁷¹ "It has been contended by the counsel for the appellant, that, as the word 'to regulate' implies in its nature, full power over the thing to be regulated, it excludes, necessarily, the action of all others that would perform the same operation on the same thing. That regulation is designed for the entire result, applying to those parts which remain as they were, as well as to those which are altered. It produces a uniform whole, which is as much disturbed and deranged by changing what the regulating power designs to leave untouched, as that on which it is operated. There is great force in this argument, and the court is not satisfied that it has been refuted." 22 U.S. (9 Wheat) at 209.

⁷² "But all inquiry into this subject seems to the court to be put completely at rest, by the act already mentioned, entitled, 'an act for the enrolling and licensing of steam-boats' This act demonstrates the opinion of Congress, that steam-boats may be enrolled and licensed, in common with vessels using sails. . . .

Neither the positions of the state nor of the federal supporters have ever been specifically accepted or rejected by the Court. The general guidelines that emerged during the first half of the nineteenth century, and which still basically apply, are:

- (i) The states, in regulating the general public good, can pass laws that affect commerce, as long as they do not come into conflict with the federal powers;⁷³
- (ii) If the subject matter is by its nature national, or suited to one uniform system of control, it requires exclusive regulation by Congress;⁷⁴ and
- (iii) Local government can exercise powers that are local and not national in scope, in areas in which local peculiarities can best be regulated by local legislation until Congress finds it necessary to act.⁷⁵

The Supreme Court expressly limited these rules to the cases then before it and refused to say they would apply in all commerce clause problems. These rules do provide a background, however, for understanding judicial reactions to community attempts to regulate noise.

2. Local Regulation

In *Allegheny Airlines v. Village of Cedarhurst*,⁷⁶ decided in 1956, the local community attempted to enforce a regulation barring overflights below a certain altitude by planes taking off and landing from

The one element [steam] may be as legitimately used as the other [sails], . . . and the act of a state inhibiting the use of either, to any vessels having a license under the act of Congress, comes, we think, in direct collision with that act." *Id.* at 220-21.

⁷³ *Willson v. Black-bird Creek Marsh Co.*, 8 U.S. (2 Pet.) 105 (1829). "Measures calculated to produce these objectives [enhance property value and health of inhabitants], provided they do not come into collision with the powers of the general government, are undoubtedly within those which are reserved to the states. But the measure authorized by this act stops a navigable creek, . . . But this abridgement, unless it comes in conflict with the constitution or a law of the United States, is an affair between the government of Delaware and its citizens, of which this court can take no cognisance." *Id.* at 250. *See also* *Munn v. Illinois*, 94 U.S. 113 (1877).

⁷⁴ "Whatever subjects of this power are in their nature national, or admit only of one uniform system, or plan of regulation, may justly be said to be of such a nature as to require exclusive legislation by Congress." *Cooley v. Board of Wardens of Port of Philadelphia* 53 U.S. (12 How.) 299, 319 (1851), *See also* *Wabash Ry. v. Illinois*, 118 U.S. 557 (1886).

⁷⁵ *Cooley v. Board of Wardens of Port of Philadelphia*, 53 U.S. (12 How.) 299 (1851).

⁷⁶ 238 F.2d 812 (2d Cir. 1956).

what is now Kennedy Airport. This was held clearly unconstitutional. The federal government had assumed exclusive control of the airways, therefore the local government could not restrict airway usage.

In *American Airlines v. Town of Hempstead*,⁷⁷ it was held the local noise ordinances, normally within the police power of the town, were unconstitutional since the effect of the local rules was to force planes to deviate from the federally-established flight paths if they were to comply. Since many other towns around New York's Kennedy Airport were about to pass similar ordinances if those of Hempstead were upheld, there would be no path to which the planes could divert. The resulting constraints on the flight paths in and out of the airport would limit operations as severely as the Village of Cedarhurst's altitude regulations. Therefore, these ordinances were also unconstitutional since they placed an undue burden on interstate commerce.

Communities have also attempted to impose curfews on airports. In 1969 *Stagg v. Santa Monica*,⁷⁸ upheld the right of the city to prohibit night jet flights. In that case there was no interference with the federal power⁷⁹ since the city owned and operated the facility and could regulate its operation under the public utility code.⁸⁰ The California appellate court did not clarify whether both the lack of interference with federal regulations and city ownership must be present in future cases for local control to be upheld. When the city of Burbank passed a similar regulation based on the Santa Monica case, however, it was invalidated by the Ninth Circuit as an uncon-

⁷⁷ 272 F. Supp. 226 (E.D.N.Y. 1967), *aff'd*, 398 F.2d 369 (2d Cir. 1968), *cert. denied*, 393 U.S. 1017 (1969).

⁷⁸ 2 Cal. App. 3d 318, — P.2d —, 82 Cal. Rptr. 578 (1969).

⁷⁹ Based on the earlier case of *Loma Portal Civil Club v. American Airlines, Inc.*, 61 Cal. 2d 582, 294 P.2d 548 (1964). "Moreover, we note that noise abatement is a federal as well as a state aim and when not inconsistent with safety . . . would not necessarily present a conflict with federal law but might well reinforce it." *Id.* at 592, (594).

⁸⁰ "In any event, whether or not the operation of a municipally owned airport is a matter of statewide concern, such operation has been expressly committed by statute to the local agency. Government Code, Section 50470 provides that a municipality may acquire property for use as an airport. Section 50474 then provides: "In connection with the erection or maintenance of such airports or facilities, a local agency may: (f) Regulate the use of the airport and facilities and other property or means of transportation within or over the airport. . . ." *Stagg v. Municipal Ct. of Santa Monica*, 2 Cal. App. 3d 318, 322, — P.2d —, 82 Cal. Rptr. 578, 581 (1969).

stitutional interference with interstate commerce.⁸¹ In that case, neither factor was present since commercial aviation was involved and the terminal was neither operated nor owned by the city of Burbank.

The district court in the Burbank case stressed the federal nature of the air system and found that the federal government has so completely occupied the area of air space control that Congress left no room for local regulations similar to the ones Burbank sought to enforce.⁸² The court pointed out that if upheld, all cities would soon pass curfews causing a "cascade effect" severely limiting the movement of air mail and air cargo: this would ultimately place an undue burden on commerce.⁸³

The Court of Appeals for the Ninth Circuit, on reviewing the Burbank case, concentrated primarily on the issue of federal preemption and found exclusive jurisdiction in the federal government.⁸⁴ This was based on both the specific language of the Federal Aviation Act,⁸⁵ and Congressional intent as implied from:

- (1) the pervasiveness of the federal regulation . . . ; (2) dominance of the federal interest in the field of regulation . . . ; and
- (3) the objectives of the federal regulation and whether non-

⁸¹ *Lockheed Air Terminal, Inc. v. City of Burbank*, 318 F. Supp. 914 (D.C. Cal. 1970), *aff'd*, 457 F.2d 667 (9th Cir.), *cert. granted*, 41 U.S.L.W. 3165 (Oct. 11, 1972).

⁸² "However, if the time during which the navigable air space may be used is to be curtailed, the Court concludes that the action must come from Congress, or its authorized agency, if the safe and efficient use of the air space is to be maintained and interstate commerce protected from unreasonable burden and interference." 318 F. Supp. at 930.

⁸³ "The noise problem created by jet aircraft is well-known and it appears to the Court that a curfew Ordinance, if valid, would promptly be adopted by virtually all cities surrounding airports. Considered singly, such an Ordinance might not impose an unlawful interference with interstate commerce. However, considered on a national level, the Ordinance could not stand." 318 F. Supp. at 927.

⁸⁴ "The pervasiveness of federal regulation in the field of air commerce, the intensity of the national interest in this regulation, and the nature of air commerce itself require the conclusion that State and local regulation in that area has been preempted." *Lockheed Air Terminal v. City of Burbank*, 457 F.2d 667, 671 (9th Cir.), *cert. granted*, 41 U.S.L.W. 3165 (Oct. 11, 1972).

⁸⁵ "Furthermore, the Federal Aviation Act also contains language of exclusivity. 49 U.S.C. § 1508 [(1970)] declares that the United States possesses and exercises 'complete and exclusive national sovereignty in the airspace of the United States. . . .' That is the same type of expression which the Supreme Court found in the Federal Tobacco Inspection Act to evidence Congressional intent to establish a wholly federal system which states were powerless even to surplant." 457 F.2d at 675.

federal regulation obstructs the full execution of those aims. . .⁸⁶

3. Zoning Restrictions

To limit the impact of the noise rather than the noise itself, many local governments have resorted to using their zoning powers to impose land use restrictions around the airport.⁸⁷ The zoning power can only be used, however, to place minor restrictions on land use benefiting the public good, health and general welfare without placing an undue burden on the land owner.⁸⁸ Accordingly, distinctions must be made between minor restrictions limiting enjoyment or use and those amounting to an appropriation of property for public use.⁸⁹ In *Indiana Toll Road v. Jankovich*,⁹⁰ an attempt to zone land near the airport to prohibit structures that would interfere with the glide slope was held to be more than a minor restriction and amounted to a taking of the airspace that required compensation.⁹¹ Arguably, a zoning scheme based solely on noise considerations is in reality a taking of aviation easements and just compensation would be required. Thus, the airport and city planner must be very careful in drawing zoning ordinances.

In addition, zoning cannot be used to bar an activity already in existence.⁹² Any attempt to change the nature of use around present airports could only be done through condemnation proceedings in which full compensation would be paid.⁹³

⁸⁶ 457 F.2d at 671.

⁸⁷ See note 27 *supra*.

⁸⁸ "The governmental power to interfere by zoning regulations with the general rights of the land owner by restricting the character of his use, is not unlimited, and other questions aside, such restriction cannot be imposed if it does not bear a substantial relation to the public health, safety, morals, or general welfare." *Nectow v. Cambridge*, 277 U.S. 183, 188 (1928).

⁸⁹ *Id.* "[T]he city may not under the guise of an ordinance acquire rights in private property which it may only acquire by purchase or by the exercise of its power of eminent domain . . ." *Yara Eng'r Corp. v. City of Newark*, 132 N.J. 370, 373, 40 A.2d 559, 561 (1945).

⁹⁰ 244 Ind. 574, 193 N.E.2d 237 (1963), *cert. granted*, 377 U.S. 942 (1964), *cert. dismissed as improvidently granted*, 379 U.S. 487 (1965).

⁹¹ *Contra, see Baggett v. City of Montgomery*, 276 Ala. 166, 160 So. 2d 6 (1963).

⁹² See O'Reilly Jr., *The Non-Conforming Use and Due Process of Law*, 23 GEO. L.J. 218 (1935).

⁹³ "[M]ore regulation under the police power which can be modified at the discretion of the regulating authority is wholly different from the taking or appropriating of private property by the government for a specific public use. The latter can be effected only if compensation is provided. . . . With this distinction

C. *Rights of the Airport Operators*

In anticipation of the jet age, the Port of New York Authority set noise standards for the aircraft using the airports it operates.⁹⁴ The Authority specified in its rules and regulations that jet aircraft must obtain permission to use the facilities, which was conditioned upon compliance with these rules.⁹⁵ The lease agreements with the airlines contained clauses stipulating the carriers would conform with the regulations.⁹⁶

In 1964, the Port Authority granted the airlines the right to use a particular runway only if a given noise level were not exceeded in nearby communities. The airlines complied with this condition for two years while extensions were being made to allow safer jet operations. When the work was completed, the airlines desired to renew jet operations and challenged the restriction on the basis that it was unreasonable and an interference with federal regulations that pre-empted the field.

The district court for the eastern district of New York upheld the right of the Port Authority. The court found no conflict with federal regulation, since the Federal Aviation Administration, which operated the tower, never directed that the questioned runway had to be used, although it had made it available for use under particular weather conditions. The rule was also found to be reasonable

established, it becomes apparent that the City of Gary has attempted, by the passage of the ordinance under consideration, to take and appropriate to its own use the ordinary usable air space of property adjacent to the Gary Airport without the payment of compensation." *Indiana Toll Road Comm. v. Jankovich*, 244 Ind. 574, 193 N.E.2d 237, 241 (1963), *cert. granted*, 377 U.S. 942 (1964), *cert. dismissed as improvidently granted*, 379 U.S. 487 (1965).

⁹⁴ "[W]e decided that the operation of jet aircraft could only be approved at our airports after a showing that the noise under the take-off would be comparable with, and certainly not greater than, that of the large four-engine piston transports then in In the early days of transport jet development, we refused permission to both Boeing and deHavilland to bring jet transports to New York because of noise problems." A. H. ODELL, *JET NOISE AT JOHN F. KENNEDY INTERNATIONAL AIRPORT* (1966).

⁹⁵ The New York Port Authority: Rules and Regulations for Air Terminals, Rule 2, Section I and Rule 15 Section II (rev. April 1, 1966), *as cited in* Port of New York Authority v. Eastern Air Lines, Inc., 259 F. Supp. 745, 748 (E.D.N.Y. 1966).

⁹⁶ "United agreed, [in its lease], among other things, 'to observe and obey all rules and regulations which may from time to time during the term hereof be promulgated and enforced by the Port Authority'." *Id.* at 748. A similar clause was used in leases with all airlines.

since there was only a seven-week period until an additional runway would be operational which would alleviate the problem.

At most, only nine per cent of the operations were affected and other airports were available as alternatives. Since noise was considered a major problem, these restrictions did not appear excessive.⁹⁷

In 1969 the Aircraft Owners and Pilots Association challenged the right of the Port of New York Authority to charge a landing fee that had the intent of influencing private pilots to use other airports, thus increasing the potential flight operations by commercial carriers at the three major New York airports. AOPA contended this fee amounted to a restriction on air traffic and thus was local regulation of a federally pre-empted field. Again, the district court upheld the regulation on the basis that there was no conflict between the Port Authority's acts and federal regulations;⁹⁸ moreover, the court found that the Authority's acts and the federal regulations worked together to alleviate the severe peak-hour congestion at the New York facilities.⁹⁹

These two cases, plus *Stagg v. Santa Monica*¹⁰⁰ mentioned earlier, have been cited as authority for the proposition that the airport operator can regulate noise levels. All three cases are actually limited by their particular facts, however, and may not justify so broad a conclusion. The cases do say the operator of the airport can impose some limits on operations through his contracts with

⁹⁷ "By reason of its specialized experience and expertise, the Port Authority is uniquely equipped to weigh the various conflicting interests and to resolve the same by the adoption of regulations which it believes to be reasonable. In so doing its judgment is not affected by any special or personal interest. It is not for the Court to substitute its judgement for that of the Port Authority or decide what regulations should be adopted. Its function is only to determine, in the light of all the circumstances, whether the particular regulation is so unreasonable as to violate the understanding between the parties. . . . [The Court] is convinced that under the circumstances the regulations . . . are still reasonable. . . ." *Id.* at 751.

⁹⁸ "Nothing in the present fee schedule runs counter to the FAA regulation in the sense that it seeks to authorize conduct which the federal regulation prohibits or requires the cessation of a practice required by federal regulation." *AOPA v. Port Authority of New York*, 305 F. Supp. 93, 105 (E.D.N.Y. 1969).

⁹⁹ "United in general purpose with the high density regulation [imposed by the FAA], the revised fee schedule, if viewed as a regulation of air traffic, simply has the tendency further to restrict the traffic restricted by the federal regulation, but to do so in a direction of restriction and for an aim common to both sets of regulation. *Id.* at 105.

¹⁰⁰ 2 Cal. App. 3d 318, — P.2d —, 82 Cal. Rptr. 578 (1969).

the users, as long as the restrictions are reasonable, do not place an undue burden on interstate commerce and do not conflict with some federal rule or regulation.

The ability of the airport operator to control the noise of his facility is important since he is responsible for the detrimental results of the noise. In *Griggs v. Allegheny County*,¹⁰¹ the Supreme Court of the United States held that the airport operator, "as promotor, owner, and lessor of the airport,"¹⁰² had to take the required easements for flight paths since the operator decided "where the airport would be built, what runways it would need, their direction and length, and what land and navigation easements would be needed."¹⁰³ The federal government merely approves the plans; consequently the airplanes fly where they are directed. This places the burden of paying for aviation easements on the airport operator. Therefore, it is important that he be able to regulate the noise levels and can limit his liability to that extent.

D. Summation of Law

Legal solutions to date have been largely unsuccessful. There have been cases in which an individual can recover for the diminution of value of his property attributable to noise and vibration. This rule is limited in the federal courts and in many state jurisdictions to direct overflights. All efforts by the community to control noise in the immediate area have been struck down except when the local government unit was also the operator of the facility. In that instance, the courts have upheld the operator's right to impose noise restrictions through contracts with the airline. Moreover, this contract right has been recognized for private airport operators. Accordingly, the operators of airports, as a class, have been the most successful in imposing noise limits. Since the operator's financial well-being depends on expanding air commerce, however, the noise restrictions may not have been as severe as those recommended by the community.

IV. RECENTLY PROPOSED SOLUTIONS

The primary cause of concern with respect to airport noise, is

¹⁰¹ 369 U.S. 84 (1962).

¹⁰² *Id.* at 89.

¹⁰³ *Id.* at 89.

not the noise levels around airports, but the impact of those noise levels on the community as measured by land devaluation, physical and psychological well-being of the citizens, disruption of normal community development and other diffuse social effects. Solutions can be directed at the noise itself, at its effects or both to achieve the desired elimination of noise impact in the area.

Several different plans have been proposed to control noise impact. Some are national in scope, some are local and some require cooperation and interaction at several levels of government. In any case, most of the plans attempt to limit directly the level of noise, but some concentrate on the elimination of noise impact by a method suited to the particular community.

A. Federal Aviation Regulation: Part 36

By virtue of Public Law 90-411,¹⁰⁴ the Federal Aviation Administration is given the authority to prescribe and amend rules and regulations necessary "to afford present and future relief and protection to the public from unnecessary aircraft noise. . . ."¹⁰⁵ In setting these rules and standards, the Administrator of the FAA is to consult with appropriate federal, state and interstate authorities;¹⁰⁶ consider the impact of the rules and standards on safety;¹⁰⁷ and evaluate their economic and technical reasonableness.¹⁰⁸ This law represents the first major attempt to control commercial aircraft noise at the national level. Federal Aviation Regulation Part 36,¹⁰⁹ was issued in response to the command in Public Law 90-411 and sets standards on the noise levels made by different weight-classes of aircraft during takeoff and landing. But the regulation is primarily prospective in operation since aircraft certified before the regulation was in effect are given exemptions.¹¹⁰ Thus, significant noise reduction in the vicinity of the airport is several years away.¹¹¹

¹⁰⁴ Act of July 21, 1968, Pub. L. No. 90-411. 82 Stat. 395 (49 U.S.C. § 1431 (1970)).

¹⁰⁵ 49 U.S.C. § 1431(a) (1970).

¹⁰⁶ 49 U.S.C. § 1431(b)(2) (1970).

¹⁰⁷ 49 U.S.C. § 1431(b)(3) (1970).

¹⁰⁸ 49 U.S.C. § 1431(b)(4) (1970).

¹⁰⁹ 14 C.F.R. Part 36 (1970).

¹¹⁰ *Id.* Subpart C § 36.201(b), (c) (1970).

¹¹¹ "Pursuant to 49 U.S.C. 1431(b)(4), [(1970)], the noise levels in this part have been determined to be as low as is economically reasonable, technologically practicable, and appropriate to the type of aircraft to which they apply. No de-

The standards that have been set should reduce the noise of future aircraft to levels that will subjectively seem to be about one-half those made by today's airplanes. Although the resulting sound level will still be excessive in communities near the airport runways, nevertheless, there should be significant reductions in the over-all noise impact area.

There are several problems with this noise reduction plan. First, any law that sets absolute limits on the noise an aircraft can make is economically inefficient. The most efficient noise reduction occurs when the cost of further noise reduction exceeds the benefit the community receives from a reduction in noise impact. Since the noise impact depends on several factors in addition to the absolute noise level, any plan that deals solely with noise cannot possibly meet the needs of all communities. If the noise level is set to alleviate noise impact at some average airport, then it may not be high enough to significantly reduce the problem at "high-noise" airports. If the noise level is set to alleviate the high-noise problem, then the cost of noise reduction to the air system will be much greater than is needed to reduce noise impact at a majority of airports. In one case, there is too much noise; in the other, too much noise reduction.

Second, the legislative history of Public Law 90-411¹¹² makes it

termination is made, under this part, that these noise levels are or should be acceptable or unacceptable for operation at, into, or out of, any airport." 14 C.F.R. Part 36, Subpart A, § 36.5 (1970).

¹¹² "The bill is an amendment to a statute describing the powers and duties of the Federal Government with respect to air commerce. As indicated earlier in this report, certain actions by State and local public agencies, such as zoning to assure compatible land use, are a necessary part of the total attack on aircraft noise. In this connection, the question is raised whether this bill adds or subtracts anything from the powers of State or local governments. It is not the intent of the committee in recommending this legislation to effect any change in the existing apportionment of powers between the Federal and State and local governments.

In this regard, we concur in the following views set forth by the Secretary in his letter to the committee of June 22, 1968:

The courts have held that the Federal Government presently preempts the field of noise regulation insofar as it involves controlling the flight of aircraft. Local noise control legislation limiting the permissible noise level of all overflying aircraft has recently been struck down because it conflicted with Federal regulation of air traffic. *American Airlines v. Town of Hempstead* [citation omitted]. The court said . . . "The legislation operates in an area committed to Federal care, and noise limiting rules operating as do those of the ordinance must come from a Federal source." H.R. 3400 would merely expand the Federal Government's role in a field already preempted. It would not change this preemption. State and

clear that Congress did not intend to pre-empt local control over noise impact. Although the local community may be in the best position to assess its own impact problems, it is not clear if this type of control could be implemented without severely restricting interstate commerce. Noise impact may be a local problem, but the effects of myriad local rules and regulations could have national impact. The fundamental issue is whether the subject matter is best suited to local control or whether it is, by its nature, national in scope or suited to one system of national control.¹¹³

local governments will remain unable to use their police powers to control aircraft noise by regulating the flight of aircraft.

However, the proposed legislation will not affect the rights of a [s]tate or local public agency, as the proprietor of an airport, from issuing regulations or establishing requirements as to the permissible level of noise which can be created by aircraft using the airport. Airport owners acting as proprietors can presently deny the use of their airports to aircraft on the basis of noise considerations so long as such exclusion is non-discriminatory.

Just as an airport owner is responsible for deciding how long the runways will be, so is the owner responsible for obtaining noise easements necessary to permit the landing and takeoff of the aircraft. The [f]ederal [g]overnment is in no position to require an airport to accept service by larger aircraft and, for that purpose, to obtain longer runways. Likewise, the [f]ederal [g]overnment is in no position to require an airport to accept service by noisier aircraft, and for that purpose to obtain additional noise easements. The issue is the service desired by the airport owner and the steps it is willing to take to obtain the service. In dealing with this issue, the [f]ederal [g]overnment should not substitute its judgment for that of the [s]tates or elements of local government who, for the most part, own and operate our Nation's airports. The proposed legislation is not designed to do this and will not prevent airport proprietors from excluding any aircraft on the basis of noise considerations.'

Of course, the authority of units of local government to control the effects of aircraft noise through the exercise of land use planning and zoning powers is not diminished by the bill.

Finally, since the flight of aircraft has been preempted by the Federal Government, State and local governments can presently exercise no control over sonic boom. The bill makes no change in this regard." U.S. Code Cong. and Ad. News, 90th Cong., 2d Sess. at 2693 (1968), P. 2693.

¹¹³ In *Lockheed Air Terminal, Inc. v. City of Burbank*, 318 F. Supp. 914, (D.C. Cal. 1970), *aff'd*, 457 F.2d 667 (9th Cir. 1972), *cert. granted*, 41 U.S.L.W. 3165 (Oct. 11, 1972), the district court considered the legislative history of Pub. L. 90-411, and concluded that in spite of the Congressional intent: "... air commerce by reason of its speed and volume, requires a single authority in control if it is to be conducted at maximum safety and efficient use of the navigable airspace.

The evidence discloses that air traffic is unique and should be controlled on the national level." *Id.* at 928.

Although the courts have allowed various local regulations that affect interstate commerce,¹¹⁴ none of the permitted regulations have touched on the control of aircraft or the air system. The regulations concern trucks, trains or barges that are slow compared with aircraft and remain in one state for some time. Moreover, much of the activities of these modes of transportation may be constrained to a local geographic area. If a city regulates truck noise, most of the trucks affected are primarily used in that city. Interstate truckers can either comply, reroute their trucks around the area or use remote terminals, without significantly affecting their over-all operations. In contrast, a modern jet airplane could theoretically either pass over, or land in, every state in the country in a twenty-four hour period. It is impossible to stop at state borders to transfer crew members, passengers or change to quieter aircraft. If each city on an air carrier's routes were to set different standards, the carrier would be forced to either abandon service to points with restrictions it could not meet, buy planes that would meet the strictest standards even though they would not be necessary at other points or buy different models of aircraft to serve particular cities based on their noise limits. None of these alternatives is presently practical or desirable.

In reaching this conclusion, the court relied heavily on *C. & S. Airlines v. Waterman Corp.*, 333 U.S. 103, 107 (1948) and stated:

Of course, air transportation, water transportation, rail transportation, and motor transportation all have a kinship in that all are forms of transportation and their common features of public carriage for hire may be amenable to kindred regulations. But these resemblances must not blind us to the fact that legally, as well as literally, air commerce, whether at home or abroad, soared into a different realm than any that had gone before. . . . A way of travel which quickly escapes the bounds of local regulative competence called for a more penetrating, uniform and exclusive regulation by the nation than had been thought appropriate for the more easily controlled commerce of the past.

The Ninth Circuit Court of Appeals, on reviewing the *Burbank* decision, held:

The legislative history emphasizes the status of the one regulating the use of the airport, not the locus of the aircraft when the offensive sounds are produced. A State or local public agency, as the proprietor of an airport, can deny the use of its airport based on noise consideration; a state or local government cannot use its police power to do so.

457 F.2d at 674.

¹¹⁴ *Huron Cement Co. v. Detroit*, 362 U.S. 440 (1960); (City smoke abatement code applied to ships in interstate commerce); *South Carolina State Highway Department v. Barnwell Bros.*, 303 U.S. 177 (1938) (State regulation of weight and width of trucks on its highways); *Townsend v. Yeomans*, 301 U.S.

Although Federal Aviation Regulation Part 36 leaves many unanswered questions, it does serve as a starting point. When the present aircraft are replaced with planes that do comply with the standards, the over-all noise levels will decrease. In the interim, the plan has political and psychological value. It assures people that someone is taking an active interest in the noise issue and that some relief is in sight.

B. *The Cranston Plan*

In April 1971 Senator Alan Cranston of California introduced an amendment to the Federal Aviation Act of 1958 that would impose strict noise limits on all aircraft, effective in 1976.¹¹⁵ The reduced levels would subjectively seem to be about one-half those imposed by Federal Aviation Regulation Part 36; any aircraft that could not comply with these severe restrictions would be banned from the airways. To enable the carriers to comply with the extreme limitations, the Federal Aviation Administrator would be authorized to fund up to thirty-five million dollars in research programs for sound reduction devices. The grants would have to be repaid, however, if the devices were sold commercially. An additional one billion dollars would be provided to:

. . . guarantee in whole or in part the repayment of any loan or other form of financing made to an air carrier for the purpose of modifying airplanes prior to January 1, 1976 to meet the requirements. . . .¹¹⁶

The actual cost of retrofitting, re-engining or retiring aircraft would be paid by the carriers. But the bill does provide:

The Civil Aeronautics Board shall not reject any increase in rates, fares or charges filed by an air carrier . . . if such carrier files with the tariff showing such increase adequate proof that such increase is due to costs of complying with the new noise standards.¹¹⁷

Twenty million dollars would also be provided to allow authorities to install sound measuring devices in the vicinity of airports to monitor aircraft operations and detect violations.

441 (1937) (Regulation of tobacco warehouse changes by the state when most of the tobacco was destined for interstate commerce).

¹¹⁵ S. 1566, 92nd Cong., 1st Sess., April 19, 1971.

¹¹⁶ *Id.* at 3.

¹¹⁷ *Id.* at 5.

Similar to Federal Aviation Regulations Part 36, the Cranston bill would set absolute noise limits on aircraft operations. Accordingly, the bill can be criticized for being potentially economically inefficient and for ignoring the potential federal-state conflict over control of noise impact. The major problem with this plan, however, is not economic or constitutional, but technical. The proposed noise limits are well below those attainable by known acoustic treatment techniques and could only be obtained by introducing a new engine. Assuming the technology used to develop present high-bypass engines could be directly applied, the first available engine that could meet the standards would be five to six years away.¹¹⁸ Moreover, additional research and development would probably be needed, which would cause additional time delay. Even after the engines were available, several years would be needed to produce enough engines to re-engine all aircraft in the fleet. By then, most of the present generation of noisy aircraft would have been retired from service or have few operational years left that it would be economically unfeasible to install the new equipment.

Thus, the standards set could not possibly be met in the proposed time period. If noise limits are to be set, they should push technology, but only in a time frame that permits realistic compliance without economic waste.

C. *The Brooke Plan*

In August 1971, Senator Edward Brooke of Massachusetts introduced an amendment to the Airport and Airway Development Act of 1970¹¹⁹ to provide for more effective control of airport noise.¹²⁰ The key portions of this proposal would authorize the Secretary of Transportation:

- A. to make grants to air carriers for such sums as he may deem appropriate up to two-thirds of the direct costs required for the modification of existing transport aircraft, including the replacement of engines to meet the noise abatement standards, rules, and regulations issued pursuant to Section 611 of the Federal Aviation Act of 1958 [Federal Aviation Regulations Part 36] and

¹¹⁸ R. Russell & J. Kester, *Aircraft Noise, Its Source and Reduction*, Feb. 1971 (Society of Automotive Engineers' Paper 710308).

¹¹⁹ Pub. L. 91-258; 84 Stat. 219 (1970).

¹²⁰ S. 2398, 92D Congress, 2d Session, August 2, 1971.

- B. to make grants to air carriers to encourage the replacement, before the end of their then remaining useful life, . . . of existing transport aircraft by transport aircraft which meet more stringent noise abatement standards . . . [than] the aircraft replaced, except that (i) such grants shall not exceed two-thirds of the unamortized cost, as of the date of its retirement from service, of the existing transport aircraft which is replaced, . . . and (iii) any such grant shall not exceed the amount of the grant in respect to that aircraft to which the air carrier would have been entitled under clause (A) if the aircraft were not replaced.¹²¹

The total funds would not exceed 725 million dollars and would be funded by temporary increases of the user tax.

There are several problems with this plan. First, the thrust of the proposal is to provide financial incentives for complying with Federal Aviation Regulation Part 36. The proposed bill neither sets standards for compliance nor penalties for violations and therefore must depend on voluntary participation by the airlines. Second, the financial incentives are not large enough to encourage widespread response. Part B, section iii of the bill limits the funds available for the purchase of quiet aircraft to two-thirds the costs of new engines for the plane being replaced. Since new aircraft are considerably more expensive than the cost of replacing an engine, this limit would provide little incentive to buy new planes. Consequently, the economics of engine retrofits or of new engine programs are dubious and the two-thirds limit would not encourage airlines to adopt these programs.

Finally, even if there were enough incentive to gain the voluntary participation of the airlines (or even if Federal Aviation Regulation Part 36 were changed to force compliance), the total amount provided is insufficient. At a cost of one million dollars per aircraft for an engine program, less than one-half the fleet could be re-equipped with the money to be provided by the bill.

D. California Legislation

The State of California has established a plan for the control of airport noise that, unlike the federal proposals, stresses noise impact reduction by all means rather than by noise limits alone.¹²² Although

¹²¹ *Id.* at 2-3.

¹²² Title 4, CAL. ADM. CODE, ch. 9, subch. 6 (Register 70, No. 48-11-28-70).

absolute noise levels are set for individual aircraft operations, they are not essential for the operation of the plan. Instead, the limits are set to protect individuals from being exposed to harmful noise levels rather than to control airport noise.

Individual noise constraints are enforced at two levels. Under article 9 of the regulations: "No operator of an aircraft shall operate any aircraft in excess of the single event noise exposure level limits adopted."¹²³ Violations are a misdemeanor subject to a substantial fine unless "such operation is in the direct result of the pilot's exercise of his responsibility for the safety of the passengers, crew, cargo and aircraft or of his emergency authority."¹²⁴ In addition to the operator of the aircraft, the operator of the airport is also held liable for violations of the single event limits. "No airport proprietor shall knowingly permit any aircraft operator to exceed the single event noise exposure level limits"¹²⁵

Although this approach to controlling individual noise events is unusual, the unique feature of the California plan appears in article 10: "No airport proprietor shall operate his airport with a noise impact area of other than zero unless said operator has a variance."¹²⁶ This section attempts to regulate noise impact rather than just noise and provides a flexibility and adaptability lacking in federal plans.

The noise impact area is based on the amount of land subjected to an average noise level that exceeds the limits established as compatible for the existing type of land use. These limits were developed from numerous studies of the impact of noise on sleep, communication, health and other factors.¹²⁷ Different limits are specified for various activities, thus permitting various amounts of noise depending on local conditions.¹²⁸

The average noise level is determined for property near the airport by computing or measuring the loudness of each aircraft operation at the particular point and then weighting the result by the time

¹²³ *Id.* at art. 9, subsection 5055.

¹²⁴ *Id.* at art. 9, subsection 5055.

¹²⁵ *Id.* at art. 10, subsection 5061.

¹²⁶ *Id.* at art. 10, subsection 5062.

¹²⁷ Wyle Laboratories, *Supporting Information for the Adopted Noise Regulations for California Airports*. 1971 (Report No. WCR 70-3(R)).

¹²⁸ Title 4, CAL. ADM. CODE ch. 9, subch. 6, art. 2, subsection 5014 (Register 70, No. 48-11-28-70).

of day when the noise occurred.¹²⁹ A noise during the evening relaxation hours is considered to cause as much annoyance as three flights during the day, while noises during sleep periods are considered as offensive as ten daytime operations. The impacts of all the noise levels are combined and averaged to yield the average daily noise level.¹³⁰ This number is compared to the limits set for the various types of property to see if a violation has occurred.

This formulation gives the airport operator the option of using several types or combinations of techniques to reduce noise impact beyond the airport boundary.¹³¹ Either through the use of variable landing fees or contracts with the airlines, the airport proprietor can encourage the use of aircraft with lower noise characteristics while at the same time discouraging noisier airplanes. By lowering the noise level of each operation, the proprietor thereby lowers the average value of noise impact.

The proprietor can also encourage the use of runways, flight paths and operational procedures that reduce the noise or increase the distance between the noise source and the noise impact boundary. Shielding (the use of natural terrain, buildings and other similar objects to act as a natural buffer) would likewise reduce the noise that reaches the measurement points and thus lower the average levels.

Since evening and nighttime operations are heavily weighted, the proprietor of an airport having many flights during these noise-sensitive periods can greatly reduce the average noise level for the area by imposing flight restrictions or a curfew. If the airport had ninety flights during the day and ten at night, the ten nighttime operations, which are considered ten times as offensive as day operations, would add more to the average noise impact level than all the day flights combined. Consequently, by eliminating these ten night flights the proprietor of the airport can substantially reduce the average impact level while decreasing his capacity by only ten per cent. Thus, the reduction of flights, particularly during the noise-sensitive periods by noisier aircraft, is an effective control of overall noise impact.

Limitations on the number of flights that can operate at an air-

¹²⁹ *Id.* at art. 1, subsection 5006(f).

¹³⁰ *Id.* at art. 1, subsection 5006(g).

¹³¹ *Id.* at art. 2, subsection 5011.

port have an additional effect on noise reduction even though not immediately obvious. Either landing fees proportional to noise levels or fines for excessive noise might encourage airlines to buy quieter planes, but the degree of incentive would depend on the policy established by the Civil Aeronautics Board. If all or a portion of the costs could be passed on to the passengers through a fare increase, then an airline would carefully weigh the potential savings in noise costs against decreased traffic, the remaining life of the noisy equipment and similar factors before undertaking a large re-equipment program.

Frequency limitations, however, cannot be passed on through a fare increase. Since the over-all noise impact for several flights by a quiet aircraft could equal the noise impact for a few flights by noisier planes, the first airline to get quiet planes could fly more often and still meet the noise criteria. Moreover, the airline with the greater frequency of service between two cities is known to get more than a proportionate share of the passenger traffic; consequently there would be a strong incentive to be the first airline to fly quieter planes.¹³²

Finally, the airport proprietor could reduce the noise level at the noise impact boundary either by physically expanding the boundary or by changing the land use to be compatible with the noise impact level. This can be done by buying land, paying for building modifications, purchasing easements and otherwise controlling land use without actual purchase.

This plan gives flexibility to the airport operator and also permits community involvement in the setting of standards. Although the minimum levels of tolerable noise impact are established by the state, the local governments are expected to work with the airport proprietor in setting levels best suited to the area.¹³³ Thus, if an area felt that economic development would be encouraged by a busy airport, it could impose only the minimum standards required by the state. If, on the other hand, the area wanted some air service but placed a higher value on quiet, then the community could set

¹³² See generally N.K. Taneja, *Airline Competition Analysis*, Sept. 1968 (Massachusetts Institute of Technology, Flight Transportation Laboratory Report R68-2).

¹³³ Title 4, CAL. ADM. CODE ch. 9, subch. 6, art. 1, subsection 5003 (Register 70 No. 48-11-28-70).

higher standards than the state's and, thus, better suited to the community's needs.

Each county has the responsibility to decide how it defines a noise problem and what airports within its jurisdiction have the problem. The county government may also require the installation of an automatic noise monitoring system at an airport if it feels the problem requires it.¹³⁴ To avoid confusion, the minimum standards and specifications for this type of monitoring system are specifically detailed in the state regulations.¹³⁵

The major problem with the California Plan is whether it violates the commerce provisions of the federal constitution. The state has attempted to avoid this question in several ways. First, the limits set for individual aircraft operations approximate those imposed by Federal Aviation Regulation Part 36 although a different measurement technique is used. Second, California contends it can act to the extent it is not prohibited by federal law.¹³⁶ Since the legislative history of Public Law 90-411 indicates that not only is there no prohibition in the federal law but rather an active encouragement of the state to pass local regulations,¹³⁷ the state's position may be valid.

Finally, the state relies on those cases upholding the right of the airport proprietor to set noise limits for operators using his facility. The California Plan makes the proprietor liable for violations of the noise standards and threatens revocation of his permit for non-compliance.¹³⁸ Accordingly, the operator imposes the curfew and bans certain aircraft instead of the state.

The issue not satisfactorily addressed is the question raised in the preceding discussion of Federal Aviation Regulation Part 36. Is the impact on interstate commerce from local noise impact regulation so great that the topic is only suited to national regulation and standards? This will probably be resolved by judicial determination in the near future.¹³⁹

¹³⁴ *Id.* at art. 8, subsection 5050(b).

¹³⁵ *Id.* at art. 14.

¹³⁶ *Id.* at art. 1, subsection 5000.

¹³⁷ See note 112 *supra*.

¹³⁸ Title 4, CAL. ADM. CODE, ch. 9, subch. 6, art. 10, subsection 5061 (Register 70 No. 48-11-28-70).

¹³⁹ The United States Supreme Court has recently granted certiorari in *Lock-*

A second major problem with the California Plan is enforcement. If the airport proprietor does not comply, the state may revoke his right to operate the airport. Although his revocation may prove to be an effective threat against a private or small operator, it is doubtful whether the revocation could be enforced against the city of Los Angeles or whether any of the major California airports would be closed.

A final problem is whether the standards are realistic for the time period proposed. Since present airports do not have to meet the minimum noise levels until 1985,¹⁴⁰ the time problem does not undermine the whole plan as does the Cranston bill. In addition, California has shown a willingness to cooperate and grant variances when required. Therefore, realistic standards and an appropriate time frame should emerge over the next few years.

In summary, even though the California Plan does pose some problems, its basic structure and intent seem far superior to the other proposals that have been made. The standards in the California Plan are based on research into the effects of noise on individuals and their well-being. In addition, it opens communication at the local level between the county government and the airport proprietor, giving the local community a greater sense of control and participation. Moreover, the proprietor is given flexibility in meeting the goals established. He can also choose the techniques best suited to his area and operations. Thus for all these reasons, the California Plan appears to be superior to other proposed solutions and would serve as an excellent basis of further planning.

V. A NEW APPROACH

Having reviewed some of the technical, political and legal aspects of the airport noise issue and having considered some of the proposed solutions, can a better plan be developed?

Appropriate goals of a proposed plan would be:

(i) The eventual elimination of noise impact on communities surrounding the airport. This is essential not only to the health and welfare of the citizens but also to the continued growth of aviation.

heed Air Terminal, Inc. v. City of Burbank, which raises these issues. 41 U.S.L.W. 3165 (Oct. 11, 1972).

¹⁴⁰ Title 4, CAL. ADM. CODE, ch. 9, art. 2, subsection 5012(c) (Register 70 No. 48-11-28-70).

Until airports are better neighbors, political pressures will block both the expansion of present facilities and the development of new sites.

(ii) The immediate reduction of noise impact through whatever means are presently available—in addition to enforced continued reduction at as rapid a rate as is technically possible. Although the plan should push technology, it must not set unreasonable noise limits or unreasonable time periods.

(iii) Economic efficiency: the plan cannot force solutions that are more expensive than the benefit received.

(iv) Legal acceptability: the implementation of the plan must be constitutionally acceptable.

(v) Political acceptability: the community should be involved in the process of setting noise impact limits and planning how these limits will be met. The local citizens should also be assured that the plan will not be modified in the future without their consent.

The California Plan meets most of these goals. Since it is directed at noise impact reduction, the first goal is satisfied. The goal of economic efficiency is partially met since the airport operator is given a choice of the methods he can use to reduce the noise impact. Thus, he can choose the technique or combination of techniques that is best suited to his area. The plan, however, does not assure that the noise limits set strike the best balance between local interests in property values and national interests in air commerce.

The California rules also partially satisfy the desire for some immediate noise impact reduction and community political involvement. The constitutionality of the plan, however, remains in doubt. The issue is not whether the California Plan would have a substantial impact on interstate commerce, but what would be the effects of the passage of similar bills by all states. Would the resulting diversification of state and local standards significantly impede air commerce among the states? To improve the California Plan, this question must be resolved.

A. The Proposal

The issue of constitutionality can be best solved by federal action. Since the matter is directly related to interstate commerce, there is no question of the power of federal authorities to enact regulations on a national scale.

In addition, the federal government through the Civil Aeronautics Board, the Federal Aviation Administration and the Department of Transportation may be in the best position to assess available technology, weigh the impact of restrictions on the airlines and the over-all economy and produce standards that balance all interests.

If the federal government adopted the primary concepts of impact reduction and the freedom of the airport proprietor to select the techniques best suited to his location, then it would approximate the first four goals outlined. But would federal action be politically acceptable to the community?

Community acceptance could be assured if the establishment of local noise levels were left to the local government as in the California Plan. The setting of local noise levels by local governments, however, would lead to the proliferation of local standards and resulting impact on air commerce that federal action was designed to avoid. On the other hand, if limits are set without local participation then the noise impact reduction effects of community involvement are lost. The problems of injustice and distrust could not be alleviated.

The conflicting needs of national standards and local involvement could be resolved by the creation of noise classifications for airports at the federal level, but with local participation in deciding the "noise class" of the airport. Four or five types of airports with different levels of allowable noise impact at the boundary could be established nationwide. Since all airports in the country would have to comply with one of the standards, the impact on air commerce would be less than if each community set its own limits. Yet, there would be freedom for the local government to select standards best suited to its own situation. The residential area could choose a quiet airport while a developing region could choose a facility with more flights and higher noise if it felt air commerce would improve the local economy.

To give the community an additional means of involvement, the initial setting of the standards for airport noise classes could involve a consumer-oriented federal agency, such as the Environmental Protection Administration, in addition to the more industry-oriented CAB and FAA. Moreover, the monitoring of the activities at the airport could be directly entrusted to the Environmental

Protection Agency or to the local government. This would assure the community that the class of airport they selected would not change in the future.

If the federal legislation included a provision for airport noise classes based on the California concepts of impact reduction, then all five of the goals set out could be achieved. By concentrating on noise impact, rather than absolute noise levels, the plan would have flexibility needed to address the peculiar problems of each area. The noise impact limits set and the timetable developed for their reduction would best consider both national and local requirements yielding both some immediate relief and over-all economic efficiency. Since the federal government would play the leading role under its commerce powers, the legality of the plan should be above challenge. Finally, through the establishment of airport noise classes, a proper balance can be achieved between the national interest in consistent regulations and the local interest in involvement and participation.

VI. SUMMARY

Although there will always be some detrimental impact on a community from the noise of a nearby airport, it can be kept to a minimum by the application of technology and legal-political approaches that are both effective and economical.

Technology can make major reductions in the land area subject to high noise levels. Judicious use of eminent domain and zoning power can eliminate the impact on areas that would still have high noise levels. Legislation is needed, however, both to push the technology and to allow area and regional planning. The standards established must be national in scope, but allow a maximum of local freedom in application to the particular problems of an area.

With the decrease in airport activity because of the economic setback of the late 1960's and early 1970's and the introduction of the larger, but quieter, wide-bodied jets, the peak of airport noise has probably passed. As the air industry recovers, quieter aircraft will replace older equipment, and the trend in noise will continue downward. The problem facing the country is the continued reduction of noise impact without allowing overreaction to noise

levels of the recent past to prompt unreasonable future restrictions and limitations.

AUTHOR'S NOTE: Subsequent to final preparation of this article for publication, Public Law 92-574, The Noise Control Act of 1972, was enacted. This charges the Environmental Protection Agency to recommend standards for acceptable noise levels from the community's viewpoint and not for the protection of commerce. Although this Act has not been discussed in this paper, the same methods of analysis apply regarding the setting of fixed noise limits or flexible noise impact standards. It is strongly recommended that the EPA adopt the latter approach.