Jet Noise in Airport Areas: A National Solution Required

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Notes

Jet Noise in Airport Areas: A National Solution Required*

I. INTRODUCTION

For at least fifteen years it has been urged that commercial airport areas be carefully zoned to provide adequate noise buffers between them and surrounding residential communities.1 Although many established residential areas2 already have severe noise problems resulting from public airports, those responsible for such land use planning continue to permit creation of residential areas within hearing range of jet noise sources.

As commercial air operations expand, and more powerful and thunderous jets begin operations, the noise could become so great that owners of such residences will incur substantial economic losses.3 Residents within a few miles of public airports may find that normal conversations, use of television, radio, and telephones, and normal sleep will become difficult or impossible. In some instances family members may even experience genuine fear.4 Moreover, not only will the number of afflicted property owners increase, but noise levels in presently affected areas will also intensify.5

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* The primary concern of this Note is the problem of jet transport noise along flight paths near public airports. The problem of the sonic boom is dealt with in the Appendix.


2. President's Panel 7. For instance, in 1966, about 150 suits concerning airport area noise were pending. One New York City suit alone involved 807 property owners. Goldstein, A Problem in Federalism, Property Rights in Air Space and Technology, in id. at 132.

3. See Batten v. United States, 306 F.2d 580, 583 (10th Cir. 1962) (homeowners lost from 40 to 55% of their property values); Martin v. Port of Seattle, 64 Wash. 2d 309, 312, 391 P.2d 540, 543 (1964); President's Panel 3-4, 120, 124. For the noise levels at which occupancy becomes brutish or impossible see note 61 infra and accompanying text. For prospects concerning increased airport noise through the 1980's, see notes 61, 78 infra.

4. These are the usual interferences with enjoyment of property upon which claims for a taking are based. E.g., Griggs v. County of Allegheny, 369 U.S. 84 (1963); City of Jacksonville v. Schumann, 167 So. 2d 95 (Fla. 1964); Martin v. Port of Seattle, 64 Wash. 2d 309, 391 P.2d 540 (1964).

5. President's Panel 3; Richards, The Control of Aircraft Noise
Pressures presently exist for a national solution to the problem, and greater federal involvement may be imminent. Therefore, this Note will examine the present and future scope of airport noise problems, the present status of legal relief afforded airport area residents, and the financial burdens involved. Suggestions will be made concerning appropriate legal remedies and equitable policies for distribution of the costs incurred because of airport noise.

II. RIGHTS OF A PROPERTY OWNER UNDER PRESENT LAW

A. INVERSE CONDEMNATION: THE PRINCIPAL REMEDY

All courts agree that some residents aggrieved by substantial noise from nearby public airports should have a legal remedy. They also agree, however, that the proper remedy is not an injunction preventing airport operations. The policy underlying this reputedly universal view is that however disturbing or damaging noisy operations may be to some airport area residents, the general social need for such operations is a paramount interest. Instead, the avenues to relief are limited to the tort the-


6. Initiative for solving problems of jet aircraft noise can effectively come only from a source not compromised by economic interests in conflict with those of the major groups now involved—engine and aircraft manufacturers, airline operators, and local governments. And there is only one source meeting this constraint which can be functionally effective—the Federal Government.

President’s Panel 4.


Thus the defense of legalized nuisance is clearly most justified when the plaintiff seeks to enjoin the public airport operations. See Loma Portal Civic Club v. American Airlines, Inc., 39 Cal. 2d 708, 794 P.2d 548 (1964); Atkinson v. City of Dallas, 353 S.W.2d 275 (Tex. Civ. App.
ories of trespass and nuisance or a constitutional theory of inverse condemnation.11

Simple trespass is an unsatisfactory theory. If the property owner sues in trespass on the basis of flights through the airspace above his land, he is thwarted by the congressional doctrine that a landowner does not own the navigable airspace above his property.12 Besides, since many afflicted property owners who reside up to four thousand feet from either side of takeoff or glide paths13 cannot allege any property rights in these paths, no trespass is committed against them.14

A simple nuisance theory is equally unsatisfactory. In most jurisdictions, public airports are considered of sufficient value to the general good to be regarded as legalized or privileged nuisances.15 This status provides immunity not only from injunctions, but also from some or all damage actions.16

14. The trespass requirement is variously referred to in the cases as a penetration to airspace, invasion, overflight, or physical penetration. 15. See Tondel, op. cit. supra note 1, at 125 and cases cited therein. But cf. McQuillan, MUNICIPAL CORPORATIONS §§ 53.24b, .47, .96 (1963).
16. It has been held that damages for nuisance will not be awarded against a public authority, unless a statute specifically allows them. The courts fear that repeated actions of this nature could halt or thwart the public activity. Transportation Co. v. Chicago, 99 U.S. 635, 640 (1878); see Richards v. Washington Terminal Co., 233 U.S. 546, 553-55 (1914) and cases cited therein. Moreover, there appears to be a reluctance on the part of some courts to award damages to plaintiffs who have suffered less than the substantial interference needed for a taking, apparently for fear of the economic burden upon the public. Anderson, Some Aspects of Airspace Trespass, 27 J. AIR L. & COMM. 341, 358 (1960); Stoeckbuck, Condemnation by Nuisance: The Airport Cases in Retrospect and Prospect, 71 Dick. L. Rev. 207, 233-35 (1967). Such fear may result in part from the nature of nuisance damages, which allow recoveries for injury to health, lost income, discomfort, extra expenses, and diminution in property value. Prosser, TORTS § 691, at 623-24 (3d ed. 1964).

There is much criticism of the view that municipal corporations are
An additional obstacle arises when recovery under a tort theory is sought against the federal government since all such actions must be brought under the Federal Tort Claims Act.\textsuperscript{17} Because there are substantial doubts as to whether such operations are within the discretionary duty exemptions of the act,\textsuperscript{18} success of such actions is less sure than under inverse condemnation.\textsuperscript{19} Similar considerations also exist with respect to some state tort claims acts.\textsuperscript{20}

Over the past decade the most successful legal theory has been inverse condemnation, under which it is asserted that aircraft noise has resulted in the taking of a private property right for a public use.\textsuperscript{21} An action in inverse condemnation differs from an eminent domain proceeding only in that the private property owner, rather than a governmental unit, institutes the action. In both, the claim is that an activity under governmental authority has taken or damaged some or all of the claimant's property rights without paying him just compensation.\textsuperscript{22}

Inverse condemnation is based on the constitutional concept of private property. This concept denotes a group of rights and

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\textsuperscript{17} 28 U.S.C. §§ 1346(b), 2680 (1964).

\textsuperscript{18} Where an agent or officer of the United States causes the tort in the exercise of official discretion, such as the creation of a sonic boom, governmental immunity is not waived. See Schwartz v. United States, 38 F.R.D. 164 (D.N.D. 1965); Huslander v. United States, 234 F. Supp. 1004 (W.D.N.Y. 1964); Wright, \textit{The Federal Tort Claims Act} 11-16 (1957). But \textit{see} Brown v. United States, 230 F. Supp. 774, 776 (D. Mass. 1964) (dictum).

\textsuperscript{19} Stoebuck, supra note 16, at 229.

\textsuperscript{20} See, \textit{e.g.}, MINN. STAT. §§ 466.01-.07 (1963); CAL. GOVT CODE §§ 815.2, 820.2.

\textsuperscript{21} In the period 1956-1966, 25 out of 27 successful actions were inverse condemnation actions. Tondel, \textit{op. cit. supra} note 1, at 123-24. \textit{E.g.}, City of Jacksonville v. Schumann, 167 So. 2d 95 (Fla. 1964); State ex rel. Royal v. City of Columbus, 3 Ohio St. 2d 154, 209 N.E.2d 405 (1965).

\textsuperscript{22} Martin v. Port of Seattle, 64 Wash. 2d 309, 391 P.2d 540 (1964).
interests which inhere in the relationship between a person and a thing, such as possession, use, and disposition. Governmental interference with this relationship may range from complete destruction to substantial damage to all or a portion of the individual’s property. It may have the general appearance of a continuing trespass, as when a public authority floods land, or it may appear as what would otherwise be a tortious impairment of a land use covenant.

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 governmental authority.

Damages recoverable for airport noise under inverse condemnation are limited to loss in market value of the plaintiff’s property. Some cases suggest that recovery in one year would not block additional recoveries in later years, if subsequently noisier operations further diminish property value substantially.

Although most American courts agree that inverse condemnation is an appropriate theory upon which to proceed, they are divided as to whether all residents who are substantially injured should recover, or whether a method of limiting the number who may recover should be used. This division is illustrated most vividly in the contrast between federal case law and that currently developing in several states.

24. United States v. Chicago, M., St. P. & P.R.R., 113 F.2d 919 (8th Cir. 1940), rev’d, 312 U.S. 592 (1941).
25. See Annot., 4 A.L.R.3d 1141 (1965) and the authorities cited therein, which are split as to the types of interferences with restrictive covenants which require a public authority to make compensation.
27. Richards v. Washington Terminal Co., 233 U.S. 546 (1914); Martin v. Port of Seattle, 54 Wash. 2d 309, 319, 391 P.2d 540, 546 (1964); see City of Jacksonville v. Schumann, 167 So. 2d 95 (Fla. 1964). For a discussion of the mechanics for choosing market values before and after the airport expands (or newer, noisier jets are added), see Note, 47 Minn. L. Rev. 889, 897-98 (1963). There is, however, little equitable appeal in awarding compensation to one whose property values actually rise because of the airport, but whose windfall is smaller than others because of increased noise. See Dunham, Griggs v. Allegheny County in Perspective: Thirty Years of Supreme Court Expropriation Law, 1962 Sup. Ct. Rev. 63, 89.
29. See note 21 supra.
B. Status of Inverse Condemnation Doctrine

1. Under Federal Law

Recovery has been allowed in the only two cases the United States Supreme Court has decided involving loss of property values due to aircraft noise. Both cases, United States v. Causby and Griggs v. County of Allegheny, stressed the penetration to airspace above plaintiffs' land and the substantial property losses caused by the nuisance of aircraft noise and vibration. Consequently, the Court has been criticized for creating ambiguity by using both trespass and nuisance language, without clearly indicating whether either or both are indispensable to recovery for a taking.

This ambiguity probably arises from the Court's search for a public use or purpose to which the plaintiff's property was appropriated Griggs seemed to hold that two different properties were taken. First, a physical trespass by means of overflights constituted a taking of airspace above the land for public use. Since this airspace was within the congressionally defined public domain, however, such a taking alone was not compensable. Second, the Court found that the aircraft noise resulted in a compensable taking of property value from the improved surface land. The Court intermingled these two property elements so that the noncompensable public use of the airspace was carried over to permit compensation for the loss in market value of the surface land. An alternative approach would have been to find that the improved surface land itself was subjected to a public use by the absorption of byproducts, such as noise and

30. 328 U.S. 256 (1945) (noise from military overflights destroyed chicken business).
31. 369 U.S. 84 (1962) (noise from commercial landings and takeoffs depreciated property values).
32. One state court which criticized this overflight requirement maintained that the language of Causby and Griggs was not intended to require actual penetration to the plaintiff's airspace as a prerequisite to recovery for a taking. Martin v. Port of Seattle, 64 Wash. 2d 309, 316-17, 391 P.2d 540, 545-46 (1964); see Batten v. United States, 306 F.2d 580, 585 (10th Cir. 1962) (dissent); Thornburg v. Port of Portland, 233 Ore. 178, 185-86, 376 P.2d 100, 103 (1962); Dunham, supra note 27, at 87; Note, 47 Minn. L. Rev. 889, 894-95 (1963).
33. See note 12 supra.
34. Although the Griggs' Court viewed airspace as the property used, it rejected the argument that the airspace was taken by Congress, declaring it to be part of the public domain. This legal effect probably would have developed without congressional action. See Faessonn, Torx § 13, at 72-73 (3d ed. 1984). There was no hint that Griggs sought
shock waves. This alternative has not yet been accepted in the airport cases.

The lower federal courts have recently followed an inverse condemnation standard which does not allow recovery for a taking of property due to aircraft noise unless a number of aircraft have physically penetrated the airspace above the land or unless the nonoverflight noise took all or most of the property value. This standard is clearly traceable to the mixture of nuisance and trespass language in Griggs. One writer has argued that such a construction should not be put upon Griggs or Causby because "there is no justification in the [Supreme Court] precedents for a requirement that the condemnor actually go upon or over or under the objector's surface land." However, the leading case of Batten v. United States justifies overflight as a prerequisite to recovery, primarily upon the basis of the trespass language in Griggs and Causby, and a pair of Supreme Court cases denying recovery where there had been no physical invasion, and the deprivation was either temporary or insubstantial.

to use the overflight factor to limit the class of homeowner-plaintiffs. Justice Black argued that if the airspace was the property taken for a public use, Congress must have declared it free to all air travel, and it would logically follow that the United States and not Allegheny County was the taker. 369 U.S. 84, 90, 91 (1962) (dissent); see 72 Stat. 740 (1958), 49 U.S.C. § 1304 (1964); Dunham, supra note 29, at 84-86. It has been suggested that public use is an evaporating requirement. Note, 58 YALE L.J. 599 (1949).

35. Such a theory may be the Court's next step, according to Stoe-buck, supra note 16, at 238.

36. In Batten v. United States, 306 F.2d 580 (10th Cir. 1962), ten homeowners sued for taking-compensation because the noise of 4,000 monthly military flights (70% jet) plus scores of maintenance high power rev-ups caused the market value of their homes to depreciate 40-55%. Id. at 583. The court stated that without an overflight to raise the claim to the dignity of a constitutional taking, the plaintiffs must be deprived of all or most of their property interests—such as rendering the homes uninhabitable. Id. at 585. Batten cites Richards v. Wash-ington Terminal Co., 233 U.S. 546 (1914), where market value diminution of about 27% was compensated as a taking without a trespass require-ment. In accord with Batten, e.g., United States v. Certain Parcels of Land, 252 F. Supp. 319 (W.D. Mich. 1966); Bellamy v. United States, 235 F. Supp. 139 (E.D.S.C. 1964); Leavell v. United States, 234 F. Supp. 734 (E.D.S.C. 1964).

37 Those who disagree with Batten rely upon the nuisance empha-sis in Griggs and Causby; those who agree rely strongly upon the tres-pass language. See Enos Coal Mining Co. v. Schuchart, 243 Ind. 692, 188 N.E.2d 406 (1963); Martin v. Port of Seattle, 64 Wash. 2d 309, 316, 391 F.2d 540, 545, (1964); Dunham, supra note 27, at 87-88.

38. Dunham, supra note 27, at 87.

39. 306 F.2d 580 (10th Cir. 1962), discussed in note 36 supra.

40. Both cases are distinguishable from Batten on several grounds:
The policy underlying the physical trespass requirement seems to have been to reduce the danger of a stifling liability upon quasi-public activities, such as railroads, by discouraging a host of suits for inconsequential interferences with private property. Although there is no express evidence in Batten that the court perceived a similar danger to air transportation, it can be inferred that the court was determined to limit recoveries for a taking to as small a number of plaintiffs as possible by insisting upon penetration to airspace.\(^1\)

The constitutional propriety of this insistence—the pivotal issue of the overflight question—is subject to serious doubts. For instance, in Richards v. Washington Terminal Co.,\(^2\) a property owner suffered depreciation in the value of his residence due to noise, vibrations, dust, and smoke from railroad operations. That portion of the loss due to the railroad's general operations which all persons in the general vicinity of the railroad had to

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\(^1\) First, plaintiffs in both cases were on weak equitable grounds. In Transportation Co. v. Chicago, 99 U.S. 635 (1878), the plaintiff suffered only a temporary, partial obstruction to access to his property. In Batten and most of the airport noise cases, however, the interferences appear to have been permanent. In United States v. Willow River Power Co., 324 U.S. 499 (1945), the plaintiff alleged that his use of adjacent public river waters had diminished after a navigation improvement affected the water level by three feet. The Court refused to classify the plaintiff's use of adjacent public waters as a property right in the constitutional sense. In Batten, the interference claimed by plaintiffs was not to the use of adjacent public river waters, but to the use and enjoyment of their privately owned residences.

\(^2\) Second, the strong language in Transportation Co. about the necessity of a physical encroachment was later diminished to the point where nuisances could not be legalized if they were of such serious character as to rise to a taking. Richards v. Washington Terminal Co., 233 U.S. 546, 553 (1914) (dictum); Baltimore & P.R.R. v. Fifth Baptist Church, 106 U.S. 317, 333-34 (1883) (dictum).

\(^3\) Third, whereas incidental damages will not lie without penetration, use and enjoyment may not be greatly or entirely deprived, nor can physical discomfort or annoyance be created without compensation if the governmental body has alternatives open to it. Richards v. Washington Terminal Co., \textit{supra} at 554-55; Baltimore & P.R.R. v. Fifth Baptist Church, \textit{supra} at 332. Whether the 55\% deprivations in Batten rise to this standard is not clear under the precedents.

\[^{41}\] Batten seems to have assumed further that sound waves and vibrations are not a penetration to surface property, although some authorities have argued otherwise. \textit{Compare} Richards v. Washington Terminal Co., 233 U.S. 546, 550-51 (1914), \textit{with} Batten v. United States, 306 F.2d 580, 585 (10th Cir. 1962).

This has been termed the “unwarranted assumption commonly found in the federal cases that sound and vibration waves cannot be considered a ‘physical invasion’ . . . .” Martin v. Port of Seattle, 64 Wash. 2d 309, 312 n.4, 391 P.2d 540, 543 n.4 (1964).

\[^{42}\] 233 U.S. 546, 555 (1914).
suffer was held not compensable. The Court believed that liability for general losses could bring railroad operations to a standstill, even though it also admitted that such a policy would be a hardship to the private landowner.\(^4\) However, the Court ordered compensation to be paid for that portion of the property loss which was special to the plaintiff because of the location, design, and manner of operation of the railroad facilities near his property. Moreover, in addition to Richards, cases such as Baltimore & P.R.R. v. Fifth Baptist Church\(^4\) and United States v. General Motors\(^4\) have been cited to show a clear trend by the Supreme Court toward a nonphysical concept of property taking, and away from the trespass requirement.\(^4\)

If Batten was correct in finding a physical invasion to be a constitutional prerequisite to a taking, Richards would appear at a minimum to create an exception under which no physical invasion of property is needed if the property damages are special. The rationale behind this proposition as applied to airports is that, in effect, the governmental authority selects the plaintiff’s property and aims the damage at it, as opposed to creating the general damages suffered by all who live in the airport vicinity.\(^4\)

2. Under State Law

Some state courts have followed the Batten reasoning that there can be no taking without an overflight.\(^4\) Others have held there is no logic in allowing recovery for a taking to one individual whose property was overflown, while denying recovery to his neighbor, a wingtip’s distance away, when both suffer

\(^4\) Ibid. The Court stated that economic necessity outweighed the hardship to the private landowner.

\(^4\) 108 U.S. 317 (1883). The Court held that although the railroad activities creating noise, vibrations, and soot were authorized by Congress and would ordinarily be shielded from nuisance suits, the railroad had unnecessarily picked a site for its activities which injured the plaintiff’s property. Since other sites were available, recovery was allowed in nuisance for property value losses plus discomforts. Id. at 535.

\(^4\) 323 U.S. 373 (1945).

\(^4\) Stoebuck, supra note 16, at 215-17, 224.

\(^4\) Such a standard raises the question whether government licensing of jets with sound intensities so high as to invariably reach all residences within a given noise pattern along governmentally prescribed takeoff and landing paths equals an infliction of special damages upon those residences. See note 135 infra and accompanying text.

\(^4\) City of Atlanta v. Donald, 221 Ga. 135, 143 S.E.2d 737 (1965); Bowling Green-Warren County Airport Bd. v. Long, 366 S.W.2d 167 (Ky. Ct. App. 1962); State ex rel. Royal v. City of Columbus, 3 Ohio St. 2d 154, 209 N.E.2d 405 (1965).
equal property value diminutions due to aircraft noise. Because twenty-five states have constitutional clauses which prohibit taking, destroying, or damaging private property for public use without compensation, these positions may not be conflicting. Thus some jurists believe that a prohibition upon damaging private property would allow recovery for inverse condemnation without a penetration, whereas a prohibition only upon taking would require a physical entry. However, at least one interpretation of a constitution containing both provisions has rejected this view. The Supreme Court of Washington allowed recovery without an overflight solely on the basis of the taking provision, finding the damaging provision unnecessary to the result. Moreover, although lacking a damaging clause in its constitution, the Oregon Supreme Court has permitted recoveries for inverse condemnation in the absence of overflights, and decisions in several other states, dealing with analogous problems, indicate that those jurisdictions would reach the same result.

The best explanation of the judicial dichotomy regarding the overflight requirement can be obtained by examining the

49. Martin v. Port of Seattle, 64 Wash. 2d 309, 316, 391 P.2d 540, 545 (1964); see City of Jacksonville v. Schumann, 167 So. 2d 95 (Fla. 1964); Thornburg v. Port of Portland, 233 Ore. 178, 198, 376 P.2d 100, 109 (1962); Dunham, supra note 27, at 87.
50. 2 Nichols, Eminent Domain § 6.1(3) (1963); see, e.g., McKee v. City of Akron, 176 Ohio St. 282, 284, 199 N.E.2d 592, 593 (1964); Martin v. Port of Seattle, 64 Wash. 2d 309, 391 P.2d 540 (1964).
54. At least six states have decided cases on the basis of inverse condemnation by nuisance—odors, noise—without trespass. Stoebuck, supra note 53, at 224-27 and authorities cited therein. In addition, New Jersey has held that no trespass requirement is necessary for a compensable taking of property value by highway traffic noise. Board of Educ. v. Palmer, 88 N.J. Super. 378, 212 A.2d 564 (1965). In Enos Coal Mining Co. v. Schuchart, 243 Ind. 692, 188 N.E.2d 406 (1963), Griggs was construed as requiring no trespass, and recovery was allowed for vibrations alone. Id. at 695-96, 188 N.E.2d at 407-08. Iowa law seems to be that any highway changes which interfere with access, light, air, or view are compensable takings without physical appropriation. 2 Nichols, op. cit. supra note 50, at § 6.4441(3) and cases cited therein.
underlying policy. Implicit in the Batten decision, and express in the older railroad cases which discussed the trespass requirement, was the policy of limiting liability for public activities, despite acknowledged hardship to injured parties. Such a limitation could flow rationally only from a fear that permitting wider recoveries would create serious adverse effects upon the national economic interest by unduly burdening public activities.

The issue thus becomes whether the economic costs created by jet transport noise should be borne in general by afflicted home owners, or whether they should be imposed upon some larger group, such as airport authorities, state governments, or the federal government. Those who strongly believe that imposing the burden upon a larger body would be economically undesirable in terms of potentially adverse effects upon air transportation would be likely to choose an overflight requirement. Others, who assign larger values to the protection of private property rights, or who believe that the costs of public air transportation should reside primarily with those who most enjoy its benefits, will tend to reject the overflight rationale.

To answer such a policy question, it is necessary to consider the cost burdens involved. Since no decision attempting to undertake such an inquiry has been found, it appears that courts have taken the relative significance of cost burdens to be axiomatic. To evaluate these covertly held positions, the total scope of the costs involved must be understood. Therefore, an inquiry into the present status of aircraft and airport noise, its effects upon man, its future potential, and its physical remedies must be undertaken.

III. A DIAGNOSIS AND PROGNOSIS OF AIRPORT NOISE

A. Human Response to Noise

Aircraft noise decisions have not been guided by scientific studies of either individual tolerances or community outrage.

55. The denial of reparations should be based on reasons of policy which are strong enough to counterbalance the constitutional demand that reparations be paid. Thornburg v. Port of Portland, 233 Ore. 178, 192, 376 P.2d 100, 106 (1962); see Richards, The Control of Aircraft Noise Perceived at Ground Level—Technical Aspects, 66 ROYAL AERONAUTICAL SOC'y 45, 47 (1964).


58. City of Jacksonville v. Schumann, 167 So. 2d 95, 102 (Fla. 1964).
Courts have relied instead upon evidence of interference with sleep, thinking, conversations, radio and television, telephone use, and creation of fear. Although evidence has generally been limited to witnesses and an occasional report of indoor decibel levels during aircraft operations, research studies of the effects of jet noise reveal features which have important legal significance.

59. A decibel is a physical measure of the faintest audible sound and the smallest degree of difference in loudness detectable by human hearing. WEBSTER'S NEW INTERNATIONAL DICTIONARY 585 (3d ed. 1965). Technically it is a measure of sound pressure variations in normal atmospheric pressure of .0002 microbars (microbar = pressure of about 1/1,000,000 normal atmospheric pressure). PETERSON & GRoss, HANDBOOK OF NOISE MEASUREMENT 3 (1960); see MEE, SOUND 134 (1950).

Aircraft noise is frequently reported in “perceived noise decibels” (PNdb.) which is an internationally adopted standard measure of the subjective loudness of the noise. New York, London, Moscow, and other cities have established airport noise maximums of 100 to 112 PNdb., but many feel that 100 PNdb. is the maximum noise tolerable because above that level, hostility to noise rises rapidly. See PRESIDENT'S PANEL 4-5 (1966); Beranek, Kryter & Miller, Reaction of People to Exterior Aircraft Noise, Noise Control, Sept. 1959, p. 25; Mel’nikov, Noise Generated on the Ground During Takeoff and Landing of the Tu-124 Passenger Aircraft, 11 SOVIET PHYSICS-AcouSTICS 170 (1965); Richards, supra note 55, at 45.

60. E.g., Griggs v. Allegheny County, 369 U.S. 84 (1962) (unable to sleep, phone, converse); State ex rel. Royal v. City of Columbus, 3 Ohio St. 2d 154, 209 N.E.2d 405 (1965) (cracked plaster, disrupted sleep, and inaudible TV); Martin v. Port of Seattle, 64 Wash. 2d 309, 391 P.2d 540 (1964) (unable to sleep, converse, hear TV and radio, fear created); see McPike, Recommended Practices for Use in the Measurement and Evaluation of Aircraft Neighborhood Noise Levels, Soc'y of Automotive Engineers Paper 650216, at 7 (April 12-15, 1965) [hereinafter cited as SAE PAPER].

61. The following is a reference basis for evaluating individual responses to noise:

<table>
<thead>
<tr>
<th>Psychological Response</th>
<th>db.</th>
<th>PNdb.</th>
</tr>
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<tbody>
<tr>
<td>Quiet</td>
<td>66</td>
<td>82</td>
</tr>
<tr>
<td>Noisy</td>
<td>93</td>
<td>108</td>
</tr>
<tr>
<td>Intrusive</td>
<td>96</td>
<td>115</td>
</tr>
</tbody>
</table>

Robinson, Bowsher & Copeland, On Judging the Noise from Aircraft in Flight, 13 Acustica 324, 332 (1963). It has been found that continuous neighborhood exposure to levels above 85 db. leads to vigorous community protest and action. PETERSON & GRoss, op. cit. supra note 59, at 74-75. Above 105 PNdb., community hostility to aircraft noise rises rapidly as the number of occurrences increases. Kryter, Evaluation of Psychological Reactions to Aircraft Noise, in PRESIDENT'S PANEL 13, 19, 22; PRESIDENT'S PANEL 5. It is frequently noted that the advent of the SST and other super jets will involve a large increase in exposure to noise above the 100 PNdb. range. See Ingerslev, Measurement and Description of Aircraft Noise in the Vicinity of Airports, 3 J. Sound and Vibration 95 (1966); Symposium—SST Development Program, 30 J. AIR L. & COM. 1, 14 (1964); Tanner & McLeod, Preliminary Measurements of Take-Off and Landing Noise From a New Instrument Range,
Recent NASA tests have demonstrated that a person three miles from the takeoff point and one thousand feet to the side of the flight path of a tested supersonic transport62 (a military SST) would perceive a noise louder than Niagara Falls—nearly the equivalent of firing a machine gun at close range.63 Even when shouting, audibly perfect conversations with persons standing six inches away would be impossible.64 The noise would be much greater than the level at which abstract thinking becomes impossible for many humans.65 It would be above the level at which the United States Air Force requires its personnel to wear earplugs.66 Under normal atmospheric conditions it is not likely that sound perceived one thousand feet to the side of the flight path would reach the range of tolerability67 until a climbing plane had traveled at least five miles from the start of takeoff.68 Moreover, it can be determined quite precisely

<table>
<thead>
<tr>
<th>Noise Source</th>
<th>DB</th>
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<tbody>
<tr>
<td>Breathing</td>
<td>10</td>
</tr>
<tr>
<td>Breeze</td>
<td>20</td>
</tr>
<tr>
<td>Busy Traffic</td>
<td>70</td>
</tr>
<tr>
<td>Machine Gun, close range</td>
<td>130</td>
</tr>
<tr>
<td>Jet at takeoff</td>
<td>140</td>
</tr>
<tr>
<td>Space Rocket</td>
<td>175</td>
</tr>
</tbody>
</table>


64. The courts frequently mention interferences with conversations and telephoning as elements of serious interference with property use. Telephone use interference is as follows:

<table>
<thead>
<tr>
<th>Interference Level</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 60 db.</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>60-70 db.</td>
<td>Difficult</td>
</tr>
<tr>
<td>Above 75 db.</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

In addition, audibly perfect conversations could not take place between persons six feet apart until the interfering noise was reduced to 49 db. Peterson & Gross, op. cit. supra note 59, at 14, 71.


67. Above 105 PNdb, community hostility to airport noise rises rapidly. President's Panel 5.

68. The 100 PNdb. level extends about 30,000 feet beyond the start of takeoff. Galloway, Measurement and Description of Aircraft Noise Exposure Around an Airport, in President's Panel 28, 34. It has been argued that it would be unreasonable to expect a local airport to acquire land within the 100 PNdb. blanket since this would require purchasing a belt of residential property 7 1/2 to 10 miles long and a few thousand feet wide.
where the offensive noise contours will exist at a given airport.69

Present jetliners create sufficient noise upon takeoff and landing to cause wide community agitation and lawsuits by those residing near airports.70 The attitude of the community toward the air transport industry has been said to control its tolerance of increased jet noise.71 However, because of human physiological characteristics, there is a relatively minimal level at which noise causes speech interference, pain, and hearing loss, and is said to "attack the biological organism."72 Therefore, it would seem fair to infer that favorable community attitudes can have only marginal effects upon establishing maximum noise levels for reasonable aircraft operation in airport vicinities.73

Furthermore, it has been clearly established that as the frequency of aircraft takeoffs and landings increases, the average amount of noise tolerated from each aircraft substantially decreases.74 This psychological factor greatly complicates the problem of airport area noise as the magnitude of jet transport operations increases.

B. Jet Aircraft Noise Potentials

Given a society with such vulnerabilities to noise, the important considerations become the noise levels which will be created during the next generation of jet aircraft, and the portion of the population which will be exposed to them. Jets currently in commercial service project substantial blasts of noise along their takeoff and landing paths for several miles beyond

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70. See President's Panel 3. For example, the margin between community complaint and outrage is 90-105 FNdb. Id. at 5. For the possibility of psychoses through sleep interruptions, see N.Y. Times, March 13, 1966, p. 66, col. 4; cf. 2 Bolt, Beranek, & Newman, op. cit. supra note 65, at 148.
72. 2 Bolt, Beranek & Newman, op. cit. supra note 65, at 148; Peterson & Gross, op. cit. supra note 59, at 9, 75.
73. If hearing loss and speech and telephone interference have readily measurable limits, and community psychological response is quite constant, favorable community attitude is a slim reed to rely upon in planning future airports and their operations. See notes 62-65 supra.
74. With one occurrence per day, community noise tolerance will allow up to 115 FNdb. before vigorous individual complaints and potential concerted community action appear. With 64 flights per day this drops to 97 FNdb., and with 128 flights per day the tolerability level falls to 94 FNdb. Kryter, op. cit. supra note 61, at 22.
airports. These areas can be determined well in advance of actual commercial flights, based on the findings that the noise pattern created on takeoff is conic in shape, with the peak at the point downrange at which the jet finally attains sufficient altitude to substantially dissipate the noise before it reaches the ground. [See fig. 1] To minimize this lengthy pattern of noise exposure, some airports now require jet craft to make a sharp, climbing turn during takeoff and/or a sharp cutback in thrust during the climb. Such procedures may not be possible with the future super jets because they will require generation of far greater thrusts.

Landing, rather than takeoff, presents the major noise problem for many airports, especially those without over-water landing paths. Because landing approaches are generally less steep than climbouts, greater area in the vicinity of a landing path is exposed to low altitude jet noise for a longer period of time than on takeoffs. In addition, if special maneuvers cannot be used, the greater noise produced by future turbojets and turbofans will aggravate these problems.

Although no significant technological breakthroughs in controlling the source of jet engine noise are foreseen, a vast expansion of commercial air transport into supersonic (SST), hypersonic (HST), and suborbital cargo rockets is probable.

76. McPike, supra note 60, at 8, fig. 9.
77. Ruby, Operational Procedures, in President's Panel 102-03.
78. Id. at 104. Such operating procedures as preferred runaways, turns from heavily populated communities, and high descents will not adequately solve the noise problem. Environmental compatibility is the only effective solution. Bakke, Air Traffic Control and Flight Procedures, in President's Panel 86, 88. In addition, offloading cargo in order to reduce thrust is uneconomical. Tyler, A New Look at the Aircraft Noise Problem, SAE Paper 911B, at 3 (Oct. 5-9, 1964).
79. See Ingerslev, supra note 61, at 95.
80. President's Panel 6; Symposium, supra note 61, at 44. Hush kits can be used to muffle conventional jet noise somewhat, but these reduce thrust during takeoff, which necessitates costly offloading and a longer period of climb, thus exposing greater numbers of people on the ground to the noise. Steeper takeoff and landing paths are often recommended to minimize the period of low altitude flight over a community. This necessitates acquisition of more land in the airport vicinity because takeoff thrusts will need to be greater and noisier. See Tyler, supra note 79, at 9, 13.
81. U.S. News & World Report, Jan. 30, 1967, p. 64; See Martin v. Port of Seattle, 64 Wash. 2d 309, 317, 391 P.2d 540, 546 (1964); President's Panel 3; Ziegenfelder & Wilkinson, Jr., Super Airport Planning,
Key: The area within the large cone is the ground area subjected to 105 PNdb. during takeoff of a commercial turbojet scheduled and fueled for a trip of over 2000 miles. The smaller cone (shaded area) indicates the area subjected to 105 PNdb. for a trip of less than 2000 miles. For a turbofan aircraft, subtract 5 PNdb. See Kryter, Evaluation of Psychological Reactions of People to Aircraft Noise, President's Panel 13, 25 (1960).
The engines on these aircraft can be expected to create substantially greater airport vicinity noise problems. Moreover, as the number of takeoffs and landings triples in the next decade, and a thousand planes are added to current air traffic each month, community tolerance of aircraft noise will undoubtedly decline. Such expansions of air commerce, however, are compelled by national and international economic considerations of large magnitude.

C. COSTS: SCOPE AND DISTRIBUTION

A recent test has revealed that an SST creates a noise carpet one thousand feet wide for a distance of three miles beyond the start of takeoff, which is thirty per cent greater than that deemed acceptable. The point along the flightpath at which the sound carpet diminishes to tolerable levels was not reported. If such a craft were flown from La Guardia Airport, assuming no compatible land use areas to have been created along the takeoff path, some residents of Jackson Heights, one and one-half miles beyond the end of the runway, would be exposed to sound levels well beyond the element of interference with conversation, sleep, telephoning, and other factors which have been material to recovery for inverse condemnation.

If recovery were allowed to all these residents whose property values substantially decreased as a result of such SST operations,
the immediate costs to the defendant could prove very substantial.\textsuperscript{87}

In determining how to distribute such immediate costs, those parties who clearly should not bear them should be eliminated from consideration. The private homeowner who loses up to fifty-five per cent of his property value is least able to bear the cost.\textsuperscript{88} In contrast to some foreign decisions,\textsuperscript{89} the American courts have not imposed the burden of damages upon the commercial airlines whose aircraft produce the noise.\textsuperscript{90} This approach is clearly justified, since the airlines are not at liberty to select airport sites, approaches, or flight paths: Commercial aircraft are certified and controlled in their landing and takeoff maneuvers by the Federal Aviation Agency.\textsuperscript{91} It has also been suggested that where several commercial airlines use the same public airport, plaintiffs would be under an extreme handicap in attempting to identify the exact sources of the noise which constitute the taking.\textsuperscript{92}

Aside from cases involving military air fields, the defendant is almost universally the public airport authority.\textsuperscript{93} Arguably, however, Griggs has not closed the door to making the United States a defendant in suits for inverse condemnation.\textsuperscript{94} Given the fact that substantial national benefits are derived from the exist-

\textsuperscript{87} Odell, \textit{Jet Noise at John F. Kennedy International Airport}, in \textit{President's Panel} 162, 166.

\textsuperscript{88} The plaintiffs lost 40.8\% to 55.3\%—$4,700 to $8,800—in property value in Batten v. United States, 306 F.2d 580, 583 (10th Cir. 1962).

\textsuperscript{89} For the methods of handling the airport noise problem elsewhere, see Caplan, \textit{The Control of Aircraft Noise Perceived at Ground Level—Legal Aspects}, 68 \textit{Royal Aeronautical Soc'y} 49, 50 (1964) (England); Mel'nikev, \textit{Noise Generated on the Ground During Takeoff and Landing of the Tu-124 Passenger Aircraft}, 11 \textit{Soviet Physics-Acoustics} 170 (1965) (U.S.S.R.); Time, March 18, 1966, p. 67 (France).


\textsuperscript{91} "Planes do not wander about in the sky . . . . They move only by federal permission" which is "intensive and exclusive." Northwest Airlines, Inc. v. Minnesota, 332 U.S. 292, 303 (1944) (concurring opinion). See note 12 supra.

\textsuperscript{92} Fleming, supra note 66, at 601.

\textsuperscript{93} See Griggs v. Allegheny County, 369 U.S. 84 (1962). In dissent, Justices Black and Frankfurter argued that since Congress had financed and induced local governments to create airports in pursuit of a national and international air system, to so emburden local units could frustrate this congressional purpose and place an unfair proportion of costs upon local agencies. \textit{Id.} at 94.

\textsuperscript{94} Griggs has been read to hold that the local airport authority is a proper party defendant, but that there may also be others. Dunham, \textit{Griggs v. Allegheny County in Perspective: Thirty Years of Supreme Court Expropriation Law}, 1962 \textit{Sup. Ct. Rev.} 63, 86.
ence and growth of national and international air commerce,\textsuperscript{95} assumption by the federal government of the costs of noise damage to private property does not seem inequitable. Moreover, a broad federal tax basis would permit the federal government to spread these costs nationally. Even if the local airport authority is the sole defendant as in \textit{Griggs}, however, it will have to internalize the inverse condemnation costs and either attempt to shift them to the airlines and hence to airline customers or seek to offset part of them through solicitation of increased federal and state subsidies.\textsuperscript{96} Therefore, if costs should be proportionate to the control possessed and benefits derived, the federal government should be a defendant.

\section*{IV. PROPOSED REMEDIES}

\subsection*{A. ZONING}

The main thrust against the argument for federal financing of the costs of increased airport noise is based upon supposed local responsibility for zoning. It is contended that a governmental unit cannot properly be held accountable for such property losses unless it had zoning control when residential encroachments upon the immediate airport vicinity came into being.\textsuperscript{97} And since Congress has traditionally adhered to a policy of leaving development of local airports to local governmental units,\textsuperscript{98} some writers have concluded that the federal government should be exempt from economic responsibility for the noise problem.\textsuperscript{99}

This argument, however, is questionable upon a number of grounds. Congress has long provided financing, standards, and research for air transportation.\textsuperscript{100} In fact, the air transport sys-

\begin{footnotesize}
\textsuperscript{95} See note 84 \textit{supra}; S. Rep. No. 446, 88th Cong., 1st Sess. 16 (1963); cf. Richards, \textit{supra} note 55, at 45, 47-49.

\textsuperscript{96} Dygert, \textit{An Economic Approach to Airport Noise}, 30 J. Air L. & Com. 207, 215-16 (1964). Since the states generally grant zoning power to local units, they have retained little control of local zoning situations. See ANDERSON \& ROSWIG, \textit{PLANNING, ZONING, AND SUBDIVISION} 178-79 (1966).

\textsuperscript{97} See Tondel, \textit{Noise Litigation at Public Airports}, in \textit{PRESIDENT'S PANEL} 117, 119-120; Dygert, \textit{supra} note 96, at 216.


\textsuperscript{99} Dygert, \textit{supra} note 96, at 215-16; see Tondel, \textit{op. cit. supra} note 97, at 119-21.

\end{footnotesize}
tem is historically a creature of the federal government. The commercial and defense benefits of the airport system are not limited to airport communities themselves, but are directly or indirectly realized by the nation as a whole. Furthermore, burdening local governmental units with such immediate costs is expected to curtail severely local funds available for traditionally local items such as schools, hospitals, and roads. Such a curtailment could serve to enlarge the federal role in financing such local facilities. If this should result, the actual financing of airport noise costs would ultimately, though indirectly, be borne by the federal government.

It is highly questionable whether local authorities are capable of providing adequate land use planning in airport areas. As zoning plans are being shaped, it is necessary to develop noise contour studies of engines during their research and development stages, in order to intelligently anticipate zoning needs. Local zoning authorities have neither the facilities nor the power to measure and control the noise sources being developed. The financing of much of the research and the eventual certification of new aircraft and engines is under the aegis of the FAA. Moreover, since the flight paths of the noise sources are controlled by the FAA, local zoning plans are adequate only insofar as they are able to respond to flight path changes over which local government has no control.

In addition, local airport authorities often have extraterritorial zoning powers only within severely circumscribed limits. For instance, some states grant such power only within one-quarter to two miles of airport boundaries. Another complication tending to neutralize the power of local authorities to zone airport areas effectively is the division of zoning power in

102. See text accompanying notes 84 supra and 115 infra; Burkhart, SST—To Build or Not To Build?, New Republic, Dec. 24, 1966, p. 12.
103. Goldstein, A Problem in Federalism, Property Rights in Air Space and Technology, in President's Panel 132, 142.
104. Perhaps the same demand which caused federal funds to become available for impacted defense areas would impel federal funds for areas with large inverse condemnation costs.
106. See President's Panel 3, 147.
such areas among several local governmental units.\textsuperscript{108}

It may be further suggested that wherever airports are located, access freeways soon follow; and wherever freeways go, housing developers follow. Since housing developers often carry considerable weight with local zoning authorities, local units are sometimes inherently incapable of prescribing adequate zoning for airport areas.\textsuperscript{109}

One possible solution to local inability to zone airport areas effectively would be to require the FAA to include compatible land use zoning as a mandatory criterion for grants to local airport authorities.\textsuperscript{110} Should such a proposal be effectuated, the federal government will clearly bear a major, though indirect, responsibility for zoning of future airport areas.\textsuperscript{111} Although some believe the federal government lacks the constitutional

\textsuperscript{108} The Port of New York Authority was unable to prevent thousands of homes from being built within the shadow of JFK International Airport recently. At Dulles International Airport, zoning authority resides in two counties which have refused FAA requests to compatibly zone the area. This is a “prime example of the problem of divided jurisdictions” which supports the need to place adequate zoning control in the hands of local airport authorities. Odell, op. cit. supra note 87, at 166; President's Panel 7. Adequate federal noise guidelines for airports which are not yet afflicted are necessary today in order to assure large savings in the future. See Goldstein, op. cit. supra note 103, at 141.

\textsuperscript{109} Tyler, supra note 79, at 1; see President's Panel 3-4; Tondel, op. cit. supra note 97, at 120.

\textsuperscript{110} The same suggestion has been made concerning certification of new aircraft. Goldstein, op. cit. supra note 103, at 132. Under 14 C.F.R. §§ 151.9-11 (1967), federal funds or grants for airport construction or repairs are presently given only if the airport sponsor acquires or promises to acquire “runway clear zones.” As defined in 14 C.F.R. § 77.27(b)-(c) (1967) these zones include no noise requirement but pertain only to flight safety. In March 1966, the FAA proposed to amend its regulations to require applicants for federal funds to show that their land acquisitions would meet requirements of the National Airport Plan for the next five years, but here again noise factors were not included. 31 Fed. Reg. 4523 (1966). Because funds available for distribution to public airports were less than requests submitted, priorities were established for fiscal 1967. Again noise requirements were not included. 31 Fed. Reg. 7766 (1966). Such funds are distributed under 49 U.S.C. §§ 1101 (3) (B), 1103 (1964), and these seem to permit acquisitions for purposes of flight safety only. Thus, noise costs currently reside outside the concern of the federal government.

\textsuperscript{111} See 72 Stat. 749 (1958), 49 U.S.C. § 1348(c) (1964); 78 Stat. 161 (1964); 14 C.F.R. § 91.87(g) (1967); H.R. Rep. No. 1002, 88th Cong., 1st Sess. 6 (1963); Fox, Consideration of the Problems Arising From the Effects of Jet Engine Sounds and Recommended Solutions, in President's Panel 157, 158-9; Randall, Possibilities of Achieving a Quiet Society, in President's Panel 143, 144-48. But see FAA, 1965 National Airport Plan 14-16.
power to directly zone future airport areas,\textsuperscript{112} one writer has suggested that such a power may be found within the commerce clause.\textsuperscript{113} In addition, some decisions suggest that federal zoning power might be grounded in the war powers, the commerce clause, or by analogy, the power over navigable rivers.\textsuperscript{114} Since the national commercial jet fleet is ready for military service on thirty-six hour notice as the Civil Reserve Air Fleet,\textsuperscript{115} the war powers argument may have merit.

By whatever governmental unit, effective zoning appears to be an attractive solution to the noise problem because it can create compatible land uses in airport vicinities.\textsuperscript{116} However, it is of little value to those residential areas which already have severe noise afflictions,\textsuperscript{117} since "zoning out" such established residences amounts to a taking for which compensation must be paid.\textsuperscript{118}

\begin{itemize}
  \item \textsuperscript{112} Randall, op. cit. supra note 111, at 143.
  \item \textsuperscript{113} Goldstein, op. cit. supra note 103, at 134.
  \item \textsuperscript{114} It seems to be firmly established that Congress may enact laws and grant regulatory discretions repugnant to state or local zoning laws, and that the latter must yield. The cases have involved federal construction projects under the war power or power over navigable rivers. Although the nation is not actually at war, federal activity can be deemed preparation for war. See \textit{1 Yokley, Zoning Law and Practice} § 39 (2d ed. 1953), and cases cited therein.
  \item \textsuperscript{116} Forest preserves, parks, artificial lakes, sewage disposal plants, industries, agricultural uses, reforestation projects, commercial centers, and riding academies have been suggested as compatible land uses. FAA, 1965 \textit{National Airport Plan 15}; \textit{League of Minn. Municipalities, Zoning Guide for Minn. Cities and Villages} 16-17 (1952); Strunk, \textit{An Analysis of the Advantages \& Difficulties of Zoning Regs. for Chicago O'Hare International Airport}, in P\textit{resident's Panel 151, 155-56}; \textit{Webster, Urban Planning and Municipal Policy} 388-89 (1958); Goldstein, op. cit. supra note 103, at 136-37.
  \item \textsuperscript{117} See Odell, op. cit. supra note 87, at 166. Perhaps future national or state statutes could be drawn whereby anyone building noise-vulnerable structures within a prescribed radius of national or international airports would be absolutely liable to their owners for noise-caused diminutions in property values. If inverse condemnation laws of the states and nation do begin to emburden the air transport system, Congress may have power under the commerce clause to impose such liability upon those builders who violate prescribed noise-buffer radii.
  \item \textsuperscript{118} 2 \textit{Nichols, Eminent Domain} § 6.35 (3d ed. 1963); Randall, op. cit. supra note 111, at 149. 1 \textit{Yokley, op. cit. supra} note 114, § 150. However, amortization ordinances exist wherein the owner is ordered to terminate his nonconforming use after a period as long as the remain-
B. Alternatives Where Zoning is Not Feasible

For airport areas already surrounded by incompatible land uses, possible solutions, especially condemnation, promise to be of great immediate expense. The cost-benefit analysis clearly justifies placing much of the cost burden of airport area noise upon the federal government, particularly if recommendations for the federal government to take direct or indirect control of the final feature—land zoning—are adopted. If that time comes, the federal government will be in a controlling position insofar as responsibility for all aspects of the noise problem is concerned.

One suggestion for alleviating the local incidence of the cost burden would entail a congressional amendment to the Federal Aviation Act to make the United States solely liable for all takings due to jet noise at public airports. Presumably, the commerce and war powers would permit Congress to preempt all state remedies. Although Congress has no power to declare there is no taking in cases such as Griggs, it seemingly has the power to determine who should be liable for the costs. The same result could be obtained indirectly through adequate subsidies to local airport authorities.

Some alternative steps which would at least partially ameliorate the jet noise problem in present airport areas include such measures as systematic purchase of residences by airport authorities in anticipation of future expansion of operations; subsidizing soundproofing for residences through direct payments to afflicted residents, or by allowing tax deductions to those who do so privately; or planting sound absorbing shrubbery to

119. It is noteworthy that the power of condemnation is widely used by the federal government in connection with military airports. Randall, op. cit. supra note 111, at 145.
120. Goldstein, op. cit. supra note 103, at 140-42. For instance, the Tucker Act already permits suits in federal courts against the United States for constitutional claims up to $10,000. 28 U.S.C. § 1346(a)(2). Congress could declare that actions for property diminutions due to jet noise must be exclusively against the United States.
121. President's Panel 7. One of the largest American airports has systematically been purchasing residential land in those areas where PNDb. is expected to be over 105, hoping to recoup costs by resale for compatible uses. One authority, however, sees the new generation of jets as potentially creating astronomical costs because of the size of noise-affected (100 PNDb.) areas. Odell, op. cit. supra note 87, at 166.
122. See Dygert, An Economic Approach to Airport Noise, in President's Panel 107, 111; Richards, The Control of Aircraft Noise Perceived at Ground Level—Technical Aspects, 68 Royal Aeronautical Soc'y 45.
reduce some of the noise.\textsuperscript{123} Technological breakthroughs, although not expected to materialize in time to solve the immense problems presently developing, must still be pursued for whatever marginal or substantial results they may ultimately produce.

All such remedies considered, the best view seems to be that compatible land usage zoning for future airport areas and condemnation and repurchase for presently impacted areas is the only remedy effective on a large scale.\textsuperscript{124}

C. The Appropriate Legal Remedy for the Individual Property Owner

Absent a comprehensive land use program it would be unjust to deny recovery to those homeowners who are severely damaged by jet noise, but who do not live directly beneath flight paths. This is especially true as long as public funds underwrite the noise-created costs of their neighbors whose airspace was penetrated, and of others who receive the market value of their property under various condemnation programs designed to solve the noise problem. In addition, a few state courts—potentially all those with damaging provisions in their constitutions plus some others—currently recognize the "logic and fairness"\textsuperscript{125} of permitting recovery without overflights. In addition to these considerations, the policy underlying the \textit{Batten} line of cases—fear of the economic burden to governmental activities—is not persuasive in determining the most appropriate legal theory.

An underlying policy judgment that the costs of inverse condemnation recoveries are prohibitive, is unmindful of the viable alternatives open to government. Failure of government to take these less costly steps should not operate to deny the more costly recovery at law. In light of the predictable nature of the damages involved,\textsuperscript{126} a judicial assumption that recoveries in inverse condemnation would be unlimited is inappropriate.

\footnotesize{(1964); Robinson, Bowsher & Copeland, \textit{On Judging the Noise from Aircraft in Flight}, 13 A\textsc{c}ust\textsc{ica} 324 (1963); Tyler, \textit{A New Look at the Aircraft Noise Problem}, SAE Paper 911B, at 18 (Oct. 5-9, 1964).}

\footnotesize{123. Dygert, op. cit. supra note 122, at 111.}

\footnotesize{124. \textsc{President}'s \textsc{Panel} 7; Strunk, \textit{Airport Zoning}, 50 A.B.A.J. 345 (1964); Fleming, \textit{Aircraft Noise: A Taking of Private Property Without Just Compensation}, 18 S.C.L. Rev. 593, 596 (1966).}

\footnotesize{125. Dunham, \textit{Griggs v. Allegheny County in Perspective: Thirty Years of Supreme Court Expropriation Law}, 1962 \textsc{Sup. Ct. Rev.} 63, 88; see Thornburg v. Port of Portland, 233 Ore. 178, 198, 376 P.2d 100, 109 (1962); Fleming, supra note 124, at 606.}

\footnotesize{126. See notes 75-76 supra.
Viewed alone, inverse condemnation proceedings entail enormous costs.\textsuperscript{127} However, less costly solutions, such as zoning and condemnation, are available to the governmental units involved. It has even been suggested that condemnation and resale for compatible uses would result in long term profits.\textsuperscript{128} In addition, since the present status of technology permits a clear delineation of the zones near an airport which will be affected by flight procedures of given aircraft,\textsuperscript{129} liability limits can be known. Permitting such recoveries at law would not halt air commerce, but would be likely to motivate corrective governmental measures.

Having sounded in both overflight and nuisance, the Supreme Court is free\textsuperscript{130} to formulate a legal theory granting recovery absent overflight, which will control the federal courts and, through the fourteenth amendment, the states.\textsuperscript{131} It has been predicted that the Court will merely adopt a clear condemnation-by-nuisance policy, without reasoning from precedents.\textsuperscript{132} Nevertheless, there are ample rationales upon which the Court can adopt a condemnation-by-nuisance policy permitting recovery without overflight. For instance, the penetration requirement could be retained, but penetrations of energy could be equated with penetrations by mass. In short, penetrations to property, such as radioactivity, noise, vibrations, and electromagnetic waves, which even though unseen are capable of causing substantial losses in property value, could be deemed penetrations for purposes of recovery in inverse condemnation.\textsuperscript{133}

An alternative rationale is based upon the theory of special damages found in \textit{Richards v. Washington Terminal Co.}\textsuperscript{134} Of

\textsuperscript{127} In 1962, 100,000 homeowners were in the Griggs (overflight) class. Kryter & Pearson, \textit{Judgement Tests of the Sound from Piston, Turbojet, and Turbofan Aircraft}, Sound, March-April 1962, p. 24.

\textsuperscript{128} Randall, op. cit. supra note 111, at 150.

\textsuperscript{129} See notes 76-77 supra and accompanying text; Randall, op. cit. supra note 111, at 150.

\textsuperscript{130} Since Griggs and Causby both involved overflights, the issue of a nuisance without overflights has never been presented to the Supreme Court. One commentator expects a standard of condemnation by nuisance \textit{alone} to be accepted by the Court, probably in a Batten-type case. Stoebuck, \textit{Condemnation by Nuisance: The Airport Cases in Retrospect and Prospect}, 71 Dick. L. Rev. 207, 224, 237-38 (1967).


\textsuperscript{132} Stoebuck, supra note 130, at 215-17, 224.

\textsuperscript{133} See 9 McGr. L.J. 246 (1963).

\textsuperscript{134} Richards v. Washington Terminal Co., 233 U.S. 546 (1914), discussed at note 42 supra.
the persons living in an airport vicinity only those living directly under designated flight paths and within the cone a few thousand feet to each side of the flight paths are exposed to damaging noise levels. Since governmental authorities determine noise contours for engines, license aircraft and engines, and fix flight paths and maneuvers, they are consciously directing the paths of the noise nuisance. Recovery could then be allowed on the principle that the plaintiff's property was made the special focus of a governmentally sponsored nuisance—that continuous flights impose special harm upon his property, which is not generally shared by those within the airport vicinity. However, the force of this argument would be lost if future airport design, engine thrusts, air traffic density, and flight patterns combined to form overlapping cones of damaging noise levels. In such a case all property in an airport area would receive the damaging noise levels.

Theoretically, an additional rationale, applicable in a few cases, is that recovery for lost property value should be allowed since the authorities could reasonably have forbidden certain engines or flight paths, located an airport at a more compatible site, prevented improper zoning, or condemned residences. Such a rationale is analogous to that of Baltimore & P.R.R. v. Fifth Baptist Church, under which recovery for property losses was permitted when reasonable alternative sites for the governmental activity existed.

V. CONCLUSION

The equities of permitting recovery for inverse condemnation, regardless of overflights, to all who suffer substantial property losses due to public airport noise have been widely praised. These considerations should be outweighed only by clear evidence that the costs of such recoveries would seriously impede the national air commerce system and that there exists no reasonable alternative location for the airport. Such a showing,

135. As a corollary to this special damages rationale, it has been implied that proof of intentionally inflicting such damages would support recovery for a taking. Batten v. United States, 306 F.2d 580, 585 (10th Cir. 1962). "Intentionally" was not defined by the Batten court.

136. 108 U.S. 317 (1883). For a description of this case, a nuisance claim, see note 44 supra.

however, has not been made. The high immediate costs for accommodating present airport areas can be recouped, and through prompt national action the compounding of the problem for future airports can be prevented. Although a trend toward condemnation by nuisance exists in some state courts, the division among the state courts and between some states and the federal courts could prove to be a source of undesirable economic consequences.138

It is apparent that the immediate costs of coping with noise-vulnerable residential areas near established airports should be borne in large part by the federal government. Federal funds will not be available except through subsidies, however, as long as *Griggs* is interpreted to hold that the proper defendant is the local airport authority.

A strong federal hand in airport zoning control, whether direct or indirect, is necessary to prevent future problems. The alternatives to a larger federal role would include a reliance upon diverse local zoning reforms to cope with future noise problems and a continuing restrictive federal judicial remedy, in contrast to the present potentially mischievous schism in state court remedies. On balance these alternatives seem undesirable.

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138. If some states allow recovery without overflight while others do not, airport defendants in the former will acquire an additional immediate cost factor. This cost will be internalized and allocated to the airlines in the form of higher fees (less whatever additional subsidies can be obtained). See Dygert, *An Economic Approach to Airport Noise*, 30 J. Am. L. & Com. 207, 216 (1964). Some commercial airlines have threatened to abandon some air centers, thereby allegedly causing broad economic shifts to competing areas which covet the other’s commerce. See Wall Street Journal, Dec. 14, 1966, p. 2 (threat to New York City based upon air traffic difficulties). If higher fees could produce this result, the judicial conflict as to the overflight requirement could have undesirable effects upon national commerce.
Appendix: The Sonic Boom Problem

The sonic boom is the byproduct of supersonic flight, caused by increases in atmospheric pressure in the wake of an aircraft. Since commercial SST flights will not begin until 1971-1974, current instances of sonic boom damages relate to military or experimental aircraft.

The sparse sonic boom case law is unfavorable to the injured party. The Federal Tort Claims Act does not create absolute liability for sonic boom damages on the part of the United States, and since res ipsa loquitur is not available, plaintiffs must prove pilot negligence—a considerable burden. Moreover, it has recently been held that the Federal Tort Claims Act's exception for "discretionary duty" applies to the creation of sonic booms by United States pilots, thus blocking recoveries for sonic boom damages on the basis of sovereign immunity.

Public demand for a more effective legal remedy for sonic boom damages may be rather small if some FAA-NASA tests are valid. As few complaints as .1 per cent per capita were


141. See Brown v. United States, 230 F. Supp. 774 (D. Mass. 1964); Coxsey v. Hallaby, 231 F. Supp. 978 (W.D. Okla. 1964) (injunction against experimental series of booms denied because FAA was authorized to conduct such experiments). For Federal Tort Claims Act cases, see note 144 infra.

142. Brown v. United States, 230 F. Supp. 774, 776 (D. Mass. 1964). Probably because of the occasional nature of the sonic booms, no inverse condemnation suits on a theory of taking through continuing nuisance have been found. Whether after commercial SST operations commence such a remedy should be allowed depends upon policy and cost considerations, discussed at notes 84, 102 & 105 supra and accompanying text.

143. Id. at 776. An independent architectural firm was employed by NASA to study sonic boom damages in St. Louis during a test boom series. Most damages were attributable to poor construction (building code called for 20 lbs. per sq. ft. minimum resistance, and sonic booms under 3 lbs. per sq. ft. cracked plaster or titles), deterioration due to age, or faulty installation of glass or plaster. Sound constructions were not damaged, and properly installed glass did not crack nor deflect any farther than under shocks from passing highway traffic. Clark, Buhr & Nexsen, supra note 139, at I-1, V-1, IV-2 & 3.

registered during an extensive St. Louis experiment.\textsuperscript{145} Factors which contributed to this surprisingly high tolerance level were probably: (1) There were only 0.83 damages per flight per one million persons exposed to the sonic booms, and on the average these damages were small;\textsuperscript{146} (2) The sonic boom noise level is usually below the limit found to be psychologically acceptable for takeoffs and landings;\textsuperscript{147} (3) The audible indoor sound pressure increases (dbs.) are relatively low compared with inaudible increases;\textsuperscript{148} (4) About 90 per cent of the complaints were confined to the area lying twelve miles to the sides of the flight track;\textsuperscript{149} (5) Almost no personal injuries resulted from the booms.\textsuperscript{150}

In strong contrast to the general airport area noise dilemma, there are reportedly prospects for a substantial technological solution to the sonic boom problem.\textsuperscript{151} If the boom can be eliminated or significantly reduced below present maximum assigned tolerances\textsuperscript{152} prior to the advent of commercial SST

\textsuperscript{145} Clark, Buhr & Nexsen, supra note 139, at IV-3; Nixon & Hubbard, Results of USAF-NASA-FAA Flight Program To Study Community Responses to Sonic Booms in the Greater St. Louis Area, NASA TN D-2705, at 20-21 (May 1965).

\textsuperscript{146} Nixon & Hubbard, supra note 145, at 21.

\textsuperscript{147} Pearsons & Kryter, Laboratory Tests of Subjective Reactions to Sonic Boom, NASA CR 137, at 20–21 (March 1965) (2.3 lbs. per ft. overpressure, .3 lb. above maximums set by FAA, create 95.5 PNdb., which is within the tolerance for jet noise in residential areas).


\textsuperscript{149} Clark, Buhr & Nexsen, supra note 139, at V-1; see Maglieri, Hilton and McLeod, Experiments on the Effects of Atmospheric Refraction & Airplane Accelerations on Sonic-Boom Ground Pressure Patterns, NASA TN D-3520, at 13, 23 (July 1966).


\textsuperscript{151} One aeronautical authority believes a design breakthrough would eliminate the boom altogether during cruise speeds, and would cut it from the FAA-designated 2 lbs per sq. ft. overpressure during climb to 1 lb. per sq. ft. Aviation Week & Space Technology, Aug. 3, 1964, p. 39. Another research report indicates that substantial modifications in the boom during climb are possible, but argues that cruise reductions will be less substantial, given presently known principles. McLean, Carlson & Hutton, supra note 139, at 8–9 (Sept. 1966). If certain design techniques for area distributions of aircraft surfaces can be achieved, sonic booms much lower than those presently produced would be possible. McLean, Some Nonasymptotic Effects on the Sonic Boom of Large Airplanes, NASA TN D-2877, at 18 (June 1965).

\textsuperscript{152} Although tests have been conducted with 2.3 to 3 lbs. per sq. ft. overpressures at ground level, the design plans and assigned over-pressure limits are 2.0 during climb and 1.5 to 1.7 during cruise. Avia-
flights,\textsuperscript{153} no general legal remedy need be created.

Assuming, however, that no technological \textit{deus ex machina} materializes in time to prevent the problem, there are several solutions which offer varying degrees of hope. First, and most drastic, would be to prohibit supersonic speeds over populated land masses, thus curtailing part of the economic motive for SST development,\textsuperscript{154} although the vital trans-Atlantic trade would still remain.\textsuperscript{155} Less dramatic would be a prohibition of supersonic speeds at altitudes below forty-three to fifty thousand feet, which theoretically would allow the intervening airspace to dissipate most of the boom.\textsuperscript{156} This, unfortunately, would necessitate slower, costlier climbs from takeoff\textsuperscript{157} and could result in an increase in the area exposed to conventional jet noise.\textsuperscript{158}

A somewhat more fatalistic approach would be to accept the FAA's present sonic boom limitations, within which SST's allegedly can operate and endure the results.\textsuperscript{159} However, military SST research indicates that the boom created by craft designed to operate within the designated levels can vary widely, both above and below the maximums, due to atmospheric conditions which can change enough in two hours to drive the boom level from a high to a low extreme.\textsuperscript{160}

Creation of a more effective legal remedy should therefore await determinations concerning the achievement of an engineering breakthrough or the ability to utilize flight techniques which would confine the boom within psychologically tolerable limits. However, the considerations of policy which should materially affect the creation of a legal remedy seem clear. If the national interest in acquiring a cross-continental SST fleet can-
not be sacrificed to the interests of a more quiet society, cost balancing not unlike that underlying the general airport noise problem seems in order. Thus, if studies showing that the cost of boom damages is relatively small prove valid, a system for administrative claim adjustments would be feasible. Conversely, if the economic burden of sonic boom damages would substantially impede the SST fleet program, recoveries should be limited to tolerable amounts. The shield of sovereign immunity could be extended to air carriers, or recovery could be awarded only upon a showing of actual negligence in the creation of the allegedly injurious sonic boom.

161. If the average over a long, all-weather test is .83 damages per flight per million population at an average cost of $71 each, and if nearly all damages are limited to the 40-mile carpet beneath the flight, an SST flight passing near 10 million persons would result in about $590 in damages. See Nison & Hubbard, supra note 145, at 21. Since a single circling of an airport by a SST due to landing delays can cost up to $20,000 in fuel, the cost of creating a system to adjust all damage claims which are shown to be due to the flight’s sonic boom may not be prohibitive. Aviation Week & Space Technology, Aug. 3, 1964, p. 40.

162. In the Chicago study 49 sonic overflights—all beneath the recommended altitudes for boom minimization—were made. During the test period of two months, 7,116 complaints were received; 2,964 formal claims for damages were filed; 1,442 claims were approved with the caveat that such approval did not mean validation of the claim. Only one claim for a personal injury was filed and it was not approved. The total cost was $114,763. If this high figure was due to normal boom damages, the cost of systematic compensation may prove too great. If part of it is attributable to lower altitudes of the boom producing aircraft, or generous public relations by the Air Force, the St. Louis results are not rebutted, and costs may not be too burdensome. See Hilton, Huckel & Maglieri, supra note 150, at 3-4, 15.