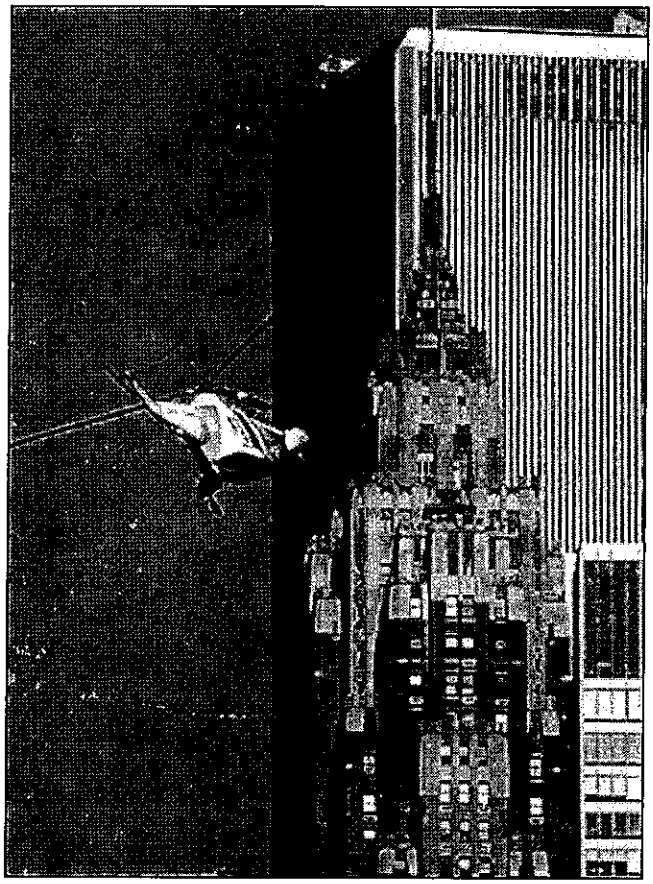
NEEDLESS NOISE



The Negative Impacts of Helicopter Traffic in New York City and the Tri-State Region

NRDC Natural Resources Defense Council

December 1999

NEEDLESS NOISE

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Carolyn Cunningham
Author

Richard Kassel
Project Director

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About NRDC

The Natural Resources Defense Council (NRDC) is a non-profit environmental membership organization with 400,000 members and contributors nationwide. Since 1970, NRDC's scientists, lawyers, and staff have been working to protect the world's natural resources and to improve the quality of the human environment. NRDC has offices in New York City, Washington, D.C., San Francisco, and Los Angeles.

Production Supervision
Sharene Azimi

Director of Communications
Alan Metrick

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Helicopters are increasingly a frequent—and noisy—part of the sky-scape around New York City and its suburbs, as well as in many other metropolitan areas around the nation. Over the past year, NRDC gathered helicopter information data from sources at the FAA, EPA and other government agencies; the helicopter industry; airport and heliport managers; and citizen noise groups that have formed in reaction to helicopter noise. Given the growth in numbers of helicopters nationally and their increased impact in certain local areas of the country, especially the New York City area, this study focuses specifically on helicopter environmental impacts we found to be most significant and measures to mitigate these impacts.

NRDC found that helicopter noise—and to a lesser extent ground level air emissions—has a negative environmental impact in certain local areas experiencing frequent helicopter flights.

NRDC found that helicopter noise negatively impacts areas that experience frequent helicopter flights. Previous NRDC studies had determined that airport and aircraft environmental impacts are currently inadequately regulated. In this study, we found that helicopter impacts are even more inadequately regulated than other fixed-wing aircraft. Among the leading areas of inadequate regulation: the absence of minimum flight altitudes or required flight paths in most places. In addition, helicopter engines have no air emission standards so their emissions go unabated and uncontrolled.

NRDC recognizes and supports the critical safety concerns and requirements of the FAA, airports, helicopter operators, and the public. Those concerns and requirements have been taken into account in our recommendations. Nothing we recommend would compromise the safety of helicopter flight.

NRDC Findings:

Helicopter Growth

The United States has by far the largest civil helicopter fleet of any country in the world. There are more than 11,000 civil helicopters in the United States, more than triple the amount that were registered in 1970. During this period, helicopter air tours within the U.S. have also increased significantly; in 1996, almost one million tourists took such tours.

Detailed data on the number of helicopter flights in particular areas of the country are difficult to obtain, because the FAA does not maintain databases on regional and local

helicopter operations. Further, many corporate and other private helicopters operate from private helipads, without providing any flight data for the public record. This lack of government data makes the adequate assessment of helicopter impacts difficult - and likely leads to the under-estimate of such impacts.

New York City is one city that records the helicopter operations at its heliports and airports. Helicopter operations at the city's four heliports in 1990 numbered 160,000 per year and stayed above 140,000 until 1997, making New York City the most heavily helicopter-trafficked area of the country. Many of these flights impact the suburban areas of New York, New Jersey and Connecticut that surround the City; details of these suburban impacts are also detailed in the report.

Environmental Impacts and Federal Response

NRDC reviewed the limited (but growing) body of research conducted in the United States and Europe over the past several decades that links aircraft and airport noise to identifiable health effects. Noise-based health impacts include sleep deprivation and impacts on cardiovascular and gastrointestinal functions, as well as reduced learning abilities of school children. These impacts go beyond the quality-of-life annoyances caused when noise disrupts normal daily activities such as speech, sleeping and relaxation.

In the U.S., there is not much helicopter-specific health research that documents the relationship between helicopter noise and human health and well-being. However, both the FAA and NASA have concluded that the public perceives helicopter noise to be twice as loud as comparable-decibel fixed-wing aircraft. This perception of greater helicopter noise and annoyance is due to the distinctive low frequency, vibration-inducing, and blade slap characteristics that are unique to helicopters. A limited number of European studies of helicopter noise confirm that there is a systemically different quality of noise from helicopters compared to fixed-wing aircraft that results in higher public annoyance levels.

There are no aggregate data regarding smog-forming and toxic air emissions from helicopters. Even more disturbing, neither the FAA nor the EPA require per-engine emissions data for helicopter engines, as is required for other types of aircraft engines. Yet an environmental impact statement prepared for New York City's East 34th Street Heliport found

that the heliport was the source of measurable quantities of smog-forming gases and elevated levels of formaldehyde and other cancer-causing toxic emissions.

Legal Issues: The Effect of Federal Preemption and the Impact of the 1990 Airport Noise and Capacity Act (ANCA)

Nearly ten years after the passage of the federal Airport Noise and Capacity Act (ANCA), millions of Americans continue to live in environments that exceed the noise threshold set by the FAA as compatible with residential use. Because ANCA is limited to aircraft over 75,000 pounds, ANCA has had no impact on reducing helicopter noise levels whatsoever. Currently, all U.S. civil helicopters are under this weight threshold. Although federal aviation regulations classify helicopters based on their noise emissions (according to similar Stage 1, 2 and 3 noise certification designations used for fixed-winged aircraft), the FAA has not set a Stage 3 (the quietest level) noise certification level for helicopters.

Thorny legal issues govern the amount of control localities can exercise to reduce helicopter noise. Besides phasing out the noisier commercial aircraft by the year 2000, ANCA's other main purpose is to review noise and access restrictions on aircraft operations that are imposed by airport proprietors and owners. ANCA created a number of procedural hurdles that airport proprietors must overcome prior to adopting any noise or access restrictions. Although the boundaries of ANCA have yet to be litigated, the Act has increased the power of the federal government to preempt the traditional authority of the airport proprietor to address serious local noise impacts, including those from helicopters. Chapter 2 discusses this preemption issue and finds that the extent of preemption remains unclear at this point.

To help the reader work through the legal maze in this area of law, we have provided a case-by-case summary of most of the pertinent noise-related preemption cases (including a discussion of 1998's *National Helicopter Corp. v. City of New York)* and regulations as a help to practitioners, as well as a series of "question and answers" based on current law.

NRDC's recommendations for local and federal agencies are listed below. While our local recommendations focus primarily on the NYC area, they could be adapted to many other areas experiencing heavy helicopter activity.

Since 1990, the Natural Resources Defense Council (NRDC) has conducted several studies that document the environmental impacts of aircraft and airports. These reports include: *Flying Off Course: Environmental Impacts of America's Airports* (1996), and *Under the Flight Path*

(1997), a study of airport noise impacts at Westchester County Airport (WCA) in New York State. In these studies, NRDC found that, because of the continued (and projected) rapid growth in air travel, there is an urgent need for increased scrutiny and mitigation of aviation's noise, air and water pollution impacts. Neither of our two previous reports focused on helicopter impacts. We hope that this report fills this gap.

Federal Recommendations

- Congress should immediately direct the FAA to take two steps: first, to develop and implement more protective "Stage 3" noise standards for helicopters; and second, to work with other federal agencies to implement a series of tax and/or other market incentives to encourage helicopter owners to retire their noisy Stage 1 and Stage 2 helicopters and to invest in quieter (and cleaner) Stage 3 helicopters. Research to further document the effects of helicopter and other aircraft noise on health and learning should also continue.

- Congress should pass H.R. 729 (co-sponsored by Congressman Jerrold Nadler and Congresswoman Carolyn Maloney, among others), which would require the FAA to prepare helicopter risk plans in cities with substantial helicopter noise impacts.

- To fill the significant data gap with respect to helicopter health impacts, environmental impacts, and number of operations, the FAA should require the collection of separate helicopter operations data by heliports. The FAA should provide public information on numbers of helicopter operations to enable the adequate assessment of their impacts.

- The FAA should require a 2,000 foot minimum flight altitude for helicopters wherever possible, especially over residential and other noise sensitive areas.

- The FAA should require helicopters to follow noise abatement procedures for takeoffs, flyovers and landings, unless safety, weather, or other FAA-specified concerns preclude their use.

- The FAA should require helicopter identification numbers that are readable from the ground on low-flying helicopters to help the FAA and local public officials to enforce requirements

on minimum altitudes and noise abatement flight paths. Likewise, the FAA should work with local public officials, noise abatement advocates and other interested parties to develop local rules that minimize the impacts of media, tourist and other non-essential helicopter flights in noise-sensitive areas.

- EPA should also act to address the currently-uncontrolled air emissions from helicopters. A 1993 EPA-sponsored study at Chicago's Midway Airport found that aircraft engines emit significant quantities of toxic volatile organic compounds (such as formaldehyde, benzene and 1,3-butadiene), and particulate matter. EPA should implement regulatory limits on these toxic air emissions from helicopter and other aircraft engines.

- Congress should amend and clarify the 1990 Airport Noise and Capacity Act (ANCA) to clearly allow reasonable, non-discriminatory local regulations to control the environmental impacts of helicopter operations.

Local Recommendations

- Public officials throughout the tri-state region should work with regional helicopter councils, the FAA, and local community and noise abatement advocates to develop noise mitigation procedures and flight paths for their locales. To the extent possible, flight paths should avoid residential areas and fly over highways and waterways. Public officials and local advocates should support H.R. 729, a bill in Congress that would require helicopter risk plans in cities with substantial helicopter traffic.

- Public officials should determine if any financial incentives (i.e., reduced fees/rents) can be provided to helicopter companies that fly quieter, new-technology aircraft, as well as to heliport operators that encourage their use.

- Heliport owners or operators should make noise-related improvements at each heliport including: installing a permanent noise monitoring system serving all sites or using portable monitors to conduct spot-checking at sites near heliports or flight paths. Public officials should explore the use of monitoring results to impose noise-related fines for aircraft exceeding specified lower decibel thresholds.

- Heliport owners and operators should collect monthly operational breakdowns by mission (e.g., air tour, charter, corporate, emergency, media, special/other) and aircraft type, and provide public access to the data.

- Local public officials (especially in suburban counties) should consider refusing to zone for heliports, depending on local helicopter traffic and noise impacts on their jurisdictions.

- NRDC supports many of the recommendations of the *Heliport and Helicopter Master Plan for the City of New York*. These are listed in Chapter 3. These recommendations include ways to reduce the impact of helicopter operations, for example, by further restricting and/or banning tourist sight-seeing flights and by restricting flight paths to primarily over water and highways. NRDC strongly supports a ban on tourist flights over residential areas, and urges the City to keep tourist flights over major waterways.

- Despite many positive recommendations, the City's Master Plan does more to justify its current helicopter policies than to create and implement a sufficient plan for the future. Most significantly, it underestimates the community, environmental and health impacts of helicopter growth in NYC, and fails to adequately discuss all possible alternatives to the current projections of the City's helicopter growth. For example, the Master Plan does not adequately explore the obvious need to limit media and other non-essential helicopter traffic, focusing solely on the tourist helicopter phenomenon. The City should work with FAA to develop rules and a pooling/sharing arrangement to reduce the numbers of media and traffic helicopters that converge on a site and hover for long periods of time.

- New York City should continue its recent ban on sightseeing flights at the 34th Street Heliport and should work toward banning sightseeing flights over the city generally. Further, New York City should not allow a heliport to be placed on the Hudson River's Pier 76, which is in the middle of the newly-created Hudson River Park.

- New York City should develop ground-based restrictions for operating hours, idling times, engine run-ups related to maintenance, and training operations. These restrictions (as well as the mission-related operational breakdowns noted above) should be incorporated into the city-issued Aviation Facility Licenses.

- New York City should establish a Heliport Oversight Committee, which should work with the FAA, community representatives and industry organizations to review and improve existing noise-abatement procedures.

- New York City should take a co-lead position with the Eastern Regional Helicopter Council and the FAA to develop an Electronic News Gathering (ENG) Operations Manual for media helicopters. Issues covered should include minimum weather criteria, altitude minimums, hovering durations, and event-specific guidelines.

- In New Jersey, local public officials should work with New York City officials and the FAA to establish altitude restrictions, flight paths, hovering duration, and other noise abatement procedures for ENG (electronic news gathering) helicopters, most of which are currently based in New Jersey.

THE SCOPE OF THE HELICOPTER PROBLEM

Aircraft Noise May Be Hazardous to Your Health

Aircraft noise has been found to produce a number of adverse health effects, ranging from headaches, sleep disruption and hypertension to compromised cardiovascular and gastrointestinal functions. In a 1981 study, children attending elementary schools near Los Angeles International Airport (LAX), where they were exposed to more than 300 overflights per day, were found to have higher blood pressure than students who lived farther away from the airport.[1]

Other studies of schoolchildren have shown adverse effects in the area of learning, such as impaired reading skills and learned helplessness. Indeed, a 1995 study that focused on the effects of Munich Airport noise found that elementary-school children chronically exposed to the airport noise had poorer long-term memory recall, reading comprehension, and overall persistence than did children in a comparable urban environment not affected by aircraft noise.[2] This report also found a relationship between chronic noise and elevated cardiovascular and neuroendocrinological measurements among the exposed children. The authors found their data "sobering when one considers that more than 10 million American schoolchildren are exposed to comparable noise levels."[3]

Aircraft noise can also have an impact on health by disrupting sleep. Sleep disruption can result in awakenings that affect health in the short term by causing headaches, irritability, poor work performance, and fatigue. Moreover, studies have

shown that even if one is not awakened by noise, the noise can disturb sleep patterns required for restful sleep. And such disruptions may have possible long-term physiological effects. A 1993 Dutch report determined that sufficient evidence existed to conclude that aircraft noise induced changes in sleep patterns and subjective sleep quality, and could possibly cause coronary artery disease. The report also found limited but growing evidence that noise caused impacts on birth-weight, work-related performance, and general psycho-social well-being. [4]

Respondents living within the flight pattern of nearby Newark Airport were more likely to complain of sleep difficulties and to perceive themselves to be in poorer health than the control group living in a non-overflight area.

More recently, a study was conducted among residents of Staten Island, New York, in which subjects were asked to evaluate their general health, without being informed that the study's goal was to evaluate the effect of aircraft noise on health. The study found that the respondents living within the flight pattern of nearby Newark Airport were more likely to complain of sleep difficulties and to perceive themselves to be in poorer health than the control group living in a non-overflight area.[5]

In light of the above findings, it appears probable that airport and aircraft noise—to which helicopters are a major contributor—has a demonstrably negative effect on the health and well-being of those exposed to it. As helicopter flights continue to increase, more research is needed on helicopter-specific health impacts.[6]

Helicopter Traffic Growth and Noise Impacts

There are more than 11,000 civil helicopters in the United States, more than triple the amount that were registered in 1970 and constituting by far the largest civil fleet of any country in the world. Helicopter air tours within the U.S. have increased significantly: in 1996, almost one million tourists took such tours.[7] As the nation's helicopter fleet and helicopter flight operations continue to grow, so will the problems most closely associated with helicopters—namely the noise and air emissions they generate.

Helicopter Air Emissions

Generally speaking, helicopter engines and turbines emit similar types of air emissions as fixed-wing aircraft engines. Unfortunately, neither the FAA nor the U.S. Environmental Protection Agency (EPA) have established air emission standards for helicopter engines, nor have they generated any available data specific to helicopter air emissions. However, a New York City environmental review of the East 34th Street Heliport provides cause for concern. Both the City's 1995 Final Environmental Impact Statement (FEIS) for the heliport and an independent study commissioned by a nearby hospital found that helicopters emitted measurable quantities of volatile organic compounds (VOCs,) nitrogen oxides (NOx), and toxic air pollutants.[8] Levels of formaldehyde, a cancer-causing compound typically found in turbine engine exhaust, were found to be consistently higher at the heliport than in the surrounding ambient air.[9] This data was consistent with an earlier EPA-sponsored study of toxic emissions in the communities surrounding Chicago's Midway Airport. In 1993, this study found that aircraft engines release significant quantities of toxic volatile organic compounds (e.g., benzene, formaldehyde and 1,3-butadiene) and particulate matter.[10]

Helicopters—also known as rotorcraft—are a special breed of aircraft capable of hovering in mid-air and taking off and landing vertically. These special characteristics have made them important for military use and particularly useful in rescue operations. Some helicopters lift heavy loads (structural steel, for example); others transport passengers to destinations lacking normal airports, such as oil rigs or corporate headquarters with small helipads. Their ability to hover has also made them popular for sightseeing flights. With their powerful engines and swirling rotors, they are also very noisy.

Helicopters produce a wide range of noise, depending on the size, age, and type of engine. There are some generalities about helicopter noise. Smaller, lighter helicopters are generally quieter than larger, heavier ones, since their engines are smaller. Newer, turbine-powered helicopters are generally quieter than older,

piston-powered models. Helicopter noise levels also vary with the type of flight operation—the noise levels of takeoffs, flyovers, and approaches of the same helicopter can vary widely depending on how the helicopter is flown.

Helicopter Noise: What Makes It Distinctive?

As a consequence of the increasing numbers and greater use of helicopters, helicopter noise is now a growing and significant portion of the overall aircraft and airport noise problem in many areas of the country—particularly around military bases, urban areas, and scenic areas over which flights have become a popular mode of sightseeing.

Even when helicopter traffic is not as heavy as fixed-wing aircraft traffic, distinctive, pulsating helicopter noise often causes passionate reactions from those near flight paths or heliports. Compared to fixed-wing aircraft, helicopters are virtually unregulated with respect to flight paths and minimum altitudes; as a result, noise impacts can be particularly severe. Some studies have found that the annoyance generated by helicopter noise is often rated above comparable noise levels of fixed-wing aircraft. In 1997, NRDC's *Under the Flight Path* report found that "helicopter operations at WCA (Westchester County Airport) were 18 times as likely to generate a noise complaint" as fixed-wing aircraft. The FAA and the National Aeronautics and Space Administration (NASA) stated in a recent *Report to Congress* that the public perceives rotorcraft noise to be twice as loud as comparable fixed-wing aircraft.[11] Indeed, other helicopter research has found that helicopter-generated annoyance is often rated above comparable noise levels of fixed-wing aircraft by as much as 10-15 decibels, i.e., by more than a doubling of perceived loudness.[12]

What's the reason for this? Helicopters require a tremendous amount of power to turn their blades fast enough to lift them off the ground; consequently, their

engines are extremely powerful and loud. Turbine-powered helicopters make a high-pitched whine; piston-driven helicopters make a loud throbbing noise.

Then there is the noise created by the rotors, or blades. The typical helicopter has two sets: the large blades on top of the machine, which are used for lift, and the smaller blades on the tail, which are used for stability and maneuvering. The main rotors of most helicopters generate a sound known as blade slap, which is a loud banging, slapping, or cracking noise caused by the extremely high speed of the tip of the rotor blade (rotating at an average of 15-20 rotations per second), slashing through and compressing the air underneath it. Blade slap is technically known as "blade vortex interaction" (BVI); BVI increases during certain operations, such as partial power descents, high speed cruise operations, and hovering.

The smaller tail rotor, rotating five times as fast, creates its own noise. This can be the most pronounced noise from a cruising helicopter.[13] The main rotor system's pulsating sound—the helicopter's distinctive acoustical signature—attracts attention much as a flashing light does by being more conspicuous than a steady light. This increased noticeability[14] is enhanced by the fact that the helicopter's noise "footprint" is in front of it as it approaches, thus acting as an early trigger to the negative response that will grow as the noise level increases.

Another factor in the distinctive character of helicopter noise relates to their production of low frequency sound—in excess of that produced by jet aircraft.[15] Low frequency noise is less noticeable to the human ear, but can induce vibrations and rattles in houses and other structures. In 1995, the U.S. Army Construction Engineering Research Laboratory studied whether the sound of windows or other objects in a room rattling increases the public's adverse response to helicopter noise, and concluded that it did.[16] The FAA has also expressed concerns about the implications of low frequency noise for fragile environments and historic

structures.[17] However, little research has been done in this area, and more is clearly needed.

Helicopters commonly fly at lower altitudes than most fixed-wing aircraft, adding to the annoyance they generate. Unlike its regulations for fixed-wing aircraft, the FAA does not prescribe minimum altitudes for helicopters. Helicopter pilots generally fly visually, not under air traffic control (ATC), unless they are landing at an airport and thus enter an ATC area. However, even where there are suggested minimum altitudes (usually 1,000 to 2,000 feet) they are often ignored.

Unlike fixed-wing aircraft, the FAA does not prescribe minimum altitudes for helicopters.

The lack of regulation regarding flight altitudes is matched by a similar lack of regulation regarding helicopter flight paths and flight frequency. One study of rural community reactions to helicopter noise suggested that anything above four or five flights per day would be considered an unacceptable annoyance.[18] The FAA itself stated in its 1996 *Report to Congress* that, "Recent studies have shown that annoyance associated with rotorcraft noise...is highly dependent on both the frequency of operations and the duration of exposure...."

Pressing for Change: The People vs. Noise

Citizen groups have formed throughout the country in response to airport and aircraft noise problems. Sizable helicopter noise groups have been organized in Hawaii, Los Angeles, and in New York City. Not coincidentally, the largest helicopter sightseeing operations in the country are currently in Hawaii, the Grand Canyon and New York City.

In the 1980s, increased noise from a Los Angeles commuter helicopter service and from the fleet for the 1984 Olympics led to intense opposition and the formation of a group called "Chopper Stoppers." Chopper Stoppers later stopped a proposed National Prototype Demonstration Project Heliport Program planned for Los Angeles by the FAA.[19]

In the 1990s, a homeowners group in Encino, California was organized in response to helicopter noise from the Van Nuys Airport. It grew into a regional "Stop the Noise" group comprising 26 homeowners organizations in the San Fernando Valley and the Santa Monica Mountains with a total membership of several thousand.[20] The group eventually created a committee called the National Helicopter Noise Coalition (NHNC), a network of 1,500 individuals, cities, and organizations whose common bond is opposition to helicopter noise. In a two-year effort, NHNC petitioned the FAA for a minimum helicopter altitude over Los Angeles of 1,000 feet. The FAA denied the petition.

In New York City, pockets of opposition to helicopter noise have existed for years. Some of the main areas of complaints have been Roosevelt Island in the East River (near the East 60th Street Heliport), Brooklyn Heights (affected by the Downtown Manhattan Heliport), areas of the upper east and west sides of Manhattan in response to flight paths particularly of air tours, and recently around the East 34th Street Heliport. Responding to hugely increased operations at this heliport, which had made it the busiest heliport in the world,[21] residents forged a Helicopter Noise Coalition (HNC), which now claims more than 18,000 members. Among HNC's goals are banning all except emergency helicopter flights and closing the East 34th Street Heliport.[22]

The national parks and Hawaii are other areas of heavy helicopter activity, because of the demand for sightseeing flights. Such flights increased dramatically at the Grand Canyon (from about 40,000 overflights of planes and helicopters in 1987 to more than 100,000 at present). Public pressure to reduce aircraft and helicopter noise over areas to which people come to enjoy nature resulted in 1987 in federal legislation designed to control this noise.[23]

The Helicopter Industry's Response to Helicopter Noise

Long prodded to reduce the decibel level of its aircraft, the helicopter industry has responded with two principal efforts: a voluntary "Fly Neighborly" program initiated in 1982 and research and development projects (see box). The program provides helicopter pilots with useful noise-abatement information drawn from a number of helicopter companies and from the FAA's Advisory Circular on "visual flight rules" (VFR) flights near noise-sensitive areas.[24]

The helicopter industry launched it's Fly Neighborly program, in part, to prevent the FAA from regulating helicopter noise.

Fly Neighborly was developed, in part, to prevent the FAA from regulating helicopter noise in the early 1980s. Indeed, the FAA withdrew a proposed regulation and did not institute helicopter noise standards until 1988.[25]

Clearly, the way helicopters are flown contributes to the amount of noise and blade slap they produce. Accordingly, Fly Neighborly recommends four ways to remedy the problem: (i) reducing air speed in level flight (generally, 10-20 percent below normal cruising speed) to a speed that will decrease or eliminate blade slap; (ii) adjusting the rate of descent; (iii) using flight paths over uninhabited areas or over noisy highways rather than over residential areas; and (iv), flying at the "highest practical" altitudes. In its Advisory Circular on "VFR Flight Near Noise-Sensitive Areas" (AC 91-36C, 1984), the FAA recommends these practices, including, "making every effort to fly at not less than 2,000 feet above the surface" for noise-abatement purposes. The 1993 revised *Fly Neighborly Guide* includes this same AC, but does not endorse the FAA's 2000-foot noise abatement recommendation. Indeed, some of the *Guide's* model-specific operating advice recommends flying at a minimum of 500 or 1000 feet, where possible, rather than 2000 feet.

The Fly Neighborly recommendations are a good first step in reducing helicopter noise impacts. However, as a voluntary program with no regulatory strength or enforcement mechanisms, the program is insufficient. To achieve genuine

helicopter noise mitigation, the FAA should mandate the procedures outlined in the Fly Neighborly program, where possible.

Research and Development of Quieter Helicopter Technologies

Working in conjunction with the helicopter industry, the FAA and NASA are funding the research and development of quieter, cleaner helicopters. Categories of investigation include main rotor technologies, anti-torque systems, engine designs, and advanced systems.

Many research projects are focusing on the optimal design of the main rotor including rotor-blade geometry and the number of blades. Increasing the number of blades allows for lower revolutions per minute (RPM) and slower tip speed. A larger number of blades also increases the frequency of the noise, which, in turn, reduces the amount of low-frequency noise—one of the elements that makes helicopter noise particularly annoying. Unfortunately, reducing tip speed can seriously impair rotorcraft performance. More promisingly, researchers are testing out active main-rotor-control techniques that include individual blade control. Under certain conditions these techniques reduce noise and vibration while not impairing rotorcraft performance.

Researchers are also developing advanced anti-torque systems, include the "fan-in-fin" (the tail rotor is inside the tail) and "No Tail Rotor" (NOTAR) designs. Such designs reduce the interaction between the main rotor air streams and the tail rotor, a significant contributor to helicopter noise.[26] These two designs have been developed and successfully applied to commercially available civil helicopters, although some will work on smaller helicopters only. The "fenestron solution," is a fan-in-fin design of multiple blades inside the tail. The Comanche helicopter (of Boeing/Sikorsky) also uses the fan-in-fin design. Westland Helicopter has also developed a "quiet tail rotor" (Q.T/R) design that can be used on helicopters of all sizes.[27]

According to NASA and the FAA, what is needed to meet public expectations of acceptable noise levels and foreign certification requirements is a decrease of 12 decibels for helicopters over 30,000 pounds gross takeoff weight and 6 to 10 decibels for helicopters under 30,000 pounds.[28]

HOW HELICOPTER NOISE IS REGULATED

How Noise is Measured

The FAA relies almost exclusively on a single noise measuring unit (or "metric") for all of its noise measurement, mitigation, and land-use compatibility efforts in and around airports. This metric averages all the noise in a 24-hour period, adding an extra 10-decibel penalty for nighttime noise events to account for the additional impacts of noise that occurs between 10 p.m. and 7 a.m. Called the "day-night sound level" (abbreviated as DNL or, in mathematical equations, as L_{dn}), it is a cumulative measurement whose noise-averaging method masks the effect of each single noise event, often resulting in an underestimation of the impact of aircraft noise on the surrounding communities.[20]

While the FAA relies almost exclusively on the DNL metric for airport compatibility evaluation and planning, it uses various sets of metrics for other aircraft and helicopter noise measurement. The FAA uses a different set of metrics for determining certification noise levels. It uses a complex metric known as Effective Perceived Noise Level (EPNL) to certify jets and large helicopters, while it uses the simpler measurement of sound exposure levels (SEL) to certify small helicopters (these and other technical terms are defined in Appendix A). Consequently, it is difficult to directly compare the certification noise levels of small and large helicopters. In order to compare EPNL and SEL results, one needs to apply a series of correlations or conversion factors, and also know the distance at which the measurements were made and during what kind of operation. A further

hindrance to comparison is that jet certification tests include a sideline noise measurement, while helicopter certification tests use a flyover measurement.

None of these metrics takes low frequency sounds into account in any significant way. Also, as the metrics were not developed for helicopters, some experts believe that they do not adequately account for the directionality, overall duration, tonal and impulsive qualities of certain helicopter noise events. Thus, they do not adequately measure the most important aspects of helicopters' unique noise.[30]

The FAA's Three Stages For Classifying Aircraft Noise Levels

Most helicopters in use today fall into the noisiest Stage 1 and 2 categories, and thus are louder on approach than several Stage 3 jet aircraft listed below.

Since 1977, the FAA has provided for three "stages" for classifying aircraft noise levels, each with specified limits.[31] Stage 1 levels (represented now primarily by the oldest aircraft) are the loudest. Stage 2 levels are somewhat quieter, and Stage 3, quieter yet. The thrust of the regulations over the years has been to require new aircraft to comply with progressively quieter Stage 3 noise limits. For commercial jet aircraft fleets, the phase-out of Stage 2 engines to somewhat quieter Stage 3 noise certification levels is to be completed by the year 2000. (See discussion under ANCA in Regulatory Section.) Stage 3 aircraft are generally about 10dB quieter than those designated Stage 2.[32] But this is by no means always the case. Stage 3 aircraft are not equally quiet and a Stage 3 aircraft is not necessarily quieter on landing, for example.[33]

How Loud Are They?

Most helicopters in use today fall into the noisiest Stage 1 and 2 categories, and thus are louder on approach than several Stage 3 jet aircraft listed below. Helicopters are getting quieter, in relative terms, but nearly all helicopters built since 1988 are rated Stage 2 although some—several of the Sikorksy S-76 series and the Bell Heli Textron 412 SP, for example—meet even more stringent noise levels. However, the fact that helicopter approach noise levels are even close to those of a large Boeing

737 jet airliner makes clear that the helicopter industry has a long way to go toward bringing down the noise generated by its uniquely useful and uniquely noisy flying machines.

Table 1

Comparison of Helicopter and Jet Aircraft Approach Noise Levels

Helicopter Approach Levels	
Sikorsky S-76 series (several models)	95, 96 and 97.7 EPNdB
Bell Heli Textron 412 SP	95.6 EPNdB

Several Stage 3 Jet Aircraft Approach Levels	
Boeing 727-200 (hushkitted)	97.2 EPNdB
Boeing 737-200	95.8 EPNdB
Lockheed 1011-1	96 EPNdB
Fokker F-100	93 EPNdB

dB =Decibel - the logarithmic unit used to measure sound as perceived by the human ear; because it is a logarithmic scale, a 10-decibel increase is perceived as a doubling of loudness.
EPN= Effective Perceived Noise, a term used by the FAA in determining the approximated human annoyance response to a given noise. The EPN Level is the metric used to measure noise certification levels for large aircraft, including large helicopters. EPNL noise measurements are measured in EPNdB.

Noise limits for the various stages are prescribed separately for the takeoff, flyover, and approach tests. The limits also depend on the maximum certificated weight of the aircraft or helicopter. The heaviest craft are allowed the maximum noise levels or standards, and the levels are reduced for each halving of the maximum weight by a given number of EPNdBs, down to a minimum weight and noise level, which aircraft weighing below the minimum must also meet. (See box on pg. 15)

Because the FAA began helicopter noise-testing in 1988, helicopters built before that date have not been noise-tested by the FAA, unless the helicopter company changed the type design of the helicopter. These untested helicopters are considered to be Stage 1 noise level, even though most are actually in the Stage 2 range.[34] (No information was available on the numbers of Stage 1 helicopters still flying.)

Nearly all helicopters built since 1988 are rated Stage 2, although, as previously mentioned, some meet more stringent noise levels. However, there is no Stage 3 standard for helicopters, as there is for fixed-wing aircraft and no new domestic regulations are immediately planned. At the international level, discussions are currently under way with the International Civil Aviation Organization (ICAO) concerning Stage 3 limits that would apply to U.S. helicopters.[35] NRDC believes that Stage 3 limits for helicopters should be established now and at levels that will lessen future helicopter noise impacts.

Helicopter Noise Standards and Tested Noise Levels

The FAA's aircraft and helicopter noise levels are found in various areas of Part 36 of FAA regulations. Helicopter noise standards are presented in Appendices H and J to Part 36; the actual tested noise levels of aircraft and helicopter models are presented in Appendices 1 through 11 in FAA Advisory Circular (AC) No. 36-1G.

The noise levels of larger helicopters (and jet aircraft) are measured using the EPNdB unit. Noise levels of the smaller helicopters, listed in Appendix 11 in the AC, are measured in terms of the SEL metric for the flyover operation only. Noise levels for smaller helicopters (6,000 pounds and under) during flyover, range from a low of about 79 SEL to 85.2 SEL.[36] The EPNdB flyover noise levels for helicopters over 6,000 pounds (listed in Appendix 10) range from about 86 on the low end to a high of about 93 EPNdB.[37] With the lack of a direct conversion between the SEL metric and the EPNdB, noise comparisons are difficult and, apparently, almost nonexistent.

The comparison of helicopter and airplane noise standards in the box below illustrates the need for Stage 3 helicopter noise standards. Note, for example, that a Stage 3 airplane weighting 77,200 pounds or less, regardless of number of engines,

has a noise limit on approach of 98 EPNdB, while a Stage 2 helicopter of 44,000 pounds has a flyover noise limit of 102 EPNdB.

Stage 2 Noise Levels for Larger Helicopters

For flyover, the Stage 2 maximum allowable helicopter noise levels is 108 EPNdB for the maximum weight of 176,370 pounds or more. (No U.S. civil helicopter currently weighs more than 50,000 pounds.) This maximum noise limit is reduced by 3.01 EPNdB per halving of the maximum weight down to 88 EPNdB for maximum weights of 1,764 pounds or less. This means that a helicopter weighing 44,092 pounds (two halvings of the maximum weight) has a Stage 2 *flyover* noise limit of about 102 EPNdB (or 6 EPNdB less than the 108 EPNdB maximum).

For takeoff calculated limits, using the same maximum and minimum helicopter weights and the same reductions per halving of the helicopter weight as for *flyover,* the limits are 109 EPNdB down to 89 EPNdB.

For approach calculated limits, using the same maximum and minimum weights and reductions, limits are 110 EPNdB down to 90 EPNdB.[38]

Stage 2 and 3 Levels for Transport Category and Turbojet Powered Airplanes

Stage 2: *For takeoff,* 108 EPNdB for maximum weights of 600,000 pounds or more, reduced by 5 EPNdB per halving of the 600,000 maximum weight down to 93 EPNdB for maximum weights of 75,000 pounds and less.

For sideline and approach, 108 EPNdB for the same maximum weight reduced by 2 EPNdB per halving of the maximum down to 102 EPNdB for maximum weights of 75,000 pounds and less.[39]

Stage 3: *For Takeoff* - limits differ depending on the number of engines.

For airplanes with more than three engines, 106 EPNdB for maximum weights of 850,000 pounds or more, reduced by 4 EPNdB per halving of the maximum weight down to 89 EPNdB for maximum weight of 44,673 pounds or less;

For airplanes with three engines, 104 EPNdB for the same maximum weights, reduced by 4 EPNdB per halving of the weight down to 89 EPNdB for maximum weights of 63,177 pounds and less;

For airplanes with fewer than three engines, 101 EPNdB for the same maximum weights, reduced by 4 EPNdB per halving down to 89 EPNdB for maximum weights of 106,250 pounds and less.

For sideline, regardless of the number of engines, 103 EPNdB for maximum weights or 882,000 or more, reduced by 2.56 EPNdB per halving of the maximum weight down to 94 EPNdB for maximum weights of 77,200 pounds or less.

For approach, regardless of the number of engines, 105 EPNdB for maximum weights of 617,300 pounds or more, reduced by 2.33 EPNdB per halving of the maximum weight down to 98 EPNdB for weights of 77,200 pounds or less.[40]

A series of federal statutes expressly preempts control over air space, flight routes, safety, aircraft airworthiness certification, and control of engine air and noise emissions.

HOW FEDERAL PREEMPTION LIMITS LOCAL HELICOPTER RESTRICTIONS

Federal law "preempts" state law, under the Supremacy Clause of the U.S. Constitution,[41] when Congress expressly or impliedly indicates its intention to displace state law, or when state law actually conflicts with federal law.[42] State and local law can be invalidated or voided by the courts, if it is found to "interfere with" or be "contrary to" federal law.[43]

In the interest of developing and maintaining a fair and efficient air transportation system and preventing interference with interstate commerce, Congress long ago largely preempted state and local control of the aviation industry and air travel by placing them under federal law.[44] In the air transportation field, a series of federal statutes expressly preempts control over air space, flight routes, safety, aircraft airworthiness certification, and control of engine air and noise emissions (at the source) and airline rates, to name some areas.[45] These statutes give federal control to the FAA. (Some of these statutes are discussed in the "Legislative Components" section below.)

Courts may also find that Congress has preempted an area of regulation where Congress has enacted a sufficiently comprehensive scheme of federal regulation or where the federal interest is so dominant as to preclude state legislation in the same area.[46] (See discussion of the *Burbank* case below.)

Federal Preemption and the Proprietor Exception

While regulation of aircraft as a noise "source" has been preempted by the aircraft-engine-noise certification levels prescribed in Part 136 under the Federal Aviation Act Amendment of 1968, the boundaries of federal preemption of the larger area of airport noise control are not as clearly defined. Congress has carved out a limited "proprietor exception" to federal control of airport noise that allows a state or local

government, when acting as the proprietor of an airport, to exercise certain regulatory powers in the area of airport noise.[47]

The proprietor exception was created to protect the airport owner from liability for damage suits by airport neighbors. The airport owner wanted protection from neighbors who were suing under nuisance, trespass, and negligence theories, or claims that their property had lost its value and been "taken" by overflights and excessive aircraft noise. In a seminal case, *United States v. Causby*, the Supreme Court held that aircraft noise and low overflights were so damaging to the farmer's property that the farm had been "taken" without just compensation under the Fifth Amendment.[48]

As several recent courts have explained, the proprietor exception recognizes the responsibility of the airport owner to obtain air easements from airport neighbors, as well as the airport's liability for noise abatement, compensation, assuring compatibility in land use and, in some instances, relocation of neighboring property owners.[49]

Takings and Inverse Condemnation

Claims of a "taking" brought by property owners adjacent to an airport have frequently been upheld by the courts. If the court finds that a governmental airport owner has taken the owner's property (or has taken an easement over the owner's property), the court can grant a judgment for the value of the property destroyed, or for the diminution in value of the property.[50]

Courts have also upheld "inverse condemnation" suits to recover the value of property that has in fact been taken by a governmental defendant, although no formal condemnation proceeding has been attempted by the taking agency.[51] Sometimes, when a diminution in property values could not be shown, nuisance cases have also been successfully brought against airports, as have cases of negligence and trespass.

Relevant Case Law on the Preemption Doctrine

The key Supreme Court case in the area of federal preemption of aircraft noise control is *City of Burbank v. Lockheed Air Terminal,* decided in 1973.[52] In a five-to-four decision, the Court overturned an attempt by the City of Burbank to increase the curfew hours at the privately owned Hollywood/Burbank Airport. The Court found that there had been implied federal preemption of the control of aircraft noise because of the pervasiveness of federal regulation in the aviation area.[53]

The courts continue to affirm Congress' traditional policy of not preempting the airport operators' or proprietors' limited authority to establish permissible levels of noise, as long as the airport noise rules are fair, reasonable, and nondiscriminatory.

Because the City of Burbank was not the airport proprietor and had attempted to use its police powers to extend the curfew, the Court did not consider here what limits, if any, applied to an airport proprietor in enacting a curfew. In a much cited "footnote 14," the Court cited a letter from the U.S. Secretary of Transportation stating that the proposed legislation at issue in *Burbank* (the Noise Control Act of 1972) would not affect the rights of a state or local public agency, "*as the proprietor of an airport* [italics in original] from issuing regulations or establishing requirements as to the permissible level of noise which can be created by aircraft using the airport."[54] In footnote 14, the Court noted that the municipality here was not the proprietor and that the "authority that a municipality may have as a landlord is not necessarily congruent with its police power." Here, the City of Burbank attempted to impose the curfew using its police powers and the Court held such noise regulation to be preempted.

The courts continue to affirm Congress' traditional policy of not preempting the airport operators' or proprietors' limited authority to establish permissible levels of noise, as long as the airport noise rules are fair, reasonable, and nondiscriminatory.[55] The courts' support of airport proprietors' limited role in noise regulation continues despite a series of federal statutes giving increased responsibility for aircraft noise to the FAA.[56]

The following paragraphs provide a guide summary of some of the most relevant appellate court decisions in the area of federal preemption. Because this is an

extremely complicated and evolving area of law, they are meant as an introduction only, i.e., as the start of any advocate's exploration of the issue. NRDC strongly urges the reader to go straight to the sources—read the cases, review the related citations, explore relevant law review and other articles, and consult legal counsel—before proceeding with any legal strategy in this area.

National Helicopter Corp. Case

In 1998, the U. S. Court of Appeals for the Second Circuit, in *National Helicopter Corp.* v. *City of New York*, citing a long line of federal case law, upheld New York City's right, as a proprietor, to place restrictions at the 34th Street Heliport.[57] The appellate court noted that National Helicopter Corporation "does not dispute the viability of the proprietor exception."[58] National Helicopter argued that the city was not acting in its proprietary capacity, but under its police powers. The appellate court disagreed and upheld four of the seven New York City regulations as not preempted and as reasonable regulations to control the permissible levels of heliport noise. The permissible regulations included weekday and weekend curfews, elimination of sight-seeing helicopter operations on the weekends, and a 47 percent reduction in operations. The appellate court did not uphold the City's ban on a particular, noisy helicopter (the S-58T), finding the ban to be discriminatory; nor local regulation of sightseeing routes, finding routes to be a preempted area; nor changes in the marking of helicopters for the purpose of monitoring their use of the proposed routes.[59] The Court found a "cooperative scheme" existed between federal and local control.[60]

Other Cases on the Proprietor Exception

- *British Airways Board v. Port Authority of New York and New Jersey (Concorde I).*[61]

This case was occasioned by proposed flights to the U.S. of the new British/French supersonic transport, the Concorde. In 1976, the U.S. Secretary of Transportation ordered a 16 month operational test of the Concorde at both John F. Kennedy (JFK) and Dulles International Airport in Washington. In response to local political opposition to the Concorde flights, the Port Authority at its JFK airport imposed a temporary ban on the flights. The Port Authority believed the Concorde could not meet JFK's existing noise limit for takeoffs and landings, that the Concorde's low frequency noise characteristics would not be adequately addressed by its rule, and that the Concorde's noise and vibration impacts needed additional evaluation.

The Port Authority wanted more evidence of the Concorde's noise characteristics and impact from its operations at Dulles, Paris and London, while it conducted its own research. The airlines challenged the Port Authority's ban and the lower court upheld the challenge. The Court of Appeals for the Second Circuit, however, reversed the lower court and sent the case back for further evidentiary hearings on the reasonableness of the three-month ban on flights. The appellate court reasoned that federal policy authorized the local airport owner (when acting as the airport proprietor) to refuse landing rights for noise abatement purposes. Therefore, the appellate court held that the Secretary's order to accept the Concorde operational tests did not preempt the Port Authority's temporary ban of the Concorde. During the ban, the Port Authority was ordered to develop reasonable, nonarbitrary, nondiscriminatory regulations that established acceptable noise levels for the airport and its immediate neighbors.[62]

- *British Airways v. Port Authority of New York and New Jersey* (*Concorde II*).[63] Only months after the *Concorde I* decision, the lower court again entered an injunction to end the Port Authority's ban on the Concorde flights; Port Authority appealed the decision again, and this time the appellate court ruled the ban should be ended (*Concorde II*).

In the interim between *Concorde I* and *Concorde II*, the U. S. Secretary of Transportation concluded that vibrations produced by the low frequency noise of the Concorde did not present any danger of structural damage to homes and little possibility of annoyance. While the Port Authority's consultant had devised a means of relating household vibration to the Concorde's absolute noise levels, it had not been able to correlate this figure with the amount of irritation experienced by an individual at a given level of noise and vibration.[64] Further research needed to establish this correlation had not been authorized by the Port Authority. Meanwhile the airlines had refined their data to prove that the Concorde could meet JFK's existing noise standard. The appellate court concluded that Port Authority had not come up with new regulations quickly enough, that the ban had already been in effect for 18 months, and that further delay was unwarranted.

- *City and County of San Francisco v. FAA*[65]

This case stemmed from a San Francisco Airports Commission resolution prohibiting certain retrofitted (i.e., quieted for noise abatement purposes) aircraft from using San Francisco International Airport (SFO) after a certain date. Only retrofitted Stage 2 certified aircraft certified before January 1985 were allowed. Any retrofitted cargo carrier that had not received the FAA certification by that date was denied access. The carrier appealed to the FAA, which found this rule to be unjustly discriminatory—i.e., that it violated the airport's assurance of nondiscrimination in public use availability of the airport. The FAA then denied SFO's applications for airport improvement grants from the Airport and Airway Trust Fund.

This suit arose when the City and County of San Francisco petitioned for court review of the FAA decision to deny them airport grants because of their local rule. The appellate court reaffirmed that, although the federal government regulates aircraft and airspace pervasively, Congress had reserved a limited role for airport proprietors in regulating noise at their airports.[66] But the Court stressed that this power is limited to regulations that are not unjustly discriminatory. Finding that other aircraft permitted to operate at San Francisco were in fact equally noisy or noisier than the banned aircraft, it found the rule to be unjustly discriminatory.[67] The Court noted that neither it nor the FAA had considered whether the Airport Noise and Capacity Act of 1990 had altered the division of responsibility between federal government and the airport proprietor, since the Act was passed after the administrative proceedings in this case were completed.[68]

- *Global International Airways Corp. v. Port Authority of New York and New Jersey*[69]

Global International Airways, a charter carrier, and several international carriers sought to enjoin enforcement of some noise abatement regulations (an "Interim Rule" and "Nighttime Rule") at Port Authority-run airports. The lower court found that the Nighttime Rule was a permissible exercise of the airport proprietor's noise abatement powers, but that the "Interim Rule" was preempted by the federal government. The appellate court disagreed, finding that the Interim Rule, aimed at encouraging international carriers to use mostly noise compliant aircraft ahead of the FAA's schedule for these planes, was not preempted. The appellate court held that an airport proprietor's rule could be aimed at reducing cumulative noise levels rather than only barring aircraft that exceeded minimum decibel levels. But the appellate court again noted that aircraft could only be denied use of an airport "on the basis of non-discriminatory noise criteria".[70]

With the passage of the Aircraft Noise and Capacity Act in 1990, Congress tilted the traditional local/federal balance of control of airport noise levels further toward federal control. In ANCA, Congress mandated a phase-out of airlines' noisier Stage 2 air carriers by the year 2000. At the same time, it also enacted burdensome new procedural requirements and standards that an airport must meet in order to enact new local noise or access restrictions on Stage 2 and particularly on Stage 3 aircraft.

ANCA has not had a major court challenge since its enactment, (though it was discussed in *Millard Refrigerated Services v. FAA)*[71]; consequently, no court has explicitly considered how ANCA may have effectively altered the traditional division of responsibility between the FAA and the airport proprietor. But it appears that the onerous new burden of proof required by the ANCA regulations has discouraged airports from attempting to enact new local controls, such as curfews, even where noise impacts are extreme. As of this writing, no airport or heliport has enacted a Part 161 restriction under ANCA. ANCA is further discussed below.

LEGISLATIVE COMPONENTS, INCLUDING THE AIRCRAFT NOISE AND CAPACITY ACT OF 1990 (ANCA) AND OTHER MAJOR AIRCRAFT NOISE STATUTES

The following paragraphs provide a quick summary of some of the most important laws related to the issue of helicopter and other aircraft noise. They are meant as an introduction only, i.e., as the start of any advocate's exploration of legal avenues. NRDC strongly urges the reader to go straight to the sources—read the statutes, and review the underlying regulations, and consult legal counsel—before proceeding with any legal strategy referred below.

- Federal Aviation Act of 1958 (Pub. L. 85-726, 72 Stat. 731), now codified in various sections of 49 U.S.C., the FAA's statutory charter.

This law established the legal basis for the Federal Aviation Regulations (FAR), codified under 14 Code of Federal Regulations (14 CFR), which includes those regulations relating to helicopters. Section 611 of the Act mandated the FAA's noise abatement authority (directed at abating aircraft noise "at the source", i.e., the aircraft engine).

- Aircraft Noise Abatement Act of 1968 (Pub. L. 90-411; 82 Stat. 395) amended the Federal Aviation Act of 1958.

This act established a new Part 36 of the federal regulations governing aircraft noise levels. It prohibited further escalation of aircraft noise levels in subsonic civil turbojet and transport category airplanes and required new ones to be quieter. The act established "stages" of noise levels and has been amended numerous times. By 1977, the FAA determined that the technology was available to make aircraft quieter and required that such technology be used in all new designs.[72] In 1988, by amendment to Part 36, noise standards for helicopters were finally added, in part to provide uniformity with helicopter standards that had been enacted by ICAO.[73]

- Noise Control Act of 1972 (Pub. L. 92-574, 86 Stat. 1234)

Codified at 42 U.S.C. § § 4901- 4918, this act directed EPA to publish scientific information about the effects of noise including sound levels that would protect the public health and welfare with an adequate margin of safety.

- Aviation Safety and Noise Abatement Act (ASNA) of 1979 (Pub. L. 96-193, 94 Stat. 50)

Codified at 49 U.S.C. § 47501 *et seq.* (1994), the act established the Part 150 voluntary noise-compatibility programs that allow airports to apply for federal funds to implement noise-mitigation measures. ASNA was aimed at addressing growing conflicts over airport noise between the airports and surrounding communities and

helping to protect the airports from potential liability from damages they might incur from noise suits.

In this law, Congress directed the FAA to establish a single system for measuring noise; to develop noise exposure maps around airports, and to modify land uses (and/or acquire land) in accordance with the maps to mitigate airport noise impacts. "Compatibility" (of uses with an airport) was defined in terms of interstate commerce concerns and local land use compatibility, not in terms of the health-and-welfare-based threshold of noise exposure developed by EPA only five years before.[74] Part 150 designates a decibel level of 65 dB DNL as compatible with residences -- a level twice as loud as the 55 dB DNL threshold earlier identified by EPA as protective of human health and welfare.[75]

- Airport and Airway Improvement Act of 1982 (Pub. L. 97-248, 96 Stat. 671), codified at 49 U.S.C. § 47101 et seq.

This act includes federal policies on airport construction and improvement projects. One policy is that aviation facilities are to be constructed and operated to minimize current and projected noise impacts on nearby communities.[76]

- Airline Deregulation Act of 1994 (Pub. L. 103-305, 108 Stat. 1569), codified at sections of 49 U.S.C. including § 71713.

Section 47509 of this law added research programs on quiet aircraft technology including rotorcraft. This act also explicitly preempts regulations related to "price, route, and service of an air carrier."[77] But Congress specifically states in the next subsection that the preemptive effect of this section does not limit state and local agencies in the course of carrying out their proprietary powers and rights.[78]

- Airport Noise and Capacity Act of 1990 (ANCA) (Pub. L. 101-508, 104 Stat. 1388), codified at 49 U.S.C. §§ 47521 et seq.

ANCA's regulations are at 14 C.F.R. Part 161 and Part 91. ANCA directs the FAA to establish a national program to review noise and access restrictions imposed by airport proprietors on aircraft operations (§ 47524). (Access restrictions are any limitations on the time or manner of aircraft access to an airport.) ANCA also requires quieter engine technology for air carriers above 75,000 pounds by requiring airlines to convert their fleets from aircraft meeting Stage 2 noise certification levels to quieter Stage 3 levels by December 31, 1999 (§ 47528).

It can be argued that ANCA was not intended to change the substance of the law concerning when it is permissible for an airport to impose noise restrictions on Stage 2 aircraft. (See § 47533 - relationship to other laws.)[79] But onerous procedural hurdles have been added.

ANCA Further Restricts Local Noise Control Powers

In the Airport Noise and Capacity Act of 1990 (ANCA), Congress expressly attempted to balance the local needs for airport noise abatement against the needs of the national air transportation industry.

Outside of the FAA and the aviation industry, few observers would argue that the balance was adequately reached. ANCA sets forth criteria and standards - these are intended to ensure that an airport cannot upset this balance by imposing a local restriction whose negative effect on the national air transportation system outweighs any local benefits which a restriction is designed to produce.[80] Some highlights follow:

- ANCA criteria for local restrictions on Stage 2 aircraft are more straight forward than for Stage 3 aircraft and do not require FAA approval.

The procedural hurdles that are preconditions to valid Stage 2 restrictions are set forth in the statute. The most important, and most difficult, requirement involves doing a cost-benefit analysis of the restriction and of alternative measures to the proposed restriction (§ 47524 (b)(4)). Since Part 161 provides no guidance and there

is no accepted standard for comparing noise-abatement benefits with financial cost, this comparison is always subjective and results in an under-weighting of benefits and an over-weighting of costs.

- Both ANCA and its regulations impose substantial hurdles on any Stage 3 aircraft local restrictions.

Any local restrictions on Stage 3 aircraft must be approved by the FAA and can only be submitted by an airport proprietor. Neither local governments nor community organizations can submit local Stage 3 restrictions for approval (14 C.F. R. 161.301(c)). This FAA approval gives the agency much more leverage over local Stage 3 restrictions than over Stage 2 restrictions. The stringency and subjective nature of the Stage 3 requirements[81] have effectively eliminated the ability of the local proprietor to address serious noise problems in the way that the proprietor exemption has envisioned over the years.

The stringency and subjective nature of the Stage 3 requirements have effectively eliminated the ability of the local proprietor to address serious noise problems in the way that the proprietor exemption has envisioned over the years.

Even when there is a voluntarily negotiated agreement among airlines and airport proprietors, any Stage 3 restriction must allow new entrants to object to the agreement, and it must be published in the Federal Register (14 C.F.R. § 61.103).

Enforcement of ANCA is based on the financial disincentives to violating the Act or its regulations. If an airport is found to have violated ANCA, it could lose its eligibility for federal airport grant funds (under the Airport and Airway Improvement Act) and its authority to collect passenger facility charges (§ 47526). However, nine years after its passage, no airport has been found to violate ANCA, so the act's enforcement provisions are untested.

ANCA's phase-out of Stage 2 aircraft applies only to those weighing more than 75,000 pounds—primarily to large aircraft owned by air carriers. All domestic helicopters are currently below the 75,000 pound weight threshold, so that it might appear that ANCA does not apply to helicopters. However, the FAA has included helicopters in the Part 161 regulations implementing ANCA and asserts that ANCA procedures apply to restrictions on Stage 2 helicopters at heliports.[82]

Selected Helicopter Regulations in the Federal Aviation Regulations (FAR)

- **14 C.F.R. Part 1 - Definitions and Abbreviations**

  Provides the definitions used throughout the Code, including: rotorcraft—a heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors; and helicopter—a rotorcraft that depends on engine-driven rotors for its horizontal movement.

- **14 C.F.R. Part 34 - Emission Requirements for Turbine Engine-powered Airplanes**

  Contains emission standards for fixed-wing aircraft engines, but not for helicopter engines.

- **14 C.F.R. Part 36 - Noise Standards**

  Provides noise standards for various types of fixed-wing aircraft, including transport category large and turbojet airplanes, subsonic and supersonic airplanes, and small propeller-driven airplanes. Certification, noise limits, and noise-measurement procedures are provided in this Part. Part 36 originally applied only to "airplanes," but this definition was changed to "aircraft" and helicopter noise standards were added in 1988. The helicopter noise standards are in Appendix H and Appendix J to this Part. Noise limits for Stage 2 helicopters are in § H36.305; the Stage 2 limit for helicopters under 6,000 pounds tested under Appendix J is given in § J 36.305.

- **14 C.F.R. Part 91 - Flight Rules**

  Defines operating and flight rules for all aircraft. Helicopters may be operated at less than the minimum altitudes prescribed for other aircraft, if the operation is conducted without hazard to persons or property on the surface. However, helicopters must comply with any routes or altitudes specifically prescribed for helicopters by the FAA Administrator (§ 191.110 (d)) (Part 91 also contains the regulations for ANCA's phase-out of Stage 2 aircraft in Subpart I §§ 91.801-.875).

- **14 C.F.R. Part 135 - Operating Requirements: Commuter and On-demand Operations**

  No person may operate a commercial helicopter over a congested area at an altitude of less than 300 feet above the surface, except when necessary for takeoff and landing (§ 135.203).

- **14 C.F.R. Part 150 - Airport Noise Compatibility Planning**

  This Part defines the requirements and methodology for airport noise compatibility studies. It defines the Yearly Day-Night average sound level (Ldn) as the standard for measurement of cumulative noise exposure for all such noise studies. (Also see discussion above regarding ASNA in the "Major Statutes" section.)

FAA Advisory Circulars

Unlike the federal aviation regulations, directives in the advisory circulars are not binding; rather, they provide approved guidelines for implementing the regulations and criteria that are often regarded as standards for the industry.

- Advisory Circular No. 36-1G - Noise Levels for U.S. Certificated and Foreign Aircraft

Provides noise data on helicopters certified to fly in the U.S. and includes noise levels at takeoff, landing and overflight. Appendix 10 gives noise data for the heavier helicopters (over 6,000 pounds) and shows that their noise levels (for take off, flyover, and approach) range between 85 to 99 EPNdB—highly problematic noise levels if close to residences or working environments. Appendix 11 has data for the smaller helicopters, measured in SEL, and shows their noise range during flyover to be mostly between 79 to 85 SEL.

- Advisory Circular 91-66 - Noise Abatement for Helicopters

Provides guidelines to assist pilots, operators, and others to achieve noise reduction when operating helicopters.

For all the regulations just cited, there are currently no Federal—or City or State—noise regulations that directly limit heliport noise impacts.

First and foremost, local authorities can prohibit heliports in the zoning code; or require a special permit (as is the case in New York City).

HOW LOCAL AUTHORITIES CAN CONTROL HELICOPTER OPERATIONS AND MITIGATE THEIR IMPACTS

First and foremost, local authorities can prohibit heliports in their zoning code[83] or require a special permit (as is the case in New York City). If a heliport is established, but the locality would like to keep control of the facility, it should not accept federal money for any construction project. Avoiding federal funds can be a

costly step to reduce federal control, but it seems to work. Accepting federal money establishes a contractual relationship that allows the FAA to impose federal conditions on what the local jurisdiction may do at the heliport at least during the life of the improvement or grant project. The New York City heliport case appears to suggest that it can work.

The following paragraphs provide quick summary answers to some often-asked questions asked by local authorities that are interested in mitigating helicopter noise impacts. They are meant as an introduction only, i.e., as the start of answering these questions. NRDC strongly urges the reader to consult with legal counsel before proceeding further with any local noise mitigation strategies.

Can Local Noise Ordinances Help in Setting Noise Limits?

Local jurisdictions may not use their police powers to try to control aircraft and airport noise without risk of federal preemption.[84] That may mean that such local codes as applied to airports and heliports can be preempted. The NYC Noise Code, for example, sets ambient noise limits, but the city does not believe it can be used to control heliport noise. One reason given is that transportation facilities are exempt.

Can Flight Paths Be Controlled?

No. Flight paths are clearly a preempted area, and cannot be controlled. However, the FAA says it will work with the local communities, if sufficient pressure is brought to bear on it, in setting new routes to reduce noise, as it did regarding some changes to helicopter sightseeing routes over New York City. However, the FAA's track record is mixed, for route changes that reduce noise in one community result in increased noise elsewhere.

Can Minimum Altitudes Be Set?

No. Only the FAA can set minimum altitudes, and it has been resistant to enacting minimum altitudes for helicopters, even when they are clearly needed. However, Congress has gotten involved in the issue (because of public pressure for restoration of quiet in the parks) by passing the 1987 National Parks Overflight Act (Pub. L. 100-91). This Act requires the FAA, among other provisions, to control helicopter flights over the Grand Canyon.

NRDC believes that both the FAA and Congress should be pressured on this issue to bring relief not only to national parks, but to localities impacted with heavy volumes of helicopter traffic, such as the NYC region.

Can A Curfew Survive A Legal Challenge?

This is yet another unclear area of the law of federal preemption. Yes, a curfew can survive a challenge, as New York City's has. The curfew must be instituted by the proprietor, however. It is still not entirely clear, but that the FAA might attempt to challenge under ANCA such curfews and regulations, as improper restrictions affecting flights.

Can A Municipality Ban Certain Helicopter Operations Altogether?

It is not clear whether such a ban could withstand a federal preemption challenge. NYC closed its 60th Street Heliport and imposed a weekend curfew at East 34th Street that was upheld. But, having taken federal money for the Downtown Manhattan Heliport, the City cannot discriminate against the types of helicopters using the site. To our knowledge, the question has not been tested by any court.

Who Can Enforce and How?

As mentioned above, localities can refuse to zone for heliports. Communities have also successfully placed flight restrictions on hospital helipads or prohibited them. At least in the Second Circuit, a proprietor has the authority to add conditions to a

special permit for a heliport (as NYC did at its 34th St. Heliport) or it can rescind a special permit for heliport operations (as the City did on the use of the Pan Am building heliport after an accident in 1977).

WHAT ROLES DO OTHER FEDERAL AND STATE AGENCIES PLAY?

While the FAA has primary responsibility in helicopter matters, several other agencies and groups play important roles. Some, such as the Environmental Protection Agency, should play larger roles than they do.

EPA needs to play a stronger role in the environmental impacts of helicopters (and aircraft generally).

Environmental Protection Agency (EPA)

During the 1970s, EPA was extensively involved in noise issues and research. This research culminated in a report, mandated by Congress in the Noise Control Act, that addressed the noise levels the agency deemed necessary to protect the public health and welfare.[85] However, despite its important work on the public health implications of noise, EPA's Office of Noise Abatement and Control (ONAC) was denied funding in 1981 and basically eliminated. Since the dissolution of ONAC, EPA's involvement in aircraft noise issues has been largely limited to environmental review of federal projects in accordance with the National Environmental Policy Act (NEPA) and comments filed under Section 309 of the Clean Air Act.

Under NEPA and Section 309, EPA's administrator reviews and comments on proposed major federal actions that significantly affect the quality of the human environment. In addition, EPA is authorized, under the Noise Control Act of 1972 and Quiet Communities Act of 1978, to develop and submit recommendations to the FAA regarding noise produced by aircraft and aircraft-related activities.

EPA has prescribed air emission standards for certification of aircraft engines, but has not prescribed such standards for helicopter engines. Toxic air pollutants in emissions from aircraft are currently unregulated under the Clean Air Act.

EPA needs to play a stronger role in the environmental impacts of helicopters (and aircraft generally). As we enter the next century with numbers of aircraft and helicopters continuing to grow—thus offsetting much of the technological noise and air-emissions reductions already achieved—reducing the environmental and public health impacts of air travel and airports and heliports is essential.

National Aeronautics and Space Administration (NASA)

NASA plays a crucial governmental research role in aeronautical technology that currently includes a major aircraft noise and air emission reduction program. In what is often joint research with the FAA, the Department of Defense, and industry, NASA is pursuing innovative engine technology aimed at producing cleaner-burning and quieter engines.[86] The ultimate objective of the noise program is to achieve a 10 EPNdB reduction in aircraft noise by the end of the century compared to 1992 technology and 20 EPNdB within 20 years.[87] NASA is also conducting noise research applicable to helicopters.[88] This NASA research program, including rotorcraft research, is urgently needed and should be supported and funded.

Approval of the state in New York, or a license by the state in Connecticut and New Jersey, is required for heliports.

State Agencies: The Tri-State Area

Approval of the state in New York, or a license by the state in Connecticut and New Jersey is required for heliports.[89] A NYS heliport must have municipal approval; in addition, under New York General Business Law § 249, before a municipality can approve a private heliport, the NYS Department of Transportation (NYSDOT) must determine that the heliport complies with certain standards. These standards are twofold: that the heliport does not impact public transportation corridors or public buildings; and that the volume, character, and direction of traffic at the heliport will not constitute a menace to safety of operations at other airports in the vicinity. Air space approval must be granted by the FAA, and NYSDOT relies on the FAA for the safety analysis of the heliport.[90]

In 1990, NYS DOT in conjunction with the Port Authority of New York and New Jersey produced a *Downstate New York Helicopter System Plan* (hereafter *Downstate Plan*). The *Downstate Plan* includes a survey of heliports throughout the New York downstate region, an origin and destination survey, and forecasts of heliport system needs.[91] At that time, DOT reported 108 airports and helicopter facilities in the downstate area, only eight of which were true public heliports. Six of these eight were in the New York City area.[92] Since that time, several of the heliports in the survey have closed. NYS DOT has not done any follow up to this report[93] and current origin and destination data for the New York metropolitan area apparently do not exist. Even the NYC *Helicopter Master Plan*, discussed in Chapter 3, does not fill this particular data gap.

HOT SPOTS IN THE NEW YORK TRI-STATE REGION

For several reasons, data on the number of helicopters in particular areas of the country are difficult to obtain. For example, there are no regional registries and the FAA does not require airports to keep separate helicopter operations data. Usually, these data are lumped together with many different types of general aviation (i.e. private) aircraft flights.

The lack of separate record-keeping of helicopter data is a major problem when trying to assess helicopter impacts. In addition, many corporate and other private-use helicopters operate to and from private helipads, without providing any flight data for the public record. New York City records operations data for the New York City heliports and airports. Since many, if not most, helicopter flights that originate in the tri-state area (New York, New Jersey, and Connecticut) have New York City as their destination, these data provide some, albeit incomplete, operations and growth numbers for helicopter use in this tri-state area.[94]

Total helicopter operations at the New York City heliports (until recently, four heliports; now three) and LaGuardia and Kennedy Airports reached a high of 164,866 in 1990. They have remained at over 140,000 per year for most of the 1990s, which makes the New York City area the most heavily helicopter-impacted area in the country – if not the world.

The New York City area is the most heavily helicopter-impacted area in the country – if not the world.

NEW YORK CITY

New York City is generally acknowledged to have the greatest amount of helicopter activity of any city in the United States, and probably in the world.

New York City's helicopter system currently consists of dedicated landing pads at both LaGuardia and Kennedy Airports in Queens and three heliports in Manhattan. The Manhattan heliports are at East 34th Street on the East River; the Downtown Manhattan, at Pier 6 near Wall Street (both owned by New York City); and the West 30th Street, on the Hudson River, owned by New York State and currently operated by Air Pegasus. The City closed its fourth heliport at East 60th Street in early 1998 and, following the court decision (previously discussed) in the *National Helicopter* case, has significantly curtailed operations at East 34th Street.

Total helicopter operations[95] in the City system (including the former East 60th Street site) reached nearly 165,000 per year in 1990. There was a small downturn during the next few years, but the numbers rose again to more than 150,000 in 1995 and 1996.[96]

The reader should note that the operations data for 1997 in Table 1, Appendix B, is incomplete. The City recorded no data for much of the year at the East 34th Street site, during its effort to evict National Helicopter Corporation from the site. Operations were reduced during this period.[97] *The Heliport and Helicopter Master Plan for the City of New York* estimates that operations at 34th Street were reduced to 36,000 in 1997.[98]

Newark Airport

Newark International Airport, the region's busiest airport, is also the source of many helicopter flights in the tri-state region. Its helicopter data must be added to the New York City System totals to obtain a more complete picture of the total number of helicopter overflights above the City. No data apparently exist to determine how many of the Newark operations are to city heliports and how many are going to other destinations. NRDC obtained the following operations data for Newark from the Port Authority.

Table 2

Newark Airport Helicopter Operations Data

Date	Operations
1988	3,928
1995	3,664
1996	2,982
1997	2,950

In addition, significant numbers of operations at Floyd Bennett Field in Brooklyn also contribute to the City's helicopter overflight totals. The City's six police (NYPD) helicopters are based at this field, as were, until recently, the Coast Guard Air Station's search and rescue unit for the area. The Coast Guard helicopters added roughly about 6,000 to 7,000 landings or 12,000 to 14,000 operations per year.[99] In 1998, the Coast Guard unit was moved to Atlantic City, New Jersey; police operations totaling more than 3,000 flights last year continue at Floyd Bennett Field.[100]

The lack of total helicopter operations data from these and other area airports (notably Westchester County in New York, and Teterboro, Linden, Morristown, and

Ridgefield Park, in New Jersey, discussed below) makes it virtually impossible to assess the actual numbers of helicopter operations over New York City and its surrounding areas or the impacts of these flights.

What is the Proper Role for Manhattan's Heliports?

A bill introduced in Congress in 1997 would require the FAA administrator to develop and implement a helicopter risk-reduction plan for counties or municipalities of more than 500,00 people, whenever the FAA determines that helicopter operations pose a risk to the public health.

During the past few years, the volume of helicopter operations rose to a point where citizen-generated pressure for cutting back, and even eliminating, some helicopter operations became intense. The volume of overflights of some areas, primarily by sightseeing helicopter air tours, had increased to a frequency of every two minutes during peak hours.

This led to opposition by residents, community boards, elected officials, and environmental groups, and to the formation of a Manhattan Helicopter Task Force, and the Helicopter Noise Coalition (HNC). It has also resulted in lawsuits by the City to evict National Helicopter Corporation, another by the Helicopter Noise Coalition and certain legislators against the City, and to actions by the City in 1997-98 to reduce operations at the Manhattan heliports. It also prompted the introduction of federal legislation by New York representatives to reduce helicopter impacts. In 1997, a bill was introduced in Congress that would require the FAA administrator to develop and implement a risk-reduction plan whenever the FAA determines that helicopter operations (including takeoffs, landings, and overflights) pose a risk to the public health and welfare in a county or municipality of more than 500,000. This bill was re-introduced in the 1999 Congress in broadened form to include more municipalities and is in the Aviation Subcommittee.[101]

Broad-based opposition also prompted the City to undertake the helicopter and heliport master plan study discussed below.

Helicopter Master Plan for New York City

The *Heliport and Helicopter Master Plan for the City of New York* (*Master Plan*) was prompted by a wide range of existing and emerging heliport issues in the city. The *Master Plan*, produced primarily with funding from the FAA, was drawn up by several consulting companies.[102] The stated goal of the *Master Plan* is to provide a comprehensive analysis of the City's heliport infrastructure and its associated helicopter activity and to project future needs. Its additional goal is to help develop City policy initiatives and recommendations "to achieve a balance between the local helicopter industry's operational needs (efficiency and safety) and the affected communities' quality of life."[103] To achieve this balance, the Plan states that the City is implementing a policy to redistribute the helicopter activity to more community-compatible heliports.

Brief History of the City's Heliport System

Helicopter use in the City dates back to 1948, when the NYC police became the first police department to use the aircraft.[104] In years following, demand for helicopter use for the city's many urban activities (from bank money transfers to advertising, filmmaking, and ferrying of corporate executives to and from area airports) resulted in the development of several heliports in the City, as well as dedicated helicopter landing pads at the City airports.

The City's first public-use heliport was developed in the 1950's at West 30th Street on the Hudson River. A second (on the East River south of Wall Street) was opened in the 1960s, followed, in 1968, by a third -- the heliport at East 60th Street on the East River. However, also in the early 1960s, growing concern about helicopter activity prompted the City to include future heliport development in its new zoning regulations. Those regulations, which are in force today, require that before a heliport can be established, the proprietor must obtain a special permit. In

order for the proprietor to obtain the permit, the heliport must be deemed an appropriate use of a site and must not interfere with surrounding land uses or proximate aviation facilities.[105]

Over the years, the heliport scene changed, as several rooftop heliports were opened and then closed and certain helicopter charter operations thrived and then succumbed to market downturns. Nationwide growth of corporate helicopter activity in the 1970s was reflected in increased local corporate demand. The City opened its fourth waterfront heliport at East 34th Street in 1972, partly in response to this demand, but also partly to replace a rooftop heliport on the Pan Am Building. This rooftop heliport had not been open long when it closed in 1968. After opening again, it closed in 1977 following a helicopter accident that resulted in five fatalities. The City has not considered any rooftop proposals since that time.

In the 1980s, continued demand for sightseeing and corporate operations was also accompanied by the financial failure of some local operators. New residential developments on Roosevelt Island near the East 60th Street Heliport and near the East 34th Street Heliport led to opposition to the increasing helicopter operations at the two East River sites. This opposition finally led to the recent closure of the East 60th Street heliport and cutbacks in the record numbers of flights at the East 34th Street heliport, which had become the busiest public-use heliport in the world.[106]

Each recent proposal for additional heliports has generated intense local opposition. Current proposals for heliports adjacent to the new Hudson River Park (at Pier 76) and a proposed helicopter maintenance facility at the former Brooklyn Navy Yard are also extremely controversial (See Pier 76 section below).

The Master Plan's Discussion of New York City Airspace

Some understanding of the complicated airspace over New York City is necessary to appreciate the reasons for the current low-altitude flight of much of the helicopter

traffic. Airspace considerations affect efforts to require higher-altitude flight for helicopters in order to reduce noise impacts on the ground.

The FAA has created a Class B Airspace (CBA) to encompass JFK, LaGuardia, and Newark Airports that extends 20 miles from each airport. In general, Air Traffic Control (ATC) allows visual flight rule (VFR) traffic to pass through the CBA on a limited basis. Transient aircraft (both VFR and Instrument Flight Rules [IFR]) are usually routed around the CBA (or some can fly over) to minimize interference with landing and departures at the three airports and to minimize ATC's workload.[107] Helicopters usually fly around or under the CBA.

Beneath LaGuardia's Class B Airspace , the FAA established the Hudson River Exclusion Corridor (uncontrolled airspace), which is used by most of the City's helicopter air-tour traffic, as well as large volumes of fixed-wing and helicopter traffic flying between the Northeast and New Jersey. The FAA also designed an East River Exclusion Corridor, used primarily by helicopters from the East 34th Street Heliport and some seaplane activity at East 23rd Street.[108] These corridors extend from the river surface to 1,100 feet mean sea level and were intended to allow for helicopter travel under the CBA without ATC assistance.

The Plan's Demand Capacity Analysis

The Plan forecasts large increases in heliport activity, driven primarily by growth of the air-tour industry. Other sectors, such as corporate helicopter activity, are expected to remain flat. In its Demand/Capacity Analysis of the City's heliport system, the *Master Plan* looks at future helicopter facility requirements. Its findings are based on a baseline and six system scenarios using differing assumptions: some scenarios assume that helicopter air-tour activity will continue at or above its present level; other scenarios assume that it will be curtailed or eliminated. The scenarios also envision differing combinations of existing and proposed (e.g., Pier 76) heliports that will

function or remain closed. The plan concludes that, if air-tour activity is allowed to continue, a helicopter system consisting of no fewer than three heliports would be required—for example, East 34th Street, West 30th, and Downtown.[109] However, if the City were to pursue a management option allowing it to gain control of all the heliports and to implement a prohibition on air-tour operations, the Plan concludes that a two-heliport system might accommodate the remaining helicopter activity—for example, closing East 34th Street, but using the Downtown (Wall St.) heliport and a proposed new one at Pier 76 in the Hudson River.[110]

Plan's Discussion of Noise Impacts

The Master Plan *recognized noise "as the most significant potential environmental effect generated by helicopter activity."*

The *Master Plan* discusses environmental issues associated with helicopter activity, including noise exposure and other categories as defined by the City Environmental Quality Review (CEQR) guidelines. Among these other categories are land use and zoning, open space, hazardous waste, traffic and parking, air quality and construction impacts. The Plan found no potential significant impacts to be associated with any of these categories, but recognized noise "as the most significant potential environmental effect generated by helicopter activity." [111]

Surprisingly, only five days of noise monitoring was conducted for the *Master Plan.* But even given the limited monitoring, the Plan cites individual, high sound exposure levels (SELs) that were significant noise events at the various monitoring sites.[112] Previously, the FEIS for the 34th Street Heliport in 1995 had found the Ldn noise measurement for the Rivergate Apartments near the heliport to be 79.8 dBA Ldn,[113] well above the 65 dB Ldn set by the FAA as the residential compatibility limit. An independent study prepared for the Helicopter Noise Coalition had found 15 to 26 dBA increases in noise resulting from the operation of helicopters (above background levels) at the Rivergate.[114] These data tallied with increases found at the

Rivergate by the FEIS for the heliport. These are large increases in an area with already high background noise levels from the FDR (East River) Drive.

The *Master Plan* concludes that a 90 dBA SEL contour defines the area where helicopter operations "begin to interfere with indoor speech."[115] Some experts, and many residents, believe that indoor-speech interference begins considerably below this external noise level and that this 90 SEL assumption should be further studied (see "NRDC's Critique of the *Master Plan.*").

Plan Recommendations

Some of the *Master Plan*'s significant recommendations include:

1. The City should continue its recent ban on sightseeing flights at the 34th Street Heliport and will not "support" sightseeing flights generally.

2. The City should develop ground-based restrictions for idling times, engine run-ups related to maintenance, and training operations. The restrictions should be incorporated into the City-issued Aviation Facility Licenses. The City should maintain [control] each heliport's hours of operations.

3. Noise-related improvements should be made at each heliport.

4. The City should determine the feasibility of installing a permanent noise-monitoring system serving all sites or utilizing portable monitors to conduct spot-checking at sites near heliports or flight paths. It should seek legal counsel to determine if monitoring results can be used to impose noise-related fines for aircraft exceeding "normal" decibel thresholds.

5. The City should establish a Heliport Oversight Committee, which should work with the FAA and industry representatives to review and modify (as necessary) existing noise-abatement procedures.

6. The City should take a co-lead position with the Eastern Regional Helicopter Council and the FAA in developing an Electronic News Gathering (ENG) Operations Manual. Issues covered should include: minimum weather criteria, altitude considerations, hovering durations, and event-specific guidelines.

7. The City should determine if any financial incentives (i.e., reduced fees/rents) can

be provided to helicopter companies that fly new-technology (quieter) aircraft, as well as heliport operators that encourage their use.

8. The City and the FAA should establish an effective dialogue and working relationship to jointly address local helicopter-related issues.

9. The City should assist local congressional delegations in their efforts to expand the FAA regulatory authority and empower local residents to better control the City's helicopter traffic.

10. Through its Aviation Facility License, the City should require heliport operators to provide monthly operational breakdowns by mission (air tour, charter, corporate, emergency, special/other) and aircraft type.[116]

NRDC Critique of New York City's Helicopter Master Plan

NRDC supports the recommendations just listed, but believes that they fail to address adequately the City's growing helicopter-related noise impacts. Indeed, NRDC finds that the *Master Plan* appears to be largely a justification of what the City is doing now rather than a sufficient plan for the future. It lacks a serious policy discussion of all alternatives, and an adequate analysis of the environmental impacts. Its preparation was also short on public input and process.

Several of the Plan's scenarios on air tours depend on whether the City can persuade New York State, owner of the West 30th Street Heliport, to ban such flights also. With the shift in tour flights from East 34th Street to West 30th Street, this heliport has now assumed the title as busiest public-use heliport in the country. Any ban at the Downtown Manhattan Heliport (DMH) is probably not possible until 2005. Having accepted federal funding, DMH is encumbered by federal construction grant assurances that run for 20 years. The assurances require that all categories of helicopters be served without restriction. The Plan states that the City will seek a

waiver from the FAA on these and other restrictions that conflict with City policy. But the City expects that such action will be challenged by the aviation industry.[117]

The Plan inadequately presents the existing substantial research data on the effects of chronic noise on health and learning. This may be one reason that the Plan recognizes the economic benefits brought to the City by the helicopter industry, but does not adequately chronicle the negative impacts of heavy helicopter activity on the lives of the millions living in the City and its surrounding areas. Furthermore, the Plan does not recognize that merely redistributing the great volumes of helicopter traffic from one area of the City to another does not address the root problem of noise and its health impacts. The Plan also fails to address adequately helicopter traffic's current and projected unacceptable impacts upon large segments of the City's population partly because its initial goal is faulty. A goal to "balance the helicopter industry's need and the affected communities' quality of life" must give higher priority to communities' quality of life at the outset.

Should air tours continue (at West 30th and DMH or just at DMH or with new heliports at Pier 76 or 72), total helicopter activity is projected to increase by unacceptably large numbers through 2017.[118] It is clear that the City's main efforts must be toward reducing and then eliminating the non-essential helicopter air-tour flights over the City. The City should work with the FAA to control other segments of helicopter traffic when their volumes cause unacceptable impacts to heliport neighbors, as well as to those under the flight paths. Mandatory flight paths that minimize noise impacts to all residential neighborhoods will be essential.

How to Deal with Tourist, News, and Other Non-Essential Helicopters

In the congested New York City area, helicopters are generally directed to fly under the fixed-wing aircraft flight paths, thus increasing helicopter noise impact to residences on the ground. Since the late 1980s, the air-tour segment of New York's

helicopter operations has been the fastest-growing segment. Since the early 1990s, they have constituted a majority of the flights, and in 1996, there were 200,000 sightseeing passengers.[119] After the demise of National Helicopter Corporation in early 1998, Liberty Helicopter, based at West 30th Street Heliport, became the major tour company in the City. It served nearly 100,000 passengers in 1997.[120] Banning—or at least sharply reducing—air tour flights would result in significant noise reductions in the communities surrounding the heliports and under the flight paths.

Electronic News Gathering (ENG) helicopters above New York City (and Los Angeles) have also been identified as a major noise irritant for city residents.

Electronic News Gathering (ENG) helicopters above New York City (and Los Angeles) have also become identified as a major noise irritant for city residents. Actually, all of the New York City ENG helicopters are based across the river in New Jersey. They tend to fly at low altitudes for reporting and the half dozen helicopters representing the City's TV channels may converge on the same site and hover for long periods of time. This practice imposes high levels of noise on those on the ground. Opposition to increased media flights and their practices has been building. Recently it led, among other things, to the formation of a committee composed of the Eastern Region Helicopter Council and the helicopter operators; the committee's worthy goal is to develop procedures and guidelines to mitigate impacts.[121] This kind of action is sorely needed as a start.

NRDC believes that the FAA should go beyond the voluntary guidelines, such as those recently set, for example, in conjunction with LaGuardia Tower and NYPD Aviation,[122] and should determine altitudes and flight paths for normal operations to alleviate the noise impacts of media reporting. The FAA should also pressure the media to develop acceptable pooling arrangements, so that the number of helicopters responding to events can be reduced.

Pier 76: Why the proposed heliport in the Hudson River should not go forward

In October 1997, Governor George E. Pataki signed the Hudson River Park Act. This act was a historic milestone in the decades-long debate over the Hudson River waterfront, and created a joint city-state park from the Battery to 59th Street in Manhattan. Although the law prohibits heliports within the park, part of Pier 76 was cut out of the park boundary by the City, leaving open the possibility of a heliport on the border of one of New York City's future crown jewels.

NRDC strongly opposes the Pier 76 heliport proposal. Simply stated, heliports and their noise are not compatible with parks. Any helicopter activity at Pier 76 will impose unacceptable noise levels on the park. While the *Final Master Plan* notes that the legislation may make an adequately sized facility at Pier 76 "unfeasible," it repeats the arguments in favor of a heliport limited to corporate helicopter activity.[123] We believe the parties should abandon this ill-conceived heliport plan.

SUBURBAN HOT SPOTS

The tri-state region surrounding New York City receives large amounts of pass-through, or transit air traffic traveling between Boston and Washington and points in between. This traffic is in addition to flights whose destination is New York City, and it adds to the impacts on the region. Although there are few public-use heliports in this suburban area, there are many private or restricted heliports for corporate, police, military, or medical use. It is virtually impossible to obtain operations data from these sources, so that the total impact of these unrecorded flights, on top of all the other operations, cannot be accurately assessed. It is clear, however, that the number of flights from the private helipads is significant by most standards. (The failure of private helicopter operators to provide data is one reason that helicopter flight statistics can only be estimated.)

Westchester County/Fairfield County, Connecticut

For years, Westchester County Airport (WCA) near White Plains, New York, has been considered the busiest public-use heliport in the suburban New York region. According to the *Downstate System Plan*, WCA helicopter operations in 1987 numbered 12,000.[124] In 1997, only limited helicopter operations data were available from airport management. This data consisted of helicopter arrivals logged for landing-fee billing purposes, but no data were kept for operations by corporate helicopters based at WCA weighing less than 10,000 pounds, or police, military, and medical emergency helicopters. This incomplete 1997 operations total was 3,231.[125]

About a half dozen helicopters are based at the airport. [126] Unfortunately, as is the case with nearly all other heliport data, it is impossible to obtain the total number of helicopter operations from WCA.

Helicopter-noise concerns at WCA led to the establishment of helicopter noise-abatement procedures, including suggested flight paths into and out of the airport and a suggested altitude of 1,400 feet that was raised to 2,000 feet in 1995. According to the Noise Abatement Office (NAO) director, the suggestions are obeyed by most of the fixed-base operators, but ignored by others.

STAT Flights is an operation that provides emergency medical helicopter service and hospital transfers from a seven-county area to the Westchester County Medical Center in Valhalla, in the center of Westchester County. This service flies an average of 800 to 1,000 operations per year.[127]

Fairfield County, in western Connecticut, does not have any large heliports, but is home to a number of restricted or private heliports. Many Fairfield County helicopter overflights are to or from WCA, or to destinations to the east or north of the county, as well as to New York City.

Several of the larger towns and cities in Fairfield prohibit heliports within their boundaries. The town of Greenwich is one example, and recently, the city of

Stamford. Stamford has two private corporate heliports that are "grandfathered" under its zoning law, but no new ones can be built.[128] Norwalk has two private corporate heliports and a recently licensed one at Norwalk Hospital.[129]

The Danbury Airport had a helicopter charter company for a number of years; it moved to New York State's Dutchess County Airport in 1997. As a result, Danbury's helicopter operations have dropped from 12 to15 per day to about 30 to 40 per month.[130] However, two helicopter flight schools based at the airport generate some operations. Again, actual numbers were not available.

New Jersey

Teterboro Airport has probably the largest number of helicopter operations in New Jersey, and possibly in the suburban tri-state region. The 1997 operations total was 12,296, and these numbers represent a decline since 1990. The highest number of operations was in 1988 (18,644), when Teterboro had helicopter service to the Atlantic City casinos.[131]

Table 3

Teterboro Helicopter Operations Data

Year	Operations
1997	12,296
1996	13,342
1995	15,556
1994	14,140
1990	17,858

Other New Jersey helicopter origins or destinations identified in the *Downstate System Plan* are Atlantic City (which no longer has scheduled helicopter service to the casinos); Linden, NJ; Morristown; Camden; and Ridgefield Park.[132] At the time

of the survey (1989-1990), New Jersey accounted for about 38 percent of the helicopter origination sites and over half the activity in relation to the Downstate New York study area.

In common with the helicopter flights into New York City, many New Jersey helicopter flights must also stay under the fixed-wing commercial traffic into Newark Airport, causing their low altitude flights to be particularly intrusive.

Long Island

Long Island is home to considerable helicopter activity and a constantly evolving cast of landing sites and operators. In the 1990 *Downstate New York Helicopter Report*, McArthur Airport in Islip was listed as having an estimated 24,000 operations annually—about 90 percent of these were Army National Guard, police, and military activity. Suffolk County Airport had Air National Guard helicopters and heavy corporate use at about 9,000 operations per year. Republic Airport in Farmingdale was listed as having 7,250 operations; and Island Heliport in Garden City had about 12,000 operations.[133] Island Heliport was operated by Island Helicopter Corporation, of which New York Helicopter was a subsidiary; Island then became National Helicopter Corporation.[134]

National was evicted from the City's 34th Street Heliport in 1998 after legal action that extended over a number of years; the company had insurance and other legal problems that prevented it from starting new operations at other sites. After being the largest operator in New York City for more than twenty years, National suspended operations in January 1998. [135]

Like New Jersey's Teterboro Airport, Republic Airport was one of the few airports to have fairly complete helicopter operations data, based on landing fees charged for arrivals. Republic's helicopter operations have grown since the 1980s to where there are now 4,000 or more landings (meaning about 8,000 operations) per year.[136] Besides charter operations, Republic has some Coast Guard training and State Police helicopter activity.

Islip's MacArthur Airport does not collect separate helicopter data. But an estimate of operations by the control tower supervisor puts the number at about 30 to 40 operations a day, or about 10,000 per year (by the Suffolk County Police, the Air National Guard, a local flight school, and a fixed- based operator).[137]

CONCLUSIONS AND RECOMMENDATIONS

This study of helicopter impacts has led NRDC to a number of conclusions and recommendations that appear throughout the text and are summarized below.

FINDINGS

- Helicopters are currently responsible for significant noise impacts in some localities, including around some military bases, urban centers and, particularly, the New York City area. There is an urgent need for noise relief in these localities.

- Limited but growing research and the experience of populations in heavily helicopter-impacted localities strongly indicate that helicopter noise, similar to other aircraft noise, can affect human health, well being and learning ability.

- Helicopters often cause disproportionately severe noise impacts compared to other aircraft, because of their peculiarly annoying noise characteristics (which include blade slap and low frequency noise that results in building vibration) and the low altitudes at which they are permitted to fly.

- Compared to other aircraft, helicopters are under-regulated by the FAA. For example, helicopters have no quietest (i.e., "Stage 3") level of noise certification, no minimum flight altitudes and, generally, no required flight paths.

- Government data on numbers of helicopter operations is inadequate and its data on helicopter engine emissions is basically non-existent; current data does not allow adequate assessment of the environmental impacts of current or future helicopter operations.

The passage of the 1990 federal Aircraft Noise and Capacity Act has increased the power of the federal government to preempt the traditional authority of the

airport proprietor to address serious local noise impacts. But the extent of this preemption is unclear as it has not yet been litigated.

Federal Recommendations

- Congress should immediately direct the FAA to take two steps: first, to develop and implement more protective "Stage 3" noise standards for helicopters; and second, to work with other federal agencies to implement a series of tax and/or other market incentives to encourage helicopter owners to retire their noisy Stage 1 and Stage 2 helicopters and to invest in quieter (and cleaner) Stage 3 helicopters. Research to further document the effects of helicopter and other aircraft noise on health and learning should also continue.

- Congress should pass H.R. 729 (co-sponsored by Congressman Jerrold Nadler and Congresswoman Carolyn Maloney, among others), which would require the FAA to prepare helicopter risk plans in cities with substantial helicopter noise impacts.

- To fill the significant data gap with respect to helicopter health impacts, environmental impacts, and number of operations, the FAA should require the collection of separate helicopter operations data by heliports. The FAA should provide public information on numbers of helicopter operations to enable the adequate assessment of their impacts.

- The FAA should require a 2,000 foot minimum flight altitude for helicopters wherever possible, especially over residential and other noise sensitive areas.

- The FAA should require helicopters to follow noise abatement procedures for takeoffs, flyovers and landings, unless safety, weather, or other FAA-specified concerns preclude their use.

- The FAA should require helicopter identification numbers that are readable from the ground on low-flying helicopters to help the FAA and local public officials to enforce requirements on minimum altitudes and noise abatement flight paths. Likewise, the FAA should work with local public officials, noise abatement advocates and other interested parties to develop local rules that minimize the impacts of media, tourist and other non-essential helicopter flights in noise-sensitive areas.

- EPA should also act to address the currently-uncontrolled air emissions from helicopters. A 1993 EPA-sponsored study at Chicago's Midway Airport found that aircraft engines emit significant quantities of toxic volatile organic compounds (such as formaldehyde, benzene and 1,3-butadiene), and particulate matter. EPA should implement regulatory limits on these toxic air emissions from helicopter and other aircraft engines.

- Congress should amend and clarify the 1990 Airport Noise and Capacity Act (ANCA) to clearly allow reasonable, non-discriminatory local regulations to control the environmental impacts of helicopter operations.

Local Recommendations

- Public officials throughout the tri-state region should work with regional helicopter councils, the FAA, and local community and noise abatement advocates to develop noise mitigation procedures and flight paths for their locales. To the extent possible, flight paths should avoid residential areas and fly over highways and waterways. Public officials and local advocates should support H.R. 729, a bill in Congress that would require helicopter risk plans in cities with substantial helicopter traffic.

- Public officials should determine if any financial incentives (i.e., reduced fees/rents) can be provided to helicopter companies that fly quieter, new-technology aircraft, as well as to heliport operators that encourage their use.

- Heliport owners or operators should make noise-related improvements at each heliport including: installing a permanent noise monitoring system serving all sites or using portable monitors to conduct spot-checking at sites near heliports or flight paths. Public officials should explore the use of monitoring results to impose noise-related fines for aircraft exceeding specified lower decibel thresholds.

- Heliport owners and operators should collect monthly operational breakdowns by mission (e.g., air tour, charter, corporate, emergency, media, special/other) and aircraft type, and provide public access to the data.

- Local public officials (especially in suburban counties) should consider refusing to zone for heliports, depending on local helicopter traffic and noise impacts on their jurisdictions.

- NRDC supports many of the recommendations of the *Heliport and Helicopter Master Plan for the City of New York*. These are listed in Chapter 3. These recommendations include ways to reduce the impact of helicopter operations, for example, by further restricting and/or banning tourist sight-seeing flights and by restricting flight paths to primarily over water and highways. NRDC strongly supports a ban on tourist flights over residential areas, and urges the City to keep tourist flights over major waterways.

- Despite many positive recommendations, the City's Master Plan does more to justify its current helicopter policies than to create and implement a sufficient

plan for the future. Most significantly, it underestimates the community, environmental and health impacts of helicopter growth in NYC, and fails to adequately discuss all possible alternatives to the current projections of the City's helicopter growth. For example, the Master Plan does not adequately explore the obvious need to limit media and other non-essential helicopter traffic, focusing solely on the tourist helicopter phenomenon. The City should work with FAA to develop rules and a pooling/sharing arrangement to reduce the numbers of media and traffic helicopters that converge on a site and hover for long periods of time.

- New York City should continue its recent ban on sightseeing flights at the 34th Street Heliport and should work toward banning sightseeing flights over the city generally. Further, New York City should not allow a heliport to be placed on the Hudson River's Pier 76, which is in the middle of the newly-created Hudson River Park.

- New York City should develop ground-based restrictions for operating hours, idling times, engine run-ups related to maintenance, and training operations. These restrictions (as well as the mission-related operational breakdowns noted above) should be incorporated into the city-issued Aviation Facility Licenses.

- New York City should establish a Heliport Oversight Committee, which should work with the FAA, community representatives and industry organizations to review and improve existing noise-abatement procedures.

- New York City should take a co-lead position with the Eastern Regional Helicopter Council and the FAA to develop an Electronic News Gathering (ENG) Operations Manual for media helicopters. Issues covered should include minimum weather criteria, altitude minimums, hovering durations, and event-

specific guidelines.

- In New Jersey, local public officials should work with New York City officials and the FAA to establish altitude restrictions, flight paths, hovering duration, and other noise abatement procedures for ENG (electronic news gathering) helicopters, most of which are currently based in New Jersey.

Appendix A

Acronyms

ATC - air traffic control

BVI - blade vortex interaction; interaction between the rotor blades and air flow pattern which can cause a characteristic "blade slap" noise.

C.F.R. - Code of Federal Regulations

dBA - A-Weighted Sound Level. A decibel-based sound measurement that has been modified by a numerical filter (called "A- weighting") to better correspond to the range of sound heard by the human ear. A-weighted sound levels emphasize sound components in the frequency range where most speech information resides. As a result, A-weighting yields higher readings (A-weighted levels) for sound in the 2000 to 6000 Hz range, but considerably lower readings for low-frequency noise than does the overall sound pressure level.

EPA - Environmental Protection Agency

EPNdB - Effective Perceived Noise Level in decibels; see Glossary.

FAR - Federal Aviation Regulation(s); found primarily in 14 C. F. R.

FICAN - Federal Interagency Committee on Aviation Noise

HAI - Helicopter Association International

ICAO - International Civil Aviation Organization

NASA - National Aeronautics and Space Administration

RPM - revolutions per minute

VFR - Visual Flight Rules

Glossary

Annoyance: The typical response of humans to noise. Annoyance is a complex and subjective response; thus, when considered on an individual basis, annoyance responses to a given noise event vary widely. When average annoyance reactions within a community are considered, it is possible to determine aggregate annoyance/response relationships. The perceived unpleasantness of the noise is a factor, as is any anxiety or apprehension the noise may produce. The intensity of the noise sufficient to annoy most people is the method used to develop aircraft noise measurements.

Community Noise Equivalent Level (CNEL) is the same as DNL, except that it contains an added 5-decibel penalty to sound levels occurring between 7 and 10 p.m. CNEL is used in California and many European countries. Like DNL measurements, CNEL measurements are always A-weighted.

Day-Night Sound Level (DNL) is a single number measure of community noise exposure. In mathematical equations, DNL is notated as L_{dn}. DNL was developed to predict the impacts of the average long-term exposure to environmental noise. This metric averages all noise in a 24-hour period with an extra 10-decibel penalty for nighttime noise events to account for increased annoyance to noise events that occur between 10 p.m. and 7 a.m. DNL measurements are always A-weighted.

Decibel (dB): The logarithmic unit used to measure sound, because it more closely resembles the response of the human ear to sound. Every 10-decibel increase in sound is perceived as a doubling in loudness.

Effective Perceived Noise Level (EPNL): EPNL is the noise metric used to measure certification noise levels for large aircraft, including large helicopters. The EPNL of an event is calculated to approximate human annoyance response and to account for the presence of discreet tones and the duration of the noise.[138] EPNL noise measurements are measured in EPNdB.[139]

Equivalent Sound Level (L_{eq}): This is the continuous average noise level, measured as a unit of energy, (usually A-weighted) integrated over some specified time. Equivalent signifies that the total acoustical energy associated with the fluctuating sound (during the described time period) is equal to the total acoustical energy associated with a steady sound level of L_{eq} for the same period of time. The purpose of L_{eq} is to provide a single number measure of noise averaged over a specified time period.

Frequency: The number of times per second that an air pressure wave rises above then falls below, and then returns to normal pressure. Frequency is expressed in hertz (Hz), formerly in cycles per second. Pitch is determined by frequency.

Highly Annoyed: In determining an aggregate annoyance/response mechanism, researchers and regulators have relied upon the concept of "percent highly annoyed" in the sampled population to provide the most consistent response of a community to a particular noise environment.[140]

Loudness: A subjective perception of the magnitude of sound. Loudness largely depends on the sound's intensity, frequency, and the characteristics of the human ear (e.g., the intensity of a given sound striking the ear of a normal hearing person and a person with a hearing loss might be the same, but the perceived loudness would be different.)

Noise: Unwanted sound.

Perceived Noise Level (PNL): Expressed in decibels, PNL is a rating of "noisiness" that is used for aircraft noise assessment. PNL is computed from sound pressure levels measured in octave or one-third octave frequency bands. It is most accurate in estimating the perceived noisiness of sounds of similar time duration which do not contain strong, discrete frequency components. It is currently used by the FAA and foreign governmental agencies in the noise certification process for all turbojet-powered aircraft, large propeller-driven transports, and large helicopters. An increase of 10dB in PNL is equivalent to a doubling in perceived noisiness.[141]

Sound Exposure Level (SEL): SEL is the time-integrated level, in decibels, of a single noise event (aircraft flyover) which exceeds a threshold noise level and which is expressed by the level of an equivalent one second duration reference signal (i.e., the typical SEL measurement describes the amount of energy compressed into a one-second interval). Unless otherwise noted, SEL measurements are always A-weighted.

Appendix B:
New York City Heliport Operations
New York City Economic Development Corporation

Year	System Total	% CHG
1990	164,866	-0.11
1991	133,911	-18.78
1992	143,628	7.26
1993	148,142	3.14
1994	144,844	-2.23
1995	157256	8.5692
1996	153851	-2.165
1997	113815	-26.16

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	Annual % CHG	NYC System %	System % CHG
East 34th Street Heliport (E.34th)															32.7777	
1989	3394	3196	4584	4432	4502	4530	5214	5486	4784	5056	4634	4308	54100		35.0576	6.5031
1990	3344	3380	4344	5060	5254	5896	4416	6244	5382	5798	5140	3580	57798	6.8355	34.1578	-2.634
1991	1583	2184	3348	3376	3752	3864	4196	5414	4854	4988	4304	3866	45741	-20.86	36.8535	7.8921
1992	2950	2804	2900	4214	4790	4666	4836	5890	5648	5910	4706	3818	52932	15.721	35.3384	-4.117
1993	3106	2848	2638	4836	5238	4686	5096	5696	4756	5004	4240	4222	52348	-1.103	33.3989	-5.573
1994	2398	2078	3072	3646	4042	3900	4204	4784	4554	5856	5068	4708	48330	-7.676	34.3217	2.8615
1995	2570	2532	4166	4958	4772	4162	4674	5683	5330	5362	4872	4892	53973	11.676	35.3186	2.9044
1996	2494	2872	4426	4846	5066	4206	4602	6096	5302	5586	5038	3802	54338	0.6763	0.8564	-97.58
1997										291	253	429	973	-98.21		
1998																
East 60th Street Heliport (E.60th)															14.0114	
1989	1618	1313	1801	1977	2158	2144	2232	2488	2130	1958	1672	1686	23128		13.9366	-0.611
1990	1528	1556	1784	1768	2018	2450	2116	2146	2149	2160	1978	1331	22982	-0.623	15.9664	14.488
1991	1425	1249	1554	2179	2178	2320	1778	1558	1949	2088	1636	1452	21386	-7.032	13.8011	-14.78
1992	1350	1360	1544	1720	1919	2120	1894	1340	1780	1671	1577	1280	18535	-8.57	13.6464	0.3328
1993	1224	1220	1428	1822	1820	2036	2206	1738	1760	1834	1876	1452	20216	3.4861	15.4546	13.25
1994	980	1110	1540	1829	2156	2480	2006	2170	2200	2179	1896	1827	22385	10.729	14.5196	-6.049
1995	1264	1364	1884	1936	2172	2452	2109	1988	1942	2196	1758	1786	22833	2.0013	14.5196	-6.049
1996	1114	1388	1650	1880	2178	2092	1780	2050	2178	2726	1818	1418	22252	-2.545	14.4633	-0.388
1997	1470	1776	1682	1426	1426	2068	1988	2074	2743	2814	2,036	1,928	23431	5.2984	20.6232	42.589
1998																
Downtown Manhattan Heliport (DMH)															15.1008	
1989	2094	1620	2206	2318	2228	2108	2188	2418	1878	2004	1766	2096	24924		16.8285	12.09
1990	2360	2062	3082	2240	2574	2532	2184	2426	2232	2436	2146	1652	27906	11.964	14.0213	-17.16
1991	1448	1254	1574	1700	1724	1820	1620	1606	1562	1712	1426	1330	18776	-32.72	12.1689	-13.21
1992	1396	1216	1446	1466	1538	1682	1702	1274	1632	1654	1246	1226	17478	-6.913	11.3054	-7.096
1993	1060	1056	1392	1412	1456	1716	1606	1554	1320	1390	1436	1328	16748	-4.177	11.5296	1.9838
1994	1050	954	1296	1368	1564	1658	1494	1606	1528	1436	1346	1398	16700	-0.287	10.757	-6.702
1995	1130	1078	1466	1420	1432	1538	1408	1690	1588	1636	1296	1234	16916	1.2934	11.4318	6.2737
1996	936	1038	1104	1348	1800	1428	1578	1660	1696	2200	1462	1338	17588	3.9726	18.6349	63.008
1997	1250	1242	1382	1612	1694	1392	1616	2526	2634	2394	1938	1492	21172	20.378		
1998																
West 30th Street Heliport (W.30th)															21.0674	
1989	1620	1798	2976	2996	3318	2756	3128	4092	3338	3346	3042	2362	34772		17.0284	-19.17
1990	1906	1878	2398	2542	3116	3214	2934	1652	2076	2472	2286	1602	28074	-19.26	21.126	24.053
1991	1444	1156	1628	2164	2896	2570	2316	3080	3184	3050	2406	2396	28290	0.7694	23.1459	9.5614
1992	1700	1724	2320	2614	3468	3212	3406	3514	3552	3484	2392	1858	33244	17.511	25.3028	9.3185
1993	1706	1618	2158	2948	3810	3414	3650	4062	3824	4112	3472	2910	37484	12.754	28.9884	14.566
1994	1690	1920	2536	3208	4014	3762	3702	4164	4372	4992	3758	3870	41985	12.016	29.7426	2.6016
1995	2074	2014	3196	4366	4512	4118	3716	4972	4742	5286	3716	4060	46772	11.394	28.551	-4.006
1996	1936	2094	2966	5616	4418	3574	3516	4230	4576	4596	3556	2848	43926	-6.085	47.5853	66.668
1997	2238	2200	2922	3572	4034	3644	3874	5902	7052	7606	5376	5644	54064	23.08		
1998																
JFK International Airport (JFK)															14.0369	
1989	1958	1733	1973	2190	2020	1979	2004	1897	1918	1779	1938	1779	23168		13.9932	-0.311
1990	1786	1638	1886	1894	2292	2249	1865	1827	1932	2212	1966	1523	23070	-0.423	12.8137	-8.429
1991	1375	1040	1243	1341	1387	1637	1501	1397	1569	1708	1556	1405	17159	-25.62	12.4829	-2.582
1992	1495	1257	1447	1440	1653	1622	1710	1358	1628	1671	1397	1251	17929	4.4874	11.7765	-5.659
1993	1273	1385	1433	1464	1600	1884	1637	1502	1425	1440	1211	1192	17446	-2.694	7.44839	-36.74
1994	690	626	919	892	1095	963	899	992	1033	870	900	891	10790	-38.15	7.40957	-0.535
1995	703	734	1032	892	932	1156	1022	1053	1124	1217	992	795	11852	7.9889	6.69804	-9.603
1996	658	732	890	891	1047	821	903	812	931	1076	899	645	10305	-11.56	8.8219	31.709
1997	780	858	764	1045	1016	1093	1025	856	877	984	725		10023	-2.737		
1998																
LaGuardia Airport (LGA)															3.00574	
1989	258	278	365	346	400	493	415	467	621	433	382	503	4961		3.0546	1.6257
1990	592	492	585	542	551	350	338	411	328	344	308	195	5036	1.5118	1.92591	-36.95
1991	187	161	205	222	303	226	192	212	281	241	199	150	2579	-48.79	1.74757	-9.26
1992	115	122	166	183	248	178	240	162	286	242	208	340	2510	-2.675	2.83261	50.644
1993	341	126	186	201	343	374	427	347	471	361	440	283	3900	55.378	3.21104	21.972
1994	234	137	262	392	459	539	575	416	524	365	441	307	4651	19.256	3.24948	1.197
1995	274	248	410	326	486	455	463	473	649	532	420	374	5110	9.8688	3.53719	8.854
1996	292	255	344	407	488	471	658	505	578	702	398	344	5442	6.4971	3.47841	-1.662
1997	333	386	302	375	386	359	401	409	412	383	206		3952	-27.38		
1998																

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[2] Evans, Gary W.; Hygge, Staffan; Bullinger, Monika, "Chronic Noise and Psychological Stress." *Psychological Science*, Vol. 6, No. 6, November 1995, pp. 333-338. Evans, G. and Maxwell, L., "Noise and Reading Deficits." *Environment and Behavior*, Vol. 29, No.5, Sept. 1997, pp. 638-656. Evans and Maxwell, replicated several previous studies showing an association between chronic noise exposure and reading acquisition in a 1995 study. This study of children chronically exposed to aircraft noise showed poorer reading skills than children attending a school in a quiet neighborhood.

[3] Evans, Hygge, et al., supra "Chronic Noise", p. 337.

[4] See Paschier-Vermeer, W. *Noise and Health*, The Hague: Health Council of the Netherlands, 1993, No. A93 /02E, page 190; and *Noise and Health*, Report of a committee of the Health Council of the Netherlands, 1994/15E, page 59, Table 1.

[5] Bronzaft, Arline L., "Aircraft Noise: A Potential Health Hazard." *Environment and Behavior*, Jan. 1998.

[6] For example, it is undisputed that excessive noise (usually continuous exposure and over 85 decibels) can cause hearing loss. It has been assumed that airport noise does not cause actual hearing loss. But at least one recent study has shown that it can. Chen, TJ., Chen, S., Hseih P., chian, H., "Auditory Effects of Aircraft Noise on People Living Near an Airport." *Archives of Environmental Health*, January/February, Vol 52 (No. 1), 1997, pp. 45-50.

[7] "City Residents Lobby to Get the 'Copters to Cut the Whump", *The Christian Science Monitor*, Friday, Jan. 10, 1997, p. 1.

[8] *East 34th Street Heliport, Final Environmental Impact Statement (FEIS)*, prepared by Young Environmental Sciences, Inc. with Allee King Rosen & Fleming Inc., and PSC Engineering, et al., Dec. 1995; and "Air Quality and Noise Effects from the East 34th Street Heliport," a report for the NYU Medical Center, prepared by K.M. Chng, et al., Environmental Inc., Rep. No. 92-05, Dec. 1992.

[9] *FEIS*, p.IIID-12; and *Ambient Air Monitoring at the 34th Street Heliport* (August 1995), P-2, table 2-1.

[10] EPA, *Estimation and Evaluation of Cancer Risks Attributable to Air Pollution in Southwest Chicago: Final Summary Report* (Falls Church VA: ViGYAN Inc., April 1993). See discussion of this report in NRDC's *Flying Off Course*, October 1996, p. 39-40.

[11] U.S. DOT, FAA, NASA, *Report to Congress: Quiet Technology for Propeller-Driven Airplanes and Rotorcraft* (hereafter *Report to Congress*), June 1996, Washington D.C., p. 4-3.

[12] Leverton, John W., Helicopter Public Acceptance...How Important is Virtual Noise?", Proceedings of the Technical Specialists Meeting for Rotorcraft Acoustics and Aerodynamics, October 1997, Williamsburg, VA (hereafter "*Virtual Noise*"), p. 2, citing a 1992 London survey by the Civil Aviation Authority that found helicopters to be up to 15dBA more annoying at the 10% to 20% *very much annoyed level* of those surveyed than air transport fixed wing aircraft. Dr. Leverton is President of Leverton Associates, Inc.; his work in conjunction with GKN Westland Helicopters Ltd.

However, see Kryter, Karl, *The Handbook of Hearing and the Effects of Noise* (hereafter *Handbook*), San Diego State University, San Diego, CA, Academy Press, 1994, p. 98. Kryter citing other studies, reported that the increased helicopter annoyance levels were more on the order of 2-8 dB(A). See also, Passchier, Vermeer, W. "Rating of Helicopter Noise with Respect to Annoyance in TNO Report" 94.061, Institute of Preventive Health Care, Leiden, Netherlands, Dec. 1994.

[13] Smith, M. J. T. and Williams, J., " Subsonic Aircraft Noise," *Transportation Noise Reference Book*, edited by P. M Nelson (Butterworth, London, Boston), 1987, pp. 18-30. See also Mislow, J. and Kassel, R., *Under the Flight Path: Community Response to Aircraft Noise at Westchester County Airport and an Assessment of FAA Noise Measurement Policy* (hereafter *Under the Flight Path*), NRDC, New York, 1997, pp. 21-22.

[14] Schomer, Paul D., Wagner, L. Ray, "On the contribution of noticeability of environmental sounds to noise annoyance," *Noise Control Engineering Journal*

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44, Nov. -Dec. 1996. pp. 294-305.

[15] Robert Lee, Wright Patterson Air Force Base, telephone communication, March 31, 1998.

[16] Schomer, Paul D., Neathammer, Robert D., "The Role of Vibration and Rattle in Human Response to Helicopter Noise," Technical Report N-85/14 for the U.S. Army Corps of Engineers Construction Research Lab (USA-CERL) September 1985. The study found that when there were no vibrations or rattles, the helicopter noise was equivalent to the control noise for the same A-weighted Sound Exposure Levels (SEL); when a "little" rattle was present, the helicopter noise was perceived to be 10-12 decibels higher than the equivalent control noise. When "a lot of rattle" was present the helicopter noise was perceived as to be as much as 20 decibels higher. Ibid., p. 42.

[17] FAA, *Report to Congress*, p. 4-3.

[18] Leverton, John W., *Virtual Noise*, pp. 3-4. Dr. Leverton's concept of "virtual noise" includes factors (in addition to noise level) that contribute to the greater annoyance generated by helicopters. The virtual noise factors include concerns about helicopters' low altitude flight, apparently uncontrolled flight paths, safety concerns and frequent perceptions that they are performing no necessary service.

[19] Southern California Coalition of Governments (SCAG) and Helicopter Coalition Group. *Initial Report and Keys to Compatibility: A Positive Approach to Helicopter and Community Compatibility*, October 1986, p. 6.

[20] Telephone communication with Gerald Silver, President of Stop the Noise, July 30. 1998. Stop the Noise can be reached at P.O. Box 260205. Encino, CA 91426.

[21] *Heliport and Helicopter Master Plan for the City of York City (Final)* (hereafter *Master Plan*), March 1999, prepared by Edwards and Kelsey Engineers, in association with Simat, Helliesen & Eichner, Inc., Harris, Miller, Miller & Hanson, Inc., DY Consultants, Inc., ENG-Wong, Taub, & Associates. p. 3-2.

[22] Helicopter Noise Coalition of New York City (HNC), miscellaneous newsletters and press releases. HNC can be reached at 414 East 65th Street, Apt. 6J, New York, N.Y. 1002-7144.

[23] 1987 National Parks Overflight Act. Pub.L. 100-91, 101 Stat. 674.

[24] Helicopter Association International, *Fly Neighborly Guide*, Sept. 1983. The Guide contained the DOT FAA Advisory Circular on "VFR Flight Near Noise-Sensitive Areas", AC 91-36 B. 1982: The *Fly Neighborly Guide* was revised in 1993.

[25] U.S. DOT, FAA, Federal Aviation Regulation (FAR): Part 36 Noise Standards: Aircraft Type and Air Worthiness Certification. March 1993 (an FAA publication of Part 36 with amendments 36-1 through 36-20 with Preambles). "Regulatory History" at P-151-153.

[26] *Report to Congress*, pp. 4-8, 4-9.

[27] *Virtual Noise*, p. 10; and telephone communication, Leverton, John W., July 31, 1998.

[28] *Report to Congress* p. 4-19.

[29] *Virtual Noise*, p.7.

[30] Ibid.

[31] See Preamble to 14 C.F.R. Part 36, Amendment 36-7, p. P-54.

[32] William Albee, FAA, 1996, cited in *Flying Off Course*, note 52.

[33] Cutler and Stanfield Series, *Airport Noise: A Guide to FAA Regulations under the Airport Noise and Capacity Act*, 1992, Washington D.C., p. 2 (hereafter "*Airport Noise Guide*").

[34] Ken Jones, Aircraft Noise Certification Engineer, Technology Division, Office of Environment & Energy, FAA, telephone communication, July 13, 1998.

[35] Ibid.

[36] AC No. 30-16, Appendix 11. The higher level, for example, is with a Bell Heli Textron, model 206L; the lower level with a smaller Eurocopter EC120.

[37] AC 36-1G, Appendix 10. The higher level is for the Bell Heli Textron 412HP and 412SP weighing 11,900 pounds.

[38] 14 C.F.R. Part 36 Sec. H 36.305 (a)(2)(i),(ii), (iii).

[39] Part 36, Appendix C, Sec. C 36.5 (a)(2).

[40] Part 36, Appendix C, Sec. C 36.5 (a)(3).

[41] Article VI, clause 2.

[42] *Wardair Canada v. Florida Department of Revenue*, 477 U.S. 1, 6 (1986).

[43] *Gibbons v. Ogden*, 9 Wheat. 1, 211 (1824).

[44] Federal Aviation Act of 1958, Public Law 85-726, now codified in various sections of 49 U.S. as amended.

[45] Ibid.

[46] *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218 (1947).

[47] *See City of Burbank v. Lockheed Air Terminal Inc.*, 411 U.S. 624, 636 n.14 (1973).

[48] *United States v. Causby*, 328 U.S. 256 (1946). The Fifth Amendment of the Constitution provides that "private property" shall not "be taken for public use without just compensation." At least since the Supreme Court's decision in *Causby*, courts have often found that aircraft flights low enough ("low" is usually defined as below the navigable airspace of 500 feet (see 14 C.F.R. § 91)) and frequent enough to cause a direct and immediate interference with the enjoyment and use of the property are "as much an appropriation of the use of the land as a more conventional entry upon it." See *Causby* at 264.

[49] *San Diego Unified Port District v. Gianturco*, 651 F.2d 1306 (9th Cir. 1981); *Western Airlines, Inc. v. Port Authority of New York and New Jersey*, 658 F. Supp. 952 (S.D.N.Y. 1986); *British Airways Bd. v. Port Authority of New York and New Jersey*, 558 F.2d 75 (2d Cir. 1977) (*Concorde I*).

[50] *See generally Branning v. U.S.*, 6 Cl. Ct. 618 (1984), *aff'd* 784 F. 2d 361 (Fed. Cir. 1986).

[51] 29 A *Corpus Juris Secundum*

[52] *City of Burbank v. Lockheed Air Terminal*, 411 U.S. 624 (1973).

[53] Ibid., p. 633.

[54] Ibid., p. 636, n. 14.

[55] *See, e.g., British Airways Bd. v. Port Authority of New York and New Jersey*, 564 F.2d 1002 (2d Cir. 1977) (*Concorde II*); *San Diego Unified Port District v. Gianturco*, 651 F.2d 1306 (9th Cir. 1981); *City and County of San Francisco v. FAA*, 942 F.2d 1391 (9th Cir. 1991); *National Helicopter Corp. of America v. City of New York*, 137 F.3d 81 (2d Cir. 1998).

[56] See Aircraft Noise Abatement Act of 1968, Pub. L. No. 90-411, 82 Stat. 395 (codified at sections of 49 U.S.C. including § 1431(b)(1)(1976); Aviation Safety and Noise Abatement Act Pub. L. 96-193, 94 Stat. 50 (codified as amended at 49 U.S.C. §§2101-2125); Noise Control Act of 1972, Pub. L. No. 92-574, 86 Stat. 1234, (codified at 42 U.S.C. §§ 4901 to 4918).

[57] *National Helicopter Corporation v. City of New York*, 137 F.3d 81 (2d Cir. 1998).

[58] Ibid., p. 88.

[59] Ibid., pp. 89-91.

[60] Ibid., p. 88.

[61] 588 F. 2d 75 (2d Cir. June 1977) *(Concorde I)*.

[62] Ibid., p. 85. At pages 83-84, the court discussed the 1968 amendment to the Federal Aviation Act and the Noise Control Act's legislative history in which Congress specifically reserved the rights of proprietors to establish regulations limiting the permissible levels of noise at their airports. Senate Report No. 96-52 at 13 (1980), *reprinted in* 1980 United States Code Congressional & Administrative News 89, 101, stated that the Aviation Safety and Noise Abatement Act was not "intended to alter the respective legal responsibilities of the Federal Government and local airport proprietors for the control of aviation noise.

[63] 564 F. 2d 1002 (2d Cir. 1977) (*Concorde II*).

[64] Ibid., p. 1008.

[65] 942 F. 2d 1391 (9th Cir. 1991).

[66] Ibid., p. 1394 .

[67] Ibid., p. 1397.

[68] Ibid., p. 1395, n.2.

[69] 727 F.2d 246 (2d Cir. 1984).

[70] Ibid., pp. 248, 250.

[71] *Millard Refrigerated Services Inc. v. FAA*, 98 F. 3d 1361, (D.C. Cir. 1996). In *Millard*, the issue was not noise restrictions, but whether new ANCA regulations apply to a weight restriction on aircraft using a runway. The Omaha Airport Authority wished to reduce the allowable weight of aircraft permitted to use one of its airports in order to save money on runway reconstruction for heavier planes. The affected airline owner sued, maintaining that this was an access restriction under ANCA. The FAA disagreed. The court found that the FAA had not adequately addressed the issue and remanded to the FAA.

ENDNOTES

[72] Preambles to Part 36 of 14 C.F.R., discussion of Amendment 36-7 on changes to subsonic transport category large airplanes and subsonic turbojet powered airplanes. p. P-58.

[73] Ibid., p. P-149 discussing noise standards for helicopters.

[74] See 14 C.F.R. Part 150 §§150.33 and 150.21. EPA's standards are found in U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety* (hereafter *Levels Document*), EPA 550/9-74-004, 1974.

[75] 14 C.F.R Part 150, App. A. Table 1.

[76] 49 U.S.C. § 47101 (a)(2).

[77] 49 U.S.C. § 41713(a).

[78] 49 U.S.C. § 41713(b) (3).

[79] *Airport Noise: Guide*, p. 7-9.

[80] Ibid., p. 2.

[81] The conditions the proprietor most prove to enact restrictions on Stage 3 aircraft are: (1) the proposed restriction is reasonable, non-arbitrary, and nondiscriminatory; (2) the proposed restriction would not create an undue burden on interstate or foreign commerce; (3) the proposed restriction would maintain safe and efficient use of navigable airspace; (4) the proposed restriction would not conflict with any existing federal statute or regulation; (5) the applicant has provided adequate opportunity for public comment; and (6) the proposed restriction does not create an undue burden on the national aviation system (49 U.S.C.§ 47524(c)(2) and 14 C.F.R. § 161.305).

[82] Letter from James D. Ericson, Director of Office of Environment and Energy, the FAA, to Glenn Rizner, Vice President, HAI, July 7, 1997.

[83] For example, a number of Westchester County, New York, towns prohibit heliports, as does Greenwich, Connecticut. The Port of San Francisco, after community opposition to helicopter air tours operating from the piers, effectively prohibited them from the piers or within 100 feet of the shoreline (by declaring them to be unacceptable non-maritime land uses) in its Waterfront Land Use Plan (republished, 1996, Ch. 3).

[84] *San Diego Unified Port District* v. *Gianturco*, 651 F.2d 1306, 1316 (9th Cir. 1981). (Court found the state noise code was preempted in a case in which the code would impinge on aircraft operations at an airport where the state was not the proprietor).

[85] *Levels Document*, EPA 550/9-74-004, 1974.

[86] NASA has a major aircraft noise-reduction program under way called the Advanced Subsonic Technology Initiative Program (ASTI), which began in 1993. See Federal Interagency Committee on Aviation Noise (FICAN), *Report on Aviation Noise Research Conducted by U.S. Federal Agencies, 1994* (hereafter *FICAN Annual Report*) p. 12.

[87] See NASA publication (brochure) "Aeronautics and Space Transportation Technology: Three Pillars for Success." Pillar One: Global Civil Aviation, 1997, p. 2.

[88] 1996 *FICAN Annual Report*, p. 9.

[89] See Conn. Gen. Stat. §13b-46 (1995); N.J. Stat. §6:1-1 *et seq.*

[90] Joseph Testo at New York State Department of Transportation, telephone communication, June 15, 1998.

[91] New York State Department of Transportation and Port Authority of New York and New Jersey, *Downstate Helicopter System Plan* (hereafter *Downstate System Plan)*, submitted by Edwards and Kelcey, Inc., Dec. 1990.

[92] Ibid., Ch. 6, p. 6-2.

[93] Lorin Bird, New York State Department of Transportation, telephone communication, August 6, 1998.

[94] *Downstate Helicopter System Plan*, pp. 5-4 to 5-7. At the time of this survey New York City was accounted for about 70% of the flights. WCA represented nearly 10% of the destinations. No current destination data were available, but NYC is probably the destination of about the same percentage of flights.

[95] An operation is a take-off or a landing.

[96] Operations data for the City's Heliport System are collected by the Port Authority, which runs LaGuardia and John F. Kennedy Airports, the Downtown Heliport, and, until recently, the West 30th Street Heliport. The operations data are given to the City's Economic Development Corporation (EDC), the City entity responsible for aviation-related matters, and are available to the public.

[97] Joy Held, President of HNC, telephone communication, June 13,1998.

[98] See the *Helicopter and Heliport Master Plan for the City of New York (Final)* (hereafter *Master Plan*). March 1999, prepared by Edwards and Kelcey Engineers, in association with Simat, Helliesen & Eichner, Inc., Harris Miller Miller & Hanson, Inc., DY Consultants, Inc., Eng-Wong, Taub & Associates; Fact Sheet between pp. 3-2 and 3-3.

[99] Data supplied by Commander Jeffrey R. Pettit, Operations Officer, February 1998. These numbers are rough estimates since Coast Guard helicopter flight time and sorties are collected, not operations. (A sortie is defined as a flight or portion of a flight devoted to a particular mission. One flight may consist of one or many sorties). But landings are estimated to have been 5,900 in 1987 reaching a high of 8,680 in 1990 and declining to 6,810 in 1997.

[100] New York Police Department, Office of Public Information, telephone communication, March 31, 1991.

[101] Congresswoman Maloney's staff, telephone communication, January 25, 1999. Bill HR729 is sponsored by Maloney, Nadler, Towns, Berman, and Manton.

[102] *Master Plan*, Executive Summary, April 1999, p. S-3.

[103] Ibid., p. S-1. The Plan's goals are restated as the following objectives:

- To provide a clear and coherent framework for the city to operate and maintain its heliports so that transportation, commerce, and economic development needs are met at the highest standards of safety and efficiency.
- To provide guidelines for future heliport development which will satisfy aviation demand in a financially feasible manner, while at the same time addressing the aviation, environmental, and socioeconomic issues within the community.
- To provide an effective written and graphic presentation of the future heliport development in the city, including existing heliport facilities and Pier 76 (proposed).
- To evaluate present and future helicopter flight patterns with New York City's airspace and determine whether they are adequate from a safety, efficiency, and environmental perspective.
- To propose an achievable financial plan and implementation schedule for future heliport development/redevelopment. Ibid., p. S-3.

[104] The Master Plan presents a detailed history of the city's heliport system and helicopter activity, decade by decade, since the 1940s.

[105] New York City Zoning Resolution § 74-66.

[106] *Master Plan* p. 3-2.

[107] Ibid., p. 4-3.

[108] Ibid., p. 4-2.

[109] *Master Plan*, Executive Summary, p. S-24.

[110] Ibid.

[111] Ibid., p. S-34.

[112] See *Master Plan*, Chapter 9, pp. 9A-15-21. Monitored individual noise events caused by the S-76 (Sikorsky) helicopter were the loudest at a number of the sites. These events had Lmax readings of 78.5 dBA (at Brooklyn Heights) to 87.2 dBA at Roosevelt Island; and SELs of 88.2 dBA to 98.9dBA. These are loud events.

[113] *East 34th Street Heliport Final Environmental Impact Statement*, December 28, 1995, p. III. E-13.

[114] Cowan, James P., (Cowan Acoustical Associates)."The Effects of Noise Generated by Operations at the East 34th Street Heliport on Residents of the Rivergate Apartments." 1997, report prepared for the HNC, p. 10.

[115] *Master Plan*, p. 9A-46.

[116] Ibid., pp. 12-22; Executive Summary, pp. S-40 to S-42.

[117] *Master Plan*, p. 12-13.

[118] Ibid., Ch. 5 and p. 12-16.

[119] Ibid., p. 2-2.

[120] Ibid., pp. 2-2, 2-3.

[121] Ibid., p. 2-10.

[122] Ibid., p. 2-11.

[123] In its *Draft Master Plan*, New York City endorsed the plan for a Pier 76 heliport limited to corporate helicopter activity. The *Final Master Plan*, released over a year later, repeats the arguments in favor of such a heliport, but now states that "the recent Hudson River Park Trust legislation's public space allocation requirements at this site however, may make an

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adequately sized facility at Pier 76 unfeasible." *Master Plan* Executive Summary, p. S-13.

[124] *Downstate Helicopter System Plan*, p. 2-38.

[125] Information supplied by WCA management.

[126] General Electric, Seagrams and Sons, Bristol Meyers, Philip Morris, Triangle Aircraft Services, and Wayfarer Aviation have helicopters based at WCA.

[127] Charles Robinson, chief pilot for STAT Flights, telephone communication, April 1, 1998.

[128] Robin Stein, Stamford Planner, telephone communication, August 7, 1998. Stamford City Zoning regulations, § 68-4. The existing corporate heliports are the Cytec Corporation helistop and the Mercedes Company heliport.

[129] Dorothy Wilson, Norwalk Senior Planner, telephone communication, April 13, 1998. The two heliports are for U.S. Surgical Corp. and Norden Systems.

[130] Paul Estfan, Danbury Airport Manager, telephone communication, March 30, 1998; and Robert Richardson, Control Tower manager, telephone communication, April 2, 1998.

[131] Phil Engel, Newark Airport Manager, telephone communication, March 27, 1998. Data for table on Teterboro Helicopter Operations supplied by Mr. Engel.

[132] *Downstate Helicopter System Plan*, p. 5-3.

[133] *Downstate Helicopter System Plan*, p. 2-38.

[134] *Master Plan*, p. 2-2.

[135] Ibid., p. 2-2.

[136] Data supplied by Hugh Jones, Republic Airport Director.

[137] Estimates by Tom Straub, Supervisor, Air Traffic Control Tower in telephone communications on April 14, 1998 and August 12, 1998.

[138] FAA, *Aviation Noise Effects*, March 1985, FAA-EE-85-2, p. 12

[139] Appendix A of 14 C.F.R. Part 36 defines EPNL as the total subjective effect of an aircraft flyover that is equal to the algebraic sum of the maximum tone corrected perceived noise level and the duration correction factor. (EPNL=PNLTM +D). See 14 CFR Part 36 Appendix A and B. Section A 36.7.

[140] Schultz, T.J., "Synthesis of social surveys and noise annoyance," *Journal of the Acoustical Society of America* 64(2):377-406, 1978. Schultz reviewed the results of a number of social surveys to make a consistent judgment concerning what percent of the population was "highly annoyed." The surveys tested community reactions to several types of transportation noise, such as road traffic, railroad, and aircraft noise. Schultz developed an equation for describing the relationship between the level of noise exposure in DNL and the percent highly annoyed (%HA)]. *1994 FICAN Annual Report*, p. C-6.

[141] FAA, *Aviation Noise Effects*, March 1985, FAA-EE-85-2, p. 11.