United States General Accounting Office

GAO

Report to the Honorable James P. Moran, House of Representatives

June 2000

REAGAN NATIONAL AIRPORT

Limited Opportunities to Improve Airlines' Compliance With Noise Abatement Procedures

GAO/RCED-00-74

Contents

Abbreviations

ANOMS Airport Noise and Operations Monitoring System
CONANDA Committee on Noise Abatement at National and Dulles Airports
DOT Department of Transportation
FAA Federal Aviation Administration
GAO General Accounting Office
MWAA Metropolitan Washington Airports Authority

GAO
Accountability * Integrity * Reliability

United States General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-284054

June 29, 2000

The Honorable James P. Moran
House of Representatives

Dear Mr. Moran:

A continuing concern of communities located near commercial airports is the amount of noise generated by aircraft during takeoffs and landings. At Ronald Reagan Washington National Airport (Reagan National), the takeoff and landing paths generally follow the Potomac River north and south of the airport. In the early 1980s, residents of Maryland, Virginia, and Washington, D.C., who live along the river urged the Federal Aviation Administration (FAA) to change Reagan National's arrival and departure routes. After testing various alternative departure routes and receiving negative public reaction, FAA restored the original flight paths. Since then, local groups have expressed concern primarily about how FAA and the Metropolitan Washington Airports Authority (MWAA), which operates Reagan National, interpret and apply the local procedures and federal laws that may affect aircraft noise for flights to and from the airport.

As agreed with your office, this report responds to your request that we (1) describe the specific noise abatement procedures at Reagan National, (2) determine whether the airlines comply with these procedures, and (3) assess whether local citizen groups believe that existing noise abatement procedures and penalties are effective.

Results in Brief

Local airport procedures and federal laws contain a number of provisions designed in part to limit aircraft noise at Reagan National. First, a nighttime noise procedure imposed by the airport authority generally permits flight operations between 10 p.m. and 7 a.m. only by certain aircraft that can meet relatively strict noise limits. However, aircraft that were scheduled to arrive before 10 p.m. may land later if an air traffic controller cleared them prior to 10:30 p.m. This exception recognizes that aircraft are sometimes delayed en route. Second, local airport rules require both departing and arriving flights to follow the Potomac River north and south of the airport for several miles before turning. In particular, aircraft are prohibited from flying over federally protected areas in Washington, D.C., such as the Capitol and White House. Third, airport rules also require pilots of

departing aircraft to reduce engine power, and thus engine noise, after reaching either a specified altitude or a certain distance from the airport, depending on the direction of the aircraft's departure. Fourth, the airport's noise abatement procedure incorporates the federal law that generally bars airlines from operating nonstop flights to or from any airport located more than 1,250 statute miles from Reagan National (the "perimeter rule"). In addition, a federal law and a federal regulation generally limit the number of flights to 60 per hour (the "high-density rule," also known as the *slot rule*).

Although information available from MWAA and FAA on the number of violations of Reagan National's noise abatement measures suggests that the airlines have generally met local requirements, certain shortcomings in MWAA's and FAA's efforts to monitor airline operations raise doubts about the extent of the airlines' actual compliance. With respect to the nighttime noise procedure, data from MWAA show that violations of that rule have decreased since the early 1990s, in part because airlines have begun to replace older, noisier aircraft with newer, quieter versions. MWAA says it has a high degree of confidence that these aircraft are being operated in compliance with the noise rule but acknowledges that it could do more to spot-check compliance. Although FAA's data indicate that there were very few instances of pilots' failure to follow air traffic control instructions pertaining to the flight path, FAA officials acknowledged that they generally focus only on keeping aircraft away from the federally protected areas in Washington, D.C., and do not track the number of incidents where pilots may have strayed from the flight path over local neighborhoods. With respect to compliance with the slot rule, FAA officials maintain that there have been no violations since at least 1994. However, these officials acknowledged that FAA does not regularly monitor compliance with the slot rule. Likewise, for reasons pertaining to time, cost, and privacy, it is impractical to monitor pilots' compliance with the requirement to reduce engine power shortly after takeoff. Finally, according to MWAA, airlines have operated in full compliance with the perimeter rule.

Local groups do not believe that existing procedures and penalties are as effective as they should be in encouraging airlines' compliance with noise abatement requirements. One group representing local communities asserts that MWAA is not using available technologies to determine which airlines violate noise abatement procedures and laws. Although MWAA's 10-year-old system can provide a limited amount of information on aircraft noise, other airports are using a new, more sophisticated noise-monitoring

system to analyze aircraft flight and noise data and communicate that information to local residents.

We provided MWAA, FAA, and the Department of Transportation (DOT) with a draft of our report for review and comment. The agencies generally agreed with our findings but made several technical suggestions, which we incorporated to clarify the report. The report contains four recommendations to DOT and MWAA. However, neither agency commented on these recommendations.

Background

Shortly after the nation's major commercial airlines began jet service at Reagan National,[1] airport noise was officially recognized as an environmental pollutant. The Federal Aviation Act, as amended in 1968, authorized FAA to prescribe standards for the measurement of aircraft noise and to prescribe regulations providing for the control and abatement of aircraft noise. In 1969, the National Environmental Policy Act began requiring that environmental impact assessments of proposed airport construction or improvement projects include aviation noise as a potential pollutant. Later, the Noise Control Act of 1972 clarified that FAA's authority to apply noise standards included issuing, amending, modifying, or revoking certificates for aircraft type design and equipment. The act further provided that future certificates for aircraft operations shall not be issued unless the new aircraft noise requirements are met. The Aviation Safety and Noise Abatement Act of 1979 set target dates for reducing the number of the noisiest aircraft then in use. Finally, the Airport Noise and Capacity Act of 1990 called for all airlines operating jet aircraft weighing over 75,000 pounds in the contiguous United States to meet relatively strict "Stage 3" engine noise emission limits by December 31, 1999.[2] This law allowed aircraft operators to meet the Stage 3 requirements either by purchasing new aircraft with quieter engines or by retrofitting existing engines with so-called *hush kits*, designed to muffle engine noise.

[1]Until 1998, the airport was known as Washington National Airport.

[2]FAA's regulations define three classes of aircraft in terms of their noise levels. Aircraft certified before 1969 that do not meet the noise standards issued in that year are classified as Stage 1 aircraft (e.g., early-model Boeing 707s and McDonnell-Douglas DC-8s). Aircraft meeting the 1969 standards (e.g., most Boeing 727s and DC-9s) are known as Stage 2 aircraft. Aircraft complying with more stringent standards issued in 1977 (e.g., Boeing 757s and MD-80s) are classified as Stage 3 aircraft.

Beginning in 1982, at Reagan National, specifically, FAA, as airport owner and operator, placed limits on aircraft operations (takeoffs and landings) during the nighttime hours. This new procedure restricted all nighttime operations (10 p.m. to 7 a.m.) by imposing noise limits on departing and arriving aircraft. Because no airline operating at Reagan National could meet the nighttime noise limits then in effect, these restrictions represented a de facto curfew. Soon thereafter, airlines began operating McDonnell-Douglas MD-80 aircraft, which met the noise limits for landings, but not for takeoffs. Thus, these aircraft could land at Reagan National after 10 p.m., but could not depart until 7 a.m. MWAA adopted FAA's nighttime takeoff and landing restrictions in 1987, when it assumed authority for operating the airport. Some aircraft are now quiet enough to meet the nighttime noise limits, but these limits are stricter than FAA's Stage 3 requirements, thereby requiring aircraft operating at Reagan National during nighttime hours to be quieter than required by the U.S. national standards. In recent years, airlines have begun introducing quieter aircraft, such as Airbus A-319s and new Boeing 737s; generally, these aircraft can meet the nighttime limits governing both takeoffs and landings.

Federal Law and Local Procedures Limit Aircraft Noise at Reagan National

A combination of federal laws and local procedures required by the local airport authority seek to constrain aircraft noise at Reagan National.[3] The official noise abatement procedure at the airport includes three local restrictions—restrictions on nighttime noise, flight paths, and engine power—and the federal perimeter rule. In addition, the slot rule, by limiting the number of aircraft operations during most hours of the day, also has the effect of restraining aircraft noise at the airport.

The nighttime noise rule restricts aircraft operations between 10 p.m. and 7 a.m. During those hours, only aircraft that generate less than 72 decibels of sound may take off, and only aircraft that produce less than 85 decibels may land.[4] An aircraft scheduled to arrive before 10 p.m. may land after that time if air traffic controllers cleared it for landing prior to 10:30 p.m. This

[3]Under federal case law, the abatement of aircraft noise is primarily the airport proprietor's responsibility.

[4]The noise levels for arrivals and departures are measured in accordance with FAA's procedures for aircraft certification. Noise levels for arrival noise and departure noise are not the same because measurements are taken at different locations relative to the airport.

exception exists because weather, air traffic factors, and mechanical difficulties can sometimes delay incoming flights.

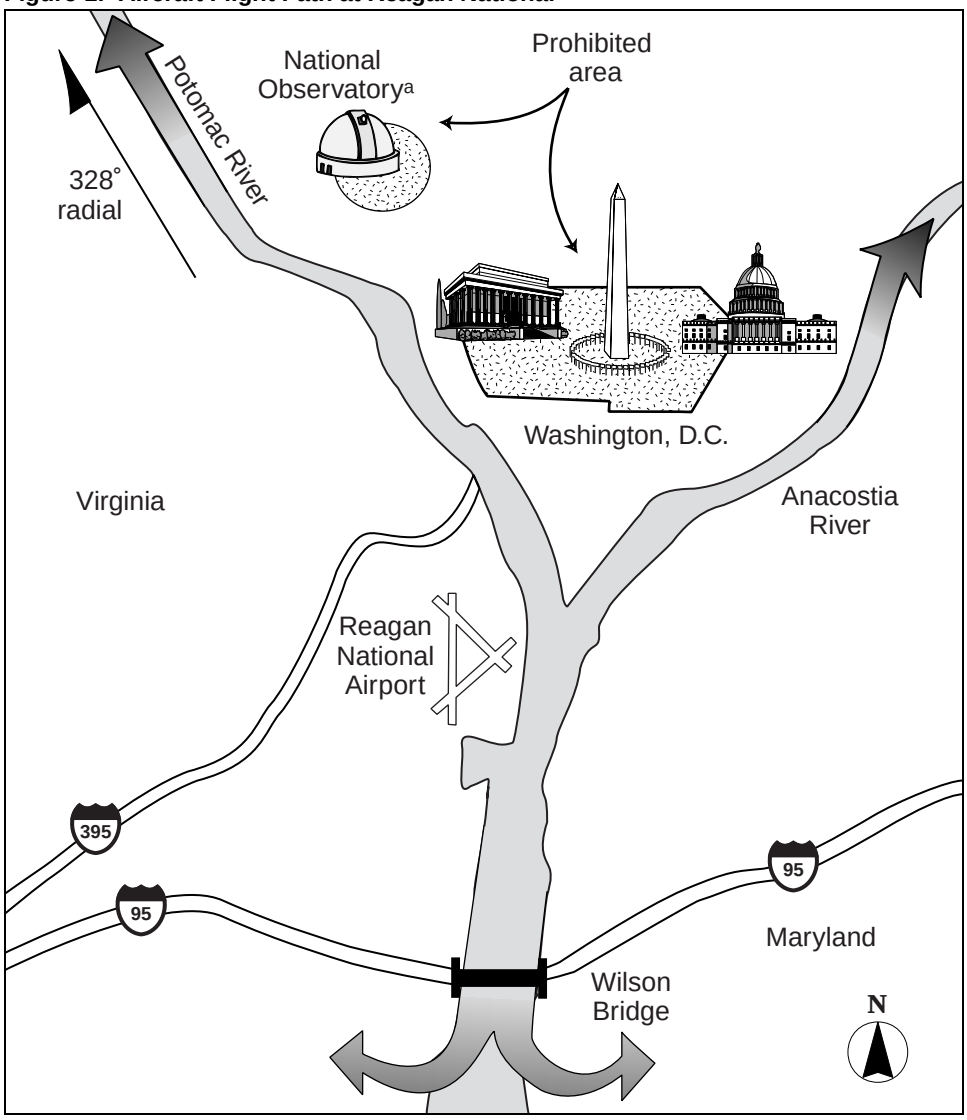
The flight paths to and from Reagan National are restricted in several ways.

- Aircraft departing to the north generally are to fly directly over the Potomac River until they are approximately 4 miles north of the airport. At this point, the pilot has the option to continue following the river or to turn slightly and follow a northwesterly compass heading ("radial") until reaching a point 10 miles away from the airport.[5] The compass heading generally follows the Potomac River. According to an FAA official at Reagan National, the radial gradually widens as the distance from the airport grows, providing a pilot with increasing latitude to maneuver the aircraft as it ascends and proceeds away from the metropolitan area. When an aircraft is 10 miles from the airport—near the Capital Beltway—the radial is approximately 4 miles wide. Thus, at this point, a pilot could be about 2 miles off the precise center of the radial—over either Maryland or Virginia—and still be within the flight path. Similarly, aircraft arriving from the north are directed to follow the Potomac once they are within 10 miles of the airport.
- Aircraft departing to the north are directed not to fly beyond the east bank of the river into restricted airspace over Washington, D.C. This airspace, which encompasses the Vice President's official residence at the U.S. Naval Observatory, the White House, and the U.S. Capitol, is restricted up to an altitude of 18,000 feet. In addition, if encountering an emergency situation—for example, conducting a fly-around to avoid hitting an aircraft on the runway—aircraft arriving from the south are to turn in time to remain clear of this airspace. This may require the aircraft to fly due west over residential neighborhoods in northern Virginia. Doing so may cause local residents to experience high-decibel noise, but it is the required maneuver to ensure safe operations.
- Aircraft departing to the south are to track the river until they are 5 miles from the airport—beyond the Potomac River's Wilson Bridge—before turning toward their destination. Starting 5.6 miles from the airport, aircraft arriving from the south are to approach the airport directly over the river.

[5]Under the flight path procedure for Reagan National, a relatively small number of flights that arrive from or depart for certain destinations to the northeast are to follow the Anacostia River.

Figure 1 depicts the flight path that pilots are generally supposed to follow at Reagan National.

Figure 1: Aircraft Flight Path at Reagan National



[a]The airspace above the National Observatory is prohibited to commercial air traffic because the Vice President's official residence occupies the grounds.

Source: GAO's depiction of information from MWAA.

Another method of limiting aircraft noise is the requirement that pilots of aircraft departing to the north reduce engine power to a given target setting once they have reached an altitude of 1,500 feet or a point 2 miles away from the airport. Likewise, this "thrust management" procedure requires pilots of southbound departing aircraft to reduce power at a point 3 miles away from the airport. Pilots of all departing aircraft are to maintain reduced engine power until their aircraft reach a point 10 miles from the airport. At this point, pilots are to increase power to normal climb settings.[6] According to FAA and MWAA officials, reducing engine power in this manner effectively reduces the amount of noise generated during takeoff. Only an air traffic controller's instruction to "expedite climb" releases the pilot from the requirement to maintain reduced engine power.

Although not primarily a noise mitigation rule, the federal perimeter rule generally bars airlines from operating nonstop flights to or from any airport located more than 1,250 statute miles from Reagan National. Coupled with Reagan National's relatively short main runway, the perimeter rule effectively prevents airlines from using certain jets that may emit more noise than some smaller aircraft now operating at Reagan National. However, many newer aircraft capable of flying beyond the existing perimeter, such as the Airbus A-320, create less sound than older aircraft equipped with hush kits, which are now in use at the airport.

Although also not originally intended as such, the federal slot rule for Reagan National serves as a noise abatement measure.[7] A "slot" is an authorization from the federal government for an aircraft to take off or land under instrument flight rules during any given hour. The slot rule specifies that no more than 60 operations—37 air carrier, 11 commuter, and 12

[6]According to FAA officials, this procedure is consistent with safe operations and is considered to be a standard rate of climb for jet aircraft operating at Reagan National.

[7]The slot rule was established to reduce delay and congestion at Reagan National and other major airports. In 1969, facing increasing delays and congestion, FAA applied special air traffic rules to certain airports that it designated as high-density airports: Chicago's O'Hare; New York's LaGuardia and Kennedy; Newark, New Jersey; and Reagan National. (The Department of Transportation suspended Newark International Airport's designation as a high-density airport in October 1970.) Because of the restricted number of allowable operations, these airports are generally known as *slot-controlled*, and the special rules governing the allowable number of operations are referred to as *slot rules*. The total number of slots allowed at Reagan National has remained unchanged, although FAA reduced the number of air carrier slots from 40 to 37 per hour in 1981. For more information on the federal slot rule, see *Reagan National Airport: Capacity to Handle Additional Flights and Impact on Other Area Airports* (GAO/RCED-99-234, Sept. 17, 1999).

general aviation operations—may be scheduled per hour.[8] In 1984, FAA used its exemption authority to permit Braniff Airlines to resume operations at Reagan National with four slots, even though all air carrier slots were already allocated.[9] In 1990, FAA allocated those four slots to America West Airlines.[10]

In April 2000, the President signed legislation directing the Secretary of Transportation to grant 24 additional exemptions to the slot and perimeter rules, provided that certain conditions generally relating to increased competition are met, including a condition that the additional flights do not result in increased travel delays.[11] The legislation specifies that 12 of these exemptions be reserved for flight operations to and from locations beyond the existing perimeter and that the remaining 12 be reserved for operations to small and medium-sized communities inside the perimeter. The legislation also includes provisions designed to ensure that the quality of the human environment is not significantly affected and that noise standards are not compromised.

Airlines' Compliance With Noise Abatement Procedures Appears High, but Certain Shortcomings in Flight-Monitoring Efforts Raise Doubts

Although information available from MWAA and FAA on the number of violations of Reagan National's noise abatement measures suggest that the airlines have generally met local requirements, shortcomings in MWAA's and FAA's efforts and abilities to monitor airlines' operations raise doubts about the extent of the airlines' actual compliance. MWAA's and FAA's data indicate that the major airlines generally comply with the procedure governing nighttime operations and the law concerning slot use. Yet, the two agencies do not verify whether the airlines comply in practice. At the same time, it is not possible for MWAA and FAA to determine with certainty whether pilots comply with procedures governing the airport's flight path and the reduction of engine power on takeoff. Although FAA's radar data

[8]The term *air carrier* generally refers to large commercial jets. The term *commuter* refers to smaller jet- or propeller-powered aircraft that typically offer regional service. The term *general aviation* refers to nonscheduled operations by small aircraft; at Reagan National, it generally refers to corporate jets.

[9]See FAA Exemption No. 2927 (Feb. 24, 1984). FAA used its statutory authority, since amended, under 49 U.S.C. section 40109 to grant this exemption from its slot rules on the basis of a public interest finding.

[10]See FAA Exemption No. 5133 (Jan. 12, 1990).

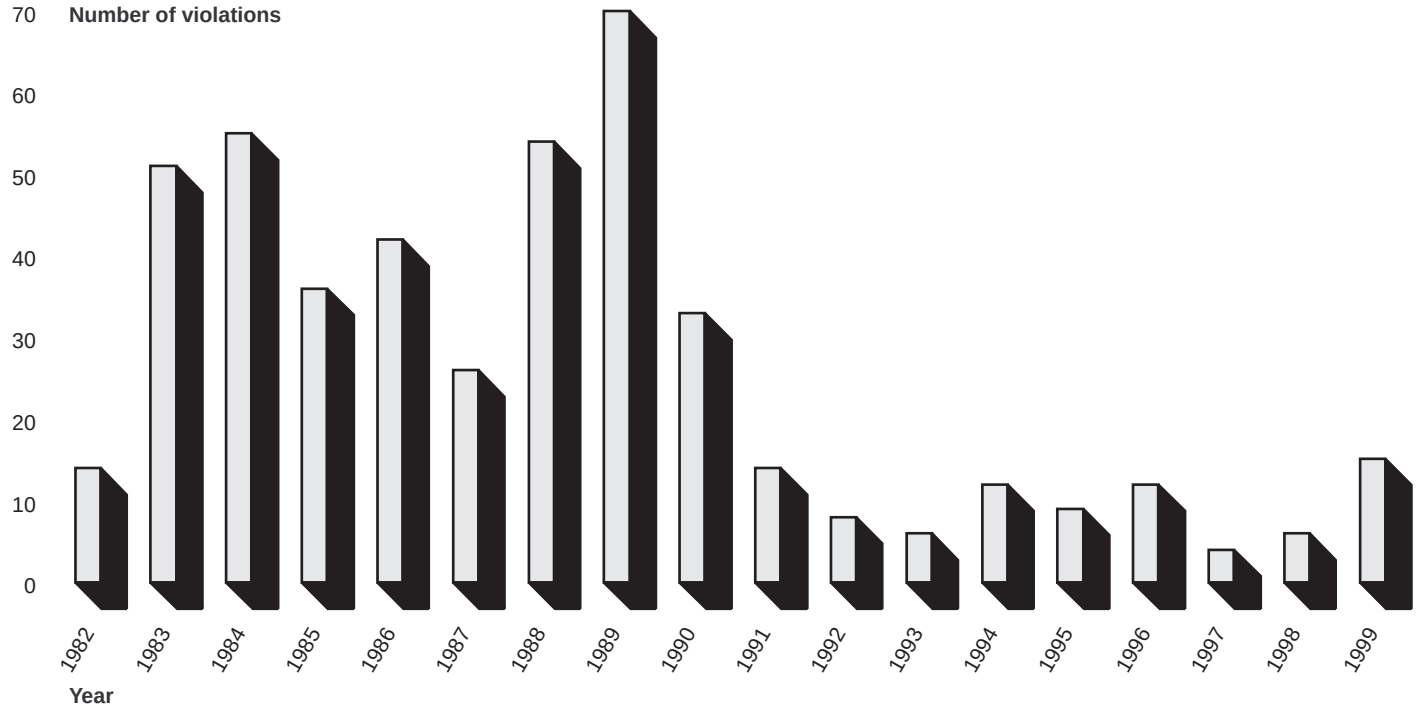
[11]See P.L. 106-181.

may suggest that an aircraft has violated flight path restrictions, unless those data can be combined with air traffic controllers' instructions, they cannot indicate with certainty whether a violation took place. Furthermore, it is impractical to fully monitor pilots' compliance with the procedure requiring reduced engine power. Under these circumstances, not all violations are likely to be detected, reported, or investigated, and the exact extent of airlines' compliance with the Reagan National noise abatement procedures cannot be determined. On the other hand, MWAA and FAA officials agree that airlines have fully complied with the perimeter rule.

Airlines' Compliance With the Nighttime Noise Procedure Appears High, but MWAA Could Take More Measures to Verify Compliance

Available data suggest that airlines' compliance with the nighttime noise procedure, as measured by the number of enforcement actions initiated, has increased since the late 1980s. From July 1982 through December 1987, roughly the period immediately before MWAA assumed operational control at the airport, FAA initiated 224 formal enforcement actions against airlines for operating aircraft that produced excess noise between 10 p.m. and 7 a.m. In those 224 cases, FAA sent 141 letters of correction or warning and levied 62 civil penalties totaling $41,600. The number of enforcement actions peaked in 1989, when MWAA initiated 70 enforcement actions. Since 1989, compliance appears to have improved because the number of enforcement actions that MWAA has taken has declined. From 1990 through 1999, MWAA initiated a total of 120 enforcement actions. MWAA officials believe that two major factors contributed to the decrease in the number of enforcement actions taken for nighttime noise violations. First, airlines began to replace older, noisier aircraft with newer, quieter versions. Second, MWAA succeeded in raising the maximum civil penalty it could assess from $1,000—which, according to MWAA officials, some airlines regarded as nothing more than a cost of doing business at the airport—to $5,000. Total civil penalties assessed in 1999 equaled $12,750. MWAA considers the airlines' compliance to be very good and believes that its vigorous and consistent enforcement has led to an improved compliance attitude among the airlines. Figure 2 shows the number of enforcement actions that MWAA has initiated against the airlines over time.

Figure 2: Enforcement Actions for Violations of the Nighttime Noise Restriction Have Generally Declined



Source: MWAA.

MWAA relies on FAA's reports to determine the types of aircraft that flew into and out of the airport during the nighttime restricted hours but does not independently verify whether the newer, quieter aircraft are actually operated in a manner that complies with established decibel limits. According to an MWAA official, the agency's operations staff receive a report each morning from FAA personnel at Reagan National's air traffic control tower showing the types of aircraft that flew into and out of the airport during the previous evening. Any enforcement action that MWAA may take depends on the type of aircraft being operated, the lawful maximum weight at which that aircraft may operate, and the amount of noise produced at the aircraft's maximum weight.

- If FAA's report indicates that certain aircraft, such as an older Boeing 727, operated between 10 p.m. and 7 a.m., MWAA initiates an enforcement action. All Boeing 727 models clearly produce more than 72 decibels of sound on takeoff and more than 85 decibels on approach—the sound thresholds for takeoffs and landings.

- MWAA does not verify on a flight-by-flight basis whether flights by certain newer, relatively quiet aircraft comply with the nighttime noise standards. For instance, if FAA's report shows that US Airways—Reagan National's largest airline—made a nighttime operation with one of its newer aircraft, such as an Airbus A-319 or Airbus A-320, MWAA presumes the flight to be in compliance. MWAA bases this presumption on US Airways' obligation to operate its aircraft in accordance with the "type certificate" provided by the aircraft's manufacturer—Airbus Industrie. An aircraft's type certificate, which is approved by FAA, specifies its operating requirements, including the maximum weights at which it may take off or land at particular airports. The certificate that US Airways holds for its Airbus A-320 operations at Reagan National, for instance, specifies an allowable takeoff weight of 73.5 tons—about 13 tons less than the maximum takeoff weight that the aircraft could accommodate, according to Airbus Industrie's calculations. According to FAA's calculations, this combination of aircraft and weight for an Airbus A-320 generates approximately 69 decibels of sound on takeoff, which is less than the 72-decibel limit that MWAA allows for nighttime operations at Reagan National. US Airways managers have agreed with MWAA to operate all of the airline's Airbus A-319s and A-320s during daytime and nighttime hours in a manner consistent with these weight requirements.
- MWAA presumes that US Airways will abide by those weight restrictions because it is an obligation under federal law and airport rules, and because of the severe penalty that FAA could impose on the airline. If US Airways were to operate one of these aircraft contrary to this agreement, not only would it be violating MWAA's nighttime noise procedure, but it would also be violating a federal aviation regulation by operating the aircraft in a manner inconsistent with its certificate.[12] In such an event, FAA could apply a range of enforcement actions, including suspending the airline's operating certificate—effectively grounding the airline. However, FAA has notified MWAA that it will not police how US Airways operates its aircraft, leaving that responsibility to local airport officials.
- MWAA officials recognize that other newer aircraft, such as Boeing 737-800s, may or may not meet the nighttime decibel limits, depending on their weight and how they are operated. MWAA has recently concluded agreements with two other airlines—Delta and American—about the

[12]See 14 C.F.R. 121.189.

weight with which, and the manner in which, their aircraft will be operated.

According to an MWAA official, MWAA is able to verify whether US Airways aircraft are complying with the terms of a May 1999 agreement with the agency. This agreement allows MWAA full and regular access to company records regarding aircraft takeoff and landing weights. However, MWAA has not conducted spot checks on US Airways aircraft to determine whether these aircraft are being operated either in accordance with the airline's certificate or in compliance with Reagan National's nighttime noise limits. If MWAA conducted such inspections, it would be able to determine whether US Airways was adhering to the conditions specified in its operating certificate. According to an MWAA official, the agency has checked the records, which indicate compliance, but has not yet begun checks on the actual aircraft, which have been operating at Reagan National since October 1999.

MWAA and airline officials believe that violations of the nighttime noise rule are few and will continue to decrease as airlines phase in a new generation of quieter aircraft. During early 2000, US Airways began introducing new Airbus A-320 aircraft for its shuttle service to New York's LaGuardia Airport, and Delta Air Lines will soon deploy new Boeing 737s for its competing shuttle service. Operations using these aircraft will be fully compliant not only with FAA's nationwide Stage 3 engine-noise requirements, but also with MWAA's stricter nighttime noise limits—provided that they are operated in accordance with the type certificates provided by the manufacturer or FAA operations specifications with weight restrictions.

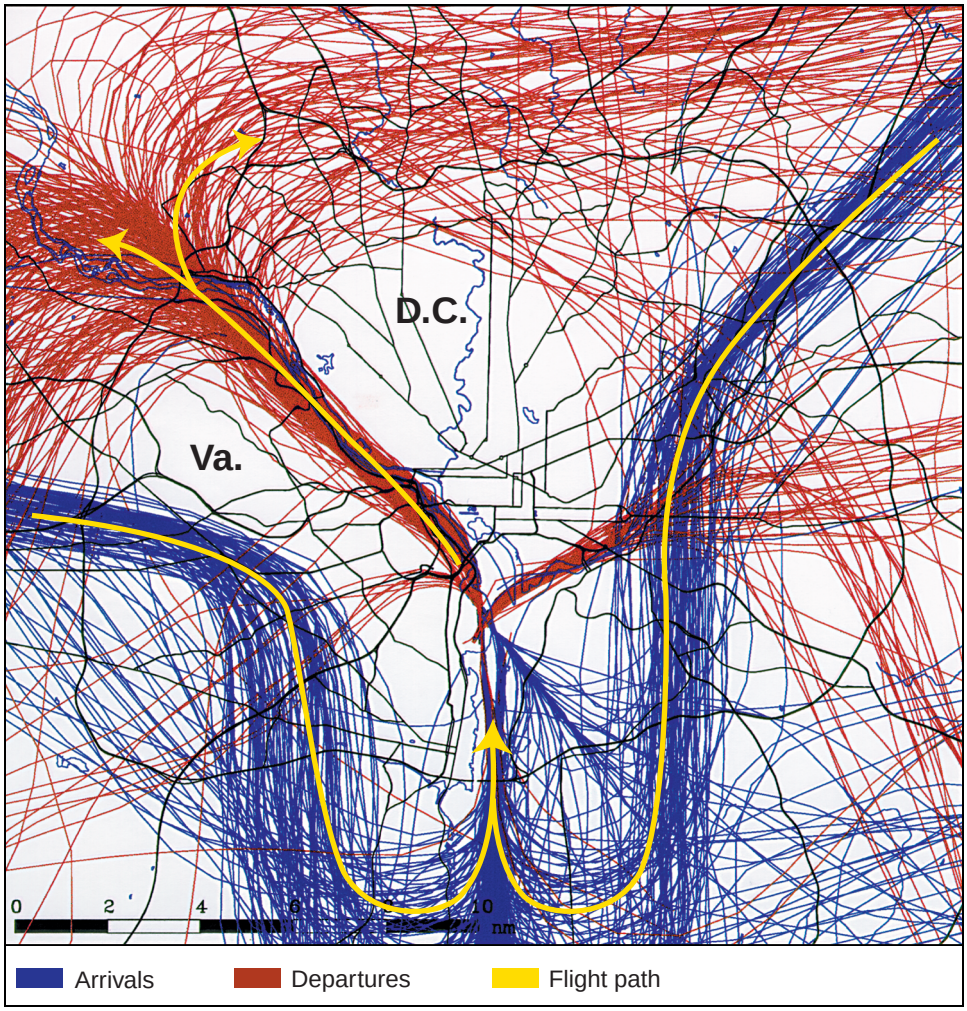
FAA's Data Suggest but Do Not Confirm That Pilots Abide by Air Traffic Control Instructions to Follow Reagan National's Flight Paths

FAA's radar data suggest that pilots flying to, from, or near Reagan National almost always comply with controllers' instructions to follow the airport's approved flight paths. Except in emergency situations, federal aviation regulations require pilots to follow all instructions from air traffic controllers. At Reagan National, these instructions incorporate the airport's noise procedures, which include a directive to follow the Potomac River flight path. A pilot's failure to follow air traffic control instructions as required by federal aviation regulations is an enforceable infraction known as a *pilot deviation*. For example, a pilot's failure to maintain the altitude directed by air traffic controllers could be considered a pilot deviation.

In fiscal year 1999, out of about 330,000 aircraft operations at Reagan National, FAA initiated 18 enforcement actions for alleged pilot deviations. This equates to approximately 5 enforcement actions for every 100,000 aircraft operations (takeoffs and landings). From fiscal year 1996 through fiscal 1998, FAA took enforcement actions against 75 pilot deviations. This equates to roughly 8 enforcement actions for every 100,000 aircraft operations. Of all the enforcement actions taken for pilot deviations during these 3 fiscal years, 63 were against pilots of general aviation or corporate aircraft and 30 involved pilots of commercial aircraft. In each of these 93 cases, FAA pursued the enforcement action because a pilot failed to avoid secured federal airspace over Washington, D.C.—not because the pilot flew over a local residential neighborhood west of the Potomac River.

Figure 3 shows the actual flight paths taken by aircraft arriving at Reagan National from the south and departing from Reagan National to the north along the Potomac and Anacostia rivers on a randomly selected day. The figure highlights the extent to which northbound departing aircraft generally follow the Potomac River, avoiding the restricted airspace over central Washington, D.C. It also shows the spread-out pattern of various points at which aircraft landing from the south turn to fly over the river from either the Maryland or the Virginia side of the Potomac.

Figure 3: Actual Arrival and Departure Observations Along Reagan National's Flight Path, October 25, 1999



Source: MWAA, based on radar data provided by FAA.

This figure suggests, but does not prove, that some aircraft may have been west of the flight path at various points during departure, thereby possibly violating the flight path restriction. FAA officials acknowledged that both they and airline personnel are generally more concerned about ensuring that aircraft avoid the prohibited area over Washington, D.C., than about overflying northern Virginia suburbs. Yet without knowing what the air traffic controllers' instructions to the pilots were, it is not possible to determine with certainty whether the flights shown in figure 3 were notcomplying with the flight path procedure. Both FAA and MWAA officials

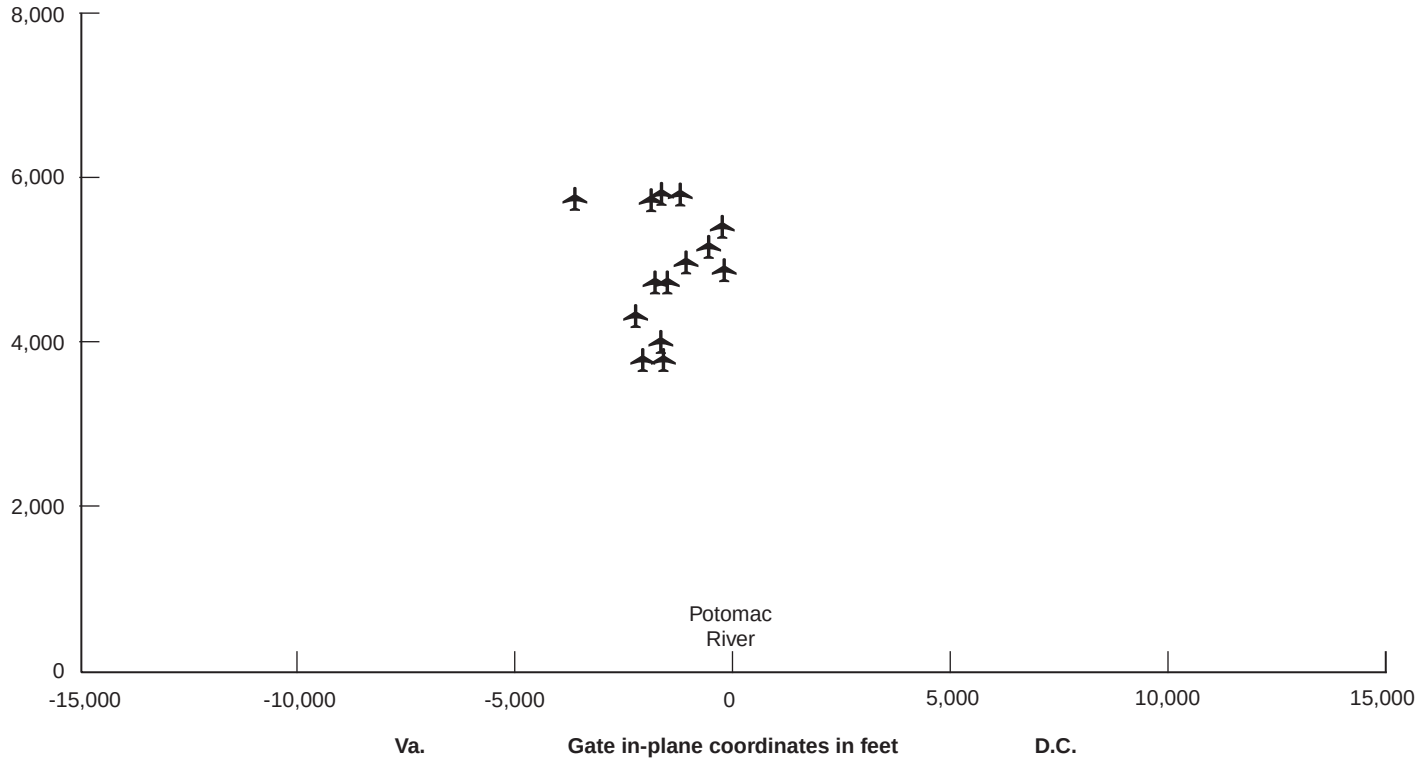
reported that controllers are usually unable to recall specific instructions given to specific flights from a previous day. Thus, these radar data alone are not sufficient to indicate whether a pilot may have erred.

Despite federal control over the use of airspace, MWAA independently supplements FAA's enforcement actions. MWAA periodically tracks aircraft movements along the airport's flight paths using FAA's radar data.[13] MWAA plots the horizontal and vertical position of each aircraft as it passes through four electronic checkpoints (or "gates") that bisect the flight path north of the airport. This information helps noise abatement officials determine how effectively aircraft maintain their positions over the river. MWAA later relays this information to the airlines to remind them of the importance of following the river to minimize the noise generated over residential neighborhoods. MWAA takes this approach—encouraging airlines to follow the established flight path—because it does not have the authority to compel compliance. According to MWAA officials, this has encouraged airlines to pay closer attention to the local flight path requirements.

Figure 4 illustrates where an airline's MD-80 aircraft passed through one of MWAA's gates during a randomly selected day. It shows that, at a point approximately 6 miles northwest of the airport, these aircraft were either directly above or west of the river (over Virginia) by roughly one-half mile at altitudes of between 4,000 and 6,000 feet, which is well within the range of normal altitudes at that point, according to MWAA officials. Again, as with figure 3, because these data cannot be matched with instructions from the air traffic controller, these flights could not be considered either to be off the flight path or operated not in accordance with air traffic control instructions, according to FAA and MWAA officials.

[13]At Reagan National, MWAA obtains these data only after a 1-week delay; national security considerations require the delay to allow time to strip out pertinent information, such as movements of the President's helicopter.

Figure 4: Example Indicating the Position of One Airline's Departing Aircraft Relative to the Flight Path at a Point 6 Miles Northwest of Reagan National



Note: GAO's depiction based on data supplied by MWAA.

Determining Pilots' Compliance With Engine Power Procedure Is Impractical

Because there is no practical way for MWAA or FAA to do so, assessing whether airlines and their pilots comply with Reagan National's procedure requiring reduced engine power on takeoff is virtually impossible. MWAA and FAA officials told us that determining whether a pilot has complied with Reagan National's power management procedure could theoretically be done in two ways. Yet according to these officials, neither of these two options is currently feasible.

- First, FAA could propose new rules that would require airlines to install video cameras in the flight deck of all aircraft to monitor pilots' decisions. The Air Line Pilots Association—a union representing 55,000 pilots at 51 North American airlines—has generally opposed installing video recorders in cockpits, citing concerns about pilots' privacy and the misuse of information obtained from the recorders. The union

supports the use of cockpit video recorders for accident investigation purposes only. Because current flight data recorders (i.e., the "black box") capture data on engine throttle settings, the union maintains that any cockpit video recorder must be installed to ensure that it focuses on and records only the instrument panel of the cockpit and not the flight crew's activity, including how they set engine throttles. Thus, such union concerns effectively prevent cockpit video recorders from being used as a means to determine compliance with engine power requirements.

- Second, FAA officials could retrieve the flight data recorder from an aircraft to determine whether a pilot properly reduced engine thrust. However, because the recorder is designed to produce data for only the last 30 minutes of a flight, information pertaining to an aircraft's takeoff would be missing for all flights into or out of Reagan National. In addition, according to information from Delta Air Lines, obtaining engine thrust information from the flight data recorder is also not feasible because removing that equipment from aircraft is both time-consuming and costly.

FAA's Data Indicate No Violations of the Slot Rule, but Lack of Ongoing Monitoring Makes It Difficult to Fully Assess Airlines' Compliance

As we have reported in the past, FAA does not have a systematic way to monitor compliance with or enforce violations of Reagan National's slot rule.[14] To determine that an airline has violated the slot rule, FAA officials told us they must find that the airline displayed a pattern of operations that diverges significantly from scheduled times and did so intentionally. FAA staff do not consider single events in which aircraft arrive early or late to be violations because various factors outside the airline's control (e.g., poor weather and air traffic delays) can affect aircraft operations.[15]

FAA officials acknowledged that, although they routinely attempt to discern patterns indicating airlines' intent to violate the slot rule, they do not regularly compare airlines' scheduled operations with their actual operations. Even were they to do so, officials stated that they do not have a firm definition for exactly when a consistent pattern of delays or early

[14]See *Airport Noise: FAA's Enforcement of Noise Rules at National Airport* (GAO/RCED-88-117, Apr. 15, 1988).

[15]The slot rule specifically exempts certain types of unscheduled operations—that is, operations that are not regularly scheduled—from the hourly limits. These exceptions include (1) charter flights, (2) extra sections of scheduled commuter or air carrier flights (e.g., the "shuttle") that may have been overbooked, and (3) the movements of empty aircraft to position them for future operations.

operations constitutes a slot violation and that they do not use an established period of time—for example, 30, 60, or 90 days—against which to measure airlines' compliance. FAA officials said that they had recorded no violations of the slot rule at Reagan National since at least 1994.

Our analysis of flight operations data, however, revealed numerous situations that would seem to merit additional investigation by FAA. We independently analyzed information on flight arrivals and departures covering the period from September 30, 1999, through December 31, 1999. Of the approximately 580 scheduled daily operations by large air carriers (large jets) at Reagan National, 8 flights appeared to arrive consistently at times other than their scheduled hours. One of those flights arrived at Reagan National not during the 9 p.m. hour but after 10 p.m. nearly 90 percent of the time. Similarly, several other flights departed Reagan National consistently in hours other than their scheduled hours. For example, of the five flights that airlines scheduled to depart precisely at 8 a.m., four departed ahead of schedule at least 70 percent of the time.

Airlines Have Fully Complied With Reagan National's Perimeter Rule

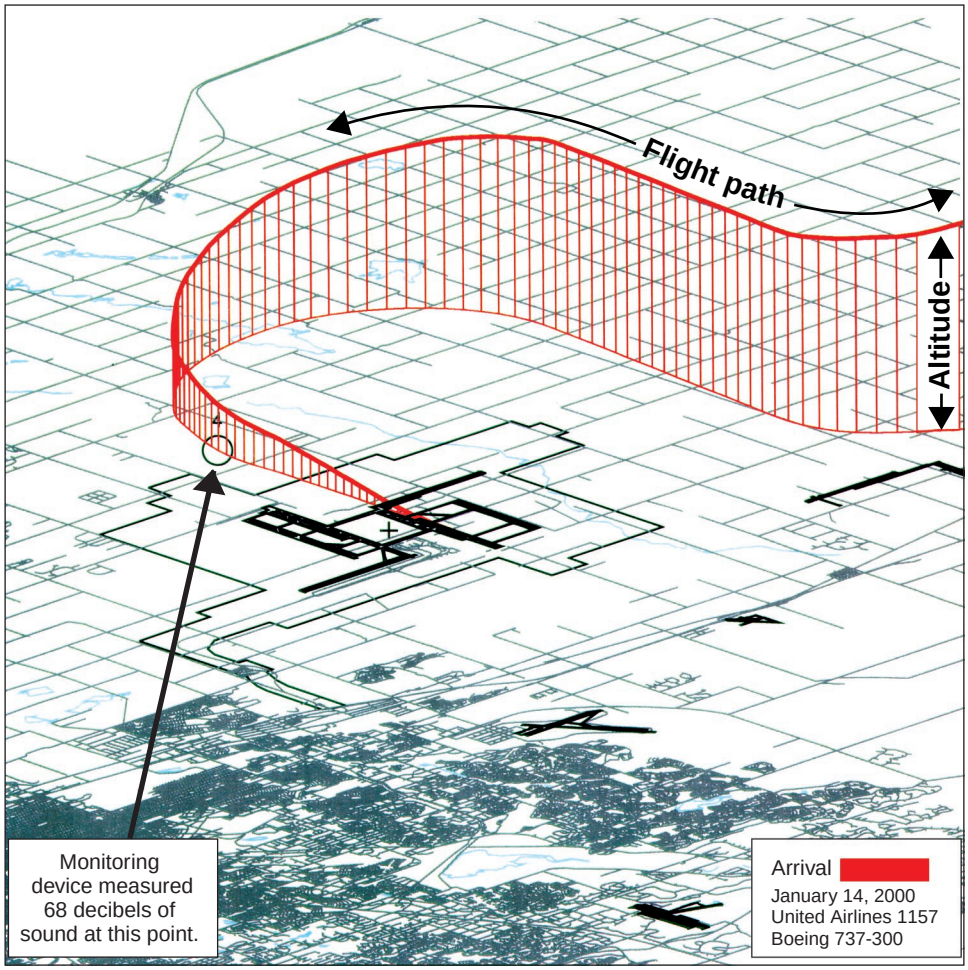
MWAA officials report that the airlines are in full compliance with the perimeter rule, which bars airlines from operating nonstop flights to and from destinations located more than 1,250 miles from the airport. Industry officials agree that an airline could not schedule, market, or operate a flight to or from a point beyond the perimeter without FAA's, the general public's, and especially competing airlines' taking notice and reporting the flight to MWAA.

Local Groups Believe That MWAA's and FAA's Efforts to Monitor and Enforce Noise Abatement Procedures Could Be More Effective

Although officials with MWAA, FAA, and key airlines operating at Reagan National generally regard these noise monitoring and enforcement efforts as effective, outside groups have a somewhat different opinion. For example, the Committee on Noise Abatement at National and Dulles Airports (CONANDA)—an advisory committee of the Metropolitan Washington Council of Governments, which is a regional planning authority composed of locally elected officials—believes that MWAA's noise abatement efforts at Reagan National are not effective enough. This committee believes that, while aircraft are generally operating within Reagan National's prescribed departure radial, many aircraft create excessive amounts of noise over local neighborhoods by not tracking the Potomac River as closely as possible.

CONANDA officials asserted that MWAA cannot adequately respond to local residents' concerns about the noise generated by particular aircraft. They stated that a more sophisticated system in use at Denver International Airport can identify the source, location, and decibel level of individual noise events with great accuracy and could possibly have applications at Reagan National. For instance, Denver's $2 million Aircraft Noise and Operations Monitoring System (ANOMS) combines data recorded at noise-monitoring stations located in noise-sensitive areas around the airport with flight progress data from FAA. ANOMS can then identify the amount of noise generated by particular aircraft at specific points along their arrival and departure flight paths. Figure 5 displays a sample of data available from ANOMS. The figure shows an arriving aircraft's flight path and altitude, along with the noise that the aircraft generated at a particular point.

Figure 5: Denver International Airport's ANOMS Provides Detailed Data on Noise From Individual Aircraft



Source: Denver International Airport.

Denver airport officials noted that ANOMS has provided at least two significant benefits. First, because ANOMS can combine flight path and noise data to identify a particular, high-decibel event with greater precision than some other systems currently in use, airport officials are better able to respond to area residents' complaints about aircraft noise. Using ANOMS data, the airport can readily provide local residents with detailed information about the particular noise event, including whether the flight took off from or was landing at Denver's airport or nearby military facilities. Second, under the intergovernmental agreement that governs

noise abatement at Denver, violations are generally defined in terms of the total amount of noise averaged over a period of time. Consistent with federal measurements of noise levels, single high-decibel events are not themselves subject to legal action. Denver's ANOMS is designed in part to capture the data needed to make these determinations.

Conclusions

Airlines' compliance with two important noise abatement procedures—limiting nighttime aircraft operations and capping the number of hourly slots in which airlines may operate—appears to have been high during recent years. Nevertheless, we believe that MWAA's and FAA's statistics on violations of these measures may understate the actual number because not all violations are likely to have been detected, reported, or investigated. For example, MWAA has not checked to determine whether certain aircraft types comply with its nighttime noise procedure and FAA has not systematically monitored compliance with the slot rule. If MWAA and FAA were to police these requirements more aggressively, they may find more situations that should be investigated, reported, and enforced. At the same time, while airlines' compliance with two other procedures—flight path and engine power management—also appears high, several matters create uncertainty for MWAA and FAA in their efforts to determine whether airlines and their pilots comply in practice. To achieve certainty on flight path compliance, FAA's radar data would need to be combined with a controller's recall of a single flight event, which is difficult or impossible, as shown by experience. Moreover, because there are no flights into or out of Reagan National of less than 30 minutes' duration, it is impossible to retrieve engine thrust information from flight data recorders. As a result, it is impractical to determine the extent to which pilots reduce power shortly after takeoff.

More advanced noise detection technology would be able to provide residents who complain about particular noise events with greater amounts of information. However, MWAA would still be hampered in its efforts to disseminate this information by FAA's obligation to clean raw radar data pertaining to national security flights. This exercise delays MWAA's ability to analyze these data by at least 1 week. MWAA may also be hampered by its inability to position monitoring stations as Denver did because the Potomac River covers much of the noise-sensitive area around Reagan National.

Recommendations to the Metropolitan Washington Airports Authority

To ensure that airlines operating at Reagan National during nighttime hours do so in compliance with the local nighttime noise rule, we recommend that the President/Chief Executive Officer, Metropolitan Washington Airports Authority, commit to a schedule of randomly verifying that arriving and departing aircraft are being operated in a manner consistent with the terms of legally binding agreements that some airlines have reached with MWAA and FAA. We also recommend that the President/Chief Executive Officer, Metropolitan Washington Airports Authority, study the relative benefits and costs of procuring a more technologically advanced noise-monitoring system.

Recommendations to the Secretary of Transportation

To improve oversight of the federal slot rule, particularly in light of the addition of 24 flights at Reagan National, we recommend that the Secretary of Transportation direct the Administrator, Federal Aviation Administration, to (1) develop a reliable method (including definitions and procedures) for consistently determining whether airlines are complying with the federal slot rule and (2) maintain a system of records of the violations identified and FAA's disposition of them in a form that will enable FAA to evaluate its overall monitoring and enforcement effort.

Agency Comments

We provided MWAA, FAA, and DOT with a draft of our report for review and comment. We met with officials from FAA, including a senior attorney from the Office of the General Counsel, officials responsible for monitoring airlines' compliance with the slot rule, and a manager from the Flight Standards District Office that oversees Reagan National's flight operations. FAA generally agreed with our findings but asked us to clarify technical issues concerning slot use and engine power management. We incorporated these remarks as appropriate. FAA did not comment on our recommendations. DOT did not comment on the facts, findings, or recommendations contained in our draft report.

MWAA generally agreed with our findings but said we should clarify our presentation on several matters, including the purpose of the airport's perimeter rule and nighttime noise procedure, which we incorporated as appropriate. MWAA did not comment on our recommendations. MWAA's comments and our responses are included as appendix II.

We conducted our review from October 1999 through June 2000 in accordance with generally accepted government auditing standards. (For a detailed description of our scope and methodology, see app. I.)

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies of this report to the Honorable Rodney E. Slater, Secretary of Transportation; Ms. Jane Garvey, Administrator, Federal Aviation Administration; Mr. James Wilding, President/Chief Executive Officer, Metropolitan Washington Airports Authority; and the Honorable Jacob J. Lew, Director, Office of Management and Budget. We will make copies available to others on request.

If you have any questions, please call me at (202) 512-2834. Key contributors to this report were Steven C. Martin, Aaron Casey, and David Hooper.

Sincerely yours,

John H. Anderson, Jr.
Director, Transportation Issues

Scope and Methodology

To describe the noise abatement procedure at Ronald Reagan Washington National Airport (Reagan National), we reviewed documentation from the Metropolitan Washington Airports Authority (MWAA) regarding the four methods—nighttime operating restrictions, flight path restrictions, engine power management, and the perimeter rule—on which it formally relies for abating noise at the airport. We reviewed applicable local procedures and federal laws and met with officials representing MWAA and the Federal Aviation Administration (FAA) to obtain an interpretation of these procedures and laws, including their purpose. We interviewed officials with both agencies to understand how each of these procedures and laws may limit aircraft noise. In addition, we interviewed officials with FAA's slot administration and general counsel's offices to obtain a description of how the slot rule may also serve as a noise abatement procedure.

To determine whether airlines comply with Reagan National's noise abatement procedures, we interviewed MWAA and FAA officials, analyzed available enforcement data, reviewed case files, and independently assessed data on aircraft operations at the airport. Specifically, to assess the extent to which airlines comply with Reagan National's nighttime noise limits, we interviewed officials with MWAA's noise abatement and general counsel's offices and reviewed documentation from FAA and MWAA regarding how determinations are made about the noise emitted by new aircraft. To determine whether airlines are complying with federal regulations requiring pilots to follow air traffic controllers' instructions, we interviewed officials with FAA's offices of Air Traffic Services and Flight Standards Services. Additionally, we reviewed data from FAA on the number of reported and investigated pilot deviation cases during the past 4 fiscal years. To examine whether pilots comply with the procedure requiring reduced engine power during takeoff, we interviewed officials with MWAA and FAA's Office of Environment and Energy. To assess airlines' compliance with the federal perimeter rule, we interviewed staff with MWAA's Office of the General Counsel. Finally, to understand whether airlines are complying with the slot rule at Reagan National—and how FAA searches for slot use patterns—we interviewed officials with FAA's Office of the General Counsel and Office of Slot Administration. We independently reviewed and analyzed FAA's data comparing airlines' published schedules for the period between September 30, 1999, and December 31, 1999, at Reagan National, against data on actual operations during the same period. We selected this period because it provided the most recent data available. In our analysis, we used FAA's data on the time that aircraft arrived at the gate, instead of the time that the aircraft's wheel touched down on the runway, as the arrival time. Similarly, for the analysis

of departure times, we used FAA's data on the time that aircraft pushed back from the gate and not the time that aircraft wheels lifted off the runway.

To assess the extent to which parties concerned with aircraft noise at Reagan National believe that existing procedures and penalties are effective in encouraging airlines' compliance, we interviewed staff representing the Metropolitan Washington Council of Governments' Committee on Noise Abatement at National and Dulles Airports. In addition, on several occasions, we attempted to contact another interested party—Citizens Against Aircraft Noise—that has campaigned for a reduction in aircraft noise at Reagan National. However, this party did not respond to our inquiries. Finally, for the purpose of comparison with noise abatement efforts at Reagan National, we met with officials representing Denver International Airport to assess that airport's own such efforts.

We conducted our review from October 1999 through June 2000 in accordance with generally accepted government auditing standards.

Comments From the Metropolitan Washington Airports Authority

Note: GAO's comments supplementing those in the report text appear at the end of this appendix.

METROPOLITAN WASHINGTON AIRPORTS AUTHORITY

1 Aviation Circle ✈ Washington, DC 20001-6000

May 25, 2000

Mr. John H. Anderson, Jr.
Director, Transportation Issues
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Anderson:

Thank you for providing the Metropolitan Washington Airports Authority (Authority) the opportunity to review the draft of the Report to the Honorable James P. Moran entitled "Reagan National Airport – Limited Opportunities to Improve Airline Compliance with Noise Abatement Procedures."

We want to acknowledge the fine job that you did in beginning to understand the technicalities and challenges inherent in managing and monitoring complex noise abatement such as the ones in effect at Ronald Reagan Washington National. However, while we do not object to the recommendations which you have proposed, we do have some concerns about some of the language which was used in the cover letter which may not accurately portray either some of the noise abatement regulations at the airport or the Authority's efforts at monitoring them. Therefore, we request that you make the following changes.

Beginning with page 3 the paragraph captioned "Results in Brief" should be rewritten as follows: (Suggested new language is underscored.)

Results in Brief

Local airport procedures and federal laws contain a number of provisions designed in part to limit aircraft noise at Reagan National. First, a nighttime noise procedure imposed by the Authority generally permits flight operations between 10 p.m. and 7 a.m. only by certain aircraft that can meet relatively strict noise limits. However, the rule allows any aircraft that were scheduled to arrive before 10 p.m. to land ~~after that time if they were by factors beyond the airline's control~~ later if they are cleared to land by 10:30 by Air Traffic Control. This recognizes that aircraft are sometime delayed enroute. Second, local airport rules require both departing and arriving flights to follow the Potomac River north and south of the airport for several miles before turning. In particular, aircraft are prohibited

See comment 1.

See comment 2.

See comment 3.

See comment 4.

See comment 1.

from flying over federally protected areas in Washington, D.C., such as the Capitol and White House. Third, airport ~~rules~~ and FAA noise abatement procedures also ~~require~~ call for pilots of aircraft departing to the north to reduce engine power, and thus engine noise, after reaching an altitude of 1,500 feet. Fourth, ~~the airport's noise abatement procedure incorporates~~ although technically not a noise abatement provision, the federal law that ~~generally bars~~ prohibits airlines from operating nonstop flights to or from any airport located more than 1,250 statute miles from Reagan National (the "perimeter rule") does have a beneficial noise impact by limiting the weight of aircraft at National. In addition, ~~another~~ other federal law and regulations generally limit the number of flights to 60 per hour (the "high density rule," also known as the slot rule).

The full paragraph on page 4 contains the following sentence which we request be written as follows:

See comment 1.

With respect to the nighttime noise procedure, data from the Authority show that violations of that rule have decreased since the early 1990s, in part because airlines have begun to replace older, noisier aircraft with newer, quieter versions. MWAA says it has a high degree of confidence that these aircraft are being operated in compliance with the noise rule, but MWAA could do more to spot check compliance.

On page 6 change the sentence beginning: "In addition, the slot rule, by limiting…."

See comment 4.

To read: "In addition, the slot rule and the Perimeter Rule, by limiting the number of aircraft operations during most hours of the day and the length of flights also ~~has~~ have the effect of restraining aircraft noise at the airport."

On page 9 delete the sentence:

See comment 1.

"This 'thrust management' procedure does not specify when southbound departing aircraft are to increase power to normal climb settings."

(Explanation: The thrust management component of the noise abatement procedures is independent of the requirement to follow the Potomac or Anacostia Rivers. The aircraft are to maintain the reduced power setting until passing DCA VOR 10 DME [a 10-mile radius from the airport] irrespective of the direction of the flight)

See comment 5.

On page 10 delete the word "generally" in the sentence that reads: "MWAA's and FAA's data indicate that the major airlines ~~generally~~ comply with the procedure governing nighttime operations and the law concerning slot use." MWAA believes that

there is a very high degree of compliance with the nighttime noise rule and the report should say so.

Now on p. 11.

On page 11, the underscored language is: "Airlines' Compliance With the Nightime Noise Procedure Appears to Have Improved, But MWAA Has Not Verified Whether New, Relatively Quiet Aircraft Meet Decibel Limits In Actual Operation"

A more accurate statement that reflects the low number of violations would be:

See comment 1.

"Airlines' Compliance With the Nighttime Noise Procedure Appears high ~~to Have Improved,~~ But MWAA ~~Has Not Verified Whether New, Relatively Quiet aircraft Meet Decibel Limits In actual Operation~~ Could Take More Measures to Verify Compliance."

It is not correct to say that MWAA has not verified compliance. MWAA receives a written printout of weights and other information from USAirways for their night operations and uses that to verify their compliance. MWAA is working on procedures with other carriers.

Also on page 11 the sentence that begins: "MWAA believes that its vigorous….."

See comment 1.

Should read: "MWAA considers the airlines' compliance to be very good and believes that its vigorous and consistent enforcement has led to an improved compliance attitude among the airlines."

Now on p. 13.
See comment 1.

On page 12, the sentence "MWAA does not verify….." Should read: "MWAA does not verify on a flight by flight basis whether flights by certain newer, relatively quiet aircraft comply with the nighttime noise standards."

See comment 1.

On page 13, the sentence that reads: "MWAA presumes that US Airways will abide…." Should be revised as follows: "MWAA presumes that US Airways will abide by those weight restrictions because of the it is a federal obligation as well as an MWAA obligation and because of the severe penalty that FAA could impose on the airline." Also, as stated, MWAA does receive data from USAirways to verify compliance.

On Page 14, the first paragraph should read:

See comment 1.

"According to an MWAA official, MWAA is able to verify whether USAirways aircraft are complying with the terms of a May 1999 agreement with MWAA. This agreement allows MWAA full and regular access to company records regarding aircraft takeoff and landing weights. ~~Regardless of which airline is operating the newer aircraft,~~ However, MWAA has not conducted spot checks of a USAirways aircraft to determine whether these aircraft are being operated either in accordance with the airline's certificate or in compliance with Reagan

See comment 1.

National's nighttime noise limits. If MWAA conducted such inspections, it would be able to determine ~~not only~~ whether USAirways was adhering to the conditions specified in its operating certificate and its records ~~but also whether its aircraft were in compliance with local noise restrictions~~. ~~However~~ According to an MWAA official, the agency has checked the records which show compliance, but has not yet begun checks on the actual ~~on these new~~ aircraft, which have been operating at Reagan National since October 1999."

See comment 1.

Also on page 14, second paragraph, the first sentence should state: "MWAA and airline officials believe that violations of the nighttime noise rule are few and will continue to decrease as airlines phase in a new generation of quiet aircraft."

See comment 1.

On page 18, Figure #4 is not an example of an MWAA report. Rather it is a figure that you prepared based on MWAA-supplied data.

In conclusion, thank you again for providing us with the opportunity to comment on the draft report. We take pride in the noise abatement program which exists at Ronald Reagan Washington National and believe that it strikes an appropriate balance between the need of the region to maintain access to the nation's air transportation system in an environmentally acceptable way. We have always strived to work with the entire region on addressing their needs and concerns regarding the operation of the airport and will continue to do so in the future.

Sincerely,

Jonathan Gaffney
Vice President
Office of Communications

JG:cr

The following are GAO's comments on the Metropolitan Washington Airport Authority's letter of May 25, 2000.

GAO's Comments

1. We have incorporated this change.

2. We disagree with the change suggested by MWAA. Airport rules—and not FAA's noise abatement procedures—oblige pilots to reduce engine power after reaching an altitude of 1,500 feet. FAA does not establish noise abatement operating procedures for individual airports, although it does offer advisory guidance. Accordingly, we did not make this suggested change to our report.

3. We agree that, technically, the perimeter rule was not originally established at Reagan National as a noise abatement provision, and because we discuss this in the body of the report, we made no change to the Results in Brief language.

4. We do not agree that the noise created by an aircraft is unconditionally related to whether or not it is capable of flying beyond the 1,250-mile perimeter at Reagan National. Many large newer aircraft (e.g., the Airbus A-320), which typically operate at weights exceeding those of some older smaller aircraft (e.g., the Boeing 727), can easily fly to and from destinations located beyond the perimeter. These newer aircraft are equipped with engines designed to emit less noise than some older aircraft, even though they are heavier. Accordingly, we did not modify the report in response to this comment.

5. Although we agree with MWAA that the major airlines have demonstrated a high degree of compliance with the airport's nighttime noise procedure, we do not agree that the major airlines have definitively complied in all cases. We believe that MWAA's proposed deletion of the word "generally" implies that the airlines have definitively complied.

Related GAO Products

Reagan National Airport: Capacity to Handle Additional Flights and Impact on Other Area Airports (GAO/RCED-99-234, Sept. 17, 1999).

Aircraft Noise at Memphis International Airport (GAO/RCED-97-37R, Dec. 17, 1996).

Transportation Noise: Federal Control and Abatement Responsibilities May Need to Be Revised (GAO/RCED-90-11, Oct. 12, 1989).

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

Aircraft Noise: Status and Management of FAA's West Coast Plan (GAO/RCED-89-84, May 8, 1989).

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

Airport Noise: FAA's Enforcement of Noise Rules at National Airport (GAO/RCED-88-117, Apr. 15, 1988).

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