United States General Accounting Office

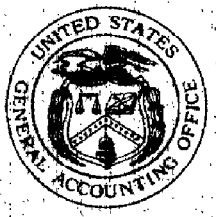
GAO

Report to the Chairman, Subcommittee on Aviation, Committee on Commerce, Science, and Transportation, U.S. Senate

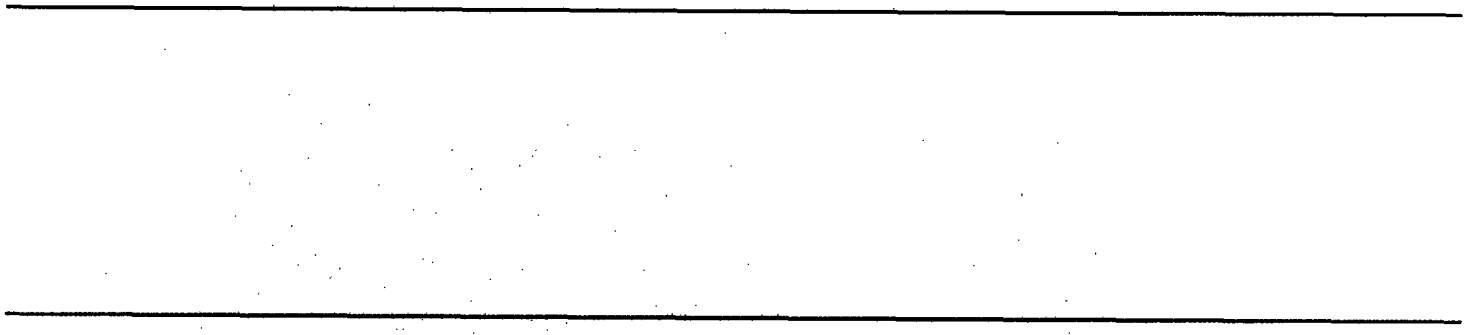
December 1993

AVIATION SAFETY

FAA Can Better Prepare General Aviation Pilots for Mountain Flying Risks



GAO/RCED-94-15



GAO

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

Resources, Community, and
Economic Development Division

B-254704

December 9, 1993

The Honorable Wendell H. Ford
Chairman, Subcommittee on Aviation
Committee on Commerce, Science,
and Transportation
United States Senate

Dear Mr. Chairman:

This report, prepared at your request, examines the Federal Aviation Administration's (FAA) oversight of general aviation safety in mountainous areas. We are making recommendations aimed at improving FAA's efforts to prepare general aviation pilots for the greater risks of flying in mountainous areas. In developing the analyses contained in this report, we received extensive assistance from the National Transportation Safety Board. As requested, this report also examines the legal and safety issues involved with the prohibition that Pitkin County, Colorado, established against general aviation night operations at Aspen Airport.

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 to the Secretary of Transportation; the Administrator, FAA; the Director, Office of Management and Budget; and other interested parties. We will also make copies available to others on request.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached on (202) 512-2834. Major contributors to this report are listed in appendix IV.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

In fiscal year 1992, 2,070 general aviation accidents resulted in 949 fatalities—over 85 percent of all aviation deaths. The Federal Aviation Administration (FAA) is responsible for promoting the safety of general aviation—civil aircraft operations not involving commercial activities, such as the transport of revenue-paying passengers. In performing this mission, FAA warns pilots that if they are not prepared, flying in mountainous areas can be hazardous. For example, in fiscal year 1992, approximately 33 percent (681) of all general aviation accidents occurred in the western continental United States, which is designated by FAA as a mountainous area.

Concerned about accidents in mountainous areas, the Chairman, Subcommittee on Aviation, Senate Committee on Commerce, Science, and Transportation, requested that GAO review FAA's oversight of general aviation safety in such areas. Specifically, GAO was asked to identify the (1) extent to which mountainous areas present higher risks than nonmountainous areas for general aviation and (2) actions that FAA is taking and should take to reduce the risks associated with mountain flying and the impact of those actions on general aviation. In addition, GAO was asked to examine the legal and safety issues involved with the prohibition imposed by Pitkin County, Colorado, on general aviation night operations at Aspen Airport.

Background

The Federal Aviation Act directs FAA to promote safety by reducing the possibility or recurrence of accidents. To fulfill this mission for general aviation, FAA requires that those seeking a pilot's license pass both a written and flight test. When initially certificated, pilots may only operate under FAA's visual flight rules—general rules that govern operations when a minimum level of visibility exists. FAA conducts seminars on such flight hazards as adverse weather and requires that every 2 years pilots pass a flight review conducted by an FAA-certified flight instructor. To operate under more stringent instrument flight rules, pilots must meet additional requirements and demonstrate an ability to fly aircraft using instruments only. Although FAA designates areas in the United States as mountainous, the agency has no regulations specifically governing general aviation operations in mountainous areas.

In 1989, the Aircraft Owners and Pilots Association filed a formal complaint with FAA challenging a prohibition imposed by Pitkin County on general aviation night operations at Aspen Airport. The association claimed that the curfew unjustly discriminated against general aviation

because the county allowed commercial carriers to use the airport at night. A 1992 FAA study concluded that restrictions on general aviation night operations at Aspen Airport were not necessary for safety. Citing its own safety analysis, however, Pitkin County has retained the curfew.

Results in Brief

In analyzing National Transportation Safety Board (NTSB) data, GAO found that the general aviation accident rate was (1) nearly 40 percent higher for western states designated by FAA as mountainous than the rate for all other continental states in fiscal year 1992 and (2) 155 percent higher for a group of selected mountain airports than for a group of nonmountain airports with similar levels of flight operations between fiscal years 1983 and 1992. Likewise, FAA and NTSB staff, pilots, and flight instructors emphasized to GAO that general aviation flying in mountainous areas and at mountain airports presents much higher accident risk than flying in nonmountainous areas. They stated that the risk is greater because higher altitudes decrease an aircraft's performance, weather conditions deteriorate with little warning, mountains limit pilots' maneuverability during takeoffs and landings, and the rugged terrain decreases the likelihood of conducting a safe emergency landing.

FAA alerts general aviation pilots about the hazards of flying in mountainous areas during the pilot certification process and at subsequent safety seminars. However, NTSB's reports on general aviation accidents in the western United States indicate that numerous fatal accidents occur each year because many pilots are not familiar with the risks of or lacked experience in mountain operations. FAA and NTSB staff as well as pilots and flight instructors suggested several actions that FAA could take to more effectively promote mountain flying safety. Many of the suggestions, such as issuing guidance that identifies special mountain airports with difficult operating conditions and recommends routes for takeoffs and landings at those airports, would impose little financial burden on the general aviation industry.

In part because of the challenges presented by mountain flying, some communities have restricted access to their airports at night. Pitkin County prohibits all general aviation night operations at Aspen Airport, which has led to a 4-year dispute between FAA and the community. GAO's analysis of general aviation accidents at Aspen Airport between fiscal years 1983 and 1992 and discussions with pilots as well as FAA and NTSB staff indicate—in contradiction to the conclusions of FAA's 1992 study—that night operations under visual flight rules at the airport would

be hazardous. GAO identified some options, such as allowing general aviation operations under instrument flight rules at night, that could form the basis for FAA and Pitkin County to develop a framework to resolve this difficult issue. (See ch. 4.)

Principal Findings

Mountain Flying Poses Greater Accident Risk to General Aviation Pilots

In fiscal year 1992, the general aviation accident rate in 11 western continental states designated by FAA as mountainous was 2.40 accidents per 100,000 operations (takeoffs or landings)—39 percent higher than the rate of 1.73 for the other 37 continental states. In addition, between fiscal years 1983 and 1992, the general aviation accident rate at five judgmentally selected airports located in high mountain terrain was 2.60 per 100,000 operations—155 percent higher than the rate of 1.02 for five judgmentally selected nonmountain airports with similar levels of operations.

Likewise, FAA and NTSB staff, pilots, and flight instructors told GAO that mountain flying presents a much greater accident risk than operations in nonmountainous areas. For example, FAA noted that engine output and propeller efficiency worsen at higher elevations, estimating that a small airplane requiring 1,000 feet for takeoff from a sea-level airport will require 2,000 feet from an airport located 5,000 feet above sea level. GAO's review of completed NTSB accident investigations found that mountain flying hazards caused or contributed to 176, or 32 percent, of the 558 fatal general aviation accidents that occurred in the 11 western states between fiscal years 1989 and 1992. These 176 accidents caused 363 fatalities—almost 11 percent of the 3,352 general aviation deaths that occurred in the United States during this period.

FAA Can Take Several Actions to Better Promote Mountain Flying Safety

Although FAA alerts pilots to mountain flying risks during the initial certification process and subsequent seminars, NTSB's accident investigators often have found that pilots involved in fatal general aviation accidents were not adequately familiar with the hazards of or lacked experience in mountain flying. Between October 1988 and September 1992, for example, NTSB staff cited the pilot's inadequate planning or lack of familiarity with flying in high mountain areas as causing or contributing to 103, or nearly 60 percent, of the 176 fatal mountain flying accidents that occurred in the 11 western states.

Emphasizing that the safety record in mountainous areas could be substantially improved, most of the FAA and NTSB staff, flight instructors, and pilots that GAO interviewed suggested several actions that FAA could take that would not impose a financial burden on the industry. For example, they stated that FAA could issue guidance identifying airports in mountainous areas that present unique challenges and recommending routes for approach and takeoff at those airports under visual flight rules. In addition, they suggested that FAA could encourage training by approving mountain flying courses and allowing pilots who complete such training to receive a "mountain endorsement" that can be used in lieu of the biennial flight review requirement.

Others noted that the written certification test does not include questions that highlight mountain flying risks and suggested that FAA develop such questions. GAO's review of all 915 potential test questions confirms that none refer to mountain flying and only 18, or less than 2 percent, could be considered to relate to flying in mountainous areas in some way (e.g., general questions on the aerodynamic effects of strong winds).

Recommendations

GAO recommends that the Secretary of Transportation direct the Administrator, FAA, to (1) issue guidance that identifies airports in mountainous areas that present unique challenges to pilots, describes those challenges, and recommends routes for approach and takeoff at those airports under visual flight rules; (2) provide incentives for pilots to obtain mountain flying training by approving courses that meet FAA's standards and issuing to pilots who obtain such training a "mountain endorsement" that can be used in lieu of meeting the biennial flight review requirement; and (3) modify the written test to include specific questions on the risks of mountain flying. GAO is making additional recommendations to promote general aviation safety in mountainous areas.

Agency Comments

GAO discussed its findings and recommendations with senior FAA officials, including FAA's Assistant Chief Counsel, Airports and Environmental Law Division; Manager, Operations Branch, General Aviation and Commercial Division; and Manager, Airport Safety and Operations Division. In general, these officials agreed with the information presented and concurred with our recommendations. However, these officials suggested several wording revisions, which GAO incorporated where appropriate. As requested, GAO did not obtain written comments on a draft of this report. GAO also provided NTSB's Chief, Regional Operations and General Aviation Division,

and Chief, Analysis and Data Division, and Pitkin County officials appropriate sections of a draft of this report. They generally agreed with the information presented, and GAO incorporated their views and suggested revisions where appropriate.

Contents

Appendixes

Tables

Figures

Abbreviations

AIP	Airport Improvement Program
AOPA	Aircraft Owners and Pilots Association
FAA	Federal Aviation Administration
GAO	General Accounting Office
IFR	instrument flight rules
NBAA	National Business Aircraft Association
NTSB	National Transportation Safety Board
VFR	visual flight rules

Introduction

The Federal Aviation Administration (FAA) is responsible for promoting the safety of general aviation, which constitutes the largest segment of the U.S. aviation industry in terms of the number of aircraft, departures, and landings. To fulfill this mission, FAA licenses pilots and issues regulations governing aircraft operations. In addition, FAA attempts to prevent accidents by conducting such nonregulatory activities as seminars for pilots on specific safety issues. The National Transportation Safety Board (NTSB) is responsible for investigating all general aviation accidents. Over the last decade, NTSB data indicate that the safety record for general aviation has improved. In part because it constitutes the largest segment of the U.S. aviation industry, general aviation accounted for over 90 percent of all aviation accidents in fiscal year 1992.

Overview of the General Aviation Industry

General aviation comprises all civil aircraft operations except those involving such commercial activities as the transport of revenue-paying passengers.[1] Flying a wide variety of aircraft including rotorcraft, single-engine propeller airplanes, and multi-engine jets, over 660,000 pilots engage in general aviation for such activities as personal and business transportation, recreational flying, and emergency rescues. As of December 1992, 269,518 of the 276,985 aircraft registered in the United States, or over 97 percent, were general aviation aircraft. The remaining 3 percent (7,467) are commercial aircraft. In addition, FAA estimates that general aviation aircraft flew more than 3 billion miles in 1992 and had over twice as many hours flown and five times as many departures as all U.S. commercial carriers combined. Finally, according to the Aircraft Owners and Pilots Association (AOPA), the general aviation industry contributes over $42 billion annually to the U.S. economy and employs 537,000 people in such areas as maintenance and flight training.

Over the last decade, the safety record for general aviation has improved. As table 1.1 indicates, the number of general aviation accidents, fatal accidents, fatalities, and serious injuries declined between fiscal years 1984 and 1992.[2] The number of general aviation accidents, for example, declined from 3,132 to 2,070, or approximately 34 percent, during this period.

[1]FAA regulations governing general aviation operations are contained in title 14 Code of Federal Regulations part 91. Regulations governing air carrier and air taxi operations for transporting revenue-paying passengers are contained in parts 121 and 135, respectively.

[2]In developing accident rates for this report, we used FAA's data on operations (takeoffs and landings) that are reported on a fiscal year basis. To be consistent, we are presenting the safety record data for general aviation by fiscal year.

Table 1.1: Total General Aviation Accidents, Fatal Accidents, Fatalities, and Serious Injuries, Fiscal Years 1984-92

Fiscal year	Total accidents	Fatal accidents	Total fatalities	Total serious injuries
1984	3,132	598	1,105	611
1985	2,827	514	965	530
1986	2,624	488	1,031	543
1987	2,504	451	831	462
1988	2,403	463	830	503
1989	2,296	470	834	438
1990	2,304	455	793	419
1991	2,192	446	776	425
1992	2,070	434	949	430

Note: Figures include data for the District of Columbia, Puerto Rico, and the U.S. territories.

Source: NTSB.

The extent to which these declines represent significant safety gains depends on the trend in general aviation activity over the last decade. FAA collects activity data in two ways: (1) each fiscal year, airport managers report the number of flight operations at their airport and (2) each calendar year, FAA surveys a statistical sample of general aviation aircraft owners to estimate the amount of hours flown. Both measures indicate that the level of general aviation activity has declined over the last decade. However, the rate of decline in the number of accidents has been greater.

Between fiscal years 1984 and 1992, the accident rate per 100,000 operations decreased from 2.88 to 2.05, or 29 percent. Likewise, FAA estimates that the accident rate per 100,000 flight hours decreased between calendar years 1983 and 1991 from 10.73 to 7.87, or almost 27 percent. According to FAA and industry officials, the safety record for general aviation improved over this period because of better aircraft technology, increased industry and FAA safety programs, and more effective pilot training. The 2,070 general aviation accidents in fiscal year 1992, however, accounted for 93 percent of the 2,218 aviation accidents in the United States. The 2,070 accidents resulted in 949, or nearly 87 percent, of the 1,093 aviation fatalities that occurred in fiscal year 1992.

FAA's Approach to General Aviation Safety

Under the Federal Aviation Act of 1958, FAA is responsible for promoting aviation safety by reducing the possibility or recurrence of accidents. FAA attempts to reduce the number of general aviation accidents by (1) certifying pilots to ensure a minimum level of proficiency, (2) issuing operating regulations, and (3) conducting safety seminars for pilots through its General Aviation Accident Prevention Program. In October 1992, FAA issued a strategic plan for general aviation safety in which it defined its mission as "providing the public with accident-free aircraft operations through the highest standards in the world."[3] In the plan, FAA noted that it will emphasize nonregulatory initiatives and develop a "partnership" approach through which it will develop closer ties with industry to address safety issues between fiscal years 1992 and 1997. FAA also noted that annual plans will be developed to implement the strategic plan.

Private Pilot Certification Process

To operate a general aviation aircraft, individuals obtain a private pilot certificate from FAA. To obtain a certificate, an individual must be at least 17 years of age and pass a (1) written test pertaining to general aviation operations, (2) flight test, and (3) medical exam. In addition, individuals training to obtain a private pilot certificate must first obtain a student license, practice under the supervision of an FAA-certified flight instructor, and receive an endorsement from the instructor prior to taking the flight test. After obtaining a certificate, pilots are required to pass a flight review conducted by an FAA-certified instructor every 2 years. FAA requires that a flight review entail a minimum of 1 hour of ground testing and 1 hour of flight testing but encourages instructors to provide additional instruction.

To be a flight instructor, private pilots must obtain a commercial certificate from FAA and meet additional requirements. Finally, pilots who also want to conduct nongeneral aviation activities—such as transporting revenue-paying passengers—must meet additional requirements. For example, to conduct air carrier operations under part 121 of the Code of Federal Regulations, a pilot must obtain an airline transport certificate from FAA. As of December 1992, over 660,000 pilots held FAA certificates—114,597 student, 288,078 private, 146,385 commercial, and 115,855 airline transport pilot certificates.

[3]General Aviation Action Plan, General Aviation and Commercial Division, Flight Standards Service, FAA, Oct. 1992.

FAA's Operating Rules

FAA's regulations governing general aviation operations consist of visual flight rules (VFR) and instrument flight rules (IFR). When initially certificated, private pilots may only operate under VFR. VFR governs operations in good weather conditions. In general, pilots may operate under VFR when visibility is 3 miles or more and cloud cover is 1,000 feet or higher above the surface. Pilots operate under IFR when visibility is less than 3 miles or cloud cover is less than 1,000 feet from the surface.[4] During a flight under IFR, pilots use onboard instruments instead of navigating visually. For both VFR and IFR flights, FAA regulations state that a pilot "is directly responsible for, and is the final authority as to, the operation of that aircraft."

FAA's requirements for IFR flights are much stricter than for VFR flights. To operate under IFR, for example, pilots must obtain a rating from FAA designating that they can aviate and navigate using aircraft instruments only. In addition, pilots flying under IFR must file a flight plan indicating the planned route, destination, and altitude. They must also operate an aircraft certified by FAA to fly under IFR. IFR-certified aircraft must contain such additional equipment as a two-way radio communications system and a direction and rate-of-turn indicator. Finally, pilots flying under IFR must maintain an altitude assigned by air traffic control personnel. As a result, pilots flying under IFR rely on air traffic control guidance more than pilots flying under VFR. As of December 1992, more than 306,000 pilots, including 56,199 private pilots, had an FAA rating allowing them to fly under IFR.

FAA's General Aviation Accident Prevention Program

In 1970, FAA created the General Aviation Accident Prevention Program to provide pilots with information on how to (1) prepare for such specific flight hazards as adverse weather and (2) operate an aircraft with greater proficiency. In general, Accident Prevention Program staff disseminate this information through nonmandatory, 1-day safety seminars throughout the United States. To complement these efforts, FAA, in 1977, established the Pilot Proficiency Award Program under the Accident Prevention Program to provide incentives to general aviation pilots to take additional training. In 1991, FAA amended its regulations so that a pilot's completing one or more phases of the program could be used in lieu of the biennial flight review requirement for that 2-year period. As of October 1993, the Accident Prevention Program employed 80 program managers as well as 10 regional and 7 headquarters staff.

[4]Exceptions to these general definitions exist. For example, under certain conditions, pilots may fly under VFR if the area is clear of clouds and visibility is greater than 1 mile.

Mountain Flying and FAA-Designated Mountainous Areas

During the pilot certification process, FAA identifies several potential flight hazards, such as flying in areas with high mountains—commonly referred to as mountain flying—or in airspace congested with traffic. FAA alerts pilots to the following:

> your first experience of flying over mountainous terrain (particularly if most of your flight time has been over the flatlands of the midwest) could be a never-to-be forgotten nightmare if proper planning is not done and if you are not aware of the potential hazards awaiting.[5]

To alert pilots to areas of the United States that may present these potential hazards, FAA has designated specific sections of the country as mountainous areas. (See fig. 1.1.) According to NTSB staff and FAA officials, 11 western states are the most representative of mountain flying conditions because of the extremely high mountain ranges in these states.[6] For example, 54 of the 82 mountain peaks (66 percent) over 14,000 feet above sea level in North America are located in the state of Colorado.

[5]Airman's Information Manual: Official Guide to Basic Flight Information and Air Traffic Control Procedures, FAA, May 1993.

[6]Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Figure 1.1: FAA-Designated Mountainous Areas

Source: FAA.

Objectives, Scope, and Methodology

The Chairman, Subcommittee on Aviation, Senate Committee on Commerce, Science, and Transportation, asked us to examine FAA's oversight of general aviation safety in mountainous areas. Specifically, our objectives were to identify the (1) extent to which general aviation flying in mountainous areas presents higher risks than flying in nonmountainous areas and (2) actions that FAA is taking and should take to reduce the risks associated with flying in mountainous areas and the impact of those actions on general aviation. In addition, we were asked to examine the legal and safety issues involved with the prohibition imposed by Pitkin County, Colorado, on all general aviation operations at night at Aspen Airport.

We conducted our work primarily at FAA's and NTSB's headquarters in Washington, D.C., and at FAA's offices and airports within FAA's Northwest Mountain Region.[7] In addition, we conducted work at NTSB's field office in Denver, Colorado. We reviewed (1) relevant legislation and regulations concerning FAA's oversight of general aviation safety and (2) FAA's information on general aviation flying in mountainous regions. We also viewed a 1991 AOPA video on flying in mountainous regions and attended a course on mountain flying conducted by the Colorado Pilots Association.

To determine the extent to which general aviation flying in mountainous areas presents higher risks than flying in nonmountainous areas, we interviewed FAA, NTSB, and industry officials, as well as airport managers, FAA-certified flight instructors, and general aviation pilots. In addition, we interviewed 15 of FAA's Accident Prevention Program staff—11 located in mountainous areas and 4 located in nonmountainous areas—as well as the managers of FAA's district offices in Denver, Colorado, and Scottsdale, Arizona. We also reviewed relevant FAA and industry literature on general aviation operations in mountainous regions. Finally, we conducted numerous analyses using NTSB's data on general aviation accidents to compare the number of accidents that occurred in mountainous areas with the number that occurred in nonmountainous areas. In conducting these analyses, we received extensive assistance from NTSB's Chief, Analysis and Data Division.

For example, we compared general aviation accident data for the 11 western continental states that are designated by FAA as mountainous with

[7]This region includes Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming.

data for the other 37 states in the continental United States.[8] To compare the frequency of accidents in the western states with that in the rest of the continental United States, we calculated the number of accidents per 100,000 operations as well as per 100,000 hours flown. We also reviewed all completed NTSB accident investigation reports for fatal general aviation accidents that occurred in the 11 western states between fiscal years 1989 and 1992 to document the extent to which factors related to mountain flying caused or contributed to the accidents.[9]

In addition, we compared general aviation accident rates between fiscal years 1983 and 1992 at 10 airports located in mountainous areas with accident rates at 10 airports that have similar levels of flight activity but are located in nonmountainous areas. For example, we compared the general aviation accident rate at the airport in Hailey, Idaho, with the general aviation accident rate at the airport in Hutchinson, Kansas. We selected the 10 airports in mountainous areas because they (1) are identified as mountain airports for scheduled carriers by FAA Advisory Circular 121.445-1D and (2) provide a general geographic distribution of airport operations in western, mountainous areas. We selected the 10 nonmountain airports because they had similar numbers of annual general aviation and total operations as the 10 mountain airports between fiscal years 1983 and 1992. We selected the 20 airports before obtaining their accident histories from NTSB.

Because FAA officials noted that data on general aviation operations collected at airports with a control tower (towered airports) are actual counts, while similar data for airports without a control tower (nontowered airports) are estimates by airport managers, we analyzed information for both towered and nontowered airports. Thus, we compared accident rates for (1) five towered airports in mountainous regions with rates for five towered airports in nonmountainous regions and (2) five nontowered airports in mountainous regions with rates for five nontowered airports in nonmountainous regions. To calculate these rates, we followed FAA's and NTSB's suggestions that we count only accidents that occurred within 15 miles of an airport that was the destination or departure point of the flight. According to FAA and NTSB officials, the environment and terrain up to 15 miles from an airport can affect operations to and from an airport. (App. I provides additional

[8]We primarily focused on the 11 western continental states because they are the most representative of mountain flying conditions, according to FAA and NTSB officials. As requested by the Chairman's office, we have included data for Alaska and Hawaii in our report.

[9]Because of the extensive nature of these reports, we limited our review to completed NTSB investigations of fatal accidents.

information on our methodology, airport selection criteria, and data limitations).

To determine the actions that FAA is taking and should take to reduce the risks associated with mountain flying, we interviewed FAA and NTSB headquarters and regional officials as well as representatives from three major general aviation industry associations—AOPA, the National Business Aircraft Association (NBAA), and the General Aviation Manufacturers Association. We also interviewed 15 of FAA's Accident Prevention Program staff to document FAA's safety efforts and identify needed improvements. We also visited the airports located in Aspen, Colorado; Flagstaff, Arizona; and Hailey, Idaho, to observe their operating conditions and obtain the views of airport managers, certified flight instructors, and local pilots on FAA's safety efforts. We visited these airports because FAA and NTSB staff stated that they were representative of mountain airport operations and they provided a geographic distribution of airports in the west. To supplement the information obtained during these visits, we interviewed (1) managers for five additional airports located in mountainous regions, (2) a representative from the National Association of State Aviation Officials, and (3) the directors of state aeronautics divisions in Arizona, Colorado, and Idaho. Finally, we obtained comments from representatives of AOPA, NBAA, and the General Aviation Manufacturers Association as well as FAA officials to determine the potential economic impact of the actions that we are recommending to FAA.

Finally, to examine the legal and safety issues involved with the prohibition imposed by Pitkin County, Colorado, on general aviation operations at night, we reviewed relevant legislation and FAA policies as well as airport sponsors' assurances and previous federal court decisions concerning airport access issues. In addition, we obtained the views of FAA and Pitkin County officials and examined NTSB's reports on all general aviation accidents occurring within 15 miles of Aspen Airport between fiscal years 1983 and 1992. We also flew into and out of Aspen Airport in a general aviation aircraft and viewed a film on the safety of night operations under VFR at Aspen Airport prepared by Pitkin County. Finally, we obtained the views of pilots, the Accident Prevention Program's staff, NTSB officials, and AOPA and NBAA representatives concerning the safety of night operations at Aspen Airport. As requested by the Chairman's office, we also evaluated two studies—one commissioned by Pitkin County and the other done by FAA—that analyzed the risks involved with night general

aviation operations at Aspen Airport. (App. II provides our observations on both studies.)[10]

We discussed our findings and recommendations with senior FAA officials, including FAA's Assistant Chief Counsel, Airports and Environmental Law Division; Manager, Operations Branch, General Aviation and Commercial Division; and Manager, Airport Safety and Operations Division. These officials generally agreed with the information presented and concurred with our recommendations. However, these officials suggested several wording revisions, which we incorporated where appropriate. (In addition, we have summarized FAA's comments on our recommendations at the end of ch. 3.) As requested, we did not obtain written comments from the Department of Transportation on a draft of this report.

We also provided NTSB's Chief, Regional Operations and General Aviation Division, and Chief, Analysis and Data Division, as well as Pitkin County officials appropriate sections of a draft of this report. They generally agreed with the information presented but suggested several wording revisions, which we incorporated where appropriate. Pitkin County officials also provided additional information on their views. We incorporated this information where appropriate. We conducted our work from February through October 1993 in accordance with generally accepted government auditing standards.

[10]Night Operations Under Visual Flight Rules (VFR) at Aspen-Pitkin County Airport, Aspen, Colorado, FAA, Nov. 1992; and Accident Rate Analysis: Night VFR Safety Study Report, Gellman Research Associates, Sept. 1991.

Greater Risks Inherent in General Aviation Operations in Mountainous Areas

Flying in mountainous areas involves a much greater accident risk than flying in nonmountainous areas. FAA and NTSB staff members, pilots, flight instructors, and airport managers that we interviewed stated that mountain flying presents pilots with significant challenges, such as the negative effect of high altitude on aircraft performance, that could result in accidents if pilots have not adequately prepared for them. Our analysis confirms that flying in mountainous areas constitutes a much greater accident risk. For example, the accident rate was (1) nearly 40 percent higher in 11 western mountain states than in the other 37 continental states; (2) 155 percent higher for a selected group of mountain airports with control towers than a selected group of towered, nonmountain airports with similar levels of annual operations; and (3) 150 percent higher for a selected group of nonmountain airports without control towers than a selected group of nontowered, nonmountain airports with similar levels of annual operations.

FAA, NTSB, and Pilots Highlight Special Nature of Mountain Operations

FAA and NTSB staff members, pilots, flight instructors, and airport managers that we interviewed stated that general aviation flying in high-elevation, mountainous areas presents much greater risks than operations in low-elevation, nonmountainous areas. Although they noted that some of these hazards can be encountered in nonmountainous areas, the individuals we interviewed noted—and FAA and industry literature emphasizes—that these hazards are common to a mountain environment and cause mountain flying to entail much greater accident risks. FAA and industry literature as well as the individuals with whom we met identified six hazards that mountain flying presents to general aviation pilots.

First, an aircraft's performance decreases in the high-mountainous environment. Air density is lower at higher elevations, resulting in a reduction in engine output and propeller efficiency. Propellers, for example, do not obtain as much thrust in less-dense air. As a consequence, an aircraft's takeoff and landing performance as well as rate of climb are negatively affected. FAA estimates, for example, that an average small airplane requiring 1,000 feet for takeoff from a sea-level airport under standard atmospheric conditions will require 2,000 feet from an airport located 5,000 feet above sea level.[1] It also notes that the effect of decreasing air density on an aircraft's performance—commonly measured in units of "density altitude"—is exacerbated as the temperature increases.

[1]Tips on Mountain Flying, General Aviation Accident Prevention Program, FAA, 1984.

Second, mountain flying presents pilots with the risk of severe, unexpected weather changes. Although adverse weather changes can occur throughout the United States, those we interviewed emphasized that weather in mountainous areas can change rapidly, surrounding a pilot without warning. In the summer, the rapid development of afternoon thunderstorms is common because of the combination of daily heating and unique air circulation caused by mountains. In the winter, snow showers often develop with little notice. Noting that mountain weather is composed of thousands of rapidly changing "microscale" systems, pilots Margaret Lamb and Susan Baker, who have conducted several studies on mountain flying accidents, concluded that such changing conditions "might be at the root of many mountain crashes."[2]

Third, high winds are typical in mountainous areas. As strong winds flow over mountainous terrain, severe upward ("updraft") and downward ("downdraft") surges of air are often created. In Tips on Mountain Flying, FAA estimates that mountain downdrafts can reach an "unbelievable velocity" of thousands of feet per second. The influence of terrain can also cause wind to repeatedly rise and fall for as much as 100 miles behind a mountain range ("mountain wave").

Fourth, rapidly rising terrain near airports in mountainous regions limits a pilot's ability to maneuver during takeoffs and landings. At Aspen Airport in Pitkin County, Colorado, for example, the terrain rises 780 feet within one-half mile of the runway. Because of such risks, the Colorado Pilots Association recommends that pilots not attempt night operations at such airports, noting that "departures and approaches to mountain airports are very demanding and hazardous."[3]

Fifth, the combination of rapidly rising terrain and high density altitude can also create dangerous conditions in which the terrain rises at a greater rate than an aircraft can climb. As a result, pilots can become trapped in canyons and mountain passes—a phenomenon known as box canyon.

Sixth, emergency landings due to such factors as engine failure involve much greater risks in mountainous areas because flat, level fields needed for safe landings are practically nonexistent. One accident investigator in NTSB's Denver Field Office noted, for example, that such factors as high density altitude and downdrafts commonly associated with mountain flying often cause general aviation accidents. He emphasized, however,

[2]Margaret W. Lamb and Susan P. Baker, "Mountain Flying and Weather," AOPA Pilot, July 1989.

[3]Colorado Mountain Flying Course, Colorado Pilots Association, 1991.

that the rugged, high-elevation terrain in mountainous areas often make such accidents fatal.

Our analysis of NTSB's data on all general aviation accidents occurring from October 1983 through September 1992 found that factors associated with mountain flying caused or contributed to 1,879 of the 22,352 general aviation accidents (over 8 percent). (See app. I for a listing of the accident causes identified by NTSB that are included in this analysis.) In addition, 654, or 15 percent, of the 4,319 fatal general aviation accidents that occurred in the United States involved factors associated with mountain flying. These 654 fatal accidents resulted in 1,420, or approximately 18 percent, of the 8,114 general aviation fatalities that occurred during this period.

In acknowledging that general aviation operations in mountainous areas present significantly greater risks than in nonmountainous areas, the individuals we interviewed emphasized that those risks can be greatly reduced if a pilot is familiar with them and takes such steps as attending a mountain flying training course to prepare for them. Moreover, one pilot, in his book on mountain flying, emphasized that

> Fear has no place in mountain flying; however, as all veteran mountain pilots will affirm, constant vigilance must be maintained. There is no reason to be afraid of flying in the mountains, that is, if you are aware of some of the dangers that might exist and know how to minimize or avoid them.[4]

Accident Rates in Western Mountainous States Higher Than in Other Continental States

General aviation accidents occur more frequently in the 11 western mountain states than in the other 37 continental states. (See table 2.1). In fiscal year 1992, for example, the 11 western states had an overall general aviation accident rate of 2.40 accidents per 100,000 operations—39 percent higher that the rate of 1.73 for the other 37 continental states. In addition, Alaska and Hawaii—both designated mountainous states—have had general aviation accident rates above the other 37 continental states for the last 4 fiscal years.

[4]Sparky Jim Imeson, Mountain Flying, Airguide Publications, 1982.

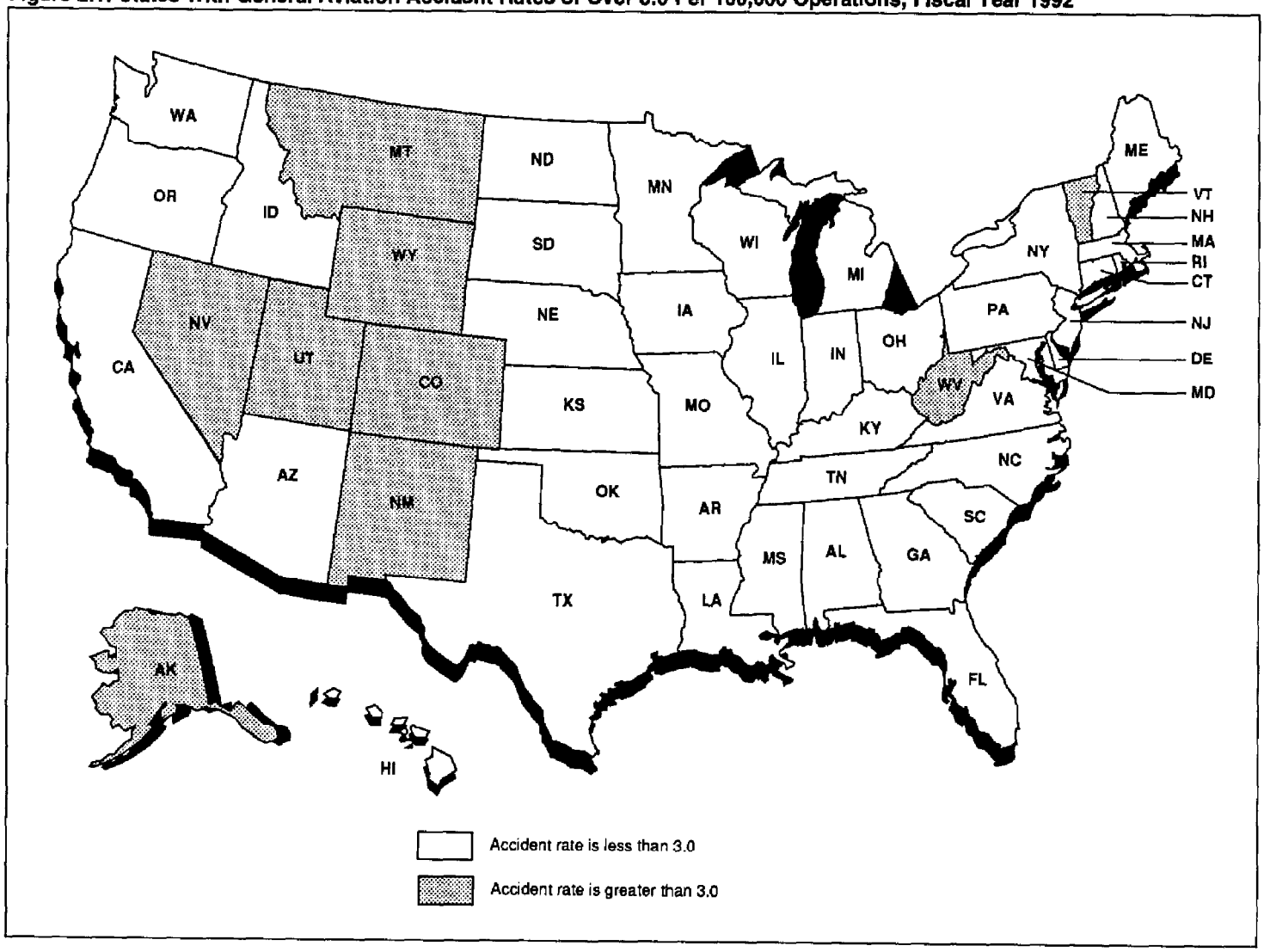
Table 2.1: General Aviation Accident Rates Per 100,000 Operations by Selected Categories, Fiscal Years 1989-92

	Fiscal year			
States	**1989**	**1990**	**1991**	**1992**
11 western mountain	2.59	2.50	2.52	2.40
37 other continental	1.84	1.85	1.77	1.73
Alaska	10.78	11.12	9.49	10.41
Hawaii	2.26	2.51	3.08	2.19

Source: GAO's analysis of NTSB's and FAA's data.

Figure 2.1 identifies the states that had the highest accident rates in fiscal year 1992. All nine states with rates of over 3 accidents per 100,000 operations—Alaska, Colorado, Montana, Nevada, New Mexico, Utah, Vermont, West Virginia, and Wyoming—contain areas designated as mountainous by FAA. According to NTSB officials, 3 or more accidents per 100,000 operations is a "very high" rate.

Figure 2.1: States With General Aviation Accident Rates of Over 3.0 Per 100,000 Operations, Fiscal Year 1992



Source: GAO's analysis of NTSB's and FAA's data.

Higher accident rates in the 11 western mountain states and Alaska are also demonstrated by using the number of general aviation flight hours rather than the number of operations as the measure of activity. As stated in chapter 1, FAA surveys aircraft owners to estimate the amount of hours flown by pilots each calendar year. In 1990, FAA found that its survey procedures were causing it to overestimate general aviation flight hours by

approximately 8 percent. As a result, FAA revised its procedures for estimating 1991 and 1992 general aviation flight hours. Accident rates developed using FAA's estimate of general aviation flight hours for these 2 calendar years produce results similar to those obtained using FAA's data on fiscal year general aviation operations. In calendar year 1992, for example, the rate for the 11 western states was 9.29 accidents per 100,000 flight hours—35 percent higher than the rate of 6.89 accidents per 100,000 flight hours for the other 37 continental states. In addition, Alaska's rate was among the highest of all states in both years.

Our review of completed NTSB accident investigation reports for 558 fatal general aviation accidents that occurred in the 11 western mountainous states between fiscal years 1989 and 1992 showed that 176, or about 32 percent, involved mountain flying.[5] These 176 accidents resulted in 363 fatalities (175 pilots and 188 passengers)—almost 11 percent of the 3,352 general aviation fatalities that occurred in the United States during this period. The following are examples of fatal mountain flying accidents in these states:

- In May 1992, a pilot and three passengers were killed in Montana after crashing into mountains 7,500 feet above sea level. NTSB determined that the accident occurred, in part, because the pilot had "no previous flight experience within the state of Montana nor any documented mountain flight experience."
- In November 1990, a pilot and three passengers departed from Aspen Airport in Colorado but crashed into a mountain one-quarter mile from the airport. All on board were killed. NTSB found that the pilot had not adequately prepared for the increased risks caused by the combination of high density altitude conditions and the rapidly rising terrain near the airport.
- In August 1989, a certified flight instructor and his student pilot crashed into high mountains in California. The student pilot was killed and the instructor was seriously injured. NTSB found that the instructor failed to adequately supervise the flight and ensure that the student could clear the high mountainous terrain.
- In October 1988, a commercial pilot flying a general aviation aircraft attempted to fly his family across the Rocky Mountains from Pueblo, Colorado, to Salt Lake City, Utah. The pilot encountered strong downdrafts over the Rockies and crashed into a mountain at

[5]Between fiscal years 1989 and 1992, 588 fatal general aviation accidents occurred in the 11 western states. As of September 1993, NTSB had completed its investigation of 558 of these accidents.

approximately 11,200 feet. Three family members were killed in the accident; the pilot and another passenger suffered serious injuries.

Accident Rates at Selected Mountain Airports Higher Than Those at Selected Nonmountain Airports

General aviation accidents occur more frequently within 15 miles of airports located in mountainous terrain than within 15 miles of airports with similar numbers of annual general aviation operations located in nonmountainous terrain. Between fiscal years 1983 and 1992, the general aviation accident rate for a group of five mountain airports with control towers was 155 percent higher than the rate for a group of five towered, nonmountain airports with similar levels of activity. Likewise, the general aviation accident rate for five mountain airports without control towers was 150 percent higher than for a group of five nontowered nonmountain airports with similar levels of activity. In addition, our analysis indicates that weather, the season of the year, and the pilot's lack of familiarity with the airport are key risk factors contributing to the higher accident rates at or near mountain airports.

Comparison of Towered Airports

As table 2.2 indicates, general aviation accidents occurred more frequently at or near five selected towered mountain airports than at or near five towered nonmountain airports with similar levels of activity. Between fiscal years 1983 and 1992, 54 general aviation accidents occurred within 15 miles of the five towered mountain airports out of 2,079,726 operations—resulting in a rate of 2.60 accidents per 100,000 operations. As a matter of comparison, during this period, 21 general aviation accidents occurred within 15 miles of the five towered nonmountain airports out of 2,053,382 operations—resulting in a rate of 1.02 accidents per 100,000 operations. Thus, the mountain rate of 2.60 was 155 percent higher than the nonmountain rate of 1.02.

Table 2.2: Comparison of General Aviation Accident Rates for Five Mountain and Five Nonmountain Airports With Control Towers, Fiscal Years 1983-92

Mountain airport	Accidents per 100,000 operations	Nonmountain airport	Accidents per 100,000 operations
Flagstaff, Ariz.	4.88	Martha's Vineyard, Mass.	0.53
Aspen, Colo.	4.10	Florence City, S.C.	2.22
Missoula, Mont.	1.98	Mansfield, Ohio	1.21
Klamath Falls, Oreg.	1.79	Sioux City, Iowa	.75
Hailey, Idaho	.99	Hutchinson, Kans.	.72
Overall	2.60	Overall	1.02

Source: GAO's analysis of NTSB's and FAA's data.

Comparison of Nontowered Airports

As table 2.3 indicates, general aviation accidents also occurred more frequently at or near five nontowered mountain airports than at or near five nontowered nonmountain airports with similar levels of activity. Between fiscal years 1983 and 1992, 25 general aviation accidents occurred within 15 miles of the five nontowered mountain airports out of 825,242 operations—resulting in a rate of 3.02 accidents per 100,000 operations. As a matter of comparison, during this period, 11 general aviation accidents occurred within 15 miles of five nontowered nonmountain airports out of 906,742 operations—resulting in a rate of 1.21 accidents per 100,000 operations. Thus, the mountain rate of 3.02 was 150 percent higher than the nonmountain rate of 1.21.

Table 2.3: Comparison of General Aviation Accident Rates for Five Mountain and Five Nonmountain Airports Without Control Towers, Fiscal Years 1983-92

Mountain airport	Accidents per 100,000 operations	Nonmountain airport	Accidents per 100,000 operations
Telluride, Colo.	13.71	Brownwood, Tex.	2.79
Ketchikan, Alaska	6.43	Houghton County, Mich.	2.46
Eagle County, Colo.	2.84	Devil's Lake, N.D.	1.86
Jackson Hole, Wyo.	2.48	Marshfield, Wis.	.50
Cody, Wyo.	1.01	Mason City, Iowa	.32
Overall	3.02	Overall	1.21

Note: The airport in Telluride, Colorado, opened in December 1985. Thus, the rate for Telluride is for fiscal years 1986 through 1992 only. The rate for its comparison airport—Brownwood, Texas—is for fiscal years 1983 through 1992. Between fiscal years 1986 and 1992, Brownwood had a rate of 1.52 accidents per 100,000 operations.

Source: GAO's analysis of NTSB's and FAA's data.

Key Factors Result in Increased Risks at Mountain Airports

Risks associated with mountain flying contributed to higher accident rates at/near mountain airports. For example, NTSB investigators determined that mountain flying factors caused or contributed to 28, or 52 percent, of the 54 accidents occurring at the five towered mountain airports and 14, or 56 percent, of the 25 accidents at the five nontowered mountain airports. Our analysis of the accidents occurring within 15 miles of mountain airports—and comparison of those accidents with the nonmountain accidents—indicates that weather, the season of the year, and the pilot's home state are key risk factors contributing to the higher accident rates at mountain airports. For example, weather-related factors caused or contributed to 46 percent of the towered mountain airport accidents but only 24 percent of the towered nonmountain airport accidents. Likewise, weather-related factors caused or contributed to 60 percent of the nontowered mountain airport accidents but only 45 percent of the nontowered nonmountain airport accidents. In addition, nearly 25 percent of the accidents at the nontowered mountain airports involved a pilot from a nonmountainous state.

Conclusions

Mountain flying presents general aviation pilots with much greater accident risks than flying in nonmountainous areas. The higher risks result from the (1) effect of higher elevations on an aircraft's performance, (2) weather-related factors associated with a mountainous environment, and (3) obstacles that mountains present to general aviation takeoffs, flights, and landings. Pilots can reduce this risk, however, by familiarizing themselves with mountain flying hazards prior to flying into mountainous areas and taking such steps as attending a mountain flying training course to prepare for them.

FAA Can Take Several Actions to Better Promote Safety in Mountainous Areas

FAA alerts general aviation pilots to the increased risks of mountain flying during the pilot certification process and at subsequent safety seminars. Numerous fatal general aviation accidents occur each year, however, because pilots do not understand the hazards of or lack experience in operations in mountainous areas. Emphasizing that the general aviation safety record in mountainous areas could be substantially improved, FAA and NTSB staff as well as pilots, certified flight instructors, and airport managers in mountainous areas suggested several actions that FAA could take to more effectively promote mountain flying safety. For example, they suggested that FAA could issue guidance identifying airports in mountainous areas that present unique challenges to general aviation pilots and recommending various VFR routes for approach to and departure from those airports. According to industry officials, these suggestions would not impose a financial burden on general aviation but may increase safety.

FAA Has Taken Some Actions to Promote General Aviation Safety in Mountainous Areas

FAA's efforts to promote mountain flying safety for general aviation consist of a general requirement that all pilots be familiar with all relevant information prior to a flight and general warnings to pilots concerning the risks of mountain flying. FAA advises pilots of the mountain flying hazards during the pilot certification process and at subsequent Accident Prevention Program seminars.

Although FAA's regulations do not specifically address mountain flying, they require pilots to review all available information prior to a flight, including information "relating to aircraft performance under expected values of airport elevation." According to FAA's Manager and Assistant Manager of the General Aviation and Commercial Division as well as the Managers of the Operations and Certification Branches within that division, sufficient information on mountain flying exists to allow pilots to prepare for flights in mountainous areas.

FAA also alerts pilots to the greater risks of mountain flying during the private pilot certification process. In its Airman's Information Manual, FAA advises pilots that they must be aware of the potential hazards of mountain flying and plan for them accordingly. FAA's advice includes such statements as "don't fly near or above abrupt changes in terrain" and "VFR flight operations may be conducted at night in mountainous terrain with the application of sound judgement and common sense." FAA also provides pilots with such general recommendations as to plan flight routes "over populated areas and well known mountain passes."

Finally, FAA's Accident Prevention Program staff in the western mountainous states conduct seminars each year on mountain flying risks. FAA's Accident Prevention Program Manager in the state of Washington, for example, told us that he conducts approximately five seminars a year on mountain flying. During these seminars, program managers generally utilize two FAA publications: Tips on Mountain Flying and High Mountain Flying in Ski Country U.S.A. Both publications contain general information that highlights the potential hazards of flying in mountainous areas.

Additional FAA efforts to promote mountain flying safety have been limited to some extent by legal constraints. In 1991, for example, FAA's district office in Denver began sending information to pilots in such nonmountainous states as Iowa and Nebraska to promote the Colorado Pilots Association's training course on mountain flying. FAA subsidized the printing and distribution of the information but did not provide funds for the course. FAA officials could not estimate the amount of funds spent on these activities. As a result of FAA's assistance, each training course provided in these states had a high attendance rate, according to Colorado Pilots Association officials. FAA's Denver staff stated that FAA's headquarters officials notified them in mid-1992 that such assistance may be in violation of federal regulations governing the interaction of agencies with private organizations and use of government mailing privileges. As a result, FAA discontinued this effort. According to Colorado Pilots Association officials, course attendance in nonmountainous states has declined from approximately 35 to 7 pilots per course since FAA withdrew its assistance. They noted that this decline may cause them to terminate the course in nonmountainous states.

Pilots in Fatal Accidents Often Not Prepared for Mountain Flying Risks

Despite FAA's general warnings, many general aviation pilots involved in fatal accidents in the western United States were not adequately prepared for the challenges of mountain flying. According to FAA and NTSB staff as well as Colorado Pilots Association and AOPA officials, numerous fatal mountain flying accidents occur each year because pilots lack experience in mountain operations or are unaware of the dramatic differences between flying in mountainous and flatland areas. Our review of fatal accidents that occurred in the 11 western mountainous states between October 1988 and September 1992 confirms their views.

In March 1991, NTSB's Denver field office wrote to NTSB's headquarters expressing concern about the number of mountain flying accidents and why those accidents had occurred. The regional staff noted that, between

July 1982 and March 1991 at least 23 accidents in the mountains of Colorado, Montana, New Mexico, and Utah involving 28 fatalities and 17 serious injuries resulted because the pilots had little or no experience in mountain flying. Noting that (1) these accidents were "a tip of the iceberg" and (2) the number of accidents in mountainous areas could be significantly reduced if pilots had a better understanding of and experience in mountain flying, the staff proposed that NTSB make several recommendations to FAA, including amending the written pilot certification test to include comprehensive questions on mountain flying. Citing a lack of statistical evidence indicating a broader problem, NTSB's headquarters did not act on the proposal. In March 1993, the Denver office revised its proposal by calling for a special NTSB study of mountain flying accidents. The office noted that, since the 1991 proposal, 10 accidents had occurred in the mountains of Colorado in which the pilot lacked mountain flying experience.[1]

Industry organizations, such as AOPA and the Colorado Pilots Association, also acknowledge that many accidents could be prevented if pilots were more aware of the risks of mountain flying. In its 1991 film on mountain flying, for example, AOPA notes that many mountain flying accidents "could have been prevented through proper education and flight training."[2] Likewise, the Colorado Pilots Association notes in its training materials for pilots that

> Several times every year, we have airplane crashes in the mountains of Colorado. These accidents happen to both Colorado pilots as well as visitors from out-of-state. It is easy to generalize, not always correctly, why these accidents occur, but one thing is clear; many pilots are not properly trained to fly in high density altitude conditions in mountainous terrain . . . . Every pilot who flies in mountainous terrain should receive some type of training before a flight in those areas, especially if passengers are being carried.

Our analysis confirms these views. In the 176 fatal mountain flying accidents that occurred in 11 western states between fiscal years 1989 and 1992, NTSB investigators specifically cited the pilot's lack of familiarity with or inadequate planning/preparation for mountain flying as causing or contributing to 103, or almost 60 percent, of those accidents. In commenting on our analysis, FAA officials noted that, had we included several other factors that they consider to be indicative of a lack of planning for mountain operations, such as the failure to obtain a preflight

[1]NTSB's headquarters officials—noting that we started a review of FAA's oversight of mountain flying safety—decided to assist us rather than initiate a duplicative study.

[2]Mountain Flying, AOPA Air Safety Foundation and Jeppesen Sanderson, Inc., 1991.

weather briefing, the percentage of mountain flying accidents in which the pilot did not adequately prepare would have been as much as 75 percent.

FAA and NTSB Staff and Pilots Suggest Actions to Improve Mountain Flying Safety

Nearly everyone we interviewed—FAA and NTSB staff, pilots, flight instructors, and airport managers—suggested several actions that FAA could take to better assist general aviation pilots in preparing for the risks of mountain flying. These suggestions included (1) issuing guidance that identifies airports in mountainous areas that present unique challenges to pilots and suggests various VFR routes for approach to and departure from those airports and (2) developing incentives to encourage pilots to obtain voluntary mountain flying training. In addition, several individuals recommended that FAA have its Accident Prevention Program's staff from mountainous states conduct seminars on mountain flying at key times each year for pilots from nonmountainous states. Others suggested that FAA modify the written pilot certification test to include specific questions that highlight the risks of mountain flying for pilots located in or near FAA's designated mountainous areas. Our review of these four suggestions and discussions about them with 15 FAA Accident Prevention Program staff indicate that these suggestions are feasible and would increase mountain flying safety.

Recommended VFR Routes at and Around Mountain Airports

Several FAA and NTSB staff, certified flight instructors, pilots, and airport managers noted that numerous airports in mountainous areas present unique challenges to pilots. They emphasized that high mountains make operating around, into, and out of these airports extremely difficult for pilots not familiar with them and stated that current guidance on VFR operations at these airports is too general to assist in takeoffs and landings. They noted that certain arrival and departure routes at these airports are safer than others. To prevent pilots unfamiliar with these airports from taking less-safe routes, these individuals suggested that FAA develop guidance on such airports that recommends several preferred departure and arrival routes under VFR. They mentioned that FAA (1) previously had "recommended mountain VFR routes" and (2) publishes approach and departure routes at most airports for IFR flights.

During the 1970s, FAA's regional offices recommended VFR routes in mountainous areas. In August 1977, for example, FAA's Rocky Mountain Region issued recommended VFR departure and arrival routes for Aspen Airport using both a video presentation and maps. In its press release announcing the recommended routes, FAA noted that

it is expected that thousands of private pilots flying into this mountain resort for the winter ski season will see on film the departure routes that will get them safely home through the 14,000-foot mountains surrounding the single runway . . . . Experience has shown that unless the pilot has visual familiarity with these routes, he can, and frequently does, take a wrong turn up an inviting mountain pass, only to find a rock wall thousands of feet above the aircraft's maximum climb capability . . . the most common factors contributing to these accidents were pilot unfamiliarity with the terrain and the recommended departure routes, and the [e]ffect of high altitude on the performance of his aircraft.

After several accidents in the Sierra Nevada Mountain Range in California, FAA's Western Region, in January 1979, also issued a recommended VFR route through that range's high mountain passes. Two pilots sued FAA, however, after crashing when using the recommended route. They claimed that FAA was negligent because, among other things, the chart on which the route was depicted was inaccurate and misleading. In Medley v. United States, a U.S. District Court concluded that FAA has a duty to use "due care" in producing a chart with recommended routes.[3] In that case, FAA (1) lost its original drawings of two recommended routes, which resulted in only one of the two routes being included on the published chart, (2) recommended only one route—one that led pilots near other, more dangerous passes—without warning of any potential hazards, (3) inaccurately placed on the chart the routing symbols for the recommended route, (4) did not review the proposed chart to ensure the route's accuracy prior to publication, and (5) failed to promptly warn pilots of the erroneous route or remove the chart from publication.

According to FAA's Manager, Airspace Rules and Aeronautical Information Division, FAA stopped recommending VFR routes as a result of this case. At hearings in December 1991, however, the Subcommittee on Aviation, House Committee on Public Works and Transportation, identified the need for recommended VFR routes in complex airspace around such high-use commercial airports as Los Angeles International Airport. As a result, in 1992, the Congress directed FAA to publish such recommended routes for general aviation pilots where the agency determines that the publication of such routes would improve safety.[4] Citing this precedent, several FAA and NTSB staff as well as one industry official suggested that FAA develop recommended routes for mountain airports. An internal 1992 FAA Northwest Mountain Region study recommended that FAA's headquarters

[3]Medley v. United States, 543 F. Supp. 1211 (N.D. Cal. 1982). FAA had argued unsuccessfully that making the chart was a discretionary function, the conduct of which is not subject to tort liability under the Federal Tort Claims Act.

[4]Airport and Airway Safety, Capacity, Noise Improvement, and Intermodal Transportation Act of 1992, P.L. 102-581, sec. 125.

examine the possibility of "establishing and depicting on aeronautical charts . . . selected VFR routes into and around prescribed mountainous airports." According to FAA officials, the agency did not implement this recommendation because of the risk of lawsuits similar to the Medley case.

Nevertheless, citing an October 1992 accident near Aspen Airport in which a pilot was killed and her two passengers injured as a result of the pilot's erroneous turn toward high terrain during departure, FAA's Accident Prevention Program Manager in Colorado and an accident investigator from NTSB's Denver Field Office have begun to develop suggested VFR departure routes for Aspen Airport. Likewise, 13 of the 15 Accident Prevention Program staff we interviewed told us that FAA could prevent accidents by recommending VFR routes at and around mountain airports and supported the suggestion that the agency recommend such routes. They stated—and our analysis of the Medley case confirms—that FAA could minimize the risk of lawsuits by (1) suggesting several routes for each airport rather than one preferred route as it did in the Medley case, (2) clearly identifying potential hazards that may be associated with any suggested route, and (3) exercising due care by reviewing the final version of the printed charts.

System to Encourage Voluntary Training Prior to Mountain Flying

Pilots, certified flight instructors, FAA and NTSB staff, and AOPA, NBAA, and Colorado Pilots Association representatives emphasized that general aviation pilots should receive specialized training in mountainous-area hazards prior to flying into FAA's designated mountainous areas for the first time. They stated that many accidents could be prevented if pilots would take a training course in mountain flying or obtain a test ride with a certified flight instructor (mountain checkout) prior to flying in high mountainous areas or into mountain airports. Although many emphasized that requiring all pilots to take such training or checkouts would be costly and difficult to enforce, most individuals we interviewed stated that FAA could do more to promote voluntary mountain flying training. They noted, for example, that the current Accident Prevention Program seminars do not adequately encourage pilots—particularly from nonmountainous states—to obtain training prior to operating in mountainous areas.

Numerous private organizations and several states provide mountain flying courses. In its fall 1993 edition, for example, Wings West magazine lists 125 mountain flying courses available in the 11 western continental United States. One of those courses is provided by the Colorado Pilots

Association, which for the last 9 years, has conducted a 2-day course on mountain flying in that state (one day of ground instruction and one day of flight training). Likewise, the state of Idaho teaches a 2-day course each year for interested pilots. In addition, numerous certified flight instructors provide mountain checkouts to pilots that request them. According to those we interviewed, two problems limit the effectiveness of the courses and checkouts: (1) the inability to attract pilots because they believe such training is not worth their time and money and (2) a wide disparity among the quality of courses and checkouts available to pilots.

To address these problems, several FAA and NTSB staff suggested that FAA develop a system that (1) provides incentives to pilots who receive FAA-approved training and (2) establishes minimum standards for instructors who provide mountain flying training in FAA's designated mountainous areas. According to these staff, such a system would require FAA to approve courses and instructors that meet minimum standards. Pilots who obtain training from an approved course or flight instructor would then receive a "mountain flying endorsement" and could use that endorsement in lieu of FAA's biennial flight review requirement for that 2-year period.

Currently, FAA has a training incentive program (referred to as Wings) that affords pilots certain benefits that include using participation in the program in lieu of the biennial flight review requirement for that 2-year period. The Wings program allows pilots who attend a safety seminar and complete 3 hours of flight training each year to receive such awards as bronze wings. According to FAA and NTSB staff, the Wings program has been an effective incentive in getting pilots to improve their skills. Several noted that developing a similar system that specifically targets mountain flying would help prevent accidents by providing pilots with incentives to take the specialized training needed. One NTSB staff member noted, for example, that a pilot from Texas who had to fly to Colorado on business—and would not otherwise obtain a mountain checkout—might obtain such a checkout if the pilot knew that he/she would not have to take the biennial flight review. Fourteen of the 15 Accident Prevention Program staff we interviewed supported FAA's implementation of this suggestion and emphasized that it was feasible and would reduce the number of general aviation mountain flying accidents.

Formal Accident Prevention Program to Better Prepare Flatland Pilots for Mountain Flying

Several individuals suggested—and all 15 of the Accident Prevention Program's staff we interviewed supported the suggestion—that FAA staff from mountainous states periodically conduct 1-day mountain flying seminars in the nonmountainous states located near the western mountainous states (e.g., Iowa and Nebraska). Noting that 19, or 25 percent, of the 76 general aviation accidents that occurred in the state of Colorado during 1991 involved out-of-state pilots, FAA's Accident Prevention Program Manager in Colorado conducted a 1-day mountain flying seminar in 1992 near Des Moines, Iowa. According to the manager, nearly 50 pilots attended the seminar. However, the program managers we interviewed stated that, although such seminars were needed, budget constraints prevented them from providing them.[5] They emphasized that FAA staff familiar with the challenges of mountain flying needed to conduct the seminars because FAA staff from nonmountainous states were not sufficiently familiar with the challenges of mountain flying.

NTSB and the Colorado Pilots Association officials we interviewed also supported such a program. The Colorado Pilots Association noted the popularity of its training course in nonmountainous states during the period when FAA was promoting the course. According to Colorado Pilots Association and NTSB officials, FAA needs to develop a program in which it effectively promotes mountain flying safety among pilots in flatland areas near mountainous states. They stated that such an effort is needed prior to the winter ski season, because of the combination of increased activity and poor weather, and the summer season, because of the high density altitude conditions caused by the high temperature and altitude. They also said that such a program could (1) detail how mountain flying presents greater challenges than flying in nonmountainous areas, (2) encourage pilots to obtain training prior to flying into the designated mountainous areas, (3) identify the mountain training and checkouts that are available, and (4) highlight information available on mountain flying and specific mountain airports.

Our analysis of general aviation accidents occurring in mountainous areas also supports the need for such a formal seminar program. For example, between fiscal years 1983 and 1992, nearly 25 percent of the accidents occurring within 15 miles of the five nontowered, mountain airports involved a pilot from a nonmountainous state.

[5]Many of the Accident Prevention Program's staff we interviewed noted that budget constraints had, until recently, forced them to continue using a 1958 film on mountain flying. According to the Manager, Accident Prevention Program, FAA decided in May 1993 to purchase copies of the 1991 AOPA training film as a result of our review. In August 1993, FAA distributed 200 copies of the film to its Accident Prevention Program's staff.

Modification of Written Test to Include Specific Questions on Mountain Flying

The pilot certification written test does not specifically address mountain flying. Each test contains 60 questions chosen by FAA from a universe of 915 questions. The 915 questions are divided equally between federal aviation regulations, principles of flight, weather, navigation, and operations. In reviewing the 915 questions, we found that none specifically refer to mountain flying, and only 18 questions, or less than 2 percent, could be considered to relate to flying in mountainous areas in some way (e.g., general questions on density altitude, the aerodynamic effects of strong winds, etc.). Acknowledging the accuracy of our analysis, FAA's Manager, Private Pilot Certification, Operations Standards Development Section, Regulatory Support Division, in Oklahoma City, Oklahoma, confirmed that a pilot will likely not be made aware of the special challenges of mountain flying or asked any questions relating to mountain flying hazards.

In addition, FAA and NTSB staff, pilots, and certified flight instructors acknowledged that the certification process is designed to ensure a minimum level of flight proficiency and not to ensure proficiency in such specific areas as mountain flying. They also emphasized that the current written test does not adequately highlight the challenges of mountain flying. For example, one Accident Prevention Program Manager stated that, while covering such areas as the effects of high altitude on an aircraft's performance, the test does not heighten the awareness of pilots to the challenges that face them if they operate in FAA's designated mountainous areas. As a result, this FAA staff member and other individuals suggested that FAA (1) revise its Recreational Pilot and Private Pilot Written Test Book, which contains the 915 potential written test questions, to include several additional questions specifically focused on mountain flying and (2) take steps to ensure that written tests given to pilots in or near FAA's designated mountainous areas contain at least one of these questions. According to FAA staff responsible for developing the written tests, such targeting could be accomplished through FAA's new computer testing program, in which tests are administered and graded by computer at approximately 400 computer testing centers throughout the country.

FAA and Industry State That Suggested Actions Would Not Impose Burden

FAA's Manager, General Aviation and Commercial Division, and Manager, Operations Branch of that division, told us that they were examining ways to improve the Accident Prevention Program and would consider implementing each of the suggested actions as part of this effort. They noted that, because commercial carriers transport revenue-paying

passengers, the Federal Aviation Act requires the "highest possible degree" of safety for such operations. General aviation does not transport revenue-paying passengers, and thus FAA requires a reasonable level of safety, according to these officials. As a result, the Division Manager emphasized that FAA preferred such innovative, nonregulatory approaches as those outlined above to promote safety rather than imposing new regulations on the general aviation community.

The Division Manager also stated that, because general aviation pilots do not have the financial and organizational resources of commercial airlines, increases in safety largely depend on the motivation of and information available to those pilots. He emphasized that FAA has a key role to play in increasing that motivation as well as ensuring that high quality, safety-related information is available to general aviation pilots—especially because many general aviation pilots also transport passengers. Our analysis supports his statements. For example, 102, or nearly 58 percent, of the 176 fatal general aviation accidents in the mountains of the 11 western states between fiscal years 1989 and 1992 involved the death of at least one passenger.

Representatives from three major trade groups representing the general aviation industry—AOPA, NBAA, and the General Aviation Manufacturers Association—supported the actions suggested, stating that they would not place an economic burden on the general aviation industry. They noted that innovative safety efforts under the Accident Prevention Program, such as those discussed above, are needed to better assist pilots in preparing for mountain flying risks. Representatives from such groups as the Colorado Pilots Association agreed that such efforts are needed and that those listed above would not place an economic burden on pilots.

Conclusions

FAA warns general aviation pilots that flying in high-elevation, mountainous areas involves increased accident risks. However, the fact that numerous general aviation pilots and passengers die each year in accidents because the pilots were not familiar with mountain flying risks or experienced in operations in mountainous areas indicates that these warnings are not enough. General agreement exists among FAA and NTSB staff, pilots, flight instructors, airport managers, and industry officials that FAA can and should do much more to promote mountain flying safety. On the basis of our (1) analysis of numerous fatal general aviation accidents in the mountains of the western United States, (2) discussions with Accident Prevention Program staff, and (3) examination of the pilot certification

process, we also believe that FAA can take several actions to better prepare general aviation pilots for operations in mountainous areas.

Recommendations

To better prepare general aviation pilots for the hazards of flying in mountainous areas, we recommend that the Secretary of Transportation direct the Administrator, FAA, to

- issue guidance that (1) identifies airports in mountainous areas that present unique challenges to pilots, (2) describes the unique characteristics at each airport, and (3) recommends various routes for approach and takeoff at those airports for pilots operating under VFR;
- provide incentives for pilots to obtain training prior to flying in designated mountainous areas by (1) approving courses and instructors that meet FAA's standards for mountain flying and (2) issuing to pilots who obtain such training a "mountain endorsement" that can be used in lieu of the biennial flight review requirement;
- require the Accident Prevention Program's managers in mountainous states who have sufficient experience in mountain flying to conduct mountain flying seminars in nearby nonmountainous regions prior to the summer and winter seasons each year; and
- modify the written private pilot certification test to include specific questions on the risks of mountain flying and develop a system that targets these questions to tests administered in states located in or near FAA's designated mountainous areas.

Agency Comments

FAA officials generally concurred with our recommendations and stated that they would examine how to best implement them. They emphasized that increased pilot awareness of mountain flying hazards and better preflight preparation are the keys to reducing the number of mountain flying accidents. They commented that our recommendations will address these factors by improving the mountain flying information available to pilots and increasing the incentives for pilots to obtain mountain flying training.

Options May Exist to Facilitate a Resolution Over Night Access to Aspen Airport

Because of the unique challenges to pilots presented by operating in mountainous areas, some communities have imposed special access rules at their airports. In one instance, a local curfew on general aviation operations at night has been the subject of formal complaints by two industry organizations and led to an on-going dispute between FAA and the local community. Citing the higher accident rates at mountain airports in general and its airport in particular, Pitkin County, Colorado, has maintained its night curfew at Aspen Airport despite FAA's objections. Although FAA has the legal authority to countermand the community's night curfew through enforcement or administrative actions, viable options may exist that could help facilitate a resolution to the dispute without necessitating such actions by FAA. However, such options have not been adequately examined, in part, because FAA and community officials have not met since February 1992 to resolve the dispute.

Some Communities in Mountainous Areas Have Implemented Access Restrictions

To promote safety, some communities located in mountainous areas have imposed requirements restricting access to their airports at night. Telluride, Colorado, for example, has prohibited all commercial and general aviation operations at night since the airport opened in December 1985. Although allowing scheduled commercial air carrier operations at night, Pitkin County, Colorado, prohibits all general aviation operations at night at Aspen Airport. Finally, Gunnison, Colorado, requires all pilots to obtain written approval from the airport manager prior to using its airport at night. Although not prohibiting night general aviation operations, some communities, such as Eagle County, Colorado, recommend that pilots who are unfamiliar with their airports not conduct operations at night.[1]

[1]The National Oceanic and Atmospheric Administration, in conjunction with FAA, publishes the Airport/Facility Directory every 8 weeks. The directory provides general information on each airport in the United States. In the directory, some mountain airport managers recommend against night operations for pilots who are unfamiliar with their airports.

Pitkin County's Prohibiting All General Aviation Night Flights, While Allowing Commercial Flights, Created Dispute

In November 1989, AOPA filed a formal complaint with FAA challenging Pitkin County's prohibiting general aviation night operations at Aspen Airport, including aircraft equipped for IFR operations. AOPA charged that, because Pitkin County allowed commercial carriers to operate at Aspen Airport until 11 p.m., the ban unjustly discriminated against general aviation and thus violated sponsor assurances made by the county in accepting FAA Airport Improvement Program (AIP) grants. FAA threatens but has not taken actions against Pitkin County to eliminate the general aviation night curfew. Citing FAA's lack of enforcement action over almost 4 years, NBAA filed a similar complaint with FAA against Pitkin County in May 1993. As of November 1993, the dispute had not been resolved.

Background on Pitkin County Curfew

Between 1946—when Aspen Airport first opened—and the mid-1970s, Pitkin County, Colorado, restricted all operations at the airport to daylight hours. In the mid-1970s, Rocky Mountain Airlines (now Continental Express) requested permission from the county to land at night and offered to install airfield landing lights at its own expense. In 1978, Aspen Airways (now United Express) also requested night landing privileges from the county. Rocky Mountain Airlines objected to Aspen Airways's entry into the market and tried to block it by refusing Aspen Airways permission to use the landing lights. In resolving the dispute, the county placed the issue of night operations before county voters. Pitkin County residents approved a 1978 referendum that allowed scheduled commercial air carriers, but not general aviation aircraft, to land and take off during evening hours between the period beginning one-half (1/2) hour after sunset and 8:30 p.m.

In October 1989, Pitkin County repealed the 1978 law and substituted new provisions. Under County Ordinance 89-3, the airport was officially closed from one-half hour after sunset until 7 a.m., but "Certificated Scheduled Air Carriers" meeting certain noise requirements were allowed to operate until 11 p.m. In addition, the ordinance permitted aircraft operating under IFR, including general aviation aircraft, to depart Aspen Airport until 2-1/2 hours after sunset on weekends and holidays during the height of the ski season. Citing noise and safety concerns, however, the county canceled the IFR-departure exception in late 1990—thus prohibiting all general aviation night operations at Aspen Airport.

According to Pitkin County officials, the access restrictions are necessary because of the steep approaches and limited maneuvering room at the airport. Takeoffs and landings at Aspen Airport are challenging under any

conditions, but the officials believe that general aviation operations at night would result in an unacceptably high accident rate. They also emphasized that, in their view a safety-related distinction exists between the scheduled carriers that are allowed to operate at night and all other flights because the scheduled carriers are required to (1) use IFR-certified, high-performance aircraft; (2) comply with IFR flight procedures; and (3) satisfy FAA training and airport-familiarity requirements for commercial pilots. County officials regard the fact that Aspen Airport has never experienced an accident at night involving scheduled carriers as confirmation of their position.

Industry's Complaints and FAA's Response

Following the October 1989 installation of new radar facilities at Aspen Airport, AOPA filed a formal complaint with FAA in November 1989. AOPA alleged that the early closure of the airport to all general aviation users unjustly discriminated against general aviation as a class. Requesting access to the airport at night equal to the commercial carriers' access (until 11 p.m.), AOPA noted that such unjust discrimination against a class of users violated sponsor assurances made by the county when it received AIP funds. FAA requires AIP recipients to make the airport "available for public use on fair and reasonable terms and without unjust discrimination to all types, kinds and classes of aeronautical uses." Local access rules must be "fair, equal, and not unjustly discriminatory . . . [and] met by all users of the airport." AOPA emphasized that, between 1982 and 1989, Pitkin County received approximately $10 million in such grants to improve safety at the airport. In addition, AOPA noted that the county, using federal funds, had installed a navigation system that increased the accuracy of IFR approaches for IFR-certified aircraft.

In response to AOPA's complaint, FAA, in February 1990, requested that Pitkin County open the airport to general aviation until 11 p.m. FAA threatened to take enforcement action against Pitkin County if it did not comply. Responding to this threat, Pitkin County officials held a public hearing in August 1990 to consider a resolution to open the airport to all operations until 10 p.m. The resolution was tabled at the end of the hearing and permanently dropped in October 1990.

Responding to these actions, FAA, in late 1990 and again in late 1991, threatened legal action to stop payments to the county under existing AIP grants and seek to recover previously disbursed grant funds if the county did not open the airport to general aviation on terms equal to those afforded to commercial carriers. Despite such threats, the county has

refused to remove its curfew, citing both safety and noise concerns. The county's position is that AOPA and NBAA seek to operate at Aspen Airport until 11 p.m. without complying with any of the restrictions that apply to air carrier night operations.

In September 1991, the county issued an analysis, which projected that the general aviation night accident rate would be 68 percent higher than the current day accident rate at the airport. In November 1992, FAA issued a study concluding that (1) the accident history of Aspen Airport was not significantly different from that of other airports located in mountainous terrain and (2) restrictions on general aviation night operations at Aspen Airport—including those under VFR—were not necessary for safety. (App. II provides our observations on both studies.) Because of these conflicting findings and strongly held views, little progress has been made in resolving the dispute over the last 4 years. Citing this lack of progress, NBAA filed a complaint with FAA in May 1993 calling for the removal of the general aviation night curfew at Aspen Airport.

FAA Has Legal Authority to Impose and Enforce a Solution

FAA has the legal authority to countermand Pitkin County's night curfew and order that Aspen Airport be opened to all users until 11 p.m. FAA maintains that Pitkin County has no authority to restrict access to the airport in the interest of safety. Relying on the legal doctrine of preemption, FAA argues that it is the only entity with statutory authority to regulate flight safety. In addition, FAA holds that, as a condition of being granted federal AIP funds, the county agreed not to unjustly discriminate against users or classes of users. FAA interprets this sponsor assurance as requiring the county to permit general aviation the same access at night as scheduled carriers. (App. III summarizes the legal issues raised by the FAA-Pitkin County dispute.)

Although emphasizing that they agree generally with AOPA's and NBAA's contentions, FAA officials stated that they have not decided whether the agency should take administrative or court action, which could entail expensive litigation between FAA and Pitkin County. They emphasized, however, that in their view, Pitkin County is not authorized to make or enforce its own safety rules, and they believe the curfew is based on noise rather than safety concerns. As a result, they noted that their preferred solution would be for the county to voluntarily rescind the curfew and establish reasonable noise restrictions after completing a noise study following procedures established in part 150 of the Code of Federal Regulations.

Safety Concerns Over General Aviation Night Operations at Aspen Airport

Our analysis of general aviation accidents at Aspen Airport over the last decade and discussions with pilots as well as FAA and NTSB staff indicate that (1) Aspen Airport is a relatively difficult airport for pilots to operate into and out of and (2) operations under VFR at night at Aspen Airport would be hazardous. Fourteen general aviation accidents occurred between October 1982 and September 1992 within 15 miles of Aspen Airport in which the airport was the destination or departure of the flight—resulting in a rate of 4.10 accidents per 100,000 operations. Aspen's rate was (1) 78 percent higher than the rate of 2.30 accidents per 100,000 operations for the four other towered mountain airports we examined and (2) 302 percent higher than the rate of 1.02 accidents per 100,000 operations for the five towered nonmountain airports we examined. Of Aspen's 14 accidents during this period, 12, or 86 percent, occurred under VFR.

Citing safety concerns, nearly every pilot and FAA and NTSB staff member that we interviewed told us that they would not fly into Aspen Airport at night under VFR. Likewise, an internal 1992 FAA Northwest Mountain Region study noted that most pilots it interviewed stated that they would not fly into Aspen at night, and the Colorado Pilots Association specifically instructs pilots not to fly at night under VFR into such mountain airports as Aspen Airport "under any circumstances."[2] Those few individuals who told us that they would fly into Aspen Airport at night emphasized that they would only do so using a high-performance, IFR-certified aircraft. These individuals emphasized that safety differences existed between (1) IFR-certified and non-IFR-certified aircraft and (2) instrument-rated and noninstrument-rated pilots.

Options May Exist to Facilitate a Resolution to Dispute Over Pitkin County's Curfew

Although FAA has the legal authority to countermand Pitkin County's curfew, we identified potential options that may help facilitate a resolution to the dispute. One such solution would involve distinguishing between IFR and VFR operations. Both parties could agree that general aviation operations under IFR would be permitted night access to the airport equal to the commercial carriers' (until 11 p.m.). A noise study would then provide the basis for limiting the noise impacts associated with the additional flights. Neither FAA nor Pitkin County has explored such options, in part, because FAA and Pitkin County officials have not met in an attempt to resolve this dispute since February 1992.

[2]Colorado Mountain Flying Course, Colorado Pilots Association, 1991.

Federal courts have held that some legitimate distinctions may be made among the types of flight operations.[3] Distinctions based on an aircraft's instrument capacity or a pilot's instrument rating could possibly be considered in the same light. As a result, solutions that distinguish between the types of aircraft or pilot ratings in determining night access could provide options to help facilitate a resolution to the current dispute. Several factors make such distinctions a basis for potential options:

- In its published interpretation of AIP grant requirements, FAA allows that an airport "may prohibit aircraft not equipped with a reasonable minimum of communications equipment from using the airport." It is possible that distinguishing between IFR-certified and non-IFR-certified aircraft in exceptional terrain would meet a reasonableness test.
- IFR-certified aircraft require additional operating equipment, and most higher performance aircraft are IFR-certified. Likewise, instrument-rated pilots have passed additional FAA tests to receive such a rating. According to FAA and NTSB staff, these factors provide an additional level of safety for operations involving IFR-certified aircraft and instrument-rated pilots.
- FAA's requirements for IFR flights are much stricter than those for VFR flights. For example, pilots flying under IFR must file a flight plan and maintain an altitude assigned by air traffic control personnel.
- In 1989 and 1990, Pitkin County allowed all general aviation aircraft equipped for IFR operations to depart the airport under IFR in the ski season until 2-1/2 hours after sunset, and no accidents occurred.
- FAA has twice offered to install at its expense a public-use microwave landing system at Aspen Airport. According to Pitkin County officials, they did not accept the system because it did not address the issue of equal access or capabilities of pilots and aircraft. As of October 1993, the system earmarked for Aspen Airport had not been reallocated to another airport, according to FAA's Colorado Section Supervisor, Denver Airports District Office. The installation of such a system would greatly enhance the safety of landings at Aspen for higher performance general aviation aircraft that are equipped to use the system, according to this official.
- AOPA officials told us that they are not opposed to exploring options to resolve the dispute as long as FAA also requires the county to conduct a noise study following established federal procedures. These officials noted that they would not be averse to a cooperative approach between FAA and the county that examined options distinguishing between IFR and VFR night operations—as long as FAA determines the final solution.

[3]Aircraft Owners and Pilots Association v. Port Authority of New York, 305 F. Supp. 93 (E.D.N.Y., 1969).

- NBAA officials told us that an ordinance allowing only IFR-certified aircraft and instrument-rated pilots to operate until 11 p.m. at Aspen Airport would be an acceptable solution to NBAA's complaint.

FAA officials stated that they have not examined the possibility of distinguishing between IFR and VFR operations in resolving the dispute with Pitkin County. They emphasized, however, that they were only willing to negotiate issues involving noise mitigation—not safety. Noting that they believe Pitkin County's night curfew to be purely based on noise concerns, these officials stated that safety regulation is solely the domain of FAA. They acknowledged, however, that a solution in which (1) only instrument-rated pilots and aircraft were allowed to operate at night and (2) Pitkin County established noise restrictions after conducting a noise study following established federal procedures would be "reasonable" and "worth examining." Pitkin County officials stated that a negotiated solution that examined such an option would be preferable to them. The County Attorney, for example, stated that "a huge middle ground" exists between the positions of FAA and the county that needs to be explored.

Conclusions

FAA has the authority to countermand Pitkin County's curfew and allow night operations at Aspen Airport for all users. If FAA did so, its actions would likely be upheld by federal courts. As a practical matter, however, the situation has remained a stand-off for the last 4 years, as FAA accepts a situation that it terms unacceptable. Nevertheless, Pitkin County has raised safety concerns that need to be addressed. We believe that these concerns can best be addressed through a cooperative approach between FAA and Pitkin County officials.

In fact, options may exist that would facilitate a resolution to the dispute. Under one option, the county would (1) allow IFR-certified aircraft and instrument-rated pilots to operate under IFR at Aspen Airport until 11 p.m., (2) accept a microwave landing system from FAA that would improve the safety of some IFR approaches, and (3) conduct a noise study following established federal procedures and, if warranted, restrict those night operations not meeting noise criteria. In turn, FAA could address safety concerns by allowing IFR night access and prohibiting noninstrument-rated pilots and non-IFR-certified aircraft from using the airport at night. Because neither FAA nor Pitkin County has examined such options, potentially expensive litigation or administrative proceedings may result. We believe that the options we have identified could form the basis for FAA and Pitkin County to develop a framework to resolve this difficult issue.

Additional Details on the Methodology, Limitations, and Results of the Analyses We Conducted

The following provides additional details on the methodology of the various analyses we conducted, the results of those analyses, and the limitations of the data that we used.

Methodology

In counting the number of general aviation accidents that occurred between October 1983 and September 1992 in which mountain factors either contributed to or caused the accident, we included factors identified by the National Transportation Safety Board's (NTSB) Chief, Regional Operations and General Aviation Division, from NTSB's accident cause/factor codes as indicative of mountain flying accidents. In our count, we included accidents in which at least one factor was cited as contributing to or causing the accident. The factors were updraft, downdraft, box canyon, mountain wave, high terrain, mountainous/hilly terrain, takeoff and climb capability, and terrain rising. As suggested by the NTSB official, we also included several other factors—high density altitude, flight under visual flight rules (VFR) into instrument meteorological conditions, ravine, adverse weather, and light condition-dark night—only when the accident occurred at or above an elevation of 4,000 feet.

In determining the accident rate for our selected airports, we included an accident if it occurred within 15 miles of the airport and the airport was a destination or departure point of the flight. We excluded accidents that occurred within 15 miles of an airport but occurred while the aircraft was departing from or landing at another location, including another airport or dirt strip. We also excluded accidents that occurred while the pilot was doing such activities as aerobatic maneuvers.

Limitations

The activity data used in our analyses have two limitations. First, FAA's data on the number of operations at airports without air traffic control towers are less reliable than similar data for towered airports. FAA relies on estimates by individual airport managers to obtain the nontowered data and does not verify these data. Many FAA officials and airport managers we interviewed noted that airport managers may overestimate activity figures to portray the airport as busy and to justify additional Airport Improvement Program (AIP) funds allocated in part on the basis of an airport's activity. They estimated that nontowered activity data could be overstated by as much as 100 percent. As a result, in our comparison of airport accident rates, we distinguish between towered and nontowered airports. However, our comparison of state accident rates per 100,000

operations includes towered and nontowered data. In providing us with data on the total operations in each state, FAA officials noted that the combination of towered airport counts and nontowered airport estimates represented the best available data on general aviation operations.

In light of the limited reliability of FAA's nontowered operations data, we also computed accident rates by state by using FAA's only other measure of general aviation activity—estimates of the number of hours flown by general aviation pilots each calendar year. Annually, FAA surveys a statistical sample of all general aviation aircraft owners to obtain these data. In 1990, FAA found that its survey techniques were causing it to overestimate activity by approximately 8 percent. On the basis of this finding, FAA modified its survey procedures. Because data prior to 1991 overestimated general aviation activity, we used FAA's survey estimates only for calendar years 1991 and 1992. Because it is a sample survey, the data are only estimates of activity whose accuracy vary from state to state.

Results

Our comparison of accident rates by state using both FAA's fiscal year 1992 count of the number of general aviation operations (table I.1) and the agency's calendar year 1992 estimate of general aviation flight hours (table I.2) for each state produced similar results. Accident rates for the 11 western mountainous states in the continental United States were over 30 percent higher than those in the other 37 continental states.

Table I.1: General Aviation Accidents and Accident Rates Per 100,000 Operations by State, Fiscal Year 1992

State	Total number of accidents	Total number of operations	Accident rate
11 western mountainous			
Arizona	76	2,903,885	2.62
California	262	13,932,098	1.88
Colorado	77	2,142,964	3.59
Idaho	25	1,063,885	2.35
Montana	30	639,205	4.69
Nevada	27	674,790	4.00
New Mexico	29	861,963	3.36
Oregon	39	1,418,135	2.75
Utah	24	737,872	3.25
Washington	77	3,582,350	2.14
Wyoming	15	364,276	4.12
Total	**681**	**28,321,423**	**2.40**
37 other continental			

(continued)

State	Total number of accidents	Total number of operations	Accident rate
Alabama	35	1,888,414	1.85
Arkansas	53	2,612,947	2.03
Connecticut	17	945,682	1.80
Delaware	5	402,611	1.24
Florida	120	7,899,370	1.52
Georgia	45	2,213,878	2.03
Illinois	60	2,993,250	2.00
Indiana	35	1,540,392	2.27
Iowa	21	985,452	2.13
Kansas	22	1,572,144	1.40
Kentucky	20	698,338	2.86
Louisiana	22	1,170,536	1.88
Maine	24	882,301	2.72
Maryland	21	1,373,927	1.53
Massachusetts	31	2,112,657	1.47
Michigan	65	2,609,977	2.49
Minnesota	33	1,854,917	1.78
Mississippi	21	1,037,369	2.02
Missouri	41	1,669,956	2.46
Nebraska	16	703,675	2.27
New Hampshire	7	522,639	1.34
New Jersey	25	3,297,446	.76
New York	34	3,320,642	1.02
North Carolina	53	1,932,395	2.74
North Dakota	12	558,055	2.15
Ohio	47	3,844,494	1.22
Oklahoma	34	1,758,637	1.93
Pennsylvania	40	3,134,247	1.28
Rhode Island	4	207,632	1.93
South Carolina	28	1,417,657	1.98
South Dakota	7	498,027	1.41
Tennessee	17	1,711,334	.99
Texas	114	6,514,178	1.75
Vermont	8	249,861	3.20
Virginia	28	1,424,313	1.97
West Virginia	14	442,917	3.16
Wisconsin	36	2,370,972	1.52
Total	**1,215**	**70,373,239**	**1.73**

(continued)

State	Total number of accidents	Total number of operations	Accident rate
Alaska	137	1,315,797	10.41
Hawaii	9	411,220	2.19
Total	**2,042**	**100,421,679**	**2.03**

Source: GAO's analysis of NTSB's and FAA's data.

Table I.2: General Aviation Accident Rates by State Based on Accidents Per 100,000 Flight Hours, Calendar Year 1992

State	FAA's estimate of flight hours flown	General aviation accidents	Accident rate	Sampling error
11 western mountainous				
Arizona	815,927	80	9.80	±2.42
California	3,616,504	255	7.05	0.59
Colorado	525,898	75	14.26	3.66
Idaho	232,243	34	14.64	5.16
Montana	186,919	25	13.37	4.80
Nevada	305,029	31	10.16	4.92
New Mexico	262,081	26	9.92	3.56
Oregon	459,011	44	9.59	2.33
Utah	206,334	25	12.12	4.87
Washington	707,724	75	10.60	2.24
Wyoming	73,912	17	23.00	12.53
Total	**7,391,582**	**687**	**9.29**	**0.61**
37 other continental				
Alabama	495,433	40	8.07	2.23
Arkansas	488,455	57	11.67	3.13
Connecticut	211,117	21	9.95	3.68
Delaware	189,870	5	2.63	1.58
Florida	2,159,583	112	5.19	0.72
Georgia	654,166	50	7.64	1.63
Illinois	878,770	58	6.60	1.15
Indiana	438,302	27	6.16	1.59
Iowa	313,951	23	7.33	2.30
Kansas	389,982	23	5.90	1.47
Kentucky	194,504	22	11.31	4.68
Louisiana	831,983	23	2.76	0.83
Maine	101,793	19	18.67	9.59
Maryland	299,343	23	7.68	2.23
Massachusetts	239,304	29	12.12	3.11

(continued)

State	FAA's estimate of flight hours flown	General aviation accidents	Accident rate	Sampling error
Michigan	717,662	63	8.78	1.55
Minnesota	587,474	25	4.26	0.95
Mississippi	317,326	20	6.30	2.43
Missouri	465,583	39	8.38	2.81
Nebraska	194,514	17	8.74	2.96
New Hampshire	159,847	9	5.63	2.62
New Jersey	547,149	27	4.93	1.33
New York	680,577	28	4.11	0.89
North Carolina	446,801	48	10.74	2.38
North Dakota	220,827	17	7.70	4.01
Ohio	800,725	51	6.37	1.12
Oklahoma	392,186	35	8.92	2.78
Pennsylvania	626,271	43	6.87	1.33
Rhode Island	47,357	2	4.22	3.85
South Carolina	233,364	30	12.86	4.81
South Dakota	123,869	7	5.65	2.81
Tennessee	344,838	24	6.96	1.91
Texas	1,951,633	120	6.15	0.71
Vermont	51,474	3	5.83	4.11
Virginia	412,333	30	7.28	2.48
West Virginia	96,025	16	16.66	7.81
Wisconsin	449,484	37	8.23	1.87
Total	**17,753,875**	**1,223**	**6.89**	**0.30**
Alaska	1,040,874	141	13.55	2.84
Hawaii	175,537	10	5.70	3.85
Total	**26,361,868**	**2,061**	**7.82**	**0.28**

Source: GAO's analysis of FAA's and NTSB's data.

Table I.3: General Aviation Operations, Accidents, and Accident Rates Per 100,000 Operations at Selected Towered Mountain and Nonmountain Airports, Fiscal Years 1983 Through 1992

Airport	General aviation operations	General aviation accidents	Accident rate
Mountain			
Flagstaff, Ariz.	388,980	19	4.88
Aspen, Colo.	341,125	14	4.10
Missoula, Mont.	454,102	9	1.98
Klamath Falls, Oreg.	391,246	7	1.79
Hailey, Idaho	504,273	5	.99
Total	**2,079,726**	**54**	**2.60**
Nonmountain			
Martha's Vineyard, Mass.	374,242	2	.53
Florence City, S.C.	314,600	7	2.22
Mansfield, Ohio	412,647	5	1.21
Sioux City, Iowa	399,399	3	.75
Hutchinson, Kansas	552,494	4	.72
Total	**2,053,382**	**21**	**1.02**

Source: GAO's analysis of NTSB's and FAA's data.

Table I.4: General Aviation Operations, Accidents, and Accident Rates Per 100,000 Operations at Selected Nontowered Mountain and Nonmountain Airports, Fiscal Years 1983 Through 1992

Airport	General aviation operations	General aviation accidents	Accident rate
Mountain			
Telluride, Colo.	36,458	5	13.71[a]
Ketchikan, Alaska	108,724	7	6.43
Eagle County, Colo.	140,629	4	2.84
Jackson Hole, Wyo.	241,801	6	2.48
Cody, Wyo.	297,630	3	1.01
Total	**825,242**	**25**	**3.02**
Nonmountain			
Brownwood, Texas	107,389	3	2.79
Houghton County, Mich.	121,766	3	2.46
Devil's Lake, N.D.	161,613	3	1.86
Marshfield, Wis.	201,992	1	.50
Mason City, Iowa	313,982	1	.32
Total	**906,742**	**11**	**1.21**

[a]The airport in Telluride, Colorado, opened in December 1985. Thus, the data for Telluride are for fiscal years 1986 through 1992 only. The data presented above for its comparison airport—Brownwood, Texas—are for fiscal years 1983 through 1992. From fiscal years 1986 through 1992, Brownwood had 1 general aviation accident out of 65,389 general aviation operations, resulting in a rate of 1.52 accidents per 100,000 operations.

Source: GAO's analysis of NTSB's and FAA's data.

Observations on Two Safety Studies of Night Operations Under Visual Flight Rules at Aspen Airport

As requested, we examined the methodology of two studies concerning the risk of conducting general aviation night operations under VFR at Aspen Airport. The objectives of the two studies differed. The objective of Gellman Research Associates—commissioned by Pitkin County—was to estimate a nighttime general aviation accident rate at Aspen Airport if these night flights were permitted. FAA's objective, on the other hand, was to determine the type of restrictions, if any, that should be imposed on night VFR operations at the airport. The studies used differing methodologies and reached different conclusions about general aviation operations at night at Aspen Airport.

Gellman Research Associates' "Accident Rate Analysis: Night VFR Safety Study Report"

Pitkin County commissioned Gellman Research Associates to estimate the general aviation accident rate that would result if the airport's night curfew were lifted. To accomplish this, Gellman computed overall daytime and nighttime accident rates per 100,000 operations between 1983 and 1988 for 29 comparison airports. Gellman chose to examine accident rates at these airports because—like Aspen Airport—they are located in mountainous regions, have an air traffic control tower, and have been designated by FAA as airports requiring special qualifications for airline transport pilots. Gellman divided the nighttime accident rate by the daytime rate to determine the relative risk of general aviation night-to-day accidents. This ratio, or relative risk factor, represents the number of nighttime accidents occurring for each daytime accident for the 29 comparison airports between 1983 and 1988. Gellman determined the risk factor to be 1.68, or about 17 nighttime accidents for every 10 daytime accidents. Applying this risk factor to Aspen Airport's daytime accident rate between 1983 and 1988 (2.53 accidents per 100,000 operations), Gellman estimated a nighttime accident rate of 4.25 accidents per 100,000 night operations.

The validity of Gellman's estimate depends on the (1) soundness of key assumptions about the comparability of risk factors at Aspen Airport and the 29 comparison airports and (2) validity of the data and methods used to compute the relative risk factor. Are the conditions at the 29 comparison airports sufficiently similar to those at Aspen Airport that the overall relative risk factor of 1.68 provides an acceptable approximation to the risk that would have been observed had Aspen allowed general aviation night operations? Some comparison airports—Harrisburg, Pennsylvania; Ontario, California; and Birmingham, Alabama—do not present operating conditions similar to those at Aspen Airport. In addition, the validity of Gellman's estimate depends, in part, on such factors as the

similarity of the terrain at these airports to that of Aspen Airport, performance characteristics of the aircraft used by general aviation pilots at these airports, experience of the pilots in flying into mountain airports, and the extent to which pilots who operated at night in these airports during this period operated under VFR or instrument flight rules (IFR).

In addition, the validity of Gellman's estimate depends on the limitations of the data used to compute the relative risk factor. Gellman used NTSB's accident data and statistics published by FAA giving total operations for general aviation aircraft between 1983 and 1988 for each of the 29 comparison airports. Because these airports have control towers, FAA's operations data should be reliable. Gellman, however, excluded accidents not specifically noted by NTSB investigators as having occurred at Aspen Airport or the comparison airports. As a result, Gellman may have understated the number of accidents occurring at both Aspen and the comparison airports, as terrain and/or weather conditions in areas near these airports could affect aircraft approaches and departures.

In addition, Gellman used data from FAA's 1985 General Aviation Pilot and Aircraft Activity Survey to determine the percentage of total general aviation operations occurring during the day and night for 1985. These percentages were then used to apportion the number of general aviation operations occurring at towered airports during the day and night from 1983 to 1988. To the extent that the percentage of general aviation day and night operations occurring from 1983 to 1988 are not accurately represented by the 1985 percentage, the validity of the overall relative risk factor is weakened. Gellman does not provide a measure of probable error in its estimate of either the overall relative risk factor or its estimate of Aspen's nighttime accident rate. Such limitations make Gellman's estimate less credible.

FAA's "Night Operations Under Visual Flight Rules (VFR) at Aspen-Pitkin County Airport, Aspen, Colorado"

In assessing night operations under VFR at Aspen Airport, FAA compared the accident rate at Aspen with that of 12 other airports in Colorado and conducted a flight evaluation consisting of day and night approaches in general aviation aircraft at Aspen and two of the comparison airports. FAA selected 12 airports with elevation and terrain it deemed similar to Aspen's. FAA did not estimate a nighttime accident rate for Aspen but instead compared Aspen's daytime accident rate between 1983 and 1989 with the total and daytime accident rates of the 12 other airports.

The general aviation accident data examined by FAA were those for which NTSB had determined that one of the airports/towns was listed as an accident location, the airport/town was listed as the destination or last departure point, and the accident occurred within a 15-mile radius of the airport. Data on total general aviation operations for the 12 other airports were obtained from airport managers' estimates because, unlike Aspen, none of the airports have a control tower. FAA estimated the percentage of general aviation night operations to total operations at mountainous airports to be 10 percent compared with 14.65 percent used in the Gellman study. After computing accident rates for the 13 airports, FAA noted that Aspen ranks fifth of 13 in overall accident rate and sixth in daytime accident rate. In part, on the basis of past accident history and because Aspen Airport does not have the highest accident rate under either its or Gellman's comparison airports, FAA concluded that (1) "the accident history of Aspen Airport is not significantly different than that of other towered and non-towered airports located in mountainous terrain" and (2) "Aspen Airport . . . is well-suited to VFR operations including night VFR operations."

FAA's methodology and conclusions are limited, however, by several factors. First, FAA acknowledges that operations data from nontowered airports are far more questionable than data obtained from towered airports. Several FAA officials and airport managers we interviewed estimated that nontowered airport data on the number of operations could be off by as much as 30 to 100 percent. Unlike Aspen Airport, which is a towered airport, all 12 of FAA's comparison airports are nontowered airports; hence, the accuracy of the accident rates for these 12 airports is uncertain.

Second, the study's conclusion that Aspen Airport is well-suited for night operations implies that Aspen's nighttime accident ranking would approximate its daytime ranking. The validity of this assumption is questionable and depends on whether the experience of pilots and the performance characteristics of their aircraft, among other things, differs between daytime and nighttime hours at Aspen Airport.

Third, one would expect the overall accident rate for Aspen to be lower than that of airports that permit nighttime operations. In its study, FAA acknowledges that general aviation night accident rates are higher than daytime accident rates. Because Aspen does not allow general aviation night operations, one would expect a lower overall accident rate than the

comparison airports. As a result, it is not clear how FAA's analysis of overall accident rates contributes to the study's conclusions.

Fourth, FAA does not specify an accident rate that would allow it to determine if an airport is or is not well-suited for night operations. As a result, one cannot definitively conclude on the basis of FAA's analysis that Aspen Airport is or is not well-suited for night operations.

FAA's methodology also consisted of an operational flight evaluation. Over a 2-day period, FAA staff flew into Aspen Airport and 2 of the 12 other airports to identify (1) possible differences between Aspen and other Colorado mountain airports where night VFR operations are permitted, (2) any conditions in the vicinity of Aspen that would be inconsistent with night VFR operations at the airport, and (3) improvements in facilities, procedures, and services that would enhance the safety of VFR operations in the Rocky Mountains. Two types of aircraft were used in the evaluation flights—a single-engine, turbo-charged aircraft and a twin-engine, business-class aircraft. All pilots were FAA inspectors, and each member of FAA's evaluation team was a commercial pilot. Daytime VFR approaches and departures were made at the three airports using both types of aircraft. To assess night VFR operations, FAA's team (1) used only the twin-engine aircraft and (2) landed at only one airport.

FAA's conclusion about the feasibility of conducting day and night VFR flights into these airports was conditioned on the capabilities of the pilots and observers. As the pilots were FAA inspectors from the Denver Flight Standards District Office, they had considerable experience in, and knowledge of, mountain flying in general and flying into one or more of the three airports in particular. They also had instrument ratings. Overall, the qualifications of FAA's evaluation flight crews and observers may not be representative of those of general aviation pilots that currently use, or potentially would use, Aspen and surrounding airports. In fact, the study noted that, because of weather conditions, one evaluation flight would have been difficult without the pilot's knowledge of and familiarity with the area and would not have been attempted by the crew after dark. As a result, it is questionable whether FAA can extend its conclusions about the safety of night VFR operations to include flights by noninstrument-rated pilots.

Several other factors limit FAA's ability to draw conclusions about night VFR operations at Aspen Airport on the basis of the evaluation flights. First, although weather conditions on some evaluation flights were not ideal, the

evaluation flights occurred during the summer. A more general assessment of the advisability of general aviation night VFR flights into or out of Aspen Airport would consider issues associated with flying in both the summer and winter. Second, although FAA stated that the aircraft used were representative of general aviation aircraft, it noted several times when the performance capabilities of the aircraft enabled the pilots to more easily accommodate difficulties presented by weather or terrain when conducting the evaluation flights. Similarly, FAA utilized only the twin-engine business aircraft on its night flights. As a result, conclusions about the safety of single-engine aircraft are tenuous. In our view, on the basis of the methodology FAA employed during the flight evaluation, the report's recommendation that "restrictions on VFR operation at night at Aspen Airport are not necessary for safety and are not recommended" was supported only for higher performance aircraft operated by experienced pilots.

Legal Issues Raised by FAA-Pitkin County Dispute

The FAA-Pitkin County dispute raises several legal issues that affect the powers of local communities imposing airport access restrictions. These issues include the federal preemption of local laws, freedom of interstate commerce, and the terms and conditions that local communities agree to when accepting federal funds to improve their airports. Pitkin County claims that it has closed Aspen Airport to all general aviation traffic one-half hour after sunset for reasons of safety. FAA's position is that Pitkin County has no authority to restrict access to the airport in the interest of safety. Relying on the legal doctrine of preemption, FAA maintains that it is the only entity with statutory authority to regulate flight safety. In addition, FAA points out that, as a condition of being granted federal Airport Improvement Program funds, the county agreed to treat all aviation users of the airport equally. FAA interprets that agreement as requiring the county to permit general aviation the same access as scheduled carriers.

FAA's Statutory Responsibilities and Preemption

FAA is charged by law with regulating aviation. Under the Federal Aviation Act, the duties of the FAA Administrator specifically include

> [t]he control of the use of the navigable airspace of the United States and the regulation of both civil and military operations in such airspace in the interest of the safety and efficiency of both.

In addition, the Congress elaborated further on those responsibilities later in the act by directing the Administrator to

> assign by rule, regulation, or order the use of the navigable airspace under such terms, conditions, and limitations as he may deem necessary in order to ensure the safety of aircraft and the efficient utilization of . . . airspace.

From the Federal Aviation Act, in general, and these two statutory provisions, in particular, FAA argues that the Congress granted it exclusive authority to control airport access and safety and that local authorities have no power to engage in the regulation of these matters. FAA's argument is based on a legal concept called preemption. Generally, preemption takes one of two forms. In its broader application, federal preemption strips other governmental bodies of legal authority to act on preempted matters.

This application, sometimes referred to as "field preemption," is based on a clearly discernable congressional intent for the federal authority to

"occupy the field" of endeavor exclusively. A second, less-expansive type of preemption exists when a federal and local action conflict with each other. The U.S. Constitution declares that federal statutes are the supreme law of the land, and in the case of a direct conflict, a federal statute or regulation must prevail. This is referred to as "conflict preemption."

Field preemption is often accomplished by specific language in a federal statute.[1] Field preemption can also be implied when the statute and its legislative history demonstrate congressional intent to "occupy the field." In its dispute with Pitkin County, FAA is arguing for the existence of field preemption. However, existing federal court decisions interpreting the statute do not unequivocally support FAA's position. In addition, FAA's claim of field preemption is apparently inconsistent with the agency's practice regarding airport access issues. It is clear, however, that if FAA were to direct Aspen Airport to be open to general aviation night traffic, that order would supersede any local restriction to the contrary.

Past Court Decisions Support Conflict Preemption

In Allegheny Airlines v. Village of Cedarhurst, the U.S. Court of Appeals for the Second Circuit upheld a lower court's decision in favor of the Civil Aeronautics Board (a predecessor of FAA) regarding the establishment of flight paths near New York's Idlewild Airport (now John F. Kennedy Airport).[2] Cedarhurst had enacted a local ordinance prohibiting aircraft operations at altitudes of less than 1,000 feet over the village. To observe the local ordinance, airlines would have had to disregard approach instructions from the airport control tower. The lower court held in favor of the airlines, holding that the matter of establishing safe flight paths was taken out of the hands of local authorities by the Air Commerce Act of 1926 (the predecessor of the Federal Aviation Act). The Court of Appeals affirmed on the ground that the local law restricting flight altitude conflicted with and was superseded by federal rules establishing flight approaches for Idlewild Airport.

In the Cedarhurst opinion, the Court of Appeals neither endorsed nor criticized a much broader field preemption analysis applied by the lower court. Since then, courts applying Cedarhurst have not interpreted it as a holding for field preemption. Twelve years later (1968), the Second Circuit Court of Appeals again considered local restrictions that would have

[1]The Federal Aviation Act has a limited preemption provision, the effect of which will be discussed later.

[2]Allegheny Airlines v. Village of Cedarhurst, 238 F.2d 812 (2d Cir. 1956), aff'g 132 F. Supp. 871 (E.D.N.Y. 1955).

required the rerouting of flights into John F. Kennedy Airport in American Airlines, Inc. v. Town of Hempstead.[3] In Hempstead, the court was interpreting the 1958 Federal Aviation Act, which had somewhat broadened FAA's authority as compared with the Civil Aeronautics Board's authority under the 1926 Air Commerce Act. The revised and strengthened authority in the Federal Aviation Act might have given the Court of Appeals a basis on which to revive the field preemption finding of the lower court in Cedarhurst. In contrast, however, the Hempstead court applied the Cedarhurst precedent narrowly and held that federal law should prevail in any direct conflict with local law.

Later, in Aircraft Owners and Pilots Ass'n v. Port Authority of New York, the issue of FAA's field preemption was again raised.[4] In this case, a federal district court examined a rush-hour landing surcharge at New York LaGuardia Airport. FAA had no rules regarding differential airport landing fees during peak hours. Moreover, the subject of airport landing fees was an area that FAA left open to local regulation. The court upheld the fee in that case, stating that FAA has not so pervasively occupied the field as to preclude application of a nonconflicting local rule.

The above cases were decided before a preemption section was added to the Federal Aviation Act in 1977. The preemption provision was included as a part of the Airline Deregulation Act of 1978, and it assigns to FAA the sole authority to control the economic regulation of air travel under title IV of the Federal Aviation Act. This preemption provision, section 105 of the act, has been held to prevent the states from regulating such economic matters as airline advertising.[5] However, the provision does not expressly provide for FAA preemption of such other areas as the access and safety issues discussed in title III of the Federal Aviation Act.[6]

In Cipollone v. Liggett Group, Inc., the U.S. Supreme Court, in 1992, offered guidance on the interpretation of limited preemption statutes such

[3]American Airlines, Inc. v. Town of Hempstead, 398 F.2d 369 (2d Cir. 1968).

[4]Aircraft Owners and Pilots Ass'n v. Port Authority of New York, 305 F. Supp. 93, 104 (E.D.N.Y. 1969). This case addressed airport access but not safety issues.

[5]Morales v. Trans World Airlines, 504 _U.S._, 112 S. Ct. 2031 (1992).

[6]The Federal Aviation Act also disclaims field preemption of airport owners' "proprietary rights." Noise control is a proprietary concern. See Aviation Safety and Noise Abatement Act of 1979, P.L. 96-193, as amended. Also relevant to preemption in noise issues are a number of court decisions including City of Burbank v. Lockheed Air Terminal, Inc., 411 U.S. 624 (1973) and Santa Monica Airport Ass'n v. City of Santa Monica, 659 F. 2d 100 (9th Cir. 1981), among others.

as the provision in the Federal Aviation Act.[7] The Court stated that "Congress' enactment of a provision defining the pre-emptive reach of a statute implies that matters beyond that reach are not pre-empted . . . ." Applying the Supreme Court's Cipollone analysis to the Federal Aviation Act, federal courts have held that the preemption clause added in 1978 does not foreclose state tort law actions (Pub. Health Trust of Dade County, v. Lake Aircraft, Inc.).[8] If safety issues were not preempted by the 1978 provision, they must be viewed under the preexisting law, namely, the Cedarhurst, Hempstead, and Aircraft Owners cases, where conflict preemption was confirmed.

FAA's Claim of Field Preemption Is Inconsistent With Its Practice

FAA's claim of field preemption is apparently inconsistent with the agency's long-standing practice regarding airport access issues. If the area of airport access were preempted, local authorities would be deprived of their ability to regulate access for any purpose. In contrast, FAA Order 5190.6A, Airport Compliance Requirements, expressly permits local airport authorities to manage access matters until a complaint occurs.[9] When a complaint is filed, FAA's policy requires that the airport defer to FAA for resolution of the matter in the public interest.

FAA has long adhered to the practice of allowing local authorities to manage access in the absence of complaints. In 1966, for example, an airline contested the local authority's decision to take two runways out of service at LaGuardia Airport.[10] The district court noted that FAA could "preempt the area of regulating the use of the runways for purposes of air traffic control into and out of LaGuardia Airport." The court observed, however, that "while FAA believes the runways can be safely used, it is not prepared at the present time to direct their use in the interest of safety or to preempt the regulation of its use in contradiction of the Port Authority's rules and regulations." If FAA had ordered that the runways be opened, the Port Authority would probably have lost its case. Because FAA had not acted, the court held in favor of the Port Authority. This case illustrates FAA's practice and also supports the conflict preemption analysis discussed in Aircraft Owners above.

[7]505 _U.S._, 112 S. Ct. 2608, 2618 (1992).

[8]Pub. Health Trust of Dade County v. Lake Aircraft, Inc., 992 F. 2d 291 (11th Cir., 1993).

[9]FAA interprets the discretion that its practice allows local authorities as being limited to "groundside" actions only. However, for purposes of field preemption analysis, we do not consider this distinction to be dispositive.

[10]Port Authority of New York v. Eastern Airlines, 259 F. Supp. 745 (E.D.N.Y. 1966).

Issues of Interstate Commerce

Access restrictions by local communities also pose another constitutional question. The Congress is given exclusive power under the Constitution to regulate interstate commerce. Consequently, states and localities are not permitted to interfere with or unduly burden the transit of people, goods, information, or other commodities between states. Air transportation is an example of an activity that takes place principally in the field of interstate commerce. Although no court decision has ever addressed the precise issue raised by the Aspen Airport dispute—the effect on interstate commerce of closing an airport at night because of local safety concerns—federal courts have held that local rules restricting airport access can place an undue burden on interstate commerce.[11] As a result, interstate commerce arguments are relevant to the Aspen Airport dispute. If a court found that the night curfew interfered with or unduly burdened interstate commerce, it would be unconstitutional and could be enjoined.[12] Importantly, this would be the case even if no conflicting FAA rule or regulation existed.

Terms and Conditions of AIP Grants

In addition to preemption and interstate commerce issues, the FAA-Pitkin County dispute involves issues of local community compliance with AIP sponsor assurances. As a condition of receiving a grant, airport sponsors are required by law to promise that they have conducted and will conduct airport operations in certain ways. In this case, FAA has focused on one particular assurance in which the grantee promises to make its airport "available for public use on fair and reasonable terms and without unjust discrimination . . . ." In response, Pitkin County points to other provisions in the grant agreement under which the grantee retains responsibility for airport management.

FAA officials argue that Pitkin County's night curfew unjustly discriminates against general aviation users. They point out that grant assurances further refine the public access requirement by adding that the fair, reasonable, and nondiscriminatory terms must apply to "all types, kinds, and classes of aeronautical uses." FAA officials argue that these stipulations cover general aviation treated as a class. In addition, FAA officials cite the agency's 1992 analysis in which it found that general aviation operations could be conducted safely at night at Aspen Airport. As a result, these officials

[11]American Airlines v. City of Audubon Park, 407 F.2d 1306 (6th Cir. 1969), cert denied, 396 U.S. 845 (1970). This case also involved altitude restrictions and flight paths to the airport.

[12]In 1977, FAA reviewed the interstate commerce implications of Aspen's night closure and determined that there was no significant impact on air commerce. FAA has not updated its analysis since that time.

contend that Pitkin County is not meeting its obligations under the terms of its grants.

Pitkin County officials note that counterbalancing the nondiscrimination requirement in the grant agreement are two provisions permitting an airport sponsor to manage its airport and make decisions about the safe and efficient operations on the property. According to these provisions,

> The sponsor may establish such fair, equal, and not unjustly discriminatory conditions to be met by all users of the airport as may be necessary for the safe and efficient operation of the airport.

> The sponsor may prohibit or limit any given type, kind, or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public.

Citing the first provision, county officials contend that an unacceptable number of accidents will occur if the airport opens to general aviation after dark. They compare this prediction with the unblemished night safety record of the scheduled commercial carriers and conclude that general aviation operations at night must be prevented for safety reasons. As a result, county officials argue that discrimination between general aviation and scheduled commercial carriers is not "unjust."

Citing the second provision, county officials emphasize that the county is permitted to limit aeronautical uses if necessary for the safe operation of the airport. From this provision, the county infers a right to maintain its night curfew as long as the curfew is motivated by safety concerns. Finally, county officials cite FAA Order 5910.6A, which interprets AIP sponsor assurances. The order notes that an airport "may prohibit aircraft not equipped with a reasonable minimum of communications equipment from using the airport." Pitkin County officials interpret this as encompassing the crew-training requirements, aircraft noise requirements, and precision-landing guidance systems of the scheduled carriers as the "reasonable minimum" equipment appropriate for night operations at Aspen Airport.

FAA in turn points out that the airport sponsor's operating prerogatives are limited to activities on the ground. FAA also maintains that the authority to limit aeronautical uses is circumscribed by the examples (such as skydiving) listed in the Order itself.

Major Contributors to This Report

Resources, Community, and Economic Development Division, Washington, D.C.	Allen Li, Associate Director Mary Ann Kruslicky, Assistant Director Timothy F. Hannegan, Evaluator-in-Charge Curtis L. Groves, Senior Operations Research Analyst
Denver Regional Office	Ted B. Baird, Regional Assignment Manager Gina M. Guarascio, Staff Evaluator
Office of the General Counsel	Margie Armen, Senior Attorney

Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are $2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

Orders by mail:

U.S. General Accounting Office
P.O. Box 6015
Gaithersburg, MD 20884-6015

or visit:

Room 1000
700 4th St. NW (corner of 4th and G Sts. NW)
U.S. General Accounting Office
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (301) 258-4066.

PRINTED ON ♻ RECYCLED PAPER

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

Official Business
Penalty for Private Use $300

First-Class Mail
Postage & Fees Paid
GAO
Permit No. G100