CED-77-98
8-15-77

REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

Effective Fuel Conservation Programs Could Save Millions Of Gallons Of Aviation Fuel

Department of Transportation
Civil Aeronautics Board
Federal Energy Administration

Aviation fuel conservation has not received the attention it deserves. The Federal Government needs to do more; specifically:

--Congressional action is needed to reduce the fuel consumed in transporting empty seats. About 4.2 billion gallons were used for this purpose in 1976.

--The Federal Aviation Administration also needs to (1) monitor its fuel conservation programs, (2) hold all aircraft on the ground to the extent possible when excessive delays are encountered at destination airports, and (3) develop program guidance to evaluate trade-offs between noise abatement and fuel conservation objectives when conflicts occur.

U93432
103089

CED-77-98

AUGUST 15, 1977

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-164497(1)

To the President of the Senate and the
Speaker of the House of Representatives

In 1976 the airlines used about 9.5 billion gallons of jet fuel. This report discusses Federal actions to conserve fuel used by the airlines and suggests ways additional fuel savings can be realized.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretary of Transportation; the Administrators of the Environmental Protection Agency and the Federal Energy Administration; and the Chairman, Civil Aeronautics Board.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

EFFECTIVE FUEL CONSERVATION PROGRAMS COULD SAVE MILLIONS OF GALLONS OF AVIATION FUEL

Department of Transportation
Civil Aeronautics Board
Federal Energy Administration

D I G E S T

An increase in the ratio of occupied seats to available seats on commercial airlines (the load factor) above the 53- to 55-percent range of recent years could improve the fuel efficiency of U.S. airlines substantially.

In 1976 the U.S. airlines achieved an industry-wide load factor of about 55 percent. Thus with 45 percent of seats empty, the airlines used an estimated 4.2 billion gallons of fuel transporting empty seats. Reducing flights to achieve a 65-percent load factor could have reduced domestic trunk airline (the largest) fuel consumption by almost a billion gallons.

Neither the Federal Government nor the airlines have made major efforts to increase load factors since the fuel crisis of 1973. GAO found that:

--The Civil Aeronautics Board, the Federal regulator of U.S. airlines, cannot require airlines' compliance with minimum load factors as a means of improving fuel efficiency.

--Board efforts to reduce domestic flight frequencies, which can increase load factors, were canceled as a result of court action.

--Federal Energy Administration fuel allocations to the aviation industry in 1974, successful in reducing the number of airline flights and increasing load factors, have since been relaxed.

Proponents of regulatory reform claim that improved regulation of the aviation industry could increase load factors to 60 percent or higher and save as much as 300 million gallons of fuel annually. Several bills were

introduced in the 94th Congress, and this matter is being further evaluated by the 95th Congress. (See p. 6.)

The Federal Aviation Administration (Agency), which controls the Nation's airways through its air traffic control system, reported to the Congress that its fuel conservation programs would reduce aviation fuel consumption by more than 1.2 million gallons a day.

However, the Agency had no assurance that its fuel conservation procedures were effective in achieving about 800,000 gallons of these estimated savings. It had neither monitored program implementation nor required reports on program use. In several instances, the fuel conservation procedures were (1) infrequently used, (2) impractical to implement, or (3) ineffective.

Since the remaining fuel savings--over 400,000 gallons a day--were attributable to fuel conservation procedures beyond the Agency's regulatory control, it is questionable whether they should have been included in its conservation accomplishments. (See p. 15.)

In 1975 nearly 400 million gallons of fuel at a cost of over $110 million were wasted because of delays in airline operations. Rather than getting better, airline delays increased from about 400,000 hours in 1969 to 500,000 hours in 1975 although airline operations decreased. The Agency has several procedures and is developing others to reduce delays, but to date these procedures have been ineffective. (See p. 24.)

To minimize the effects of extensive delays on fuel consumption, the Agency is developing a landing delay notification system at Chicago's O'Hare International Airport. Tests indicate that it can save fuel, but considerably more fuel could be saved if all aircraft were required to take ground rather than airborne delays when possible. (See pp. 28 and 44.)

The Agency's concern for reducing delays at major airports led to a task force study of delay causes at O'Hare. The study determined that annual delays there

--were significant (93,000 hours);

--cost the airlines $44.3 million;

--consumed 67 million gallons of fuel; and

--resulted from a series of factors, many of which are controllable, such as the number of flights that can be handled.

The study outlined a comprehensive program of delay reduction which, if implemented, can reduce delay costs by as much as $34 million.

A second task force is following up on the study's recommendations. Studies have been initiated at seven other major airports; however, the Agency has no definitive plans to expand these studies. Instead it is developing additional in-house capabilities that will permit it to perform other needed studies at reduced cost. GAO believes that, although this effort to reduce cost has merit, additional benefits might be realized by performing such studies now at other major airports. (See pp. 29 and 44.)

One of the Agency's regional offices developed procedures for metering and spacing arriving aircraft, which can save up to 170 million gallons of fuel annually. The Agency did not act on these procedures for 2 years. Progress is now being made to implement similar procedures at major airports, but nationwide implementation is still not a reality. (See p. 33.)

The Agency's efforts to abate noise, a responsibility it shares with the Environmental Protection Agency, can also conserve fuel, but conflicts with fuel conservation efforts have occurred at some airports. Airline proposals which would save 3 million gallons of fuel at one airport were rejected by the

Agency or were implemented slowly because of noise considerations. As a result, more than 3 million gallons of fuel were wasted. Noise abatement procedures at other airports also increased fuel consumption.

Both aircraft noise and fuel conservation are national issues, but the Agency has neither developed nor explored the feasibility of establishing program guidance for evaluating trade-offs between the two when conflicts occur. GAO believes that neither issue should be treated lightly or given precedence without evaluating the trade-off between each. (See pp. 35 and 44.)

GAO believes more attention to aviation fuel conservation is needed and it recommends that the Congress establish higher airline load factors as one of its major objectives and provide the Board with legislative guidance for achieving this objective. (See p. 45.)

GAO also recommends that the Secretary of Transportation direct the Federal Aviation Administration to give greater attention to fuel conservation by

--establishing a monitoring and reporting system to provide management with information on the effectiveness of aviation fuel conservation procedures, the frequency with which these procedures are used, and the fuel saved;

--requiring aircraft to take ground delays, when possible, when excessive delays are being incurred at a destination airport; and

--exploring the feasibility of establishing program guidance to evaluate trade-offs between noise abatement and fuel conservation objectives when conflicts occur and, if feasible, provide such guidance to its field offices, after consulting with the Environmental Protection Agency. (See p. 45.)

AGENCY COMMENTS AND OUR EVALUATION

The Civil Aeronautics Board stated that the Federal Aviation Act of 1958 precludes it from requiring compliance with its standard or any mimimum load factor. It also stated that studies cited in the report, which argue for higher load factors, were theoretically designed and considered the airline system as a collection of mutually exclusive routes between two cities.

GAO recognizes that the studies arguing for higher load factors are theoretical, although they were based on actual experiences of less regulated intrastate airlines. However, GAO believes the final outcome of deregulation and higher load factors will continue to remain theory without an actual test or experiment.

The Federal Energy Administration stated that GAO's conclusions regarding higher load factors and the need to give greater attention to fuel conservation appeared similar to its views. However, it believed the report lacked sufficient detail and depth to allow the Congress or the Secretary of Transportation to act and did not fully address agencies' responsiveness to certain provisions of the Energy Policy and Conservation Act.

GAO has revised the report to reflect additional information called to its attention and believes the report is in sufficient detail and depth to prompt action. The matters not fully addressed were outside the scope and timing of GAO's review.

The Federal Aviation Administration stated that

--the establishment of a monitoring and reporting system for its fuel conservation procedures was beyond its role in fuel conservation,

--it had no basis to dictate to the airlines where delays will be taken,

--GAO's discussion on the inefficiency of the air traffic control system ignored several important factors and accomplishments, and

--it recognized the need to study noise abatement/fuel conservation trade-offs as evidenced by actions it already had underway.

GAO continues to believe that the Agency should establish a monitoring and reporting system for its fuel conservation programs, that the agency has sufficient tools to require airlines to take ground delays, and that efficiency of the system has deteriorated.

The Environmental Protection Agency concurred with the recommendations and indicated that the Federal Aviation Administration should more fully investigate the use of auxiliary power (towing) to move aircraft on the ground for both noise abatement and fuel conservation.

Contents

ABBREVIATIONS

ATA	Air Transport Association of America
ATC	air traffic control
CAB	Civil Aeronautics Board
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAD	Fuel Advisory Departure Program
FEA	Federal Energy Administration
GAO	General Accounting Office

CHAPTER 1

INTRODUCTION

Aircraft are important to the U.S. transportation system as long-distance carriers of people and high-value goods. Speedy and convenient, air transportation has become a popular choice over other modes for medium and even short distances.

In 1976 U.S. airlines used an estimated 9.5 billion gallons of fuel to transport 223 million passengers. While automobiles consume the largest amount of energy (59 percent) used for transportation, the airlines use the second largest amount (10 percent), or about 3.5 percent of total U.S. oil consumption.

FEDERAL INITIATIVES TO CONSERVE FUEL

In a special message to the Congress on Energy Policy on April 18, 1973, the President said that all levels of government must provide leadership in energy conservation. Two months later he launched a drive to reduce expected U.S. energy consumption by 5 percent and directed the Federal Government to reduce its anticipated consumption by 7 percent in 1 year. He also directed the Department of Transportation's Federal Aviation Administration (FAA) and the Civil Aeronautics Board (CAB) to work with the Nation's airlines to conserve fuel by reducing flight speed and frequency.

As the 1973 energy crisis heightened, the Federal Government was forced to allocate fuel among petroleum users, including the transportation modes. In June 1974 the Federal Energy Administration (FEA) was established pursuant to the Federal Energy Administration Act of 1974 (15 U.S.C. 761) to insure that energy shortages were borne with equity and priority needs were met.

The Energy Policy and Conservation Act of December 22, 1975 (42 U.S.C. 6201), established new policies for Government agencies for conserving domestic energy supplies and using energy resources more efficiently. The act set energy conservation targets for broad categories of industry and all forms of transportation.

To determine the progress made by FAA, CAB, and other specified Federal agencies, section 382(a) of the act required them to

> "* * * report to the Congress within 60 days after the date of enactment of this Act with respect to energy conservation policies and practices which such agencies have instituted subsequent to October 1973."

Section 382(a) also directed each specified agency to report to the Congress within 120 days of enactment on the content and feasibility of their proposed programs for additional savings in energy consumption. The goal of these proposals was to reduce energy consumption in the first year by at least 10 percent of 1972 consumption.

In addition, section 382(a) of the act required each specified agency to report to the Congress within 1 year after enactment on

> "* * * any requirement of any law * * * or any major regulatory action which the agency determines has the effect of requiring, permitting or inducing the inefficient use of petroleum products, coal, natural gas, electricity, and other forms of energy, together with a statement of the need, purpose, or justification of any such requirement or such action. * * *"

The fuel crisis left a lasting impression by increasing the price of aircraft fuel by more than 150 percent. Fuel now accounts for about 19 percent of the operating cost of an aircraft compared to 12 percent in 1973. The following table shows this fuel cost increase in comparision to airline operations (take-offs and landings) and fuel consumption.

Year	Total number of airline operations--take-offs and landings	Fuel consumed by airlines	Average cost per gallon
	(millions)	(billions of gallons)	(cents)
1972	9.7	10.0	a/11.6
1973	9.9	10.4	12.8
1974	9.2	9.3	24.3
1975	9.2	9.2	29.2
1976	9.6	b/4.7	b/31.3

a/Second half of year only.

b/First half of year only.

FAA

FAA was established in 1958 to (1) regulate air commerce to foster aviation safety, (2) promote civil aviation and a national system of airports, (3) achieve efficient use of navigable airspace, and (4) develop and operate a common system of air traffic control and air navigation for both civilian and military aircraft.

To provide for the safe and efficient use of the navigable airspace, FAA operates an air traffic control (ATC) system, a network of 451 air traffic control towers, 25 air route traffic control centers, and over 300 flight service stations. ATC is the one area where FAA can contribute significantly toward fuel conservation. As one airline official stated:

> "Once an airplane departs, and is in the operating phase of flight, he (the pilot) is at the mercy of ATC. He is obligated to operate on routes and altitudes dictated by ATC. This brings up some very important questions. Is ATC routing aircraft along the most efficient route and altitude available? Is ATC making the most efficient use of all airspace available? Is * * * [a] circuitous route necessary to safe and efficient movement of traffic?"

In response to the President's 1973 fuel conservation program, FAA announced a seven-point fuel conservation program in November 1973, which was to be implemented within 90 days. In June 1974 the Administrator of FAA also adopted an intermediate program for aviation fuel conservation, which was to be implemented during 1974-76. (See ch. 3.)

In addition, FAA is looking for long-term jet fuel conservation actions. Long-term FAA alternatives to save fuel consist primarily of technological options for improving the ATC system.

FAA also is developing a Fuel Advisory Departure Program to reduce aircraft-engine-running time. This program is designed to conserve fuel by calculating and assigning an aircraft departure clearance time based on projected delays at the destination airport.

All of the above FAA efforts were included in FAA's February 1976 report to the Congress pursuant to section 382(a) of the Energy Policy and Conservation Act. FAA's second

report to the Congress in April 1976 described actions already underway and options available to FAA for increasing aviation fuel efficiency. FAA's third and final report on the energy efficiency of agency regulations was submitted to the Congress in December 1976.

CAB

CAB, an independent regulatory commission, has broad authority to promote and regulate domestic and international operations of the U.S. civil air transport industry. CAB authorizes (certificates) U.S. airlines to engage in interstate and foreign commerce and determines the legality (including increases) of air cargo rates and air passenger fares. It approves or disapproves proposed mergers, acquisitions of control, interlocking relationships, and agreements between airlines considering the interest of travelers, shippers, and other airlines which may be adversely affected. It also grants subsidies to airlines to finance air transportation to the Nation's small communities which would otherwise be without such services.

In October 1973 CAB authorized U.S. airlines to discuss flight frequency reductions to conserve fuel. Subsequently CAB approved agreements that resulted in reduced flights between 64 city pairs.

In November 1973 CAB relaxed the requirement that local-service airlines provide two daily round trips to intermediate stops on assigned routes. Thus, the airlines were permitted to reduce service at all intermediate points to one round trip 5 days a week. This reduced service, however, was based on a proposed fuel reduction which did not take place and, except in a few markets, service was not reduced. In December 1973 CAB also authorized airlines to suspend service temporarily--until June 1976--at certain points in their route systems.

In January 1975 CAB approved a joint application of two U.S. airlines for a temporary exchange of portions of their Pacific and transatlantic route systems, thereby reducing their fuel consumption. A similar agreement covering Pacific, Caribbean, and Bermuda routes was approved in July 1975.

These CAB energy-saving policies and practices instituted since October 1973 were reported to the Congress in February 1976 pursuant to the Energy Policy and Conservation Act. CAB's second report to the Congress in April 1976

described future prospects for improving fuel efficiency under then existing conditions. CAB submitted its third and final report to the Congress in February 1977 on the requirements of law or major regulatory actions which require, permit, or induce inefficient fuel use.

AIRLINE EFFORTS TO CONSERVE FUEL

Officials of five major airlines and three regional airlines told us that they had programs to conserve aviation fuel. These programs included such things as

--use of computerized flight plans;

--use of optimum altitude, speeds, routes, climbs, and descents;

--recalculating aircraft fuel loads;

--turning off unneeded engines while taxiing aircraft; and

--maximum use of flight simulators.

SCOPE OF REVIEW

We evaluated (1) CAB and FAA fuel conservation efforts on the airlines' daily operations and (2) the fuel conservation effects of increasing load factors.

We reviewed CAB and FAA energy policies, practices, and procedures; interviewed their officials; and reviewed their records. We also interviewed officials and obtained records from various airlines and airline associations. Our review was made at FAA and CAB headquarters in Washington; FAA's Southern, Southwestern, Great Lakes, Central Rocky Mountain, Western, and Northwest regions; and at selected FAA-ATC facilities.

CHAPTER 2

INCREASED LOAD FACTORS COULD SAVE MILLIONS OF GALLONS

Load factor--the ratio of occupied seats to available seats--is an effective method of measuring airline efficiency. In 1976 U.S. airlines achieved an industrywide passenger load factor of about 55 percent, with 45 percent empty seats. The airlines used an estimated 4.2 billion gallons to transport these empty seats, or enough fuel to fly a Boeing 727 more than 1.2 billion miles.

Since low load factors result when flight frequency is greater than passenger demand, higher load factors would necessitate reduced flight frequency, which could save millions of gallons annually. Neither the airlines nor the Federal Government have made major efforts to address this major waste of fuel since the fuel crisis of 1973 to 1974. We found that:

--CAB cannot require airlines' compliance with minimum load factors as a means of improving fuel efficiency.

--CAB efforts in 1973 to reduce domestic flight frequencies were canceled as a result of court action.

--FEA fuel allocations to the aviation industry in 1974, successful in reducing number of airline flights and increasing load factors, have since been relaxed.

Proponents of regulatory reform of the aviation industry claim that improved regulation could increase load factors to 60 percent or higher, saving as much as 300 million gallons of fuel annually. Several bills were introduced in the 94th Congress, and this matter is being further evaluated by the 95th Congress.

EFFECTS OF LOAD FACTORS ON FUEL CONSUMPTION

In 1976 U.S. airlines made about 4.8 million flights with a seating capacity of about 400 million. With an average load factor of about 55 percent for that year, about 180 million seats (the equivalent of 2.1 million flights) were empty. We estimated that over 4.2 billion gallons of fuel were used to transport these empty seats, enough fuel to fly a Boeing 727 more than 1.2 billion miles.

The low use of aircraft is illustrated by operations at Chicago's O'Hare International Airport. At yearend 1975 there was an average of 550 flights scheduled daily, 6 days a week, between Chicago and 11 other cities. Based on the load factors for these flights, 47 percent (the equivalent of 261 daily flights) were flown empty. We estimated that over 300 million gallons of fuel were used annually just to transport empty seats. Between Chicago and Los Angeles, for example, there were 97 flights daily. The load factor averaged 47 percent; the equivalent of 51 of the 97 flights, or an average of 2 planes each hour, were flown empty. Details on each of the 11 markets follow.

1975 Fuel Consumption for Equivalent Empty Planes Flying Between Chicago and Other Cities

	Total daily flights	Load factor percent (note a)	Equivalent empty planes	
			Number daily	Gallons consumed annually
				(000,000 omitted)
Los Angeles	97	47	51	95
Atlanta	57	49	28	18
Seattle	25	49	12	22
Dallas-Ft. Worth	49	48	25	21
Boston	39	43	22	21
New York (Kennedy)	22	49	11	9
Washington, D.C. (National)	61	59	25	16
San Francisco	56	53	26	52
Denver	41	51	20	19
Philadelphia	27	57	11	8
New York (La Guardia)	76	60	30	24
Total	550		261	305

a/Rounded to the nearest percent.

The low load factors in the flights between Chicago and the above cities are attributable to the high number of flights provided versus demand.

Reduced flight frequencies or use of smaller aircraft would yield higher load factors. Fewer flights also would help to reduce congestion at airports, a major cause of landing and take-off delays and the associated fuel waste. (See p. 24.)

CAB'S STANDARD LOAD FACTOR

In 1971 CAB established a 55-percent load factor for use in setting fares and approving fare increase for domestic trunk airline 1/ operations in the continental United States. CAB, however, does not have statutory authority to require airlines' compliance with its standard load factor.

The domestic trunk airlines first achieved the 55-percent standard on an industrywide basis in 1974, 3 years after establishment. If they had been required to comply with this standard from the start, they could have saved about 756 million gallons of fuel in 1972 and 1973, as follows.

Year	Actual airline load factor	Estimated gallons saved with a 55-percent load factor
	(percent)	(000,000 omitted)
1972	52.4	337
1973	51.9	419
Total		756

Since 1969 the data-base period CAB used in establishing the 55-percent load factor, two major events have altered air transportation:

--The introduction and rapid integration of wide-body, three and four jet engine aircraft into the airlines' fleet.

--Burgeoning fuel prices following the Arab oil embargo of early 1973 and the concomitant need for fuel conservation.

The price of aviation fuel, remarkably stable at about 11 cents a gallon in 1971 and 1972, had more than doubled by 1974 and has continued to rise since then. (See p. 2.) Concurrently, more seats on U.S. airline flights became

---

1/Trunk airlines include the largest airlines and provide most of the domestic air service.

available as wide-body jets, such as the B-747, DC-10 and L-1011 aircraft, were added to the arlines' fleet.

According to CAB, past increases in airline costs, including fuel, were charged to the public through higher fares--coach fares have increased about 26 percent since 1969--and if fuel prices continue to rise, this will provide impetus for even higher fares. This conversion of increased costs to fares decreases traffic. Accordingly, the balance between supply and demand will be continually altered, resulting in more empty seats.

An alternative to higher fares is to absorb these costs through more efficient operations--higher load factors. But this, just as higher fares, has an implied cost to the consumer. Fewer flights and seats would be available and the consumer's ability to move at the most desired time on the most desired flight would be limited. Thus, whether through higher fares or less service, the consumer will bear the burden.

In its April 1976 report pursuant to the Energy Policy and Conservation Act, CAB stated that because of the rise in fuel prices and the national program aimed at fuel conservation, it is reviewing its standard load factor to determine whether a higher standard should be established for ratemaking purposes. The table below shows our estimate of the fuel savings that could have been realized in 1976 had the domestic trunk airlines operated at load factors higher than the achieved load factor of 55.8 percent.

Load factor	Estimated 1976 gallons saved from higher load factors
(percent)	(000,000 omitted)
60	479
65	968
70	1,387
75	1,751

CAPACITY LIMITATION AGREEMENTS

Beginning October 1973 CAB authorized U.S. airlines to discuss reduced flight frequencies to conserve fuel. These discussions resulted in capacity limitation agreements between 9 airlines providing for a reduced number of flights between 38 city pairs. Similar agreements to reduce flights between 26 U.S. and foreign cities were entered into by 10 U.S. and foreign airlines.

CAB's report to the Congress, pursuant to the Energy Policy and Conservation Act (see p. 4), stated that these agreements saved about 260 and 140 million gallons annually in domestic and international service, respectively.

The Department of Justice filed petitions with the U.S. Court of Appeals for a review of CAB's July 1974 order renewing certain capacity limitation agreements. In United States v. CAB, 511 F.2d 1315 (1975), the Court ruled that although emergencies (fuel shortages) justified CAB's approval of capacity limitation agreements in October 1973, the conditions no longer existed at the time of its July 1974 order; therefore, the order had to be set aside. The ruling stated that CAB's approval of voluntary anticompetitive agreements, which confer an immunity against antitrust liability, must rest on a justification of serious transportation need or important public benefits, with need for CAB to show an appropriate factual predicate. The Court stated that the record in this case presented little more than speculation under emergency conditions that competitive market response would waste energy. Also it stated that there was no subsequent procedure, either for a hearing or an experiment in certain markets, and no system for testing or opportunity to examine CAB's assumptions as to the consequence of the competititve alternative.

After this decision, CAB terminated agreements covering domestic services. A CAB official told us that CAB had continued to approve capacity limitation discussions and agreements for international services but that as of May 1977 there had been no such agreements in effect or discussion authority outstanding for about the last 6 months.

Urban Systems Research and Engineering, in a study 1/ made for FEA, pointed out that a strong case could be made that capacity limitation (frequency reduction) agreements were not consistent with CAB's existing legislation to promote competition. The study stated that competition in a city-pair market is inherently unworkable in an environment with fixed prices where the airlines must all provide equal capacity and comparable service at peak hours, or suffer a competitive disadvantage. The study concluded that too many flights are scheduled at peak hours and the introduction

---

1/Conservation Paper Number 48, "Baseline Energy Forecasts and Analysis of Alternative Strategies for Airline Fuel Conservation," Office of Transportation Programs, FEA.

of wide-body jets by one airline has forced others to follow suit, resulting in excess capacity in many markets.

In addition, the study discussed other changes in the industry structure that could achieve reduced capacity, namely pooling agreements, alterations in CAB route awards, mergers, and Government control over schedules and routes.

FUEL ALLOCATIONS

Because of emergency fuel shortages during the 1973 energy crisis, FEA and its predecessors 1/ allocated fuel between the various transportation modes and other users of petroleum. Under the mandatory aviation fuel allocations initiated between November 1, 1973, and May 6, 1974, the airlines were to receive each month 95 to 100 percent of the fuel they used in the same month of 1972 (base level), provided suppliers had sufficient fuel available. An FEA official told us that because of fuel shortages from November 1973 through March 1974, suppliers generally did not have enough fuel to meet the airlines' base levels; therefore, the airlines received only a prorated share of the base. This prorated share ranged from 70 to 75 percent of base levels between November and December 1973 and from 75 to 95 percent of base between January and March 1974. As the crisis eased, allocation levels were relaxed. According to FEA almost all airlines were receiving 100 percent of base by May 1974.

During the fuel crisis the airlines curtailed service, reducing the number of flights on an average day by about 1,200. With fewer flights, load factors averaged 56 percent between November 1973 and March 1974 compared to 50 percent during the same period in 1972 and 1973. As the crisis eased, load factors just about returned to their precrisis level, 49 percent for the period November 1974 to March 1975. Although fewer flights undoubtedly accounted for higher load factors during the crisis, other factors also contributed. For example, an official from the Air Transport Association (ATA) told us that because of gasoline shortages during the crisis, more people used the airlines rather than the automobile for shorthaul transportation, then returned to the automobile after the crisis eased.

1/Fuel allocations were initiated on November 1, 1973, by the Office of Oil and Gas, Department of the Interior, and continued by the Federal Energy Office and FEA.

The Urban Systems Research and Engineering study (see p. 10) stated that fuel allocations are probably the most direct method of conserving airline fuel and that the allocations established to handle the 1973 energy crisis showed that allocations could effectively reduce aircraft fuel use without severely limiting the ability to travel by air. The study indicated that allocations that limit the growth of airline fuel use could significantly reduce forecasted fuel consumption (baseline) for domestic passenger service and increase load factors. Details follow.

Rate of growth allowed in airline fuel utilization	Fuel use		Load factor	
	1980	1990	1980	1990
	(billions of gallons)		(percent)	
Baseline	9.88	16.31	55.1	55.6
3.5 percent per annum	8.96	12.64	60.5	71.2
2.4 percent per annum	8.23	10.47	65.7	86.0

The study also stated that if fuel allocations are used to reduce future consumption, it might be useful to remove some restrictions on airline service to allow airlines full flexibility and inventiveness in using their allocations. For example, greater freedom to unilaterally curtail service could create more opportunities for fuel conservation. Alternatively, the fuel allocation regulations could mandate capacity reduction discussions among carriers on routes where average load factors are below some specified level.

As an alternative, the study indicated that increases in fuel prices, either directly or by additional Federal fuel taxes, could in principle achieve fuel reductions comparable to those implied by fuel quotas (allocations). The study indicated that these fuel reductions would be possible even if increased prices or taxes were passed on to passengers in higher fares, provided airline capacity were reduced to compensate for the reduced demand resulting from higher fares. The study also discusses other alternatives, such as regulation of the overall fare level and fare discrimination.

REGULATORY REFORM OF THE AIRLINES

Several studies on the effects of relaxed CAB controls over the airline industry indicate that this action might increase load factors to 60 percent or higher. If accomplished by a net reduction in flights, fuel savings could

result. If accomplished by increased passenger demand, induced by lower fares, fuel use on a passenger basis would be lower, thus optimizing airline fuel efficiency. Several bills that would reform Federal regulation of the airline industry were introduced in the 94th Congress, and this matter is being further evaluated by the 95th Congress.

Dr. Thoedore E. Keeler, in a 1972 study on "Airline Regulation and Market Performance," assumed that in the long run the removal of CAB's regulatory powers over airline industry entry, exit, and fares would result in improved airline efficiencies, including a load factor of about 60 percent in high-density markets. Dr. Keeler applied these efficiencies to 30 high-density routes served nonstop by CAB-regulated airlines. He found that published air fares for these routes were 20 to 95 percent higher than the fares that might have existed in the long run had the assumed efficiencies been achieved on these routes by the airlines in a fully competitive airline industry.

Our report 1/ on Dr. Keeler's results stated that his assumption that unregulated airlines could achieve a 60-percent load factor in high-density markets was reasonable based on average load factors achieved by certain less regulated intrastate airlines and by trunk airlines in the decade before their substantial use of jet aircraft. However, we expanded and modified Dr. Keeler's study in several respects. For example, our study included markets of various densities, distances, lengths, and load factors. To approximate load factor variations, we assumed the airlines would achieve an industrywide load factor of 60 percent, but varied the load factor by trip length in the same proportion as actually occurred during each year analyzed, 1969-74. Therefore, flights in high-density, medium-distance markets were assumed to achieve more than a 60-percent load factor, and flights in short- and long-distance markets were assumed to achieve less than 60-percent load factors. We believed this adjustment better showed what would occur if the trunk airlines achieved an industrywide 60-percent load factor.

Based on our overall extensions and modifications to Dr. Keeler's study, we stated that our study offered reliable

---

1/"Lower Airline Costs Per Passenger Are Possible in the United States and Could Result in Lower Fares" (CED-77-34, Feb. 18, 1977).

evidence that airlines could have profitably operated at a lower cost per passenger from 1969-74, resulting in lower fares of between $1.4 billion to $1.8 billion per year. These results could have been produced mainly by putting more seats on each aircraft, filling more of the seats available on each flight (higher load factors), increasing average aircraft use, and using some of the more efficient aircraft available while maintaining average annual rates of return on investment comparable to those of the entire corporate sector. Although our study found the argument for greater reliance on a more competitive market to determine service and price persuasive, our study did not answer a number of questions about what might happen if the form of airline regulations were changed or if regulations were abandoned completely.

Another study, entitled "Energy Impacts of Proposed Changes in Airline Regulations" and prepared in 1975 for FEA by Dr. George W. Douglas, showed that industrywide average load factors would increase from current levels to an average at or exceeding 62 percent if changes in airline regulation as proposed in the administration's draft bill (H.R. 13504, 94th Cong., 2d sess.) cause the industry to vigorously compete with prices. Dr. Douglas stated that this would reduce fuel use by 2.5 to 7.8 percent a passenger mile. Dr. Douglas' study also indicates that relaxation of certificate restrictions and limitations which would enable airlines to fly more direct routings with fewer stops could further reduce fuel use by 2.5 percent or more a passenger mile. He stated that fuel savings could also result from substituting more appropriately sized aircraft in very small or very large markets.

For the level of traffic carried in 1974, Dr. Douglas' study showed aggregate fuel savings would range from 500 to 700 million gallons annually. However, because of the expansion of air traffic from increased passenger demand induced by lower fares, Dr. Douglas concluded that fuel savings would be less, perhaps on the order of 100 million to 300 million gallons annually.

In its February 1977 report to the Congress pursuant to the Energy Policy and Conservation Act, CAB stated that it had recommended to the Congress that commercial air transport, following a period of gradual and monitored transition, should be more substantially governed by competitive market forces. CAB also believed that any legislative changes that result in an increase in economic efficiency may also result in a more efficient use of energy.

CHAPTER 3

FAA'S FUEL CONSERVATION PROGRAMS: ARE THEY WORKING?

FAA estimated that its seven-point and intermediate fuel conservation programs would reduce aviation fuel consumption by more than 1.2 million gallons a day. This equals about 440 million gallons a year, or about 5 percent of the estimated fuel consumed by airlines in 1976. It had no assurance, however, that the fuel conservation procedures under its control saved 772,800 gallons a day. FAA did not monitor program implementation or require reports on the frequency that fuel conservation procedures were used and the fuel saved. In several instances, the procedures were (1) infrequently used, (2) impractical to implement, or (3) ineffective.

FAA's remaining fuel savings, an estimated 432,600 gallons a day, were attributable to fuel conservation procedures beyond its regulatory control. As such, it is questionable whether they should have been included in FAA's fuel conservation accomplishments.

REPORTED ACCOMPLISHMENTS

FAA, in its February 20, 1976, report to the Congress pursuant to the Energy Policy and Conservation Act, stated that its seven-point jet fuel conservation program implemented in November 1973 was designed to save up to 20,000 barrels, or 840,000 gallons, of fuel a day. FAA also stated that the seven-point program had been refined and improved since November 1973 and was still producing fuel savings.

FAA stated that its intermediate fuel conservation program, adopted in June 1974 for implementation during 1974-76, would save an estimated 8,700 barrels, or 365,400 gallons, a day. In total, FAA estimated that the seven-point and intermediate programs would save over 1.2 million gallons a day, or about 440 million gallons a year.

The procedures included in each program and the estimated savings attributable to each one are shown below. These procedures are discussed in more detail in subsequent sections of this chapter.

	Estimated gallons saved a day
Seven-point jet fuel program:	
Revised gate-hold procedures (note a)	105,000
Revised flow control procedures (note a)	117,600
Increased use of optimum cruising speeds	16,800
Revised ATC procedures (note a)	159,600
Turning off unneeded engines while taxiing aircraft	252,000
Increased use of simulators for training and testing (note a)	138,600
Accelerated construction of runway and taxiway improvements	50,400
Total	840,000
Intermediate program:	
Aircraft towing	(b)
Improvement of major landing system	(b)
Additional/improved runway exits	113,400
Optimum descent landing (note a)	252,000
Reduce lateral spacing for simultaneous approaches (note a)	(c)
Total	365,400
Total	1,205,400

a/Procedures for which program implementation and actual accomplishments were unknown.

b/FAA determined that these procedures were not economically feasible to implement.

c/Fuel savings were not estimated by FAA.

PROGRAM IMPLEMENTATION AND ACTUAL ACCOMPLISHMENTS ARE UNKNOWN

FAA had no assurance that fuel conservation procedures under its control (see note a, above) saved 772,800 gallons a day. Although FAA headquarters had issued instructions on the fuel conservation programs, no guidelines were established for monitoring program implementation and for reporting on the frequency that procedures were used and fuel savings realized.

In the five regions visited, FAA officials told us that they were not responsible for monitoring implementation of their fuel conservation programs. FAA regional officials also told us that all the procedures in FAA's conservation programs could save fuel if implemented by those responsible--FAA air traffic facilities, airlines, and airports. However, as discussed below, FAA's fuel conservation procedures were (1) used infrequently, (2) impractical, or (3) ineffective; there is no assurance that reported fuel savings were realized.

Gate-hold procedures

Under FAA's revised gate-hold procedures, an aircraft was to be held at the terminal with its engines off when a departure delay exceeded 5 minutes. FAA estimated that this procedure would save 105,000 gallons of fuel a day over prior gate-hold procedures, which were not to be used until departure delays exceeded 15 minutes. The revised procedures were used infrequently or, in some cases, were impractical.

At the Dallas-Fort Worth Regional Airport and at Chicago O'Hare International Airport, FAA officials told us that because of a gate shortage it was not possible to hold aircraft at the gates and yet accommodate incoming aircraft without compounding incoming delays.

At the Atlanta and the San Francisco International Airports, FAA officials told us that gate-hold procedures were used occassionally, but the frequency of use was unknown. FAA officials at San Francisco International Airport also told us that it was not practical to impose gate-hold procedures until departure delays reached 10 to 12 minutes. According to these officials, imposing gate-hold for shorter delays would cause gaps in the takeoff and landing sequence due to the time it takes to taxi from the terminal to the runway takeoff area.

FAA regional officials told us that gate-hold had not been successful at Denver's Stapleton International Airport because of a lack of airline cooperation. FAA officials at the airport confirmed that gate-hold was not practical or effective. They said reserved departure times for an aircraft were missed because reservations were being made before the aircraft was ready for departure.

FAA instructions at the Los Angeles International Airport provided for using gate-hold procedures at night in connection with noise abatement procedures and when bad weather and traffic conditions create departure delays. FAA officials estimated that gate-hold procedures were used 15 percent of the year. During a 20-minute observation at the airport, we observed that gate-hold was not used although from five to six planes were at all times awaiting takeoff at the end of the runway with at least a 10-minute wait for each.

FAA officials at the Minneapolis-St. Paul and the Seattle-Tacoma International Airports told us that gate-hold was seldom used because departure delays of 5 minutes or more were infrequent.

Flow-control procedures

To reduce fuel consumption, FAA revised certain of its ATC procedures to improve the flow of air traffic into congested airports, considering demand and the capacity of ATC. The revised procedures included:

--Dissemination of information and instruction to field facilities, selected airline offices, and the Air Force when arrival, departure, or enroute delays exceed 30 minutes at an airport.

--Increased spacing between aircraft.

--Spacing aircraft over fixes (navigational points) in equal units of time.

--Routing traffic around congested areas.

--Restricting flight operations at a facility to a specific number of aircraft an hour.

--Holding aircraft at departure airport until congestion at destination airport is relieved.

In its February 1976 report to the Congress, FAA contended that these measures reduce airborne delays by 25 percent and save 117,600 gallons of fuel a day. These fuel savings, however, are probably overstated because revised flow-control procedures have not reduced airborne delays.

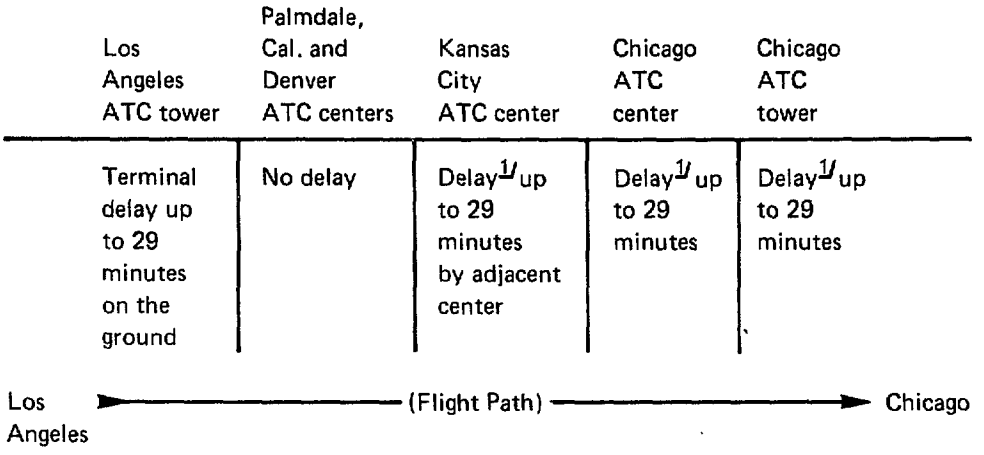
Based on airline data and FAA estimates, we estimated that total airborne delays were about 14,245,000 minutes

in 1973. In comparison, FAA estimated airborne delays at about 14,255,000 minutes in 1975. This reduction of about 20,000 minutes represents a reduction of less than 1 percent--far from the 25-percent reduction claimed by FAA. During the same time period, actual airline operations (takeoffs and landings) decreased by almost 700,000 from about 9.9 million to about 9.2 million between 1973 and 1975 respectively, or about 7 percent. When the decreased operations are considered with the small reduction in airborne delays, the average airborne delay for each operation increased slightly, as shown below.

Year	Total airline operations	Total airborne delays (in minutes)	Average airborne delay per operation (in minutes)
1973	9,900,000	14,245,000	1.4
1975	9,200,000	14,225,000	1.5

FAA reported that it reduced nationally the number of aircraft delayed over 30 minutes by more than 30 percent between 1973 and 1975. This accomplishment, however, is misleading in that FAA's reporting system permits an aircraft to be delayed as much as 4 times for up to 29 minutes each, or a total of 1 hour and 56 minutes, without reporting a delay of 30 minutes or more. As illustrated in the following diagram, for a flight from Los Angeles to Chicago, the Chicago center can hold aircraft in its airspace when delays at the Chicago tower are approaching 30 minutes. When delays at the Chicago center start approaching 30 minutes, an adjacent center can hold the aircraft in its airspace, and when delays there approach 30 minutes, the Los Angeles tower can hold the aircraft on the ground. A delay at any one point for less than 30 minutes would not be reported, although the total delays enroute could far exceed 30 minutes.

DIAGRAM OF POSSIBLE DELAYS ENCOUNTERED BY A FLIGHT BETWEEN LOS ANGELES AND CHICAGO



1/Delays can take the nature of diverting or circling the aircraft.

FAA's program to reduce the number of aircraft delayed over 30 minutes or more, however, has helped to conserve fuel. Aircraft delayed on the ground at the departure airport use no fuel, and aircraft delayed enroute at higher altitudes use less fuel than aircraft delayed at lower altitudes awaiting landing into congested airports. However, because airborne delays have not been noticeably reduced, we question whether savings of the magnitude FAA reported were realized. Fuel savings could have been determined had FAA monitored program implementation and required reports on the frequency with which these procedures were used.

ATC procedures

In revising its ATC procedures to conserve fuel, FAA also amended its policies and instructed FAA air traffic controllers to

--allow aircraft in the area of the terminal during periods of congestion to operate at higher altitudes where less fuel is used,

--assign cruise altitudes best suited to fuel efficiency, and

--minimize circuitous routings.

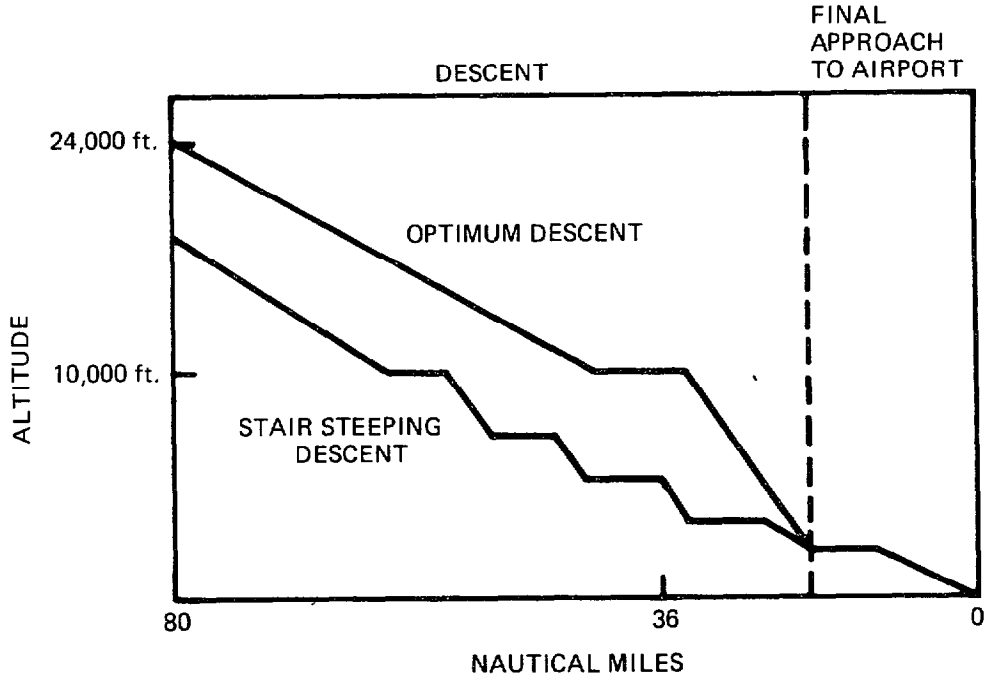
FAA estimated that these revised procedures could save 159,600 gallons of fuel a day. We found, however, that there is no reliable information on the number of times the procedures were used or fuel savings realized.

Simulators

In December 1973 FAA amended its regulations to permit airlines to increase simulator use for pilot training to reduce the number of training flights. FAA estimated that simulators would save 138,600 gallons a day; however, FAA had not obtained reports from the airlines concerning the use of simulators and related fuel savings. After FAA's February 1976 report, ATA told FAA that simulators were eliminating 177,000 landings and takeoffs annually, enabling the airlines to save 170 million gallons annually.

Optimum descent landings

FAA recognized that aircraft landing approaches to an airport, when taken in stages--stair stepping--could result in premature descent to and level-off at low altitudes where fuel consumption is high. To remedy this, in 1973 FAA authorized use of optimum descent landing which can be described as a continuous unrestricted descent, except when level flight is required for speed reduction, from a cruise altitude to the assigned altitude for final approach to any airport. A comparison of the two procedures follows.



According to FAA, a Boeing 727 landing, for example, consumes about 84 fewer gallons in a continuous descent than in one taken in steps. FAA estimated that, on the basis of average traffic activity, optimum descent landings would save at least 252,000 gallons a day. We found, however, that although FAA-ATC personnel at two airports had either accepted or were testing this procedure; others had rejected it.

FAA adopted optimum descent landings for use at the Kansas City International Airport in June 1976 after 2 years of development at that airport. Two major airlines estimated between 149 and 269 gallons of fuel were saved on each landing. At O'Hare Airport, optimum descent landings were tested for several months in 1976. Since the initial test, some modifications have been made, and new tests were still being conducted as of October 1976.

Optimum descent landings were not used at Seattle-Tacoma International, Denver's Stapleton, Los Angeles, and San Francisco International Airports. FAA's Western Region officials told us they had tested the procedure and concluded that, although the concept had considerable merit and would save fuel, traffic would be slowed during peak hours.

In November 1976 FAA issued an order to require FAA facilities at all airports where high performance aircraft operate to develop an operational plan, including implementation dates, to provide for maximum use of optimum descent landings as part of a local-flow traffic management program. (See p. 33.) The order also requires each FAA region to evaluate the progress and effectiveness of this program. It indicates that optimum descent landings can save about 50 gallons of fuel for each landing, about 250 million gallons a year based on an average of 5,000,000 arrivals annually.

Lateral spacing

FAA amended its procedures in September 1974 to reduce the lateral spacing between aircraft runways from 5,000 feet to 4,300 feet. This change would permit some airports to begin using parallel runways concurrently, thus increasing their landing and departure rate. The change also would enable other airports with limited or restricted land area to add and operate parallel runways. FAA, however, had not estimated any fuel savings as a result of this change.

Lateral spacing was not a factor at the airports visited, except Los Angeles International. There, parallel runway

capability existed before the change in regulations, but the change added runways which could be operated parallel to other runways.

PROGRAMS BEYOND FAA's CONTROL

Of the 1.2 million gallons of estimated fuel savings a day due to FAA's fuel conservation, over one-third, about 433,000 gallons, was attributable to energy conservation procedures developed and implemented by the airlines and airport operators. Because these procedures were beyond FAA's regulatory control, their inclusion in FAA's February 1976 report to the Congress seemed inconsistent with the requirements of the Energy Policy and Conservation Act.

Section 382(a)(1) of the act stated that FAA was to report within 60 days after the act's enactment on the energy policies and practices which it instituted after October 1973. We believe the language of the act and its legislative history indicate that the policies and practices to be reported were to be those under FAA's regulatory control and not energy conservation policies and practices developed and implemented by those that FAA regulates. Our view of section 382(a)(1) is supported by the conference report (S. Rept. No. 94-516), which states that the agency "* * * shall study and prepare a report * * * assessing its policies and reviewing its authority with respect to energy conservation * * *."

The following table shows those energy conservation procedures that were beyond FAA's regulatory control but were included in its report to the Congress on fuel conservation programs, those responsible for their development and implementation, and the estimated fuel savings claimed by FAA in its report.

Procedure	Group responsible for development and/or implementation	Estimated gallons saved a day
Increased use of optimum cruising speeds	Airlines	16,800
Taxiing aircraft with fewer engines	Airlines	252,000
Accelerated construction of runway and taxiway improvements	Airport operators	50,400
Additional/improved runway exits	Airport operators	113,400
Total		432,600

CHAPTER 4

FAA PROGRAMS HAVE NOT EFFECTIVELY DEALT WITH A MAJOR CAUSE OF FUEL CONSUMPTION PROBLEMS: AIRPORT CONGESTION AND DELAYS

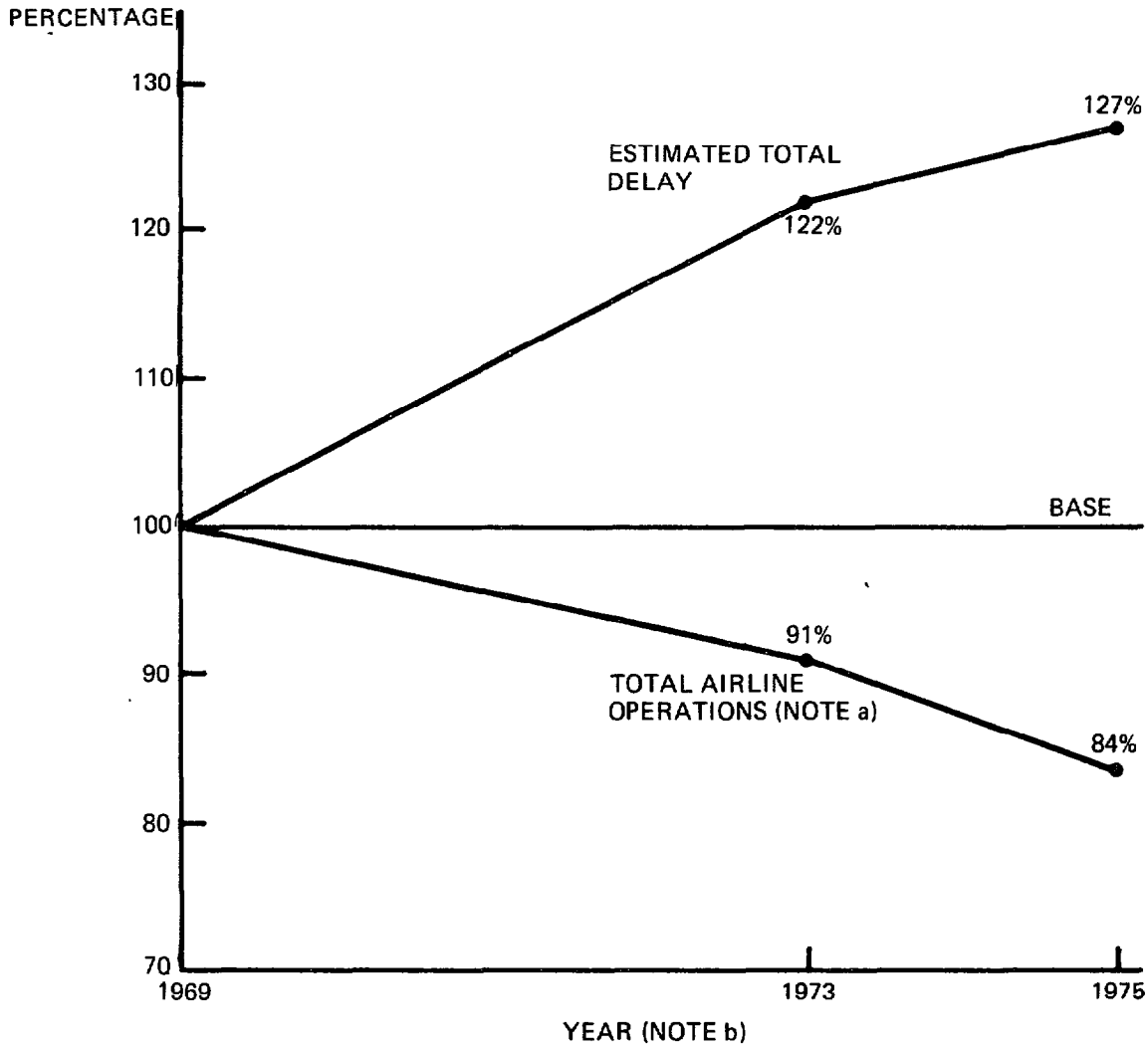
Since 1969 airline delays have increased although airline operations (takeoffs and landings) have decreased. Because of delays the airlines wasted nearly 400 million gallons of fuel in 1975. In addition, this wasted fuel cost the airlines over $110 million. Over 40 percent of the delays in 1975 occurred at five major airports. FAA efforts to improve the efficiency of its ATC system to reduce delays have been ineffective to date, but recent FAA efforts undertaken appear promising.

INCREASED INEFFICIENCY IN THE ATC SYSTEM

The ATC system became increasingly less efficient in handling airline operations between 1969 and 1975. During this period, airline arrival and departure delays (as estimated by FAA on the basis of data provided by the airlines) increased from about 24 million to over 30 million minutes in 1969 to 1975, respectively. During this same period, airline operations decreased from about 11 million to about 9 million in 1969 to 1975, respectively. Using 1969 as the base year, the graph on the following page shows the percentage increase in total delays and the percentage decrease in airline operations. The increasing gap between delays and operations depicts the decreased efficiency.

Delays at 25 airports accounted for about 75 percent of the 30 million minutes of delay incurred in 1975. Five airports--Chicago's O'Hare, Atlanta, New York's Kennedy and La Guardia, and San Francisco International--accounted for over 40 percent of all delays; O'Hare incurred the most, 14 percent. In 1975 delays at O'Hare totaled 4.3 million minutes, an increase of more than 1 million minutes since 1969. In comparison, total aircraft operations at O'Hare decreased from about 676,000 in 1969 to 668,000 in 1975.

AIRLINE DELAYS AND OPERATIONS



a Decreases in airline operations at an airport can be offset by increases in other types of aircraft operations; however, total aircraft operations decreased in 7 of the 10 highest delay airports between 1969 and 1975.

b Delay data was not available for years other than those shown.

EFFECT OF DELAYS ON FUEL CONSUMPTION

Fuel consumed during delays depends on the type of aircraft and on whether the delay occurs on the ground or in the air. Using FAA's estimate of ground and airborne delays and the fuel usage by a Boeing 727 (the most common aircraft in commercial use), we estimated that over 395 million gallons of fuel were consumed because of delays in 1975. According to FAA estimates, delays cost the airlines over $195 million in operating expenses in 1973, and we estimate that about 26 percent of this was for fuel. Estimates of the airlines' operating costs attributable to delays in 1975 were not available, but we estimate that the 395 million gallons of fuel alone cost the airlines about $133 million.

FAA EFFORTS TO REDUCE DELAYS

FAA has several procedures to reduce delays but to date its efforts have been ineffective. Revised flow-control procedures were implemented in 1973 as part of FAA's seven-point fuel conservation program; however, they did not noticeably reduce airborne delays. (See p. 18.) Also FAA established quotas at five major airports as to the number of aircraft operations that can be handled during peak hours. Quotas at least at one of these airports were not being enforced.

FAA is implementing a metering and spacing program to help reduce airport congestion. (See p. 33.) Although this program will not eliminate delays entirely, it does attempt to minimize the effects of delays on fuel usage. FAA is also developing a fuel advisory departure program, intended to alert airlines of extreme delays at destination airports and permit them to adjust their flight plans accordingly. FAA tests of this program show that fuel can be saved.

FAA participated in a recently completed task force study of delays at Chicago's O'Hare Airport. The task force suggested a comprehensive program of delay reduction measures, and a new task force has been established to follow up on implementation of the recommendations of the first task force. FAA also has similar studies underway at seven other airports having major delays.

Quotas at O'Hare

To provide relief from excessive delays at O'Hare and four other major airports, FAA amended its regulations in December 1968 to establish quotas on the number of aircraft landings and takeoffs. Since then, the regulations have been amended to eliminate quotas at one airport and to liberalize the time periods quotas are in effect at two of the other four airports. The regulation, as amended, restricted total hourly operations at O'Hare between 3:00 p.m. and 7:59 p.m. each day as follows.

User	Operations allowed an hour
Airlines	115
Air taxis	10
Other	10
Total	135

After airlines mutually agree on their proportion of the quota, they may schedule their arrivals and departures without regard to other users' schedules. If the airlines do not use their entire quota of 115, air taxis can use all or part of the remainder. Other aircraft can use any part not used by the airlines and air taxis. The regulations are violated only if total operations during the specified hours exceed 135.

Our analysis of FAA reports on O'Hare showed that total operations--takeoffs and landings by airlines, air taxis, and other aircraft--exceeded the quota by 35 percent of the measured quota hours from January 1 through June 30, 1976. There were 910 quota hours during this period, but FAA had reports on only 848 of these.

	Measured quota hours		Percent of measured quota hours in which quota was exceeded
	In month	Operations exceeded 135 quota	
January	139	15	11
February	129	38	30
March	128	34	27
April	149	63	42
May	153	66	44
June	150	78	52
Total	848	294	35

As shown in the following table, our further analysis of FAA reports on O'Hare showed that quotas during the period January 1 through June 30, 1976, were exceeded because:

--FAA allowed the airlines and air taxis to schedule more operations than their quota of 125 during 41 percent of the quota hours.

--FAA allowed other aviation users to schedule operations in excess of their quota of 10 during 36 percent of the quota hours.

	Measured quota hours in month	Scheduled operations exceeded 125 (note a)		Other operations exceeded 10	
		Hours within quota period	Percent of measured quota hours	Hours within quota period	Percent of measured quota hours
January	139	38	27	27	19
February	129	51	40	31	24
March	128	61	48	42	33
April	149	69	46	62	42
May	153	57	38	74	48
June	150	72	47	66	44
Total	848	348	41	302	36

a/Quota hours in which scheduled operations exceeded 125 did not always coincide with those quota hours in which actual operations exceeded the 135 quota because of early or late arrival and departure delays.

Fuel advisory departure program

On January 18, 1974, FAA issued procedures for developing a Fuel Advisory Departure Program (FAD) for testing at Chicago's O'Hare Airport. The major objectives of the program are to (1) reduce fuel consumption, (2) contain arrival delays to 60 minutes or less within the Chicago ATC center's area, and (3) distribute delays equally among aircraft.

After a series of simulations, FAA revised the FAD procedures in June 1975. Under these procedures FAD was to be initiated at O'Hare when weather, equipment failures, or other constraints at the airport reduced the airport's arrival capacity to such an extent that delays could be forecast to exceed 1 hour for an extended period. To conserve fuel when FAD procedures were used, FAA alerted airlines of extreme delays at O'Hare so that the airlines could--subject to the availability of airspace, ATC system

efficiency, and safety--take a ground delay at the departure or an intermediate airport, an airborne delay, or both a ground and an airborne delay.

The FAD procedures were first tested at O'Hare on January 7, 1976. On March 1, 1976, the FAA Administrator reported that, as a result of the test, 658,446 gallons of jet fuel had been saved. These savings were determined by comparing the time aircraft spent holding on the ground and in the air on January 7, 1976, with delays on a similar day when FAD was not used. The FAA Administrator also stated the results had been verified with the airlines.

Only two airlines had reported fuel savings to FAA, which totaled about 9,000 gallons. One major airline participating in the test disagreed with FAA on the reported savings and, in general, with the overall success of the test. Three airlines indicated that FAD's basic objective--to minimize engine-running time--was sound, but that accurate, timely forecasting of delay times was impossible to achieve because FAA lacked real-time computer capability to assess the numerous variables affecting traffic at congested airports. Four airlines also indicated that FAD attempts to control delays, rather than to eliminate them.

FAA officials told us that the reported savings of 658,446 gallons was inaccurate. Subsequently, the FAA Administrator, in testifying before a subcommittee of the House Committee on Appropriations on March 15, 1976, stated that FAD saved "something like 110,000 gallons." FAA also testified that FAD could be used 58 times a year and save over 40 million gallons annually. FAA officials, however, told us that they expected to use FAD only 10 to 15 times a year.

FAA issued revised FAD procedures on June 8, 1976. Subsequent tests were conducted for 10 hours on December 6, 1976, and for 2 hours on December 20, 1976. FAA's analysis of the December 6 test indicated that FAD saved 184,147 gallons of fuel. Because 52 percent of the aircraft that could have accepted ground delays took airborne delays, FAA estimated that an additional 185,518 gallons could have been saved had all aircraft choosen ground delays. Data was not available on the December 20 test.

Delay task force studies

Late in 1974 FAA, Chicago, and the airlines serving that city formed a task force to study air traffic delays at

O'Hare. According to its July 1976 report, the task force found that O'Hare experienced significant annual delays, an estimated 93,000 hours, which

--cost the airlines $44.3 million,

--consumed 67 million gallons of fuel, and

--caused delays of 4.6 million passenger hours.

An earlier FAA study in January 1974 on airport capacity at eight major airports, including O'Hare, had concluded that nearly all delays were attributable to weather problems and most severe delays were weather related and largely unavoidable. The O'Hare task force study, however, questioned whether such delays were largely unavoidable. According to the study, delays may result from a series of factors, many of which are controllable (such as the number of flights that can be accommodated by ATC facilities), which compound into severe system delays when triggered by weather or other problems.

The principal causes of delays at O'Hare were identified by the task force as

--the proximity of other airports to O'Hare;

--ATC rules, regulations, and procedures;

--physical properties of the airspace and airfield;

--weather;

--operational procedures; and

--aircraft operating demand.

Although it did not identify any individual panacea to the problem, the study report outlined a comprehensive program of measures which, if implemented, could dramatically reduce the current level and cost of delays at O'Hare. The study identified current delay reduction options in three areas which could reduce the cost of delays $16 million to $34 million. The options in each area and the amount of reduction in delay cost follow.

Area/options	Reduction in delay cost (000,000 omitted)
Air traffic operating procedures:	$11-$16
--Develop and implement a plan to select the optimal runway configuration to minimize delay.	
--Develop and implement a real-time delay information system to use in selection of optimal runway configurations and control traffic volume.	
--Immediately implement procedures to reduce separations when existing equipment indicates wake vortices (wind turbulence) are not a problem.	
Management of demand:	3- 13
--Enforce quota rule.	
--Assess the cost of changes in the level and distribution of demand as a basis for reevaluation of airline scheduling policy or adjustment of current quota regulation.	
--Refine flow-control procedures controlling O'Hare traffic under abnormal operating conditions in order to limit delays.	
Airfield improvements:	2- 5
--Plan and coordinate airfield construction to minimize delay.	
--Implement specific physical improvements.	
Total	$16-$34

Two elements in FAA's engineering and development program which could have a major impact on O'Hare's future capacity and delays and which the O'Hare task force study also identified are (1) a wake vortex advisory/avoidance system and (2) an upgraded ATC automation in the form of automated metering and spacing. The task force believed that without these two ATC improvements, O'Hare's capacity would continue to deteriorate through the post-1985 period and delay costs would escalate due to projected increased use of larger aircraft. The study stated that measured against the conditions that would occur without them, the potential net delay savings from these two proposed ATC improvements ranged from $13 to $47 million annually in future periods. The study recommended that FAA give the highest priority to developing and installing wake vortex and metering and spacing equipment and, if necessary, adjust the timetable of other engineering and development projects so that these two projects could be expedited.

FAA officials told us that a new task force had been formed to follow up on implementation of the first task force's recommendations. This task force met in December 1976 and had another meeting scheduled for February 1977. One FAA official told us that action taken on the recommendations before completion of the study has already resulted in improvements for 1976--one airline operating at O'Hare reported that delays have stayed the same although its operations increased 10 percent.

An FAA official said that besides the O'Hare task force study, similar studies are underway at seven other major delay airports--Atlanta, Denver, Kennedy, La Guardia, Los Angeles, Miami, and San Francisco--and that these studies are expected to be completed in 18 to 24 months. An FAA official told us that these seven airports and O'Hare had been selected for study based on ATA's identification of airports having major delay problems.

These eight airports account for almost 50 percent of all delays, and FAA has no definitive plans for making studies at this time at other major airports experiencing delays. FAA officials, however, told us that FAA was currently developing additional in-house capabilities--current studies were being performed in part on a contract basis--that would permit other needed studies to be made at reduced cost. To develop additional in-house capabilities, FAA plans to work closely with those contractors involved in the seven ongoing studies, and it expects to complete this project within 24 months.

CHAPTER 5

FAA DELAYED IMPLEMENTING FUEL CONSERVATION PROCEDURES THAT COULD SAVE MILLIONS OF GALLONS

For over 2 years, FAA headquarters did not act on fuel efficient ATC procedures developed by FAA's Southwest Region that could save U.S. airlines up to 170 million gallons of fuel annually. Although progress is now being made, nationwide implementation of these procedures is still not a reality.

DELAYS IN NATIONWIDE IMPLEMENTATION OF LOCALLY DEVELOPED FUEL EFFICIENT PROCEDURES

More than 3 years ago FAA's Southwest Region developed and began a metering and spacing program to reduce the amount of circling, speed control, and vectoring (change in course) FAA air traffic controllers imposed over aircraft at low altitudes during descent and landings at the Dallas-Fort Worth Regional Airport. Under this program spacing of aircraft begins when aircraft are still at high altitudes and fuel usage rates are low. The preplanned time sequencing technique involves formulating an arrival time for each aircraft as it passes over a fixed point and adjusting the spacing between aircraft to maintain required minimum time intervals between landings.

This program was started in June 1973 at Dallas' Love Field. FAA Southwest Region officials told us that system development and refinement had been handled entirely by the region because attempts to obtain headquarters assistance in its development had been unsuccessful. In January 1974 the system was placed into operation at the new Dallas-Fort Worth Regional Airport.

In January 1975 FAA's Southwest Region proposed to FAA headquarters that the metering and spacing program be in nationwide use by January 1977. The region estimated that 168 million gallons of fuel could be saved annually if the program were employed throughout the country. Region officials stated that the program also would help minimize air traffic controller workloads by reducing radio contacts with aircraft and the number of aircraft under surveillance.

The two major airlines having the most flights into and out of the Dallas-Fort Worth Airport endorsed the program and encouraged FAA to adopt it for use at other major airports experiencing landing delays.

Also, in January 1976 ATA recommended to the then new FAA Administrator that local flow procedures, such as those developed for the Dallas-Fort Worth Regional Airport, be adopted during 1976 at other major airports when practicable.

In March 1976 FAA announced that a local flow-traffic management system, combining the metering and spacing concept with optimum descent landing (see p. 21), was to be tested at the Denver Airport and on November 15, 1976, FAA issued guidelines to formally establish this program. Each FAA air traffic facility is to conduct an indepth review and revise, as necessary, procedures at all airports where high performance aircraft operate. It is also to forward to FAA headquarters, within 150 days, operational plans, including projected dates for implementing local flow-traffic management procedures. According to the guidelines, every effort will be made to implement the program as soon as possible, but no later than

--12 months after the date of the guidelines for the 16 major airports listed in appendix I,

--16 months for the remaining major airports, and

--20 months for all other airports where high performance aircraft operate.

The 16 major airports listed in appendix I were required to establish a metering and spacing program. Those air traffic facilities where total implementation is impracticable were to provide adequate justification to the region for approval, and the regional analysis of approved alternate plans are to be submitted to FAA headquarters. In addition, each region must continually evaluate the progress and effectiveness of the programs.

CHAPTER 6

FUEL CONSERVATION OR NOISE ABATEMENT

FAA, in consultation with the Environmental Protection Agency (EPA) is responsible for protecting the public from unnecessary aircraft noise. FAA efforts to abate noise can also help conserve fuel, but at times these objectives can result in conflicts. For example, proposals to improve fuel efficiency were rejected or were implemented slowly because of noise considerations. In addition, some existing noise abatement procedures resulted in increased fuel consumption. FAA has not developed program guidance to determine the trade-offs that can be made between noise abatement and fuel conservation efforts when such conflicts occur and, according to an FAA official, this matter has not been explored to determine whether it is feasible to establish such guidance.

NOISE ABATEMENT AND FAA RESPONSIBILITIES

An estimated 6 million people are subjected to aircraft noise that creates a significant annoyance. Aircraft noise disturbs the normal activities of airport neighbors--their conversation, sleep, and relaxation--degrades their quality of life, and decreases their property value.

Legal suits are being filed in some communities because of these problems. Over the past 5 years, airport proprietors have paid over $25 million in legal judgments or settlements and have spent over $3 million in legal fees, expert testimony, and similar defense efforts. In response to public opposition to noise, some airports have imposed or are considering various use restrictions. These measures include discontinuing night operations, limiting airport use to certain types of aircraft, and limiting the number of landings and takeoffs.

The Federal Aviation Act of 1958 (49 U.S.C. 1421), as amended by the Aircraft Noise Abatement Act of 1968 (49 U.S.C. 1431), and the Noise Control Act of 1972 (42 U.S.C. 4901), gives FAA responsibility for protecting the public from unnecessary aircraft noise and sonic boom, for prescribing and amending standards for measuring, and regulations for controlling and abating aircraft noise and sonic boom. The act requires FAA, in considering proposed aircraft noise regulation, to (1) consult with the Secretary of Transportation and EPA and (2) consider whether proposed regulations

are consistent with the highest degree of safety in air commerce and transportation (FAA's basic mission), economically reasonable, technologically practical, and appropriate for a particular aircraft type.

Although the control and abatement of aircraft noise and sonic boom were to rest with FAA, the Noise Control Act requires EPA to (1) study the adequacy of FAA flight and operation noise controls and present aircraft noise emission standards, the implications of achieving levels of cumulative noise exposure around airports, and additional measures available to airport operators and local governments to control noise and (2) submit recommendations for regulations to FAA, which EPA believes are necessary to protect the public health and welfare. The act requires FAA to publish EPA's proposed regulations in the Federal Register; hold public hearings on them; and to adopt, reject, or modify them within a reasonable time. Our report entitled "Noise Pollution--Federal Programs To Control It Have Been Slow and Ineffective" (CED-77-42, Mar. 7, 1977) discusses the progress in finalizing aviation noise control regulations and the lack of coordination between FAA and EPA.

The Department of Transportation's aviation noise abatement policy of November 18, 1976, states that FAA's existing authorities preempt the authority of State and local governments and airport proprietors in the areas of airspace use and management, air traffic control, aviation safety, and the regulation of aircraft noise at its source. The policy states that the power and authority of airport proprietors is limited to such things as the selection of airport sites, land acquisitions, and airport design and operations, provided the use of this authority does not interfere with Federal regulatory responsibilities over airspace management and national and international air commerce. Authority of State and local governments is limited to land-use controls and other police measures not affecting aircraft operations.

FAA has adopted, where possible, air traffic and airspace management operational procedures to help control noise at and around particular airports. For example, airport approaches have been designed to avoid residential neighborhoods. At some airports, landings and takeoffs are made over water. Steep climbs are also used over water to get aircraft higher on takeoffs than they would be otherwise when they reach inhabited areas. Where aircraft must climb over residential areas, they often do so with reduced power to minimize excessive noise from greater engine thrust. Some FAA fuel conservation procedures, such as optimum descents and increased use of simulators (see ch. 3), not only conserve fuel, but also abate noise.

EFFECTS OF FAA NOISE ABATEMENT ACTIONS ON FUEL CONSUMPTION

In January 1974 a task force representing the airlines using the Seattle-Tacoma International Airport made four proposals for revisions to ATC procedures there, which they believed would reduce fuel consumption.

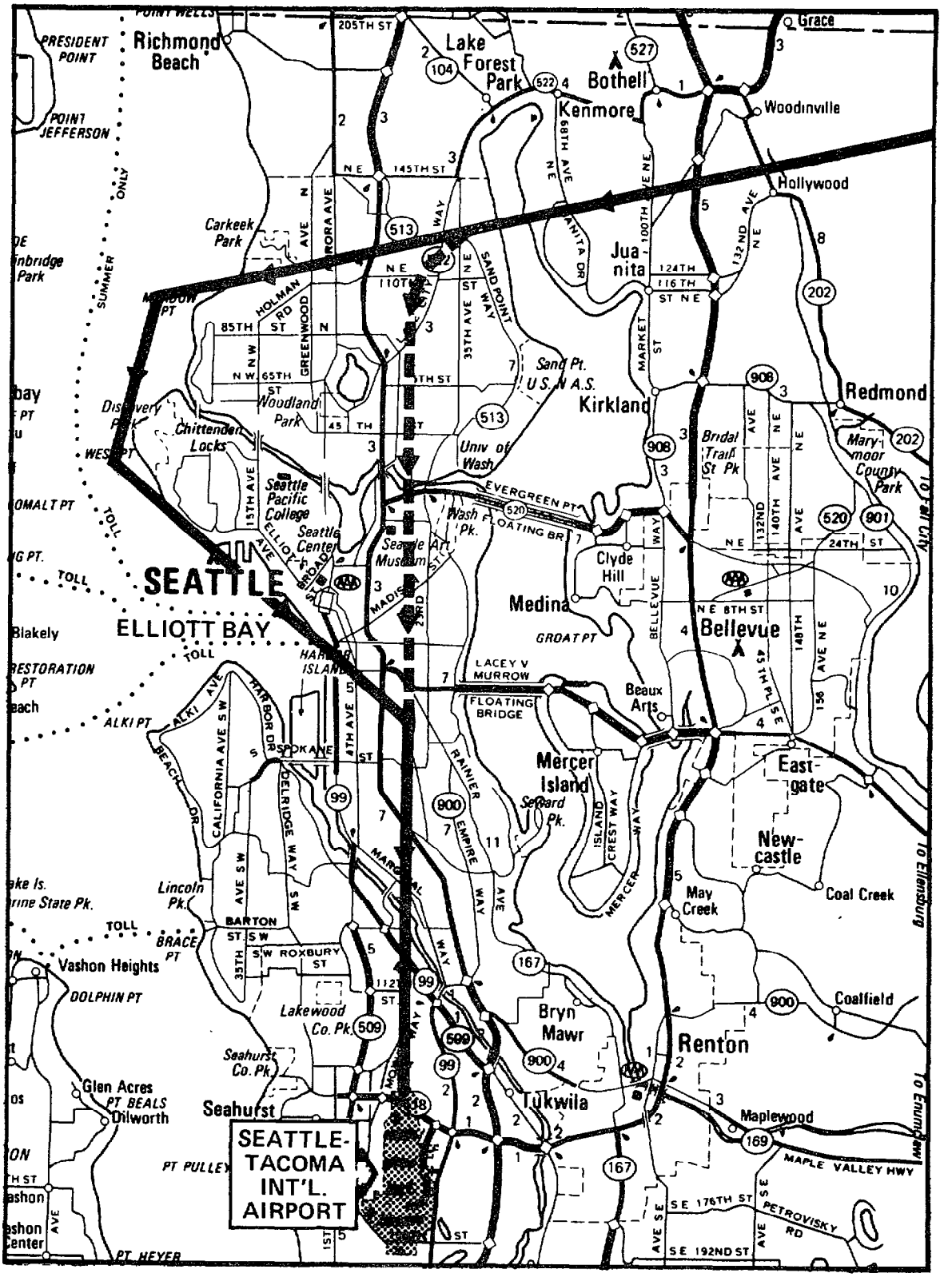
FAA's Northwest Region was aware of the additional fuel consumption resulting from existing ATC procedures at the airport. The regional director, however, believed that any significant change in procedures would be strongly opposed by citizen and civic groups because the people within 10 to 15 miles of the airport were extremely noise-sensitive and well-organized. For this reason, FAA accepted one of the proposals, did not accept two others, and finally accepted another over a year later. Airline estimates show that FAA's refusal to implement two proposals resulted in an additional 2.2 million gallons of fuel being used yearly and the delay in adopting one proposal resulted in an additional 1 million gallons being used.

One proposal suggested that aircraft inbound from the southeast be routed directly over Olympia, Washington, into Seattle-Tacoma. This change, which affected only one airline, was estimated to reduce average flight time for each arrival by 9 minutes and save 134,000 gallons of fuel yearly. FAA's Northwest Region accepted this proposal in February 1974.

Another proposal concerned aircraft departing from the Seattle-Tacoma Airport for cities in the eastern or southeastern part of the country and taking off to the north. The proposal requested that these aircraft be permitted to turn right 8 miles from the runway if they had reached at least 4,000 feet altitude. The airlines estimated this change would reduce average flight time for each departure 5 to 7 minutes and save 914,000 gallons of fuel yearly. In March 1975, about 14 months after the change had been proposed, FAA's Northwest Region notified the airlines that it was implementing the proposed change on a test basis to determine the noise impact on the community. After 7 months of testing, FAA had received only one citizen's complaint about noise from the revised right turn procedure and decided to continue its use permanently. The airlines estimated that during the 14 months before the procedure was adopted, 1 million gallons of fuel were used by following the old procedures.

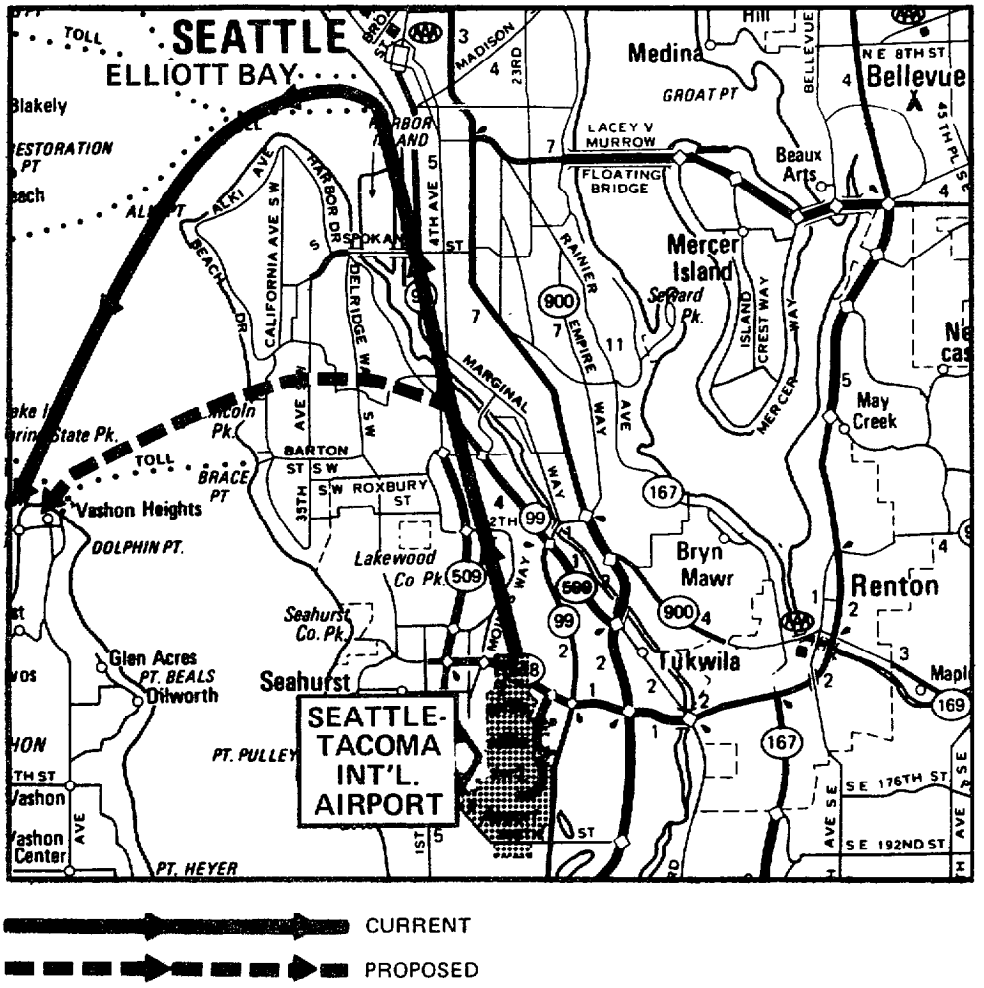
The airlines also proposed to revise the routing of aircraft arriving at Seattle-Tacoma from the east to make a more direct approach to the airport during clear weather. As shown in the map on the following page, in good weather aircraft fly west to Puget Sound 17 miles north of the airport, then turn south and approach the airport over Elliot Bay. The airlines proposed that aircraft be allowed to fly over the city to intercept the runway's final approach about 8 miles out, reducing the mileage flown for each arrival 38 miles. This route is normally used during restricted visibility conditions. The airlines estimated this change would reduce average flight time by about 5 minutes and save 731,000 gallons of fuel yearly. FAA did not accept this proposal, however, because it would have increased noise in heavily populated areas of Seattle.

FLIGHT PATHS FOR ARRIVALS FROM THE EAST LANDING AT SEATTLE-TACOMA AIRPORT



Another airline proposal would allow departing southbound aircraft to take off to the north and make a left turn south of Elliot Bay upon reaching an altitude of 5,000 feet. The airlines estimated that making this turn would reduce average flight time by 5 minutes for each southbound departure and save 1.5 million gallons of fuel yearly. FAA's Northwest Region rejected this proposal because it would have increased noise in a heavily populated and highly noise-sensitive area. The map below shows the difference between the current and proposed flight paths.

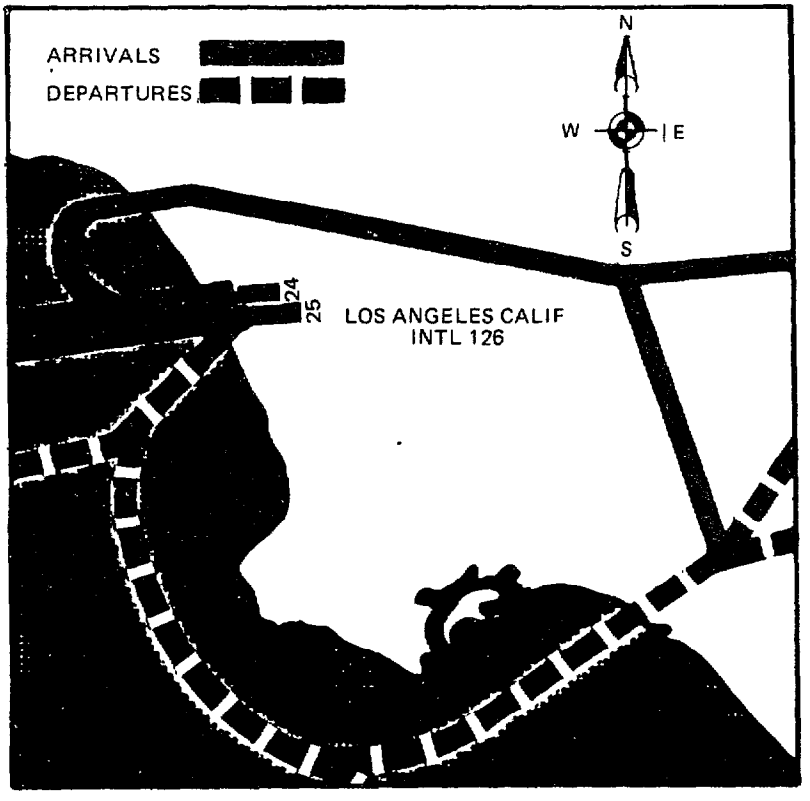
FLIGHT PATHS FOR SOUTH BOUND DEPARTURES



At the Los Angeles International Airport, the noise abatement procedures require arriving and departing aircraft to use an over-ocean route between 12:00 and 6:30 a.m. According to ATA officials, this route adds 18 to 26 miles for about 53 aircraft arriving from, or departing for, eastern airports during this period, thus increasing the mileage, flight time, and fuel consumption of these aircraft.

The over-ocean route, as shown by the map below, also requires arriving aircraft to land to the east and departing aircraft to take off to the west. To insure flight safety and facilitate the movement of arriving and departing aircraft, arrivals and departures are handled in batches; that is, a number of arrivals are landed one after the other, and then a number of departures take off one after the other. To do this, arriving aircraft must circle in the terminal area, causing additional fuel usage. ATA estimated that about 60 percent of the arrivals (about 38 out of 63 aircraft arrivals) on the over-ocean approach must circle before landing, using about 380 gallons of fuel for each circle.

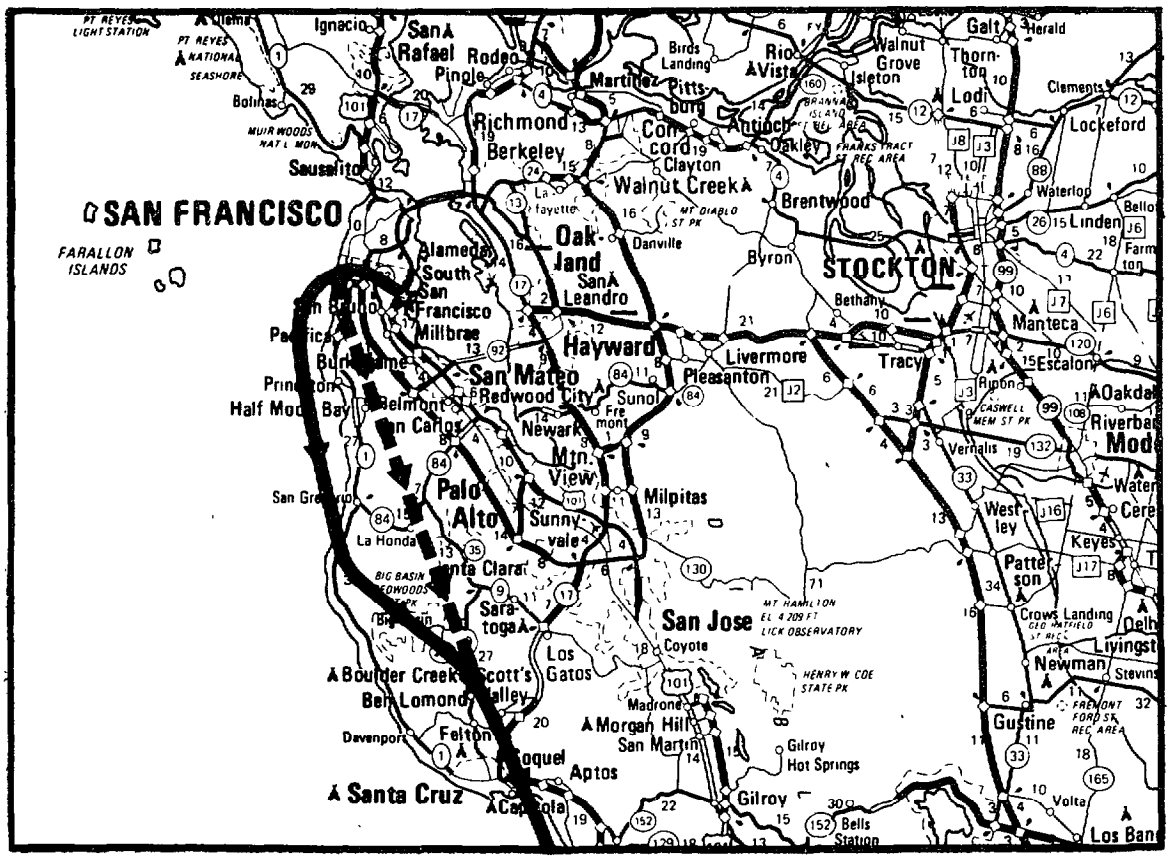
OVER-OCEAN ROUTE FOR ARRIVALS FROM, AND DEPARTURES TO, THE EAST



FAA-ATC officials responsible for directing aircraft into and away from the San Francisco International and Metropolitan Oakland International Airports told us that they revised arrival and departure routes to reduce fuel consumption. However, they said some circuitous arrival and departure routes, although not fuel efficient, were still used to reduce noise. For example, to reduce noise in communities south of San Francisco, one of the departure

routes from San Francisco Airport adds between 5 to 7 miles to the flight; a more direct route could be used if fuel conservation was a primary consideration.

NOISE ABATEMENT DEPARTURE ROUTE FROM SAN FRANCISCO AIRPORT



NOISE ABATEMENT ROUTE

FUEL CONSERVATION ROUTE

At Chicago's O'Hare Airport, FAA-ATC policy requires changing runways every 8 hours for noise abatement purposes. A July 1976 FAA task force study at O'Hare (see p. 29) indicated that a disproportionate number of these runway changes occur near the beginning of or during peak operating periods and escalate the level of delays, increasing fuel consumption. In addition, the study indicated that the most efficient runway configuration--used only 5 percent of the time because of noise and other considerations--could result in an 8-percent increase in O'Hare's capacity. The study also indicated that the most efficient runway configuration could be used without hindering FAA's efforts to spread the noise impact equitably among all populated areas around O'Hare. Increases in O'Hare's capacity would help reduce congestion and associated delays (see p. 24) and therefore save fuel.

CHAPTER 7

CONCLUSIONS, RECOMMENDATIONS, AGENCY COMMENTS, AND OUR EVALUATION

CONCLUSIONS

Section 382(a) of the Energy Policy and Conservation Act indicates that the Congress wanted to be informed of CAB's and FAA's efforts to conserve energy since the 1973 energy crisis; their proposed programs for additional savings in energy; and any law, or major regulatory action which required, permitted, or induced the inefficient use of petroleum products. This report demonstrates that aviation fuel conservation has not received the Government's fullest attention and that more could be done to conserve aviation fuel.

An increase in load factors above the 53- to 55-percent range of recent years could substantially improve the fuel efficiency of U.S. airlines. Although any significant increase in load factors may have an implicit cost to the public because of the reduction or elimination of flight services to some communities, the potential for fuel conservation warrants further action by the industry and the Federal Government to achieve improvements in load factors. Achievement of higher U.S. load factors should be a major objective of any regulatory reform by the Congress.

Although FAA reported that its fuel conservation programs were saving 1.2 million gallons of fuel a day, it had no assurance that these programs were working. If FAA had monitored program implementation and had required reports on the frequency that program procedures were used and fuel was saved, it would have realized that its fuel conservation programs were not always used, practical to implement, or effective. FAA overstated its accomplishments by including in its fuel conservation program procedures beyond its regulatory control. FAA's recent order to require its regional offices to evaluate the effectiveness of one of its procedures in its fuel conservation program--optimum descent landings--should be expanded to provide for monitoring the entire program.

Airport congestion increases the flight times of many airline flights, resulting in a waste of millions of (1) gallons of fuel, (2) hours of delays to passengers, and (3) dollars in unnecessary operating costs to the airlines.

FAA efforts to reduce congestion, primarily through quotas and flow-control procedures, have been ineffective.

Other initiatives undertaken by FAA, however, offer promise for reducing airport congestion and delays or minimizing their impact on fuel consumption. FAA's development of a Fuel Advisory Departure Program at Chicago's O'Hare Airport indicates that this program, when fully developed and expanded to other airports, could save a considerable amount of the fuel now consumed by extensive delays. However, more fuel could be saved in this program if all aircraft were required to take ground, rather than airborne, delays when gates and space at the departure airport permit this.

Also, the study of delays completed at O'Hare has identified measures which can reduce the cost of delays there by $16 million to $34 million, and studies are now underway at seven other major delay airports. Although FAA has no definitive plans now for making studies at other major delay airports, it is developing additional in-house capabilities that will permit it to perform such studies at a reduced cost. This effort to reduce cost has merit; however, additional benefits might be realized by performing such studies now at other major delay airports.

Other matters which we believe indicate that FAA has not given its fullest attention to conserving aviation fuel include

--failure to help one of its regions develop fuel efficient ATC procedures for metering and spacing aircraft and delays in accepting this concept for nationwide implementation and

--failure to develop and provide to field offices program guidance for evaluating the trade-offs between noise abatement and fuel conservation objectives.

Noise abatement and fuel conservation can be complementary but can also result in conflicts, such as those that occurred at some airports reviewed. Since both issues are of national importance, no one issue should be taken lightly or given precedence over the other without fully evaluating the trade-offs between each. To resolve conflicts when they occur, FAA should explore the feasibility of establishing program guidance for evaluating trade-offs between noise abatement and fuel conservation objectives and, if feasible, provide such guidance to its

field offices. This effort should be undertaken in consultation with EPA because of its responsibilities for noise.

RECOMMENDATION TO THE CONGRESS

In our prior report (see p. 13), we recommended that the Congress provide CAB legislative guidance defining current national objectives for air transportation and the extent to which increased competition should be used to achieve those objectives. To achieve increased fuel efficiency in the airline industry, we recommend that the Congress establish higher airline load factors as one of its national objectives and provide legislative guidance for achieving this objective.

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary direct FAA to give greater attention to fuel conservation. Specifically, FAA should:

--Establish a monitoring and reporting system to provide management with information on the effectiveness of fuel conservation procedures, the frequency with which these procedures are used, and the fuel saved.

--Require aircraft involved in the fuel advisory departure program to take ground delays when possible.

--Explore the feasibility of establishing program guidance to evaluate trade-offs between noise abatement and fuel conservation objectives when conflicts occur and, if feasible, provide such guidance to its field offices after consulting with EPA.

AGENCY COMMENTS AND OUR EVALUATION

CAB

CAB stated it had no authority to require the airlines to comply with its standard or any minimum load factor. It specified that section 401(e)(4) of the Federal Aviation Act of 1958 (49 U.S.C. 1371(e)(4)) precludes CAB from imposing any term restricting the airlines' rights to add to or change schedules, equipment, accommodations, and facilities for performing the authorized transportation and services.

CAB stated that our illustrations on the potential fuel savings from operations at Chicago's O'Hare Airport (see p. 7)

were subject to misinterpretations and should be eliminated. CAB stated that excluding an equivalent of 261 daily flights in the Chicago market to save 300 million gallons of fuel, as shown by our report, implies that all remaining flights would operate with 100-percent load factors. CAB stated that this implication was not only totally impractical, but would also generate intolerable levels of passenger rejection considering the strong peaks of demand by season, day of week, and hour of day.

In addition, CAB stated that our cited studies, which argue for higher load factor standards (see p. 12), were theoretically designed and consider the airline system as a collection of mutually exclusive city pairs. CAB believed this was an unrealistic description of the character of supply and demand as it exists in the industry today. CAB stated that its staff was reviewing a massive body of daily traffic and capacity data supplied in its Domestic Load Factor Case, which it hoped would make possible for the first time a determination of the amounts of passenger rejection that could be expected if higher load factors were achieved through changes in supply. It stated that an analysis of this data would be available in the near future.

A 100-percent load factor would be needed to eliminate the equivalent of 261 daily flights in our Chicago illustrations. We recognize that a 100-percent load factor is unrealistic, but the illustration was used to show that there is room for substantial improvement.

The studies we cite that argue for higher load factors are theoretical as to what will actually happen if the airlines are deregulated, but these theories are based on the actual experiences of the less regulated intrastate airlines. The daily traffic and capacity data obtained and now being analyzed by CAB should shed additional light on this subject. However, without an actual test or experiment, the final outcome of deregulation will remain theory.

FEA

FEA stated that our conclusions appeared similar to the views expressed previously by FEA toward achieving conservation in the air sector, specifically

--higher load factors should be an integral part of any conservation effort and

--CAB and FAA need to give fuel conservation greater attention.

FEA, however, did not believe our recommendations were developed in sufficient detail and depth to allow either the Congress or the Secretary to implement legislation or programs aimed at eliminating energy inefficiencies. FEA stated that our discussion of CAB's regulatory practices and policies lacked sufficient depth and analysis, which may be why there were no recommendations to CAB. FEA believed a complete and balanced report should have included an in-depth examination of CAB policies and procedures which will continue to play a major role in determining future airline load factors despite the movement toward regulatory reform.

FEA also believed that agency response to the Energy Policy and Conservation Act has been somewhat passive and that our report would be remiss if it did not include

--a review and analysis of the reports submitted under section 382(a)(3) of the act and

--each agency's progress, or lack thereof, in response to section 382(b) of the act, which requires the issuance of an energy impact statement for all major regulatory actions (the definition of "major" to be determined by each agency through rulemaking proceedings).

Our report shows the tremendous waste in jet fuel that results from the unused capacity of our airlines and demonstrates in sufficient depth and detail that this waste has been largely ignored. Further, the report discusses four major areas which offer opportunities for increasing load factors to reduce this unused capacity and conserve fuel or use it more efficiently. In addition, the report draws attention to another study which discusses some of these same areas as well as others.

Because the Congress is attempting to reform the regulatory structure of the airline industry, one of the major factors having an impact on load factors, we believed it was appropriate to direct our recommendation to the Congress. By providing CAB with legislative guidance for increasing fuel efficiency through higher load factors, the Congress in effect would be requiring CAB to achieve a load factor that the Congress considers reasonable. Such a mandate should favorably affect the way CAB exercises all its regulatory powers. If complete regulatory reform or a mandate for CAB is not forthcoming, the report contains sufficient information on other measures that the Congress could take to help increase load factors and thus conserve fuel.

FAA and CAB reports pursuant to section 382(a)(3) of the act pertain to laws and regulations which induce the inefficient use of fuel. FAA and CAB issued these reports in December 1976 and February 1977, respectively, when our review had been substantially completed; therefore, they were not reviewed in detail.

We also did not review FAA's and CAB's efforts to comply with section 382(b) of the act. The issuance of regulations defining major actions for which energy impact statements will be required does not in itself conserve fuel, which was the area of our concern. However, agency efforts to promptly comply with the requirements of this section with the issuance of meaningful regulations also indicates an agency's desire to give energy conservation the attention it deserves. In this respect, it took CAB about a year to issue proposed regulations and FEA's comments on them indicate that CAB's proposals were less than meaningful. FAA issued proposed regulations on March 31, 1977. Although this was 15 months after the law's enactment, FAA had issued interim guidance in February 1976 to require energy consumption to be considered for each regulatory action promulgated.

FAA

FAA stated that our recommendation that FAA establish a monitoring and reporting system for its fuel conservation procedures reflected a basic misunderstanding of FAA's role in fuel conservation. FAA viewed its role as one of promoting and encouraging fuel conservation by system users and providing a safe, efficient systems environment within which fuel conservation techniques or strategies may be practiced by the users, as illustrated by its recent airspace procedural modifications to accommodate profile (optimum) descents. FAA said it had no statutory authority to require compliance with fuel conservation programs and that the success of such programs requires the cooperation of controllers, airlines, and airport operators. Further, it stated that it had neither the staff nor resources to monitor program effectiveness and believed this, if required, should be assigned to FEA or the soon-to-be-formed Department of Energy.

In response to our recommendation that aircraft be required to take ground delays when possible in FAA's fuel advisory departure program, FAA stated that participation in this program is strictly voluntary and that there is no basis for FAA to dictate to the airlines where delays will be taken. FAA, however, stated the FAD program is in the

financial interest of the airlines and this alone should motivate them to achieve maximum savings from the program. In addition, FAA stated it was gathering data it hopes will influence the airlines to accept ground delays.

FAA stated that our discussion in chapter 4 on the efficiency of the ATC system ignored several important factors and accomplishments. FAA stated that, although airline operations have declined, general aviation operations have increased significantly. In addition, the introduction of wide-body jets during this period has required greater separation between aircraft because of wake vortex problems with safety, the primary consideration. FAA stated that, as a result, delays have increased due to limited airport capacity rather than a decline in the ATC system's efficiency. FAA stated that wide-body jets have enabled airlines to carry more passengers a flight, which has led to greater efficiency. FAA stated that air carrier revenue ton miles a gallon, which it believed was a better measure of efficiency than aircraft operations, had risen over 30 percent since 1969.

FAA stated that it recognized the need to study noise abatement/fuel conservation trade-offs as evidenced by actions already underway in this area. (See p. 37.) FAA was hopeful that one of its studies would yield guidance for application where operational flight changes proposed for environmental purposes impact negatively from a fuel conservation sense.

FAA's revised gate-hold, flow control, and ATC procedures were designed for implementation by ATC facilities and air traffic controllers. Also FAA's field offices were directed to revise their procedures to provide for maximum use of profile descents in accordance with specific requirements prescribed by FAA. Surely when an agency establishes procedures or procedural requirements for implementation by its field offices, its role is more than that of encouraging or promoting compliance. In addition, FAA has sufficient power and tools to assure that pilots and aircraft comply with ATC instructions. For example, under gate-hold procedures air traffic controllers must clear the aircraft to leave the gate or the airport, and under ATC procedures controllers are to allow aircraft to operate at higher altitudes and assign cruise altitudes best suited to fuel efficiency.

In authorizing increased use of simulators for pilot training, FAA's role is to promote and encourage as it is

in the case of those programs beyond its regulatory control. (See p. 23.) However, even these efforts should be monitored to determine where its promotional efforts should be directed.

Since FAA established these fuel conservation programs and many of the related procedures require implementation by its own facilities, FAA should monitor them. FAA has directed its field facilities to evaluate the progress and effectiveness of profile descents and local flow-traffic management (see pp. 22 and 33), and it should assign the necessary staff and resources to monitor all its fuel conservation efforts. An effective monitoring and reporting system would enable FAA to determine whether field offices are maximizing the use of these procedures and would provide data on the frequency with which these procedures were used, thus enabling more reliable estimates of the fuel saved. In addition, periodic reports from the airlines should be requested to confirm the effectiveness of FAA's efforts and to provide data on the effectiveness and fuel saved for fuel conservation procedures beyond FAA's direct control.

A reading of the FAD procedures indicates that this program was intended to be more than voluntary. Under these procedures FAA was to have the authority to assign later departure clearance times to reflect delays at the destination airport, to spread delays equitably among all system users, and to approve and disapprove airline requests to take airborne delays. If the judicious use of these powers is inadequate to assure aircraft take ground delays when possible, FAA could make such procedures mandatory by adopting them as regulations.

Concerning the ATC system's efficiency, general aviation operations may have increased significantly nationwide, but at the 25 airports experiencing the greatest delays and accounting for almost 75 percent of all delays, total operations, including both general aviation and airlines, decreased by almost 1 million between 1969 and 1975. Decreases in operations occurred at 19 of the 25 airports and increases occured at six airports. Wide-body jets do require greater separation, but these jets accounted for only about 14 percent of the hours flown by all turbine-powered aircraft in 1975.

FAA's comment that delays increased because of limited airport capacity rather than a decline in the ATC system's efficiency implies that FAA has little control over airport capacity. Such implications, however, are inconsistent with

other FAA statements. For example, in its fiscal year 1978 budget hearings, FAA stated that savings in traffic delays and fuel costs of a more efficient ATC system could offset any extra research and development cost. Also, FAA's 10-year national aviation system plan for 1977-86 estimates that 40 percent of delays could be reduced by airport and ATC system improvements, use of secondary airports, and upgrading existing or building new airports. Regarding airport improvements, FAA administers an airport and airway development program to identify the type and cost of development needed for airports and provide grants for airport planning and development. Further, Chicago's O'Hare delay task force study indicated that FAA could do more to minimize delays or their impact.

Air carrier revenue ton miles per gallon is a more useful measurement of fuel efficiency than a measurement of ATC system efficiency. Aircraft operations have been the traditional means of measurement in FAA; for example, they are used to account for delays over 30 minutes (see p. 19), establish ATC towers, determine ATC tower and center staffing requirements, and measure controller productivity.

The 30-percent increase in revenue ton miles per gallon since 1969 shows that airlines have become more fuel efficient by reducing their level of operations, introducing wide-body jets with greater capacity, and increasing passenger load factors from 50 to 55 percent. Although the introduction of the wide-body jet has enabled airlines to carry more passengers on a flight, the full potential of these aircraft has not been realized. CAB data on departures in the continental United States in 1974 showed that 62 to 70 percent of the wide-body jet departures had load factors of 50 percent or less and, when adjustments were made to reflect standard seating arrangements, 78 to 82 percent of wide-body jet departures had load factors of 50 percent or less.

EPA

EPA concurred with the general recommendations to the Secretary of Transportation, but urged that we also recommend that FAA more fully investigate towing aircraft with auxiliary power, such as tow trucks, to move aircraft from the gates to the runway takeoff position for both noise and fuel conservation benefits.

According to FAA, aircraft towing has been investigated and found to be economically infeasible unless the price of fuel increased 150 to 200 percent over 1974 prices. In

addition, a number of operational problems would have to be overcome. The Urban Systems Research and Engineering study (see p. 10), which included a review of an FAA-sponsored study by Lockheed Aircraft Service Company on alternative methods for moving aircraft on the ground, stated that

--current towing equipment was not adequate to handle all taxiing aircraft;

--complete towing systems, which also guide the aircraft, would be necessary to save a reasonable level of fuel;

--it was likely that due to their high cost, towing sytems would be installed at only the 25 largest and busiest airports where they could be used extensively each day; and

--towing systems would also benefit the environment by reducing pollution and noise at the airport.

The Urban Systems study estimated that 1990 baseline fuel consumption could be reduced 250 million gallons, or 1.2 percent, with towing at the 25 largest airports. The study concluded that the costs of installing and operating such systems must be weighed against the benefits on a case-by-case basis and that the appropriate Federal role appears to be to insure that such investments are not discriminated against relative to other categories of airport facility development.

AIRPORTS DESIGNATED BY FAA FOR INITIAL IMPLEMENTATION OF A METERING AND SPACING PROGRAM

O'Hare, Chicago, Ill.

La Guardia, New York, N.Y.

Kennedy International, New York, N.Y.

Washington National, Washington, D.C.

Hartsfield, Atlanta, Ga.

Lambert Field, St. Louis, Mo.

Cleveland-Hopkins, Cleveland, Ohio

Newark, Newark, N.J.

Philadelphia International, Philadelphia, Pa.

Pittsburgh, Pittsburgh, Pa.

Logan Field, Boston, Mass.

Miami International, Miami, Fla.

Dallas-Fort Worth Regional, Irving, Tex.

Los Angeles International, Los Angeles, Calif.

San Francisco International, San Francisco, Calif.

Stapleton, Denver, Colo.

APPENDIX II

CIVIL AERONAUTICS BOARD
WASHINGTON, D.C. 20428

MAY 5 1977

May 5, 1977

IN REPLY REFER TO: B-1-64

Mr. Henry Eschwege
Director
Community and Economic Development Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

The Board has reviewed the draft of your proposed report to Congress on "Effective Fuel Conservation Programs Could Save Millions of Gallons of Aviation Fuel", as requested in your letter dated March 10, 1977. Our comments are as follows:

1. Your illustrations on the potential fuel savings from operations at Chicago's O'Hare airport are subject to misinterpretation and should be eliminated from this study. It is stated that if all the empty seats transported in the Chicago markets were removed by excluding an equivalent of 261 daily flights, 300 million gallons of fuel could be saved. This implies, however, that all remaining flights would operate at 100 percent load factors. Considering the strong peaks of demand by season, day of week and hour of day, this implication is not only totally impractical, but it would also generate intolerable levels of passenger rejection.

2. The studies cited here that argue for higher load factor standards are theoretically designed and consider the airline system as a collection of mutually exclusive city-pairs. This is an unrealistic description of the character of supply and demand as it exists in the industry today. The Board's staff is currently reviewing a massive body of daily traffic and capacity data supplied in the Domestic Load Factor Case, Docket 27417. It is hoped that these data will, for the first time, make possible a determination of the amounts of passenger rejection that can be expected to result from higher load factors achieved through changes of supply. An analysis of these data should be available in the near future.

3.

[See GAO note, p. 55.]

APPENDIX II

Mr. Henry Eschwege (2)

Although the Board has the power to establish load factor standards for rate-making purposes, the Board has no authority under the Act to require the air carriers to comply with this load factor standard or any minimum load factor. Section 401(e)(4) of the Federal Aviation Act of 1958 (49 U.S.C. 1371(e)(4)), in effect, precludes the Board from imposing any term restricting the right of an air carrier to add to or change schedules, equipment, accommodations and facilities for performing the authorized transportation and services. [See GAO note below.]

We thank you for the opportunity to comment on this draft study.

Sincerely,

Acting Chairman

GAO note: Portions of this letter have been deleted because they are no longer relevant to the matters discussed in this report.

APPENDIX III

FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

APR 20 1977

OFFICE OF THE ADMINISTRATOR

Mr. Monte Canfield, Jr.
Director
Energy and Minerals Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Canfield:

The Federal Energy Administration (FEA) appreciates this opportunity to review and comment on the General Accounting Office's (GAO) draft report entitled "Effective Fuel Conservation Programs Could Save Millions of Gallons of Aviation Fuel." FEA has long concerned itself with the need to and the opportunities for achieving fuel conservation within the energy intensive air transportation industry and as such, is particularly interested in the GAO's views and recommendations as they relate to energy conservation in the air industry.

In general, we were pleased to note that the basic conclusions reached by the GAO in this report appear to be similar to the views expressed previously by the FEA toward achieving conservation in the air sector. These were that higher load factors should be an integral part of any conservation effort directed toward the air industry and that the Civil Aeronautics Board (CAB) and the Federal Aviation Administration (FAA), the agencies responsible for regulating the air industry, need to give fuel conservation greater attention in carrying out their respective responsibilities. While we do not disagree generally with the thrust of the GAO's recommendations to Congress and the Secretary of Transportation, there are a number of areas wherein the report needs to be corrected and supplemented if it is to serve as a basis for legislative or administrative program initiatives. These areas are outlined in the enclosed detailed comments.

I hope that our comments on this report will prove useful to your staff in the preparation of the final report. In addition to the FEA comments referred to in the GAO report,

the FEA has conducted several studies on airline conservation measures which might be useful to the GAO. If you would like a copy of any of these reports, or have additional questions regarding the FEA's activities in this area, please contact Mr. Robert Bowles, National Programs, Conservation and Environment, telephone 254-9755.

Sincerely,

John F. O'Leary
Administrator

Enclosure

DETAILED COMMENTS--GAO REPORT

"Effective Fuel Conservation Programs Could Save Millions of Gallons of Aviation Fuel"

There is a basic similarity between the general thrust of the GAO report recommendations and the historical FEA views on energy conservation in this sector. FEA has indicated, for example, that higher load factors should be integrated into energy conservation programs for this sector and that the regulatory agencies involved (CAB and FAA) need to give energy efficiency and energy conservation a higher priority. The recommendations, however, may not be sufficiently developed or have enough discussion in sufficient detail or depth to allow either the Congress or the Secretary to implement legislation or programs aimed at eliminating the energy inefficiencies.

The GAO's discussion of the regulatory practices and policies of the CAB seem to lack sufficient depth and analysis. This may be why there is an absence of any recommendations to the CAB. If the air industry is to be expected to conserve fuel in any significant quantities in the future, the air industry will necessarily have to achieve considerably higher load factors. Despite the movement toward regulatory reform, the policies and practices of the CAB will still play a major role in determining what future airline load factors will be. Accordingly, for a complete and balanced report, the GAO should include an indepth examination of the CAB policies and procedures similar to that regarding the FAA policies and practices already contained in this report.

A major portion of the draft report concerns itself with a review and analysis of the reports that the CAB and the FAA submitted to Congress in response to Sections 382(a)(1) and 382(a)(2) of the Energy Policy and Conservation Act (EPCA). Accordingly, the report would be remiss if it did not also include a review and analysis of the reports submitted under Section 382(a)(3) of EPCA, as well as a review of each agency's progress, or lack thereof, in response to Section 382(b), which requires the issuance of an energy impact statement for all "major" regulatory actions, the definition of "major" to be determined by each agency through a rulemaking proceeding. The CAB issued its proposed rulemaking on December 22, 1976; the FAA, to the best of our knowledge, has yet to issue its proposed rulemaking. The FEA submitted its comments and recommendations to the CAB on March 16, 1977. A review of each agency's response to EPCA is necessary to give to Congress a complete picture as to the impact of its efforts

to set forth energy conservation targets and improve energy efficiency within the air industry. Thus far, the response from the agencies involved has been somewhat passive and the GAO may wish to recommend that Congress strengthen this part of the EPCA.

Attention should also be directed to several errors that should be corrected before the report is finalized. They are:

[See GAO note below.]

2. Throughout the discussion of the CAB's load factor standard, reference in the text and tables refers to the load factors achieved by all certificated carriers. The CAB's load factor standard is only applicable to the 48 State operations of the domestic trunk airlines.

GAO note: Portions of this letter have been deleted because they are no longer relevant to the matters discussed in this report.

APPENDIX IV

OFFICE OF THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

ASSISTANT SECRETARY
FOR ADMINISTRATION

May 13, 1977

Mr. Henry Eschwege
Director
Community and Economic Development Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

This is in response to your letter of March 10, 1977, requesting comments on the General Accounting Office draft report entitled "Effective Fuel Conservation Programs Could Save Millions of Gallons of Aviation Fuel." We have reviewed the report in detail and prepared a Department of Transportation reply.

Two copies of the reply are enclosed.

Sincerely,

Edward W. Scott, Jr.
Acting

Enclosures (2)

DEPARTMENT OF TRANSPORTATION REPLY
TO
GAO DRAFT REPORT OF MARCH 10, 1977
ON
EFFECTIVE FUEL CONSERVATION PROGRAMS
COULD SAVE MILLIONS OF GALLONS OF AVIATION FUEL

Department of Transportation
Civil Aeronautics Board
Federal Energy Administration

SUMMARY OF GAO FINDINGS AND
RECOMMENDATIONS

The General Accounting Office (GAO) has concluded that aviation fuel conservation has not received the full attention it deserves and that more needs to be done by the Federal Government to conserve aviation fuel.

Regarding the Federal Aviation Administration's (FAA) fuel conservation programs, the GAO states that:

1. The FAA had not monitored implementation of its programs or required reports on the frequency that program procedures were used and resultant fuel saved. In several instances, the GAO found that FAA fuel conservation procedures were either implemented infrequently, impractical to implement, or ineffective. The GAO recommends that the Secretary direct the FAA to establish a monitoring and reporting system to provide management with information on the effectiveness of its aviation fuel conservation procedures.

2. The FAA is developing a Fuel Advisory Departure (FAD) program which is intended to alert airlines of extreme delays at destination airports and permit them to adjust their flight plans accordingly to minimize the effects of such delays on fuel consumption. The GAO states that FAA's tests indicate that the FAD program does conserve fuel, but that considerably more fuel could be saved if all aircraft were required to take ground rather than airborne delays whenever possible. The GAO recommends that the Secretary direct the FAA to require aircraft in the FAD program to take ground delays whenever possible.

3. Noise abatement efforts had an adverse effect on fuel conservation at some of the airports reviewed. The GAO concludes that both noise abatement and fuel conservation are of national importance and neither should be given a precedence over the other without fully evaluating possible trade-offs between objectives of the two programs after consultation with the Environmental Protection Agency. The GAO recommends that the Secretary direct the FAA to explore the feasibility of establishing program guidance for establishing trade-offs between noise abatement and fuel conservation objectives, and if feasible, provide such guidance to its field offices.

POSITION STATEMENT

1. The first recommendation reflects a basic misunderstanding of FAA's role in fuel conservation. FAA's role is one of promoting and encouraging fuel conservation by system users and of providing a safe, efficient systems environment within which fuel conservation techniques/strategies may be practiced by the users. An illustration of the latter is the airspace/procedural modifications recently developed to accommodate the so-called "profile descent" which may be an enormous fuel saver in the months to come. The FAA has no statutory authority to require mandatory compliance with fuel conservation programs. The success of such programs requires the cooperation of controllers, airlines, and airport operators. The FAA has neither the staff nor resources necessary to monitor the effectiveness of these programs. This function, if required, should logically be assigned to an energy-oriented agency such as the Federal Energy Administration or the soon-to-be-formed Department of Energy.

2. Air carrier participation in the FAD program is strictly voluntary and there is no basis on which the FAA can dictate to the airlines where delays will be taken. The FAD program is in the best financial interests of the airlines and this alone should motivate them to achieve maximum savings from the program. However, the FAA is gathering statistical data which may be used to influence the airlines to accept ground delays if the results are favorable.

3. The FAA does recognize the need to study noise abatement/fuel conservation trade-offs as evidenced by actions already underway in this area. As part of a major contractual study program, the agency will be looking into the operational cost increments, including fuel, of future class aircraft related to noise abatement technology. Based upon considerations such as fuel costs, it is intended that appropriate future noise abatement goals will be established from this effort. In addition, the FAA is in the preliminary stage of another study relating to assessment of fuel costs associated with noise abatement operational requirements. Hopefully, this effort will yield guidance for application where operational flight changes proposed for environmental purposes impact negatively from a fuel conservation sense.

   The implication in the report that noise abatement and fuel conservation efforts are rarely, if ever, complementary is not true. For example, a recent regulatory action was taken by FAA to require turbojet aircraft having a maximum weight greater than 75,000 pounds to comply with noise standards contained in Federal Aviation Regulations Part 36. In taking this action, FAA specified an 8-year compliance schedule to allow sufficient time for the development of new technology aircraft as a viable replacement option for the carriers involved. The new technology aircraft will bring with it operating efficiencies, including fuel, that would not be available through an immediate retrofit response by the carriers to comply with the regulation.

-3-

Additional comments or observations on the GAO draft report are shown below:

1. The introduction on page 1 of the report does not specify whether the 17 billion gallons number includes military and international fuel consumption. If so, this should be clearly stated.

[See GAO note below.]

By way of comparison, the report should note that automobiles consume about 59 percent of the transportation share of energy. Also, the 10 percent of the transportation share of energy consumed by airlines is equal to about 5 percent of total U. S. energy consumption.

[See GAO note below.]

2. There is an error in the last paragraph on page 4. The FAA's seven point jet fuel conservation program was announced as a result of the President's fuel allocation program in response to the Arab oil embargo, not as a result of the planning conference.

[See GAO note below.]

3. The first paragraph on page 5 is misleading. While it is true that the FAA is looking for long-term actions to conserve jet fuel, the GAO report incorrectly assumes a 1973 perspective; i.e., 1977-1982 is no longer the long term. Looking at alternatives from the point of view of 1977, short, intermediate, and long-term options would reflect time periods within which primarily operational, airport capacity, and technological options could be implemented, respectively.

[See GAO note below.]

4. The discussion in Chapter 4 of the GAO report which states that the air traffic control system has become less efficient since 1969 ignores several important factors. Although airline operations have declined, general aviation operations have increased significantly. Furthermore, the introduction of wide-body jet aircraft during this period has required greater separation between aircraft because of the wake vortex problem. Safety is, of course, the primary objective. As a result, delays have increased due to limited airport capacity rather than a decline in the efficiency of the air traffic control system. Wide-body jet aircraft have enabled airlines to carry more passengers per flight which has led to greater efficiency. Air carrier revenue ton miles per gallon (RTM/G), which is a better measure of efficiency than aircraft operations, have risen over 30 percent since 1969. The GAO report should note the accomplishments to date as evidence of the Federal agencies' and aviation community's dedication to fuel conservation efforts.

5. On page 51, the second sentence of the second paragraph should be changed by deleting the last three words and adding the following: "..., airspace management, national and international air commerce."

[See GAO note below.]

Lynn Helms
Administrator

ACT

GAO note: Page references in this letter refer to the draft report.

APPENDIX V

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
MAY 18 1977

MAY 24 1977

OFFICE OF
PLANNING AND MANAGEMENT

Mr. Henry Eschwege
Director, Community & Economic Development Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

We have reviewed the draft report entitled "Effective Conservation Programs Could Save Millions of Gallons of Aviation Fuel."

We concur with the general recommendations to the Secretary of Transporation. However, we recommend that GAO recognize that "trade-offs " between fuel conservation and noise abatement are not always required. In particular, requiring aircraft to take ground, rather than air delays, as recommended by GAO has positive noise abatement as well as fuel conservation implications. In addition, several other fuel conservation procedures which FAA has attempted to implement have positive noise abatement potential. The FAA's "Seven-Point Jet Fuel Conservation Program", for example, includes "Revised gate-hold procedures" and "Increased use of simulators for training and testing." If both of those procedures were implemented by FAA, some noise abatement would be realized from them.

In addition, we recommend that GAO urge the FAA to investigate more fully the use of auxilliary power (e.g. tow trucks) to move aircraft from the gate to the runway take-off position. This measure will also have both noise abatement and fuel conservation benefits.

Sincerely yours,

Richard D. Redenius
Acting Assistant Administrator
for Planning and Management

PRINCIPAL OFFICIALS RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of Office	
	From	To
DEPARTMENT OF TRANSPORTATION		
SECRETARY OF TRANSPORTATION:		
Brock Adams	Jan. 1977	Present
William T. Coleman, Jr.	Mar. 1975	Jan. 1977
John T. Barnum (acting)	Feb. 1975	Mar. 1975
Claude S. Brinegar	Feb. 1973	Feb. 1975
John A. Volpe	Jan. 1969	Feb. 1973
FEDERAL AVIATION ADMINISTRATION		
ADMINISTRATOR:		
Langhorne M. Bond	May 1977	Present
Quentin S. Taylor (acting)	Mar. 1977	May 1977
John L. McLucas	Nov. 1975	Mar. 1977
James E. Dow (acting)	Apr. 1975	Nov. 1975
Alexander P. Butterfield	Mar. 1973	Mar. 1975
John H. Shaffer	Mar. 1969	Mar. 1973
CIVIL AERONAUTICS BOARD		
CHAIRMAN:		
Alfred Kahn	June 1977	Present
Lee R. West (acting)	May 1977	June 1977
John E. Robson	Apr. 1975	May 1977
Richard J. O'Melia (acting)	Jan. 1975	Apr. 1975
Richard D. Timm	Mar. 1973	Dec. 1974
Secor D. Browne	Oct. 1969	Mar. 1973
FEDERAL ENERGY ADMINISTRATION (note a)		
ADMINISTRATOR:		
John F. O'Leary	Feb. 1977	Present
Gorman Smith (acting)	Jan. 1977	Feb. 1977
Frank Zarb	Dec. 1974	Jan. 1977
John Sawhill	Apr. 1974	Dec. 1974
William Simon	Dec. 1973	Apr. 1974
John Love	June 1973	Dec. 1973

a/The Federal Energy Administration superseded the Federal Energy Office.

APPENDIX VI

	Tenure of Office	
	From	To
ENVIRONMENTAL PROTECTION AGENCY		
ADMINISTRATOR:		
Douglas M. Costle	Mar. 1977	Present
John R. Quarles, Jr. (acting)	Jan. 1977	Mar. 1977
Russell E. Train	Sept. 1973	Jan. 1977
John R. Quarles, Jr. (acting)	Aug. 1973	Sept. 1973
Robert W. Fri (acting)	Apr. 1973	Aug. 1973
William D. Ruckelshaus	Dec. 1970	Apr. 1973

AN EQUAL OPPORTUNITY EMPLOYER

UNITED STATES
GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE,$300

POSTAGE AND FEES PAID
U. S. GENERAL ACCOUNTING OFFICE

THIRD CLASS