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REPORT OF THE COMPTROLLER GENERAL OF THE UNITED STATES

Military And Civilian Aircraft Discharging Fuel In Flight

Department of Defense

Federal Aviation Administration

Military and civilian aircraft at times discharge fuel in flight to facilitate a safe landing.

Studies have been made on amounts and characteristics of fuel discharged, but none has concluded whether it causes environmental problems. Furthermore, no discharging parameters have been set to prevent adverse environmental impact.

This report recommends ways for the Department of Defense, the Federal Aviation Administration, and the Environmental Protection Agency to monitor and control discharges.

LCD-76-447

AUG. 17, 1976

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

B-146333

The Honorable Ralph H. Metcalfe
House of Representatives

Dear Mr. Metcalfe:

In response to your March 1, 1976, request and discussions with your office, we obtained information on the current policies and practices of military and civilian aircraft fuel discharges while in flight. As requested, we also examined environmental laws and regulations and obtained available statistics on fuel discharges.

We developed information on the Federal Aviation Administration, the Environmental Protection Agency, the Department of Defense, the Coast Guard, and three commercial airlines. We did not look into the practices of the 150,000 "general aviation" aircraft (private and executive) operating in the United States because most of them are incapable of discharging fuel. We limited our work on civilian aircraft to the discharging practices affecting commercial passenger and cargo aircraft, which currently number about 2,600.

As agreed with a representative of your office, we are sending copies of this report to the Secretaries of Defense and Transportation and to the Administrator, Environmental Protection Agency, setting in motion the requirements of section 236 of the Legislative Reorganization Act of 1970. We are also sending copies to the Director, Office of Management and Budget, and to the House and Senate Committees on Government Operations and Appropriations.

Also, we have obtained informal comments from the agencies and have considered those comments in the report.

Sincerely yours,

Comptroller General
of the United States

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ABBREVIATIONS

DOD	Department of Defense
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
OSD	Office of the Secretary of Defense
SAC	Strategic Air Command
TAC	Tactical Air Command

REPORT OF THE
COMPTROLLER GENERAL
OF THE UNITED STATES

MILITARY AND CIVILIAN AIRCRAFT
DISCHARGING FUEL IN FLIGHT
Department of Defense
Federal Aviation Administration

D I G E S T

As part of fuel conservation and environmental instructions, most Federal agencies and airlines have policies that preclude discharging fuel while aircraft are in flight except in emergencies. However, records were not kept or were not adequate to identify whether unnecessary discharges occurred.

Federal agencies and airlines have established desired altitudes and/or zones for discharging; however, the altitudes established among the agencies and airlines vary from 2,000 feet to 20,000 feet.

The Air Force is the only service that formally records and follows up on fuel discharges. According to its records, in 1975 the Air Force discharged 2.8 million gallons of aviation fuel worth about $1 million.

Although some studies have been made on the volumes and characteristics of fuel discharged, none has concluded whether there is an environmental problem nor has any established the parameters which would prevent adverse environmental impacts.

Discharges for emergencies or other flight safety precautions are not covered by current environmental laws and regulations. Therefore, it does not appear that these practices violate such laws and regulations.

GAO has no basis for determining the magnitude of total aviation fuel discharges or their environmental effects because current procedures, practices, and studies are inadequate or incomplete.

Environmental studies are needed to determine any detrimental effects on the environment, such as whether regular discharging can add

significantly to regions already confronted with serious pollution problems and whether low-altitude discharges can contribute materially to smog or surface contamination.

GAO recommends that the Administrator, Environmental Protection Agency, study this matter and establish minimum safety parameters for fuel discharges.

GAO recommends that the Secretary of Transportation instruct the Administrator, Federal Aviation Administration, to work with the Environmental Protection Agency and determine the

--amount of fuel being discharged by civil aircraft,

--extent of environmental damage discharging is causing, and

--actions that should be taken to minimize the damage.

GAO also recommends that the Secretary of Defense establish a reporting system for all services similar to the one the Air Force now uses to report fuel discharges. Such a system would allow managers to monitor the frequency and magnitude of discharges and could assure that these are justified and within the spirit and intent of current fuel conservation and environmental laws and regulations.

Department of Defense, Federal Aviation Administration, and Environmental Protection Agency officials generally concurred with these observations and recommendations. They agreed that the potential effects on the environment from discharging fuel should be determined but the Department of Defense expressed some reservations with having to generate a report to obtain the necessary fuel discharge data.

CHAPTER 1

INTRODUCTION

GENERAL DISCHARGING PRACTICES

Fuel is usually discharged to reduce the aircraft's weight to facilitate making a safe landing. The following situations illustrate some conditions when fuel discharging is necessary.

--Emergencies caused by mechanical failures or illness of crew or passengers, which require an aircraft to land when it is heavily loaded with fuel.

--Changes in operational plans, requiring an aircraft to land before originally scheduled.

--Landings on an aircraft carrier.

Many types of aircraft can land safely, however, with a full load of fuel, and some are not capable of discharging fuel in flight. Fuel may also be discharged to test fuel discharge systems after they have been overhauled or repaired.

A few agencies have established designated discharge areas--usually over water or unpopulated districts. Also, most agencies and airlines have prescribed altitudes for discharging. In extreme emergencies, however, the discharge areas and altitudes cannot always be reached.

ENVIRONMENTAL IMPLICATIONS

We examined environmental pollution laws and talked to Environmental Protection Agency (EPA) and Federal Aviation Administration (FAA) officials to determine if aviation fuel discharges violated any of these laws. Among the laws and regulations examined were the Clean Air Act; the Marine Protection, Research, and Sanctuaries Act of 1972; the Federal Water Pollution Control Act of 1972; and Department of Defense (DOD) Assessment of Environmental Impact, 32 C.F.R. 214. In our opinion, the practices and circumstances of fuel discharges described to us are not specifically covered by these laws and therefore do not appear to violate them.

We also examined environmental studies of fuel discharges and discussed the possible pollution effects with EPA and FAA officials. All of the studies we reviewed discussed the chemical reaction of fuel when discharged at

various altitudes, but none defined the actual environmental effects or the discharge parameters that would preclude environmental damage. Whether fuel discharged in flight dissipates or actually lands on the ground or water depends upon a combination of air speed, altitude, temperature, and discharge rate. None of the studies dealt with the possible pollution of the atmosphere.

An EPA official described a general parameter based on an EPA consultant's study of water pollution. He stated that, at altitudes of 5,000 feet or above, discharged fuel is ordinarily dispersed to the extent that it does not create a "sheen" on the waters below. He added that without a sheen, petroleum products, including gasoline, are not considered to create water pollution.

EPA officials had differing opinions on whether these discharges actually pollute and whether EPA should become involved in monitoring them. EPA research and development efforts are intended to provide a strong scientific basis for developing standards and effective controls, as well as attempting to identify and evaluate long-range suspected environmental problems. Therefore, we believe EPA has the responsibility for determining the sources and effects of pollution and for trying to control it.

SCOPE OF REVIEW

We obtained information on the current policies and practices concerning military and civilian aircraft discharging fuel while in flight. We also examined environmental laws and regulations and obtained available statistics on fuel discharges.

We interviewed officials from and developed information on the Federal Aviation Administration, the Environmental Protection Agency, the Department of Defense, the Coast Guard, and three commercial airlines. We did not look into the practices of the 150,000 "general aviation" aircraft (private and executive) operating in the United States because most of them are incapable of discharging fuel. We limited our work on civilian aircraft to the discharging practices affecting commercial passenger and cargo aircraft, which currently number about 2,600.

CHAPTER 2

GOVERNMENT-OWNED AIRCRAFT

MILITARY AIRCRAFT

Officials from the Offices of the Assistant Secretary of Defense for Installations and Logistics and for Environment and Safety told us that no official policy or guidance had been issued at the Office of the Secretary of Defense (OSD) level on aviation fuel discharges. They were aware of fuel discharging practices, but they did not believe any significant environmental or logistical problems had occurred. They agreed that OSD should issue a broad policy and provide general guidance to the services on this practice.

This action seems in line with policies and procedures contained in DOD Directive 5100.50, May 24, 1973 (Protection and Enhancement of Environmental Quality). It stated that DOD components are to:

--Monitor and evaluate all activities on a routine basis and take such measures as necessary to insure compliance with applicable environmental quality standards and environmental performance specifications.

--Design, use, store, handle, and ultimately dispose of all materials to minimize the possibilities for pollution of the environment.

Air Force

According to Air Force policy, fuel is discharged only for emergencies, precautionary landings, other safety-of-flight considerations, or urgent operational requirements. The Air Force bases we visited have designated discharge zones, but different commands have different altitude requirements. For example, the Tactical Air Command (TAC) guidelines designate discharging at or above 5,000 feet, while the Strategic Air Command (SAC) guidelines specify above 20,000 feet. Although TAC officials said they did not know precisely how the 5,000-foot guideline was established, they believe it was actually an "overkill" of the altitude necessary to prevent pollution. They thought discharges above 1,000 feet would not create pollution, so TAC increased it to 5,000 feet to be sure. Officials said that in a critical emergency a pilot will discharge wherever he has to.

All Air Force discharges are required to be recorded and a followup investigation is to be made. SAC follows up on discharges through weekly staff meetings which cover all aircraft problems, including the reasons for any fuel discharges. Any questionable discharges are to be investigated to assure they were necessary. SAC officials told us that only two discharges had been questioned in the past 2 years and that both were considered justified.

The Air Force is the only service that formally reports fuel discharges. Air Force Regulation 19-3, instituted in March 1974, requires each aircraft commander to prepare and submit a report each time he discharges fuel. Data from these reports was collected to study the possible environmental effects of these discharges. The results obtained would help establish fuel discharge parameters having the least environmental impact.

The reporting system was to be discontinued after June 1976, but the Air Force has decided to continue it indefinitely as a control measure of its discharges. The discharge information recorded includes location, altitude, air speed, quantity discharged, date, time, temperature, and wind direction. Thus far the Air Force has only identified and summarized the discharge characteristics and has recommended further studies to identify the environmental impact.

For calendar year 1975 the Air Force's reported amounts discharged were:

Command	Discharges	Gallons	Estimated value (note a)
Military Airlift Command	15	57,878	$ 21,415
Strategic Air Command	361	2,352,472	870,415
Tactical Air Command	227	298,323	110,380
Other	40	83,591	30,929
Total	643	2,792,264	$1,033,139

a/Based on average price of jet fuel during 1975.

The validity of the Air Force report has been questioned by some Air Force officials. Data tabulated by the officials responsible for the study showed that there were populated areas near all but one major discharge area and that some major discharge areas cover regions of sizeable population, heavy natural vegetation, or farmland; however, this information was excluded because the Air Force believed it could

become misinterpreted and cause unwarranted public concern. Also, Air Force officials were unsure if its commands have reported all discharges. This may cause the above results to be somewhat understated. An Air Force official said a memorandum has recently been issued to major commands re-emphasizing the reporting requirements.

The total gallons discharged, shown above, represent about 0.1 percent of the total aircraft fuel delivered to the Air Force in 1975. Most of these discharges were reported as occurring above 5,000 feet. About 240,000 gallons, or 6.3 percent, were discharged below this altitude.

SAC officials explained that the large volume of its discharges is due to its large tankers. If, for example, one of these tankers has an engine failure, the pilot must discharge and land as quickly as possible; therefore, it usually involves discharging a large quantity of fuel.

TAC officials attributed most of its discharges to F-111 mechanical problems which have increased the landing speed and, of necessity, the gross maximum landing weight has been reduced to compensate.

Army

Army officials told us the Army has no policies or guidance for aviation fuel discharges because Army aircraft do not have the discharge capability of Air Force and Navy aircraft.

Some Army aircraft have auxiliary fuel tanks attached underneath the wings. These tanks permit such aircraft to fly longer distances. Each tank holds about 50 gallons of fuel. If the need arises, they can be dropped from the aircraft. Army officials said that landing weight restrictions for their fixed-wing aircraft are sufficiently liberal to generally preclude the necessity for discharging fuel.

Navy/Marine Corps

The Navy and Marine Corps instructions and policies provide that fuel discharges will be made only for reducing landing weight for emergencies or changes in operational requirements or to test fuel discharge systems. The policy is to discharge above 6,000 feet and over unpopulated areas when possible. The commands visited, however, had not established discharge zones. In a critical emergency, pilots will discharge wherever they have to.

Navy officials said records are not required because the discharges are necessary and are insignificant amounts. They said the fuel crunch, inflation, and reduced funding have served as a control over unnecessary discharges. They also said that unnecessary discharges will result in their pilots' possibly losing flying time. One Navy squadron commander, however, had kept records to track fuel distribution because his tankers support other squadrons deployed at sea. From July 1975 to March 1976, the commander's records showed his squadron discharged 135,000 gallons of jet fuel valued at $47,500.

Navy officials also described an action taken to minimize discharging during air operations on carriers. A small jet tanker is deployed with each flight group to refuel squadron planes if needed. When the first group of planes lands, the tanker (before landing) transfers its residual fuel to the oncoming tanker for the next group; however, the last tanker may have to discharge fuel to enable a safe landing. The officials said that the amount discharged would be much less in this instance than had all the tankers discharged individually.

Other aircraft may also discharge on their final landing approach to reduce weight to the maximum allowable gross landing weight. Several officials estimated that, due to aircraft emergencies, problems with ship equipment, and weather factors, one of every five landings on carriers involves discharges. They estimated that the amount discharged per landing might be about 200 gallons.

FAA AIRCRAFT

At April 1976, FAA owned or leased 91 aircraft for use in its routine operations. FAA officials told us that only 13 of these aircraft had the capability to discharge fuel. Although separate records of any discharges are not kept, the officials believed that discharges are very infrequent and are made only in emergencies.

COAST GUARD

Coast Guard officials told us that although they have planes capable of discharging, they discharge only during emergencies, about two to three times a year. They do not monitor or keep records of these discharges.

Coast Guard officials said that its pilots refer to the particular aircraft flight manual for fuel discharging instructions and procedures. The C-130 aircraft is the

only one in use by the Coast Guard which is capable of discharging fuel. For this aircraft, the flight manual recommends that, if a fuel discharge is necessary and if conditions permit, the discharge should take place at least 5,000 feet above the terrain. The officials stated that no discharge zone parameters had been set and that their pilots will discharge fuel wherever they need to.

CHAPTER 3

CIVILIAN AIRCRAFT

FAA POLICIES

Prior to 1972, it was a common practice for the airlines to discharge fuel to avoid landing the airplane above its maximum certified landing weight. Some airlines had a history of discharging considerable amounts of fuel each year. It was recognized that large cost reductions could be achieved, fuel could be saved, and the environment could be improved by decreasing the amount of fuel that airlines discharge.

The Air Transport Association's Flight Operations Committee reviewed the fuel discharging situation in 1971 to see whether any alternatives were available. The factors for consideration included the following.

--Discharging fuel down to the certified maximum landing weight is not mandatory, but discharging for weight reasons is discretionary with the pilot-in-command through the emergency authority available to him.

--An expeditious landing may, in many instances, be safer than discharging fuel.

--One airline had developed landing gross weight charts to provide performance information for landing in excess of certified maximum landing weight. The charts were suggested for use to preclude discharging fuel or at least lessen the amount discharged.

--It was recognized that landing at the higher weight could be done safely in accordance with aircraft certification requirements.

In June 1972 FAA issued Air Carrier Operations Bulletin No. 72-11 (Policy on Fuel Dumping Versus Overweight Landing). 1/ The bulletin recognized the concern for ecology and the practice of discharging fuel routinely to avoid making overweight landings. The bulletin also recognized that the pilot-in-command, in the final analysis, is the only person to determine the safest course of action in an abnormal or emergency situation.

1/This bulletin covers all commercial passenger and cargo aircraft. General aviation aircraft, such as executive and privately owned aircraft, are not covered.

There may be situations in which landing overweight is the best course of action. The bulletin provided examples of the following situations FAA considered typical of those for which a pilot may be expected to use his emergency authority in electing to make an overweight landing.

--Any malfunction or failure that would render the aircraft unairworthy.

--Any condition or combination thereof, mechanical or otherwise, where an expeditious landing would reduce the potential of additional problems which would detract from safety.

--Serious illness of crew or passengers which would require immediate medical attention.

Conversely, the following typical conditions are not considered justifiable for making an overweight landing. In these cases, fuel should be discharged, if necessary.

--A flight which is diverted or landed short of destination because of an unplanned refueling stop when fuel remaining would result in a gross weight in excess of the maximum landing weight specified in the Airplane Flight Manual.

--Minor malfunctions which do not affect the airworthiness of the aircraft but do, in the judgment of the pilot, preclude continuation of the flight to destination. These may be in the nature of pressurization problems, door warning lights when the malfunction appears to be in the warning system, or other system failures which do not actually compromise safety of flight.

In summary, the decision to discharge is left to the pilot-in-command's discretion. Guidance to pilots mentions that it is often safer, or as safe, to land overweight as to discharge fuel and that the pilot's emergency authority may be invoked to land overweight. To assist in a pilot's decision to land an aircraft overweight, charts are provided which explain the aircraft's performance at certain weights on runways of varying lengths.

If a pilot does elect to discharge fuel, he should contact the control tower. The air traffic controller will identify the discharge area and warn other airplanes in the vicinity. FAA's suggested altitude for discharging fuel is

at least 2,000 feet above the highest obstacle within 5 miles of the flight pattern. Other aircraft are advised to (1) keep a horizontal distance of at least 5 miles from the discharging aircraft, (2) stay at least 1,000 feet above the plane discharging or 2,000 feet below, and (3) allow at least 15 minutes to pass before proceeding into the discharge area. FAA officials could not readily explain how the 2,000-foot altitude requirement was set, since it was established about 23 years ago.

RECORDS

FAA does not require or routinely keep specific records of commercial aircraft fuel discharging incidents as they occur, including the locations, altitudes, and the actual or estimated quantities discharged. We were advised that individual airlines maintain records of what they discharge and that about half of the major airlines under FAA control have aircraft with discharging capability.

COMMERCIAL AIRLINES

Of the three commercial airlines contacted, two have airplanes capable of discharging fuel. The other airline modified its planes and set low fuel loads because most flights are relatively short. Therefore, they are capable of landing immediately after takeoff. Officials of the other airlines told us their policy is to discharge only in emergencies requiring reduction of the plane's weight. Both airlines try to discharge over unpopulated areas. One has an altitute requirement of 5,000 feet while the other's is 2,500 feet. Some emergencies do not permit the plane to attain the desired parameters, and under these circumstances the pilot will discharge wherever necessary. They said the FAA procedures mentioned above are followed for these discharges.

Both airlines require their pilots to enter the amounts discharged in the flight logs on board the aircraft. One also reports discharges on an FAA service difficulty report, but the amount discharged is not included. In 1975 the two airlines discharged a combined estimated total of 39,700 gallons of fuel.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

We have no basis for determining the magnitude of total aviation fuel discharges or their environmental effects because current discharge procedures and practices and studies of the problem are inadequate or incomplete; however, large amounts of fuel are being discharged, as indicated by the records that were available.

We believe environmental studies are needed to determine any detrimental effects on the environment, such as whether regular discharging can add significantly to regions already confronted with serious pollution problems and whether low-altitude discharges can contribute materially to smog or surface contamination.

Comprehensive studies would not only define what is actually happening to the environment but also could be used as a basis for eliminating the inconsistencies in discharge practices by establishing discharge parameters. For example, if an airplane has to discharge above 5,000 feet to prevent water pollution (as noted in the EPA study), it would appear that FAA's 2,000-foot altitude guideline is not adequate to prevent pollution.

We also believe that environmental studies are under the authority of EPA and, as indicated by the Air Force's reluctance to publicize data regarding potential impact, EPA would be in a more objective position to study the matter than the agencies discharging the fuel.

We recommend that the Administrator, EPA, establish minimum safety parameters for fuel discharges.

We recommend that the Secretary of Transportation instruct the Administrator, FAA, to work with EPA and determine (1) the amount of fuel being discharged by civil aircraft, (2) the extent of environmental damage discharging is causing, and (3) the actions that should be taken to minimize the damage.

We also recommend that the Secretary of Defense establish a reporting system for all services similar to the one the Air Force now uses to report fuel discharges. Such a system for all aircraft capable of discharging would allow managers to monitor the frequency and magnitude and could assure that discharges are justified and are within the spirit and intent of current fuel conservation and environmental laws and regulations.

AGENCY COMMENTS

We discussed our observations and recommendations with DOD, FAA, and EPA officials, and they generally concurred with them. They agreed that the potential effects on the environment from discharging fuel should be determined but DOD expressed some reservations with having to generate a report to obtain the necessary fuel discharge data.

RALPH H. METCALFE
FIRST DISTRICT, ILLINOIS

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March 1, 1976

B-146333

The Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
441 G Street, N. W.
Washington, D. C. 20548

Dear Mr. Staats:

Recently the General Accounting Office completed an investigation at my request into the Navy's practice of dumping fuel at sea (B-146333). Since then, it has come to my attention that certain aviation units of the armed services may be engaged in dumping fuel.

I am requesting the General Accounting Office to ascertain the practices and policies of the Department of Defense concerning the dumping of fuel by pilots while the planes are in the air. Specifically, I am requesting the General Accounting Office to make a determination by onsight audits to determine how much fuel is dumped in this manner by the aviation units of our armed services over the past three years. And, further where does this dumping occur?

I am also requesting the General Accounting Office to make a similar determination concerning civil aviation within this country. First, what is the policy of the Federal Aviation Administration concerning the dumping of fuel by civilian aircraft? Secondly, how much fuel in fact has been dumped during the last three years? And, thirdly, where has this fuel been dumped?

Further, are these practices in violation of any environmental statutes?

With every best wish.

Sincerely,

Ralph H. Metcalfe

RALPH H. METCALFE
Member of Congress

RHM:ama

BEST DOCUMENT AVAILABLE