Aviation Investigation Final Report

Location:	NOME, Alaska	**Accident Number:**	ANC93LA025
Date & Time:	January 5, 1993, 20:21 Local	**Registration:**	N900YH
Aircraft:	MITSUBISHI MU-2B-35	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

AFTER MAKING A REFUELING STOP, THE PILOT TOOK OFF AT NIGHT & WAS CRUISING AT FLIGHT LEVEL 200. AFTER ABOUT 30 MINUTES OF FLIGHT, THE RIGHT ENGINE FUEL FILTER BYPASS WARNING LIGHT ILLUMINATED. ABOUT 2 MINUTES LATER, THE SAME WARNING LIGHT FOR THE LEFT ENGINE ILLUMINATED. SOON THEREAFTER THE RIGHT ENGINE, THEN THE LEFT ENGINE, LOST POWER. THE PILOT MADE A FORCED LANDING ON A MOVING ICE PACK IN THE BERING SEA, WHICH RESULTED IN SUBSTANTIAL DAMAGE. ICE WAS FOUND IN THE ENGINE & MAIN FUEL SCREENS. SIGNIFICANT AMOUNTS OF WATER AND/OR ICE WERE FOUND IN 3 TANKS, WHICH HAD BEEN REFUELED BEFORE TAKEOFF. A HIGHER THAN NORMAL AMOUNT OF WATER WAS ALSO FOUND IN THE FUEL SAMPLE TAKEN FROM THE NOZZLE OF THE REFUELING TANKER. THE FLIGHT MANUAL REQUIRED THAT AN APPROVED ICE INHIBITOR BE ADDED TO THE FUEL, IF NOT PREMIXED. FUEL AT THE REFUELING STOP WAS NOT PREMIXED & THE PILOT HAD NO ICING INHIBITOR (PRIST) WITH HIM ON THIS FLIGHT. HE DID NOT DRAIN FUEL FROM THE TANKS DURING PREFLIGHT, SINCE THE TEMPERATURE WAS SO COLD HE FEARED THE DRAIN MIGHT FREEZE OPEN.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: FUEL STARVATION DUE TO IMPROPER REFUELING PROCEDURES BY THE FBO PERSONNEL, INADEQUATE PREFLIGHT BY THE PILOT, AND RESULTANT ICE IN THE FUEL, WHICH BLOCKED FUEL FLOW TO THE ENGINES. A FACTOR WAS THE LACK OF SUITABLE TERRAIN FOR A FORCED LANDING.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: CRUISE

Findings
1. ALL ENGINES
2. (C) AIRCRAFT SERVICE - IMPROPER - FBO PERSONNEL
3. (C) AIRCRAFT PREFLIGHT - INADEQUATE - PILOT IN COMMAND
4. (C) FLUID,FUEL - ICE
5. (C) FUEL SYSTEM,FILTER - BLOCKED(TOTAL)
6. (C) FLUID,FUEL - STARVATION

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: LANDING

Findings
7. LIGHT CONDITION - DARK NIGHT
8. (F) TERRAIN CONDITION - NONE SUITABLE
9. TERRAIN CONDITION - WATER,FROZEN

Factual Information

HISTORY OF FLIGHT

On January 5, 1993, at 2021 Alaska standard time, a Mitsubishi MU 2B 35 airplane, N900YH, operated by Bering Air, Inc. of Nome, Alaska, made a forced landing on the frozen ice pack of the Bering Sea approximately 18 nautical miles southeast of Nome, following a total loss of power on both engines. The airline transport pilot, the sole occupant, was not injured, and the airplane was substantially damaged. The positioning flight, operating under 14 CFR Part 91, departed Bethel, Alaska, at 1928, and was destined for Nome. Instrument meteorological conditions existed, and an IFR flight plan was filed.

The pilot stated that while at cruise flight at 20,000 feet msl, the right engine's fuel filter bypass warning light illuminated, followed about 2 minutes later by the same warning light on the left engine. A couple minutes later the right engine quit completely. He requested and was cleared to descend to a lower altitude. During the descent the left engine quit. After making several unsuccessful attempts to restart the engines, the pilot made a "wheels up" forced landing on the ice pack. After touchdown the airplane struck a pressure ridge, causing the left main landing gear to be torn from the airplane, and additional damage to the fuselage and left elevator.

The pilot said because of the low visibility he did not see the surface until he was about 500 feet above the moving ice pack. After the initial touchdown the airplane hit a pressure ridge, went over an area of open water, then came to a stop with the tail and right wing over the water. The pilot was rescued about three hours later by an Alaska Army National Guard helicopter from Nome.

Before departing Bethel the pilot of N900YH added 142.6 gallons of Jet A fuel to the airplanes fuel tanks. He reported on the NTSB Accident Report (NTSB Form 6120.1/2) that he departed Bethel with a total of 220 gallons of fuel. The capacity of the airplanes fuel system is 375 gallons, with 366 gallons usable.

In the Airplane Flight Manual (AFM) for the MU 2B 35 (revised December 20, 1991), is a portion entitled "Blending anti ice additive to fuel". Under that heading is the sentence: "Approved fuel system icing inhibitor conforming to MIL I 27686 must be added to the fuel in all tanks, unless fuel is premixed." (See enclosed extract from AFM.) The pilot stated that when he refueled he normally either used premixed fuel or added the icing inhibitor "Prist" which he usually carried in the airplane. He said he did not add Prist this time because the supply which he usually carried in the airplane had not been replenished by his company personnel. He said he had once previously refueled without adding any icing inhibitor and had not experienced any problems, so did not expect any this time.

The fuel in Bethel was pumped, by the pilot, from a tanker truck owned by Yukon Helicopters, Inc., dba Yukon Aviation, Box 976, Bethel, Alaska 99559. According to the pilot of N900YH, and the owner of Yukon Aviation, Mr. Thomas Ratledge, the fuel in the tanker was not premixed with an icing inhibitor.

On January 6, 1993, FAA Airworthiness Safety Inspectors Terry A. Bateman and Michael W. Hinds, from the FSDO-03 (Flight Standards District Office) in Anchorage, Alaska, visited Yukon Aviation and talked with Mr. Ratledge concerning the refueling of N900YH on the previous day. Inspector Bateman stated that no maintenance or inspection records were found for the fuel tanker or it's filters. He took fuel samples for later analysis. A statement of that visit is included in this report.

TESTS AND RESEARCH

Before the wreckage was moved from the ice pack fuel samples were taken from the airplanes left and right main fuel filters by Rudy Scott, Director of Maintenance for Bering Air. The pilot also took a fuel sample from the left inboard tank. These and other fuel samples taken later from the wrecked airplane, and fuel samples taken from the subject fuel tanker in Bethel, were tested and found to contain significant amounts of water. The tests were performed at the Chemical and Geological Laboratory, 5633 B Street, Anchorage, Alaska 99518. The tests reports are included in this report. Following the tests, the laboratory's Technical Director, Mr. Stephen Ede was telephoned concerning the results. He stated that the fuel sample from the fuel tanker nozzle contained an unusually high percentage of water.

ADDITIONAL INFORMATION

On January 7, 1993, an Alaska Army National Guard helicopter, using an external sling, lifted and carried N900YH back to Nome. In order to decrease the weight of the wreckage, so it could be recovered by helicopter, most of the contents of the airplanes fuel system was drained. Because of the dangerous moving ice pack, and the critical time factor, the contents were drained on the ice. Consequently the exact quantity and composition of the contents was not determined. After the airplane was initially lifted off the ice, and before the helicopter attained forward flight, the airplane was dropped from an unknown height back onto the ice, causing additional substantial damage to the airplane. When the wreckage was dropped the main fuel tank was ruptured, and more of the fuel systems contents were lost.

When the wreckage arrived in Nome, it was met by a number of people, including FAA Airworthiness Safety Inspector Clifford H. Smart, FSDO-01, Fairbanks, Alaska. (See his enclosed statement.) Under his supervision both the left and right main fuel screens and bowls were removed and found to be completely filled with ice. Both engine screens were also removed and found to contain significant amounts of ice. Small amounts of jet fuel, water and ice were found in both tip tanks.

The accident pilot stated that he did not drain any fuel samples from the airplane after refueling in Bethel. He said since it was so cold that if he opened a fuel drain it might freeze open. He further said that the fuel tanks were usually sumped and checked for water and other contaminants by the company maintenance personnel when the airplane was in the hangar at night. He said the airplane had been in the hangar the night before the accident.

Following the accident, Mr. Ralph Sorrells, a representative of Mitsubishi Aircraft Company in Dallas, Texas, was contacted. He stated that in his opinion, considering the large amount of water and ice found in the airplanes fuel system, even if the pilot of N900YH had added the appropriate amount of icing inhibitor when he refueled in Bethel, it would not have prevented the water from freezing.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	38,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	November 17, 1992
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	11150 hours (Total, all aircraft), 512 hours (Total, this make and model), 11150 hours (Pilot In Command, all aircraft), 280 hours (Last 90 days, all aircraft), 100 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MITSUBISHI	**Registration:**	N900YH
Model/Series:	MU-2B-35 MU-2B-35	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	584
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	September 10, 1992 AAIP	**Certified Max Gross Wt.:**	10800 lbs
Time Since Last Inspection:	75 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	6725 Hrs	**Engine Manufacturer:**	GARRETT
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	TPE331-6-252M
Registered Owner:	BERING AIR, INC.	**Rated Power:**	665 Horsepower
Operator:	BERING AIR, INC.	**Operating Certificate(s) Held:**	Commuter air carrier (135)
Operator Does Business As:		**Operator Designator Code:**	FXTA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	OME ,37 ft msl	**Distance from Accident Site:**	18 Nautical Miles
Observation Time:	19:54 Local	**Direction from Accident Site:**	315°
Lowest Cloud Condition:	Scattered / 400 ft AGL	**Visibility**	2 miles
Lowest Ceiling:	Broken / 1500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	16 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	-2°C / -2°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	BETHEL , AK (BET)	**Type of Flight Plan Filed:**	IFR
Destination:		**Type of Clearance:**	IFR
Departure Time:	19:28 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	64.709098,-164.620086(est)

Administrative Information

Investigator In Charge (IIC):	Daw, Roy
Additional Participating Persons:	CLIFFORD H SMART; FAIRBANKS , AK ERNEST A KEENER; ANCHORAGE , AK TERRY A BATEMAN; ANCHORAGE , AK MICHAEL W HINDS; ANCHORAGE , AK
Original Publish Date:	June 30, 1994
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=2327