File No. 1-0002

CIVIL AERONAUTICS BOARD

AIRCRAFT ACCIDENT REPORT

ADOPTED: October 5, 1962 **RELEASED:** October 10, 1962

ALASKA AIRLINES, INC., DOUGLAS DC-6A, N 6118C,
SHEMYA, ALASKA, JULY 21, 1961

SYNOPSIS

An Alaska Airlines, Inc., Douglas DC-6A, N 6118C, Flight CKA 779 of July 20, 1961, was a contract cargo flight from Travis Air Force Base, California, to Tachikawa, Japan.

At 0211, Bering Standard Time, on July 21, 1961, during the approach to a landing at Shemya, Alaska, an en route refueling stop, after descending through minimum weather conditions under the guidance of GCA,1/ the aircraft crashed and burned approximately 200 feet short of the runway threshold on a course aligned with the runway. All six persons aboard the aircraft were crew members and all received fatal injuries.

The red runway approach lights, the first four pairs of runway lights, and two of four green threshold lights were inoperative. This lighting deficiency was not observed or reported to the aircraft by those in charge of field lighting or by the GCA controller. The single strobe light, 152 feet short of the threshold, two of the green threshold lights, and the remainder of the runway lights were operating.

The Board determines that the probable cause of this accident was the absence of approach and runway lights, and the failure of the GCA controller to give more positive guidance to the pilot during the last stages of his approach.

The Board has recommended to the Administrator that he take action to assure that personnel and equipment used in GCA approaches meet pertinent standards for such operations.

Investigation

At 0211[2/] on July 21, 1961, a Douglas DC-6A, N 6118C, operated by Alaska Airlines, Inc., as Flight CKA 779, crashed and burned while on approach to landing on runway 10 at Shemya Airport, Shemya, Alaska. All six persons aboard the aircraft were crew members and all received fatal injuries.

Flight 779 was being conducted pursuant to a contract between the carrier and the Military Air Transport Service to transport military freight from Travis Air Force Base, California, to Tachikawa, Japan. The flight had originated at Paine Field, Everett, Washington, on July 20, 1961, and proceeded to Travis AFB, California, where it was to load military cargo. At Travis AFB 25,999 pounds of cargo was loaded by military personnel under the supervision of the Alaska Airlines'

1/ Ground Controlled Approach.
2/ All times herein are Bering Standard based on the 24-hour clock.

flight engineer. The flight then departed Travis AFB and flew nonstop to Anchorage, Alaska, where it landed to refuel and take a navigator aboard.

At Anchorage, the crew received weather and NOTAM information for the flight to Shemya, which did not include the approach or field lighting deficiencies. The stop at Shemya was for the purpose of servicing the aircraft before proceeding to Tachikawa. The flight was being conducted in accordance with the operational provisions of Part 42 of the Civil Air Regulations under an amendment to the carrier's Part 41 Operating Certificate.

The crew filed an instrument flight plan to Shemya, using Adak, Alaska, as its alternate. The estimated time en route was six hours and forty minutes. Extensive areas of fog and low stratus prevailed in the relatively warm, moist air enveloping an area including Shemya and that part of the Aleutian Islands extending 500 miles east of Shemya. The flight took off from Anchorage at 1940 and proceeded routinely toward Shemya in accordance with its flight plan.

The flight made contact with Shemya Radio at 0045 and gave its position as 55° 46' north and 179° 08' east at flight level 100 (10,000 feet with altimeter set at 29.92, required for international flights) between layers of clouds with 9,560 pounds of fuel remaining. Forty-three minutes later, the flight reported it was 100 miles east of Shemya estimating Shemya at 0155. At that time Shemya Radio transmitted to the flight as follows: "ATC advises no traffic reported, continue inbound to Shemya Homer, descend to maintain 5,500 feet, GCA standing by 134.1." The flight replied, "Alaska 779, Roger."

At 0145, the flight contacted Shemya GCA and radar contact was made with the aircraft approximately 18 miles north-northeast of Shemya, at 5,500 feet. The frequency on which the contact was made and which was used during the entire GCA approach was 134.1 mcs.

The radio transmissions of neither the flight nor GCA were recorded, which was in direct violation of instructions issued by Northwest Airlines 3/ for operation of the GCA; hence the description of how the flight was controlled through the instrument approach is based to a large degree on the controller's testimony. He said that he advised the flight while it was still in the surveillance pattern to expect possible "wind burble" on final approach between one mile and 1/4 mile from touchdown point. He stated that he gave the flight the following Shemya weather information: "Indefinite ceiling 200 feet; sky obscured, visibility one mile in fog; new altimeter 29.86."

The controller said that the flight intercepted the glidepath properly and maintained a good course during the entire approach. He said that when the flight was two miles out from touchdown, it dropped approximately 10 to 15 feet below the glidepath and he advised the flight several times to "ease the aircraft up"; however, no apparent correction was made. He said that at approximately one mile from touchdown, the flight went an estimated 30 to 40 feet below the glidepath, and he advised the flight several times to "bring the aircraft up," yet no apparent correction was made. He advised the flight it was passing GCA minimums at one-half mile out and was still below glidepath. He said that the flight maintained the

3/ Northwest Airlines operates the Shemya GCA as a privately-owned facility.

30- to 40-foot below-glidepath condition until it was over the approach lights, which begin 1,460 feet before the threshold of the runway. He stated that at no time did he consider the flight to be in danger, and that the 30- to 40-foot below-glidepath condition was still well above the minimum safe altitude for the approach. He said that when the flight was over the approach lights, it started to descend rapidly and he assumed the captain had taken over visually for his landing, intending to "grease it on" at the end of the runway. He therefore did not advise the pilot of his position relative to the glidepath at that point. The controller said that he continued to advise the flight that it was below glidepath (though not stating how far below, or that the safety limits were being exceeded). He stated that he last saw the aircraft on radar at the end of the runway, and also that he knew it had crashed because he did not see the aircraft target move down the runway as he usually is able to do by reference to his radar scope. He also stated that the flight's transmissions indicated to him that the pilot understood all instructions and was familiar with the GCA approach to Shemya's runway 10.

The crash took place at 0211. At 0212, in response to notification of the accident, the U. S. Weather Bureau observer made the following weather observation: "Indefinite 200-foot variable ceiling; visibility 3/4 mile variable, fog; temperature 45°; dewpoint 45°, wind south-southeast 8 knots; altimeter setting 29.84; ceiling 100 feet variable to 300 feet, visibility 1/2 mile variable to one mile."

Published GCA approach weather minimums at Shemya for Alaska Airlines flights are ceiling 200 feet and visibility one-half mile. The ceiling heights are reported in feet above the runway, and the reported visibility is an average visibility using a visibility reference chart which depicts objects at known distances and directions from the Weather Bureau Office.

The wind at slightly more than 500 feet above the runway was south at 20 knots, while the surface wind was southeast at 8 knots. The freezing level was at 12,000 m.s.l. Official sunset, July 20, 1961, was at 2137, and civil twilight ended at 2223. Civil twilight began the morning of July 21, at 0443, and official sunrise was 0527. The moon had set at 0046 on July 21.

Runway 10 is macadam and is 9,990 feet in length, 200 feet wide, and its elevation is 95 feet m.s.l. There are six pairs of red approach lights extending 1,460 feet outward from the threshold. They are spaced at 200-foot intervals and are 200 feet apart in width. From the edge of the threshold pavement to a point 186 feet in the direction of an approaching aircraft, the ground slopes downward gradually at an angle of about one degree. Then the ground drops suddenly at an angle of approximately 30 degrees to a valley floor 50 to 60 feet below the level of the runway.

The six pairs of approach lights are mounted on poles of different heights to accommodate the variance in terrain height, but the lights themselves are practically on a level with the runway. A single strobe light 4/ is located on the ground, aligned with the runway centerline approximately 152 feet short of the runway threshold. There are two pairs of green threshold lights, each pair mounted side by side (crosswise to the runway), one pair at each corner of the runway. Thereafter, at 200-foot intervals, single runway lights extend the full length of the runway along both sides. All lights (except the strobe light) utilize 200-watt bulbs.

4/ A condenser discharge flashing light rated at approximately 10,000,000 candle power.

The aircraft struck the embankment approximately 200 feet short of the threshold in a nearly level attitude, the nosewheel touching first about 18 feet below the crest, very nearly aligned with the centerline of the runway. The aircraft slid up the embankment during impact and when it reached the crest, broke in two (laterally) at the leading edge of the wings. The fuselage, wings, and tail section stopped and settled back on the slope. The powerplants, nose section, and the bulk of the cargo slid varying distances toward the runway and up on it for a distance of about 100 yards. Fire followed impact and the majority of the wreckage was consumed.

The cockpit area was damaged to such an extent that the positions of most of the control levers could not be determined. Three main fuel gauges showed 1,600 pounds of fuel remaining, and one showed 1,700 pounds. The alternate tank fuel gauges indicated empty. The copilot's altimeter was set at 29.86 and the pilot's altimeter was set at approximately 29.85. The wing flap indicator was damaged, but indicated a full-flap extension. The main inverter power switches were found in the "on" position and disassembly of both main inverters indicated that they had been rotating at the time of impact. The emergency inverter power switches were also found in the "on" position, but disassembly revealed that this inverter was not rotating at the time of impact.

The No. 1 VHF [5] transmitter and receiver were set at 134.1 mcs., and the No. 2 VHF transmitter was set at 124.5 mcs., and the receiver was set at 125.4 mcs. The backup frequency monitored by GCA at Shemya during an approach is 121.5 mcs. (VHF Guard), and is the frequency which GCA expects a controlled aircraft to use if the pilot needs to transmit to GCA during the final approach.

The landing gear was fully extended and locked. The wing flaps were extended beyond the 30-degree position and the landing lights were extended. It could not be determined from physical examination of the switches whether any portion of the external lighting system was on or off. One witness, standing in front of the Northwest Airlines operations building, about midpoint of the runway, stated that he saw the navigation lights, landing lights, and rotating anti-collision light of the aircraft before it crashed.

All of the wreckage was found at the point of impact and forward of it. Examination of the aircraft and flightpath area revealed that the aircraft had not collided with any foreign objects prior to impact.

During examination of the powerplants, the fuel and oil strainers and the sump plugs were found to have been in apparently good condition and free from foreign matter. Firewall shutoff valves were in the open position, and the No. 4 fuel selector was on "main." All other selectors were damaged by impact or fire. Spark plugs were removed from all engines and were found to be free from any indications of fouling or peening. No fuel, oil, or ADI [6] fluid samples were available; however, the aircraft had been serviced with 115/145 octane fuel at Anchorage. All propeller blades received extensive damage and were bent in various degrees toward the face. Several blades were broken off the propeller hubs, but examination of the blade fractures revealed no evidence of fatigue or breakage prior to impact. Examination of the propeller governors and propeller assemblies revealed engine r.p.m.'s to have been as follows: No. 1: 2,413 r.p.m., No. 2: 2,407 r.p.m., No. 3: 2,420 r.p.m., and No. 4: 2,416 r.p.m. The positions of the propeller dome

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5/ Very High Frequency.
6/ Anti-Detonation Injector.

pistons were as follows: No. 1: 32°; No. 2: 30°; No. 3: 33°; and No. 4: 31°. The specified low-pitch stop was 30°. The shim plate markings were reasonably similar to the dome piston settings.

There was no evidence to indicate that the cargo had shifted prior to impact. The weight distribution of the cargo was such that the center of gravity remained within safe limits. The maximum allowable takeoff weight was 107,000 pounds and the adjusted takeoff weight at Anchorage was 107,006 pounds. The maximum allowable landing weight was 92,360 pounds. At 0135, when the flight was approximately 50 miles east of Shemya, an entry was made on the Flight Engineer's Fuel Management log showing a gross weight of 92,346 pounds. The log also showed that at 0135, the four main fuel tanks had 1,800, 1,950, 1,950, and 1,800 pounds of fuel, respectively, remaining. The four alternate tanks had been empty, according to the log, approximately one hour and 30 minutes prior to the 0135 log entry.

According to the Alaska Airlines flight manual, the r.p.m. setting for the engines was to have been 2,400 for final approach (for 4-engine operation) and 2,600 r.p.m. (for 3-engine operation). The manual also stated that 120-130 knots should be maintained while descending on the glide slope to the airport.

On the day following the accident it was discovered for the first time that an electric power cable lying along the side of the runway had been cut two days prior to the accident to allow construction vehicles to pass over the area. This cable was the powerline leading to the six pairs of red approach lights off the end of runway 10, as well as to two of the four green threshold lights, and to the first four pairs of runway lights. This condition was not reported by previous landing aircraft, nor was a Notice to Airmen concerning this irregularity issued by Northwest Airlines, the operator of the airport. By splicing the cut cable and replacing a transformer in the circuit, all the formerly inoperative lighting was restored. The strobeacon was not included in the cut circuit, although it was disconnected by the impact of the wreckage. The main rheostat, which controls all lighting intensity (except the strobe light), was set on maximum brightness during the flight's approach.

The GCA unit used at Shemya was an AN/FPN-33 Quad Radar manufactured by Gilfillan Brothers Inc., of Los Angeles, California, and was operated under contract to Northwest Airlines, Inc., by the Micro-Craft Corporation. The GCA equipment was given a complete functional check by the GCA maintenance man and the operator prior to its use on July 20, 1961, and was operating, according to them, within tolerances. During the 12-hour period preceding this flight's approach, six other aircraft had made successful GCA approaches to Shemya, using the same equipment manned by the same controller.

On May 3, 1961, and July 12, 13, 14, and 15, 1961, the GCA facility was flight-checked by the FAA and found to have been within tolerances. However, it was pointed out by the flight check crew in their report at the time of the latter flight check that, "It would appear from personal examination that the present radar antenna system now in use . . . has deteriorated and worn beyond its normal life and tolerances, and it is anticipated that it will be difficult to maintain within acceptable tolerances in the very near future."

On July 22 and 24, 1961, the facility was again flight-checked by the FAA and found within tolerances. The check pilot gave the controller a proficiency rating

of "very good" on all of the checks. Air/ground communications on 134.1 and 121.5 mcs. were found to have been satisfactory by the flight inspection team.

The GCA controller had been employed as an air traffic controller for approximately nine years, eight of which included operation of GCA equipment. He had been operating the GCA at Shemya since the summer of 1957, using the same equipment that was in operation at the time of this accident. His tours of duty on Shemya were continuous since 1957, but were for periods of 90 days, with a 90-day rest period in between. He was the only controller during each of his tours of duty. His then-current tour of duty began April 18, 1961, and he was scheduled to begin a rest period on August 1, 1961. He stated that he conducted an average of 100 to 130 instrument approaches to Shemya per month. Flight CKA 779 was the 83rd GCA approach that he had conducted since June 20, 1961. The types of aircraft controlled during these approaches had been U. S. military as well as U. S. civil aircraft. The radar installation at Shemya is unique in that it is the only privately-owned and operated facility of its kind serving U. S. civil air carriers. The radar operator need not be certificated by FAA, nor need he demonstrate his continued competence to perform his assigned control functions, nor is he required to undergo recurrent training such as is required of FAA controller personnel. At Shemya, the installation of electronic equipment need not be approved by appropriate authority within the FAA.

The flight crew consisted of Captain Edward F. Bowman, Alternate Captain Galvin W. Sargent, Copilot John F. Bird, Jr., Flight Engineer William Donovan, Flight Engineer Dwight Babcock, and Navigator Edson A. Marahrens. The crew was to alternate its duties in order that no one would become fatigued at his duty station and, as well as could be determined, this requirement was met. Captain Bowman, Copilot Bird, and Flight Engineer Donovan had flown N 6118C into Shemya Airport, landing at 1952 on July 12, 1961, and again at 1024 on July 14, 1961. Both landings were accomplished after ground-controlled approaches in Instrument Flight Rules (IFR) weather conditions.

From its origination at Paine Field, Everett, Washington, on July 20, 1961, the flight's progress had been continuous. The flying time from Paine Field to Travis AFB was two hours and 36 minutes. The flight was on the ground at Travis AFB for three hours and 17 minutes. The flying time from Travis AFB to Anchorage was eight hours and 59 minutes. The flight was on the ground at Anchorage one hour and 18 minutes. The flying time from Anchorage to the time of impact was six hours and 30 minutes.

Testimony of Alaska Airlines flight operations supervisory personnel and examination of the crew's training records indicated that all qualifications and proficiency requirements had been met except for the qualification into Shemya Airport by Captain Bowman.

Analysis

Flight CKA 779 is considered to have been planned in conformance with existing company procedures and applicable regulations. At Travis AFB the cargo was loaded in a manner which did not adversely affect the safety of the flight's operation. There is no evidence that the cargo had shifted prior to impact. The aircraft had been modified for hauling cargo in accordance with approved specifications.

The aircraft had been serviced with the proper type of fuel, and it is believed that the ADI and autofeathering systems were capable of normal operation.

Examination of the powerplants revealed that all four engines were capable of producing adequate power. Judging from the examination of the propeller assemblies, the power being developed by the engines was that customarily used to execute successfully a GCA approach to a normal landing under the existing weather conditions. The minima applicable to the captain for a GCA approach at Shemya were: ceiling 400 feet and visibility 3/4 mile. The weather transmitted to the flight by the GCA controller, according to his testimony, was ceiling 200 feet and visibility 1/2 mile.

Our examination of fuel management logs, the fuel quantities indicated on the main tank gauges, coupled with the fuel report given approximately 26 minutes prior to the accident, and the lack of any foreign matter in fuel lines, strainers, and sumps, leads us to conclude that fuel flow to all engines was normal prior to impact and was commensurate with the throttle settings.

Control surfaces and control mechanisms seem to have been in normal operation. There is no evidence that any of the aircraft systems malfunctioned.

Examination of the structures of the aircraft showed that they were integrally sound before impact. The landing gear was down and locked, and the wing flaps were properly and fully extended for completion of the final approach and landing. The landing lights were extended and believed to have been on inasmuch as they were observed by an eyewitness to have been on. Since the landing lights were on, it is believed that the aircraft was below the clouds during some portion of the approach. Use of these lights in the clouds would have caused adverse reflection to have been experienced by the crew. Consequently, this would have hampered their ability to make visual contact with the runway.

The No. 1 VHF radio equipment aboard the aircraft was operating normally, at least until the time the GCA operator actuated his transmitter on 134.1 mcs. to give instructions to the flight upon beginning the GCA final approach. If, during the final approach, the flight were to have transmitted a distress message on that frequency it would not have been heard by the GCA controller; however, it would probably have been heard by persons standing in the Northwest Airlines operations building who were monitoring 134.1 mcs. and 121.5 mcs. The lack of any transmissions on either frequency by the flight supports the view that no emergency existed. Since the No. 2 VHF receiver was tuned to 125.4 mcs. and the associated transmitter to 124.5 mcs., it is assumed that they were either mistuned or not used.

The weather conditions existing at Shemya Airport at the time of the accident averaged a 200-foot ceiling and one-half mile visibility. The ceiling was reported to have been varying from 100 to 300 feet and the reporting of a ceiling of 200 feet is a permissible practice by the U. S. Weather Bureau under these conditions. The forward visibility of the crew when it was over the approach lights could have been as low as one-half statute mile if the aircraft had been clear of clouds in that area. Conditions of temperature and moisture in the approach zone were not conducive to structural icing, and it is therefore not considered to have been a problem. Also, according to the sun and moon data, the accident occurred during the hours of complete darkness.

It is believed that the captain knew the reported weather conditions to the extent indicated to him by the GCA controller. It must be assumed that he was monitoring his altimeter and knew that when he passed through his minimum altitude if he had not established visual reference to the airport or ground, or if he had been advised by GCA that he was exceeding the safety limits, he would have had to execute the required missed-approach procedure. Since he did not execute the procedure, did not question the condition of the weather, and since he was not advised by GCA to abandon his approach upon reaching a critically low altitude, it is assumed that he had visual contact with the runway and was contemplating a successful landing.

The controller stated in his testimony that he saw the aircraft target over the end of the runway. However, this target return must have been from part of the wreckage which continued up the runway from the point of impact.

The six pairs of red approach lights, two of the green threshold lights, and the first four pairs of runway lights beyond the two operating threshold lights were not lit. The single strobe light was lit; however, its beam was directed 4-1/2 degrees above the glidepath angle of three degrees. As an aircraft goes below the beam of the strobe light the effectiveness of the light is greatly reduced. For example, at a point 50 feet below its directed beam, the effective strength of the beam is reduced by as much as 75 percent.

The captain could not have known that the approach lights and some of the threshold and runway lights were inoperative since this information had not been given to him. It is also believed that he would not have flown below his minimum altitude had he not had some portion of the runway lights in sight. The Board concludes, however, that the existing lighting situation was a factor in causing the captain to improperly orient himself with the runway. The Board further concludes that the captain knew he was below the glidepath throughout the approach but did not believe it to be critical.

It should be noted that although the approach procedure was flight-checked and approved by the Flight Standards Service of the Federal Aviation Agency, apparently no consideration was given to the fact that the AN/FPN-33 is not deemed suitable by the Aviation Research and Development Service, the Aviation Facilities Service or the Air Traffic Service of FAA for use as an FAA-operated air traffic control facility. Another significant point to be noted is that the Flight Standards Service, in its flight checks of this facility, utilized a lower-limit safety zone line which extended one and one-half degrees below the center of the glidepath. The Air Traffic Service has established, for facilities under its jurisdiction, a safety zone limit of one-half of one degree under the center of the glidepath. A displacement value of 40 feet below glidepath at one mile, therefore, would not be considered alarming by the controller operating under the concept of a one and one-half degree safety zone, whose lower limit at that point would be 159 feet below center of glidepath; whereas, were the controller utilizing the standards prescribed by the Air Traffic Service, he would be commencing to take action to order a pullup and missed-approach procedure to be executed had the aircraft deviated to the extent indicated. However, a finite value in feet cannot be estimated accurately on a radar scope with the type of presentation provided for the AN/FPN-33. For this reason, the military services have instructed their controllers to refrain from the practice of providing foot values of displacement from centerlines of azimuth

or elevation when utilizing precision radar equipment with this type of display.

Furthermore, although the controller was directly involved in the control of civil air traffic under instrument flight rules, FAA did not enforce any requirements for certification and area rating, current medical certificate, Class II, or current proficiency in radar operation or other aspects of air traffic control.

Probable Cause

The Board determines that the probable cause of this accident was the absence of approach and runway lights, and the failure of the GCA controller to give more positive guidance to the pilot during the last stages of his approach.

BY THE CIVIL AERONAUTICS BOARD:

/s/ ALAN S. BOYD
Chairman

/s/ ROBERT T. MURPHY
Vice Chairman

/s/ CHAN GURNEY
Member

/s/ G. JOSEPH MINETTI
Member

/s/ WHITNEY GILLILLAND
Member

S U P P L E M E N T A L D A T A

Investigation and Depositions

The Civil Aeronautics Board was notified of the occurrence of the accident at 0350 Alaska Daylight Time July 21, 1961. An investigation was immediately initiated in accordance with the provisions of Title VII of the Federal Aviation Act of 1958. Depositions ordered by the Board were taken in Anchorage, Alaska, on August 4, 1961, and in Seattle, Washington, on August 8, 1961.

The Carrier

Alaska Airlines, Inc., is an Alaska Corporation with principal offices at 2320 6th Avenue, Seattle, Washington. The corporation is the holder of air carrier operating certificate No. 802 issued on September 23, 1946, and revised February 12, 1958. The corporation holds air carrier operating certificate No. 802 authorizing its charter and special services operation conducted under Part 42 of the Civil Air Regulations. The corporation holds a certificate of public convenience and necessity issued by the Civil Aeronautics Board.

The Aircraft

The aircraft was a Douglas DC-6A, manufactured as a cargo aircraft for Alaska Airlines under serial No. 45243 on October 20, 1957. The total time on the airframe at the time of the accident was 10,600:30 hours. The last major inspection was conducted 146:11 hours prior to the accident.

The powerplants consisted of four Pratt & Whitney R2800 CB 17 engines with propeller model No. 43E60-483-P9/6895 E-8. The time since overhaul on the engines was as follows: No. 1: 601:47 hours; No. 2: 601:47 hours; No. 3: 1,481:26 hours; and No. 4: 1,028:34 hours. Time since overhaul of the propellers was as follows: No. 1: 3,248:03 hours; No. 2: 1,280:37 hours; No. 3: 107:46 hours; and No. 4: 1,597:39 hours.

Flight Personnel

Captain Edward F. Bowman, age 44, had been employed with Alaska Airlines since November 17, 1946. He had 13,019:31 total flying hours, 1,117:34 hours in DC-6 equipment, 4,219:00 hours night time, and 2,051:00 hours actual instrument time, 28:00 hours of which were flown in the last month preceding the accident. Captain Bowman possessed ATR No. 54701 showing certification in DC-3, DC-4, DC-6, DC-7, and C-46 aircraft. His last route proficiency and instrument checks were conducted March 14, 1961. No route checks had been conducted over the particular route involved in this accident since the flight was conducted under the provisions of Part 42 of the Civil Air Regulations. Captain Bowman's first-class medical certificate was dated May 3, 1961.

Cocaptain Galvin W. Sargent, age 41, was hired by Alaska Airlines on June 16, 1961. He had a total of over 13,000 hours on four-engine equipment, including the DC-6. He had 714:12 hours of actual instrument time. He was given a DC-6 captain's proficiency and instrument check on June 21, 1961. Captain Sargent possessed ATR No. 35549-40 with ratings in Martin 202-424, DC-4, DC-6, DC-7, C-46 and Boeing 377; single and multiengine land and commercial privileges. The date of his last first-

class medical examination was June 23, 1961.

Copilot John F. Bird, Jr., age 29, was hired by Alaska Airlines on April 13, 1959. He possessed a flight engineer certificate No. 1439330 and commercial pilot certificate No. 1358925, airplane multiengine land and instrument rating. He completed first officer qualifications on DC-6 equipment May 21, 1961. Mr. Bird had accumulated 2,061 hours pilot time, of which 101 hours were in DC-6 equipment. He had also 150 hours of actual instrument time. His DC-6 engineer time was 780 hours. Mr. Bird possessed a first-class medical certificate dated May 25, 1961.

Flight Engineer William Donovan, age 27, was hired by Alaska Airlines on April 13, 1959. He possessed a commercial pilot certificate No. 136608 with single and multiengine land and instrument privileges. He had accumulated 1,175:55 pilot hours. He had a flight engineer certificate No. 1443248 and had completed training as a flight engineer with Alaska Airlines. The date of his first-class medical certificate was May 31, 1960.

Flight Engineer Dwight Babcock, age 28, was hired by Alaska Airlines on May 15, 1961. He possessed an A&P certificate No. 1329061 and a flight engineer certificate No. 13880698. He had approximately 1,200 hours as a flight engineer in DC-6 equipment. The date of his last first-class medical examination was June 28, 1961.

Flight Navigator Edson A. Marahrens, age 41, was hired by Alaska Airlines July 17, 1961. He possessed approximately 13,000 hours as a flight navigator and held certificate No. 1020664. This was his first flight with Alaska Airlines.

The GCA Controller

Mr. John R. Rohrbough, Jr., age 30, possesses control tower operator certificate No. 1336747 issued on April 3, 1956. On December 6, 1956, he was rated as a senior controller at Ontario International Airport, California. Prior to receiving his initial certificate, he had four years experience as a GCA operator for the U. S. Air Force with ratings at Scott AFB, Illinois; Keesler AFB, Mississippi; Biggs AFB, Texas; and Holloman AFB, New Mexico, The date of his last Class II medical examination was 1958.