

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: September 10, 1952

Released: September 15, 1952

NORTHWEST AIRLINES, INC., - SANDSPIT, BRITISH COLUMBIA,
JANUARY 19, 1952

The Accident

At approximately 0138,^{1/} January 19, 1952, Northwest Airlines' Flight 324, a Douglas DC-4, N 45342, crashed in the waters of Hecate Strait less than a mile offshore (see Attachment II), following an attempted precautionary landing at the Sandspit, British Columbia, airstrip. Only seven of the 40 passengers, all military personnel, survived the near-freezing water. A small boat rescued the survivors about an hour and a half after the accident. The three crew members survived the crash but succumbed before arrival of the boat. The aircraft was substantially damaged upon impact, and subsequently was destroyed by action of tides.

History of the Flight

Flight 324, en route from Tokyo, Japan, to McChord Air Force Base, Tacoma, Washington, via Shemya and Anchorage, Alaska, arrived at Elmendorf Air Force Base, Anchorage, at 1030, January 18, 1952. During the scheduled stop at Shemya, a crew change point, one magneto was changed on No. 1 engine. The balance of the trip to Anchorage was completed without incident, and the incoming crew reported no malfunctions. Another crew change was made at Elmendorf, with the new crew consisting of Captain John J. Pfaffinger, First Officer Kenneth H. Kuhn, and Stewardess Jane Cheadle.

Captain Pfaffinger and First Officer Kuhn were briefed on weather and route information prior to departure. Forecasts indicated that weather conditions at the planned cruising altitude of 10,000 feet would be instrument, sky condition generally broken to overcast, with two or more cloud layers. The freezing level rose along the route, being on the surface at Anchorage, 500 feet at Sandspit, and 2,000 feet at Seattle. Occasional light aircraft icing and light turbulence were forecast. Precipitation in the form of snow showers at both surface and flight level was predicted between Anchorage and the Sandspit area; between Sandspit and Seattle, forecasts predicted rain at flight level. The forecast indicated variable ceilings (6,000 feet to 300 feet) and visibility (15 miles to zero) between Yakutat, Alaska, and Seattle.

The flight plan, as approved by ARTC (Air Route Traffic Control), was for IFR (Instrument Flight Rules) flight at 10,000 feet from Elmendorf via Amber Airway No. 1 to Whittier, Alaska; Military Route to Middleton Island

^{1/} All times referred to herein are Pacific Standard and based on the 24-hour clock.

and thence to Sandspit; Amber Airway No. 1 to Blue Airway No. 32, thence to Seattle; Seattle to McChord Air Force Base via Amber Airway No. 1. Alternate airports were Seattle and Boeing Field. The flight from Elmendorf to McChord Air Force Base was to be nonstop.

Flight 324 departed Elmendorf Air Force Base at 2111, January 18, with the same 40 passengers who had enplaned at Haneda Air Force Base, Tokyo. The aircraft had 2,600 gallons of fuel and 100 gallons of oil aboard. Gross weight at takeoff was 68,275 pounds (permissible 71,800), and the load was properly distributed with relation to the center of gravity. The flight climbed to the 10,000-foot assigned altitude and at 2213, shortly after passing Middleton Island, requested permission to descend to 8,000 feet. ARTC cleared the flight to descend and the new cruising altitude was reached at 2222.

The trip was uneventful until opposite Sitka, Alaska, when the pilot reported, at 0003 (January 19), that No. 1 propeller had been feathered.^{2/} In another radio transmission (0029), the pilot ascribed the trouble to a "broken" oil cooler, and advised that the flight was proceeding to Sandspit. In other transmissions, he requested weather forecasts for Annette, Sandspit, and Port Hardy. Following receipt of this information, which revealed that Annette weather was below minimums, he again advised that a precautionary landing would be made at Sandspit, and gave 0128 as the estimated time of arrival. The flight was cleared to that point and proceeded without further incident on three engines.

The aircraft touched down at a point about one-third down the runway.^{3/} After a short roll, power was applied at about the mid-point of the strip and the aircraft took off, barely clearing a low fence and driftwood which was approximately two feet high at the end of the runway. After it failed to reappear at the approach end of the landing strip, the Sandspit radio operator discovered from the shouting of survivors that the flight had crashed in Hecate Strait. The radio operator immediately sent notification messages to place Search and Rescue facilities in operation. The wreckage could not be seen because of limited visibility. In company with a Canadian customs official, he launched his small boat and effected the rescue of the seven survivors standing on and clinging to the right wing tip of the partially submerged aircraft.

Following the alerting of Search and Rescue facilities, messages were relayed by Annette Flight Control to two other aircraft in the area. They attempted to light the area with flares and locate the wreckage, but were unsuccessful in their efforts.

The Investigation

Since the accident occurred in Canadian territory, the Canadian Government assumed primary investigative jurisdiction, and invited the Civil Aeronautics Board to send an official observer, who immediately proceeded to the

^{2/} See Attachment I.
^{3/} See Attachment II.

scene of the accident. Subsequently, the Board conducted an investigation of this accident and the Canadian Government furnished the Board with a summary report of its investigation.^{4/}

Shortly after departure from Anchorage, First Lieutenant Donald E. Baker, a U.S.A.F. navigator, was invited forward by the captain. He was cognizant of the flight's position and operation of the aircraft until the start of final approach at Sandspit, at which time he returned to his seat in the cabin. Lt. Baker advised that when near Sitka, the pilot noted a drop in oil pressure in No. 1 engine and a rapid loss of oil. The engine was therefore shut down, Annette (Alaska) Flight Control notified of the difficulty in the 0003 and 0029 radio transmissions, and clearance was received to proceed to Sandspit. Although the flight advised that the oil cooler in No. 1 engine was "broken," there was no positive means of ascertaining that this was the cause of the oil loss.

In accordance with company operating procedures the captain elected to land at the first available airport, which in this instance was Sandspit, rather than continue to destination on the three remaining engines. Annette Airport, although equipped with better facilities and slightly closer than Sandspit at the time the propeller was feathered, was not available for a precautionary landing due to poor weather conditions. The Sandspit airstrip is designated as an emergency airport for Northwest Airlines operations.

Shortly after the propeller was feathered a small amount of ice formed on the forward cockpit window. The aircraft climbed well on three engines and level flight was resumed at approximately 1,000 feet above the previously approved flight altitude of 8,000 feet. The change in altitude stopped further ice accretion. According to Lt. Baker, the aircraft flew well on three engines and the crew reported no difficulty in handling it. The captain was in the left seat, flying the aircraft, and the first officer made the radio contacts.

Lt. Baker advised that the descent at Sandspit appeared to be normal. There was light turbulence. It seemed that the aircraft was coming in somewhat high, and before the flare-out was completed rough contact was made on the runway. Lt. Baker saw lights along the runway flash by, power was applied, and the aircraft took off. He heard the hydraulic pumps operating. Shortly after becoming airborne, Lt. Baker felt vibrations associated with an impending stall; they were not violent, and to him it seemed that the aircraft was settling but not in a fully stalled condition. At the first impact with the water, the wings seemed to be level or with the left wing slightly low. The aircraft bounced and seemed to slip to the left. All lights in the cabin went out at the time of the first impact. The second impact occurred with the left wing slightly down and the aircraft spun to the left as it came to rest. Deceleration was quite rapid, but not violent.

The passengers had been advised of the feathered propeller, but no verbal instructions were issued for them to don life jackets or otherwise to prepare for a precautionary landing. Investigation disclosed that in

^{4/} See Supplemental Data: Investigation and Hearing.

Northwest Airlines' flight operations three-engine operation is considered a potential, not an actual, emergency. A ditching was not anticipated, and therefore an emergency was not declared. Although several passengers had life vests in their possession as they evacuated the cabin, Lt. Baker was the only passenger who is known to have donned one. Others soon lost their life jackets during their efforts to get on top of the settling aircraft. All or nearly all passengers evacuated the aircraft; owing to the lack of light in the cabin, and the urgency of each individual to find a means of survival, an accurate check on survivors was impossible. None of the initial survivors seemed injured. One of the pilots retained a flashlight used for signaling for a time until dropped in the water. Tide was at about one-half flood and rising.

The left cabin emergency exit, the main cabin door, and the astrodome opening were used as exits. As the aircraft settled to the bottom, survivors worked their way back along the fuselage to the tail or swam to the right wing tip. After a while, only the right wing tip remained above water. The seven survivors were clustered there when the boat arrived.

The local weather, based on the 0130 observation, was: overcast, ceiling estimated 2,500 feet, visibility 10 miles, temperature 34, dewpoint 30, wind south-southwest 10, altimeter setting 29.44, stratus overcast with breaks. There were snow showers in the area which reduced ceilings and visibilities.

Investigation disclosed that the aircraft carried one 15-man life raft stowed forward in the crew compartment, and two 20-man life rafts stowed near the main cabin door, with sufficient life vests for all aboard. Information on the use of this equipment was given to passengers in the form of trilingual pamphlets which the stewardess instructed passengers to read upon departure from Tokyo. The pamphlets described a collar-type life vest, while the type carried on the aircraft were the vest type. None of the life rafts was launched. So far as is known no effort was made to launch the two rafts in the cabin, nor was the emergency lighting in the passenger compartment turned on. The first officer and others made valiant attempts to get the 15-man life raft out through the astrodome opening, but without success.

All Northwest Airlines flight crews engaged in overwater flight are given training in ditching and survival. Pilots are also trained in two and three-engine operation. The Northwest Airlines operations manual states that three-engine takeoff and initial climb are to be made with flaps extended 15 degrees. Company records showed that all crew members in this instance had completed all the required training in these matters.

The landing strip had been cleared with snow plows and had a thin coating of packed snow and ice, with braking action reported fair. The strip was lighted along its length with kerosene flare pots since snow had covered the electrically lighted system. The radio operator on duty at the airstrip was in communication with the flight during its letdown and approach, and advised the flight of field conditions and local weather.

The only ground witnesses were the radio operator, Mr. Everett Thompson, and a Canadian customs official, Mr. John Davy, who watched the approach and start of the go-around through the radio room windows. Mr. Davy placed the

point of touchdown at approximately one-third the distance down the runway from the northwest end, using as reference points a former control tower near the runway, and a signboard. According to Mr. Davy and Mr. Thompson the approach appeared to be at, or possibly slightly above, normal speed and altitude. The three engines seemed to operate normally after the aborted landing. Acceleration appeared slow. Just prior to being lost to sight shortly after takeoff, the aircraft appeared to be in a slight left bank.

Search and Rescue facilities were not alerted until after the accident because no emergency had been declared and ditching had not appeared probable. The nearest rescue facilities were located at Annette, too far from the scene to be immediately effective. There are no rescue facilities at Sandspit, and rescue was necessarily delayed owing to the fact that the small boat had to be taken from winter storage and carried to a suitable launching point at the southeast end of the runway. Shoal water with many rocks made the rescue very difficult.

Attempts were made to salvage the aircraft and tow it to shallow water where more detailed examination might be made, but without success. Inspection of the aircraft revealed that it had broken into two separate sections, with the break occurring at a station immediately forward of the main entrance door. Divers were unable to enter the cabin due to the strong current. However, one looked through several cabin windows but could see no bodies inside the fuselage. They estimated by feel that the wing flaps were extended 40 degrees. The left wing panel was found to have sheared at a point approximately eight feet from the center wing to the outer wing attachment. The No. 1 power plant was missing from the firewall forward, as were propellers and nose sections from Nos. 3 and 4 engines. After a few days salvage attempts were abandoned.

On June 9, 1952, Mr. Rudolph Helm, Chief Pilot, Western Region, Northwest Airlines, and Mr. Don Leonard, Air Line Pilots Association accident representative, revisited the scene during a low tide condition. Debris along the shore yielded nothing of any significance. The aircraft was almost completely disintegrated by this time due to tide action and corrosion. However, it was definitely ascertained that both main landing gears were fully retracted; therefore, the nose gear, which had washed up on the beach during the initial investigation, was retracted at the time of impact, for it retracts before the main landing gears on this type aircraft. The control pedestal of the aircraft was located and controls were found in the following positions: Blowers 1 and 2 "low," cowl flaps "closed," landing gear handle "up," flap handle "neutral," mixture control "rich," automatic pilot "on." The metal deflection shield for the automatic pilot was bent downward. The wing flaps were not on the aircraft.

During the Board's investigation it was determined that Northwest Airlines had leased N-45342 for use in the military air lift Pacific operations. Examination of maintenance records for this aircraft disclosed that certain component parts of the engine installed in the No. 1 position had at the time of the accident exceeded the required overhaul time period of 1,500 hours. This engine had previously been given a top overhaul by Air Works, Inc., for TWA and shipped to Northwest Airlines' Seattle base on October 21, 1951, where it was installed in another DC-4. Northwest Airlines at Seattle was advised by TWA that the time since overhaul on this engine was 790 hours and 50 minutes. The stock clerk at Seattle who received this message did not forward

the information to the Northwest Airlines' St. Paul Routing Office, since he had not been required to do so in the past. (Normally TWA transmitted such information direct to St. Paul.) After 555 hours and 16 minutes of additional operation, this engine was installed in N-45342, where it had accumulated 379 hours and 10 minutes at the time of the accident, or 225 hours and 16 minutes in excess of the 1,500 hours allowed between overhauls. The oil cooler reported by the flight as "broken" was one of the accessories that had been in service only 934 hours and 26 minutes.

Analysis

Field conditions and runway length at Sandspit were satisfactory to accommodate the DC-4, and the captain's decision to land there was therefore in conformance with good operating procedures. Under the circumstances of load, speed, and braking conditions at the time, the distance remaining on the runway from point of touchdown might be considered marginal, and a successful stop may or may not have been possible; the attempted go-around, therefore, also appears to have been a proper decision.

Although the captain's handling of the situation following feathering of the No. 1 propeller was in conformance with Civil Air Regulations and company operating procedures, it would appear that with one engine out on a sub-Arctic overwater flight, at night, and under IFR conditions, it would have been highly desirable for the captain to have prepared the aircraft and passengers for a possible ditching. Neither passengers nor crew were prepared for a crash landing or an unpremeditated ditching. Preparation for ditching would probably have resulted in less loss of life, particularly had the life rafts been readily available for launching and inflation. Under the circumstances, the rafts were nearly inaccessible, owing to the sunken fuselage and freezing water. Had it been possible to release and inflate them the survivors could probably have rowed to shore.

Use of life jackets might also have been instrumental in saving more lives. However, their effectiveness in this instance is questionable since immersion in freezing water for as short a time as ten to fifteen minutes usually results in unconsciousness.

Subsequent to this accident, Northwest Airlines began a study of improvements in procedures and the desirability of relocating or installing additional emergency equipment on aircraft operated on overwater flights. The ditching pamphlet has been supplemented by oral briefing of passengers on location of emergency exits and how to open them; location of life rafts, how to remove them, and instructions on inflation; and personal demonstration to groups of four passengers of the manner in which life vests are to be donned and inflated. The equipment study is still in progress.

After No. 1 propeller was feathered, it was demonstrated that the aircraft could not only maintain level flight, but that the power available from three engines was sufficient to enable the aircraft to climb in the clean configuration without difficulty. Thus it was demonstrated that there should have been adequate power available for the climb after take-off at Sandspit.

Of course the possibility remains that the same amount of power developed in the previous three-engine climb was not being developed at this time, due to possible carburetor icing or other factors which would reduce horsepower output. Survivors reported no additional engine failure or malfunctioning. Since it was impossible to conduct a tear-down and examination of the engines, no concrete statement can be made regarding their condition.

Possible ice accretion could have lowered airfoil efficiency in the climb following take-off, since weather conditions at Sandspit were favorable to formation of light icing on the aircraft structure.

At the request of the Board, the Douglas Aircraft Company furnished a series of curves plotting air speed versus rate of climb for a DC-4 operating on three engines at rated take-off power and with the propeller feathered on the inoperative engine. These curves were computed for sea level without considering ground effect and a gross weight of 62,479 pounds, the estimated gross weight of Flight 324 at the time of the accident. Study of this information revealed that the optimum rate of climb with 45 degrees flaps and landing gear down would be 15 feet per minute at approximately 98 miles per hour; however, ground effect for approximately the first fifty feet of altitude would increase the rate of climb appreciably. With 45 degrees flaps, gear up, the optimum rate of climb would be 200 feet per minute at about 108 miles per hour; 420 feet per minute could be realized with 30 degrees flaps, gear up, at an air speed of about 118 miles per hour. Thus from the time the aircraft first broke ground to the time that the landing gear was fully retracted the rate of climb would have been low. At air speeds both below and above those noted, the rate-of-climb curves fall off rapidly. In considering the flight characteristics of the aircraft under the circumstances of load and available power, a successful climb would have been possible with flaps extended 40 to 45 degrees if proper air speeds were maintained and three engines continuously developed rated take-off power.

Testimony of Lt. Baker indicated that the aircraft was very near the stalling point. Further, he stated that deceleration was rapid but not violent. This would indicate that the speed of the aircraft was low. Since the wind was of low velocity, its effect on ground speed would have been negligible. Thus there is considerable evidence that since the aircraft was flown at low air speed after take-off, the wing was at a high angle of attack. During slow flight, a high angle of attack can result in decreased lift, increased drag, further loss of air speed, and loss of altitude. Air speed and angle of attack are interrelated; if air speed is maintained near the stall point, as in this case, the aircraft must inevitably settle.

In regard to the overtime of No. 1 engine: It is obvious as developed under Investigation that the engine was used beyond its maximum allowable overhaul period because of a clerical error of omission. A company official testified that since spare powerplants received from TWA were generally newly overhauled units, it was apparently assumed by the St. Paul Routing Office where such records are kept that a complete overhaul had been accomplished on this engine. It, therefore, appears that this overuse of the engine was without intent to exceed the overhaul limitations. The conditions that allowed this error to occur have been corrected by the carrier to the satisfaction of the CAA.

Following the accident, the CAA filed a technical violation against Northwest Airlines and admonished it relative to the matter of engine over-time error.

Following this accident, the Board accelerated studies in being at the time of the accident of pertinent Civil Air Regulations. Amendments to Parts 40, 41, 42, and 61 of the Civil Air Regulations are proposed, all to assure a greater margin of safety for occupants of aircraft engaged in overwater operations. Further studies of Civil Air Regulations relating to overwater flight, design features of aircraft, emergency equipment design, stowage, and use are continuing.

Findings

On the basis of all available evidence, the Board finds that:

1. The company, the aircraft (with the exception of certain components of No. 1 engine), and the crew were properly certificated.
2. The No. 1 engine suffered an oil loss, which necessitated shutting down the engine and feathering the propeller.
3. In accordance with company operating procedures, the captain elected to land at Sandspit, British Columbia, the first available airport, rather than continue to destination on three engines.
4. The aircraft, following an aborted landing at Sandspit and when last observed by a ground witness, was in a shallow left bank at low altitude.
5. The aircraft, at near stalling speed during the attempted climb-out, settled into the water, bounced, and came to rest 26 degrees to the left and approximately 4,500 feet from the end of the runway.
6. All or nearly all of the passengers evacuated the aircraft, with no known serious injuries.
7. Air and water temperatures were near freezing; drowning and exposure accounted for 36 fatalities.
8. No steps were taken to prepare passengers for a crash landing or possible ditching.
9. Emergency lighting in the cabin was not utilized, nor were any effective measures taken to remove life rafts at the rear of the cabin.
10. Search and Rescue facilities were not alerted until after the accident because three-engine operation over water was considered a potential, not an actual, emergency.

Probable Cause

The Board determines that the probable cause of this accident was the high approach to the airstrip and the attempt to again become airborne at insufficient air speed, which resulted in the aircraft settling into the water.

BY THE CIVIL AERONAUTICS BOARD:

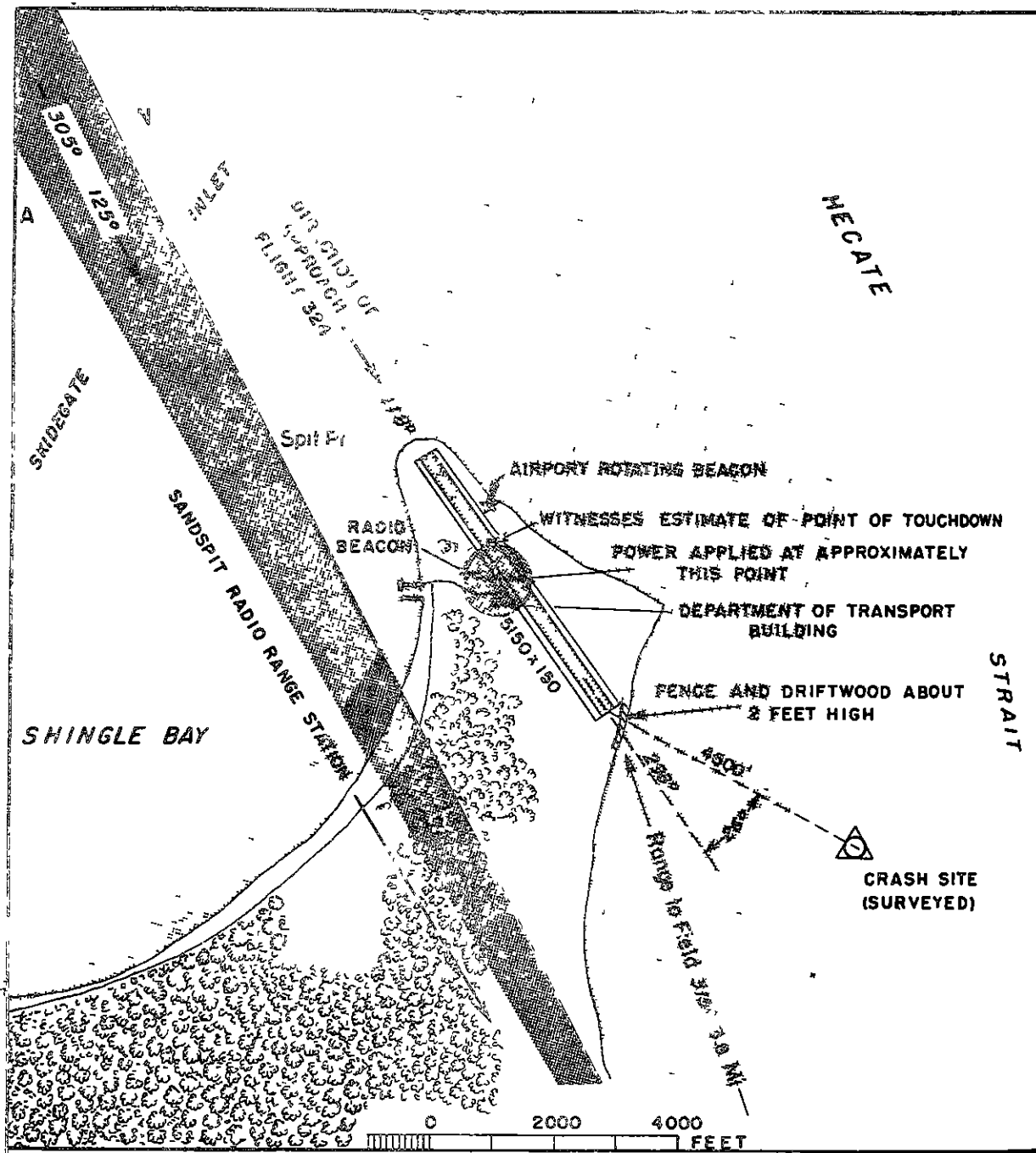
/s/ DONALD W. NYROP

/s/ OSWALD RYAN

/s/ JOSEPH P. ADAMS

/s/ JOSH LEE

/s/ CHAN GURNEY



ATTACHMENT II

**NORTHWEST AIRLINES, INC., ACCIDENT SANDSPIT, B. C.
 JANUARY 19, 1952
 SANDSPIT FLIGHT STRIP**

Crash site data furnished by R. T. Johnson, Aviation Safety Agent,
 Civil Aeronautics Administration.

Bearings are magnetic

Prepared by the Bureau of Safety Investigation, Civil Aeronautics Board.

Source of Chart. Aeronautical Chart Service # AL-2126, U. S. Air Force.



ATTACHMENT I

NORTHWEST AIRLINES, INC
ACCIDENT, SANDSPIT, B C
JANUARY 19, 1952

Pertinent radio contacts, shown in Pacific Standard, are not verbatim

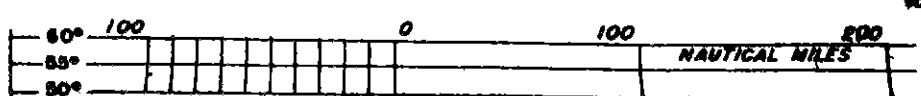
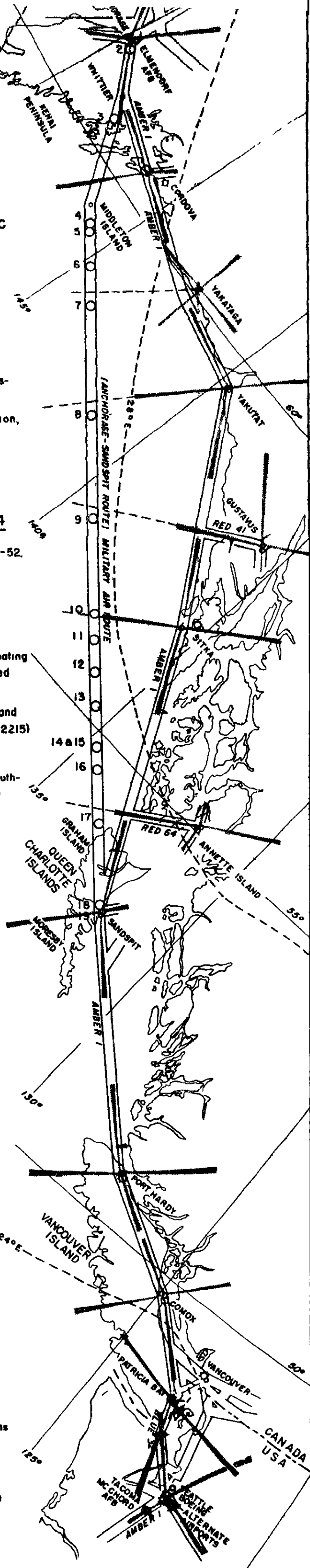
Positions are approximate, based on dead reckoning position of the flight at time of transmission or receipt of messages by the flight

Prepared by the Bureau of Safety Investigation,
Civil Aeronautics Board

Source Pertinent portion of Aeronautical
Planning Chart 3069a,
U S Coast and Geodetic Survey.

RADIO CONTACTS, FLIGHT 324

- 1- Takeoff, Elmendorf Air Force Base, 2111, 1-18-52.
- 2- Over Anchorage range station 2123, climbing VFR, estimating Whittier 2138. (2127)
- 3- Over Whittier 2138, 10,000' estimating Middleton Island 2210 (2145)
- 4- Over Middleton Island 2209, 10,000', estimating 90 degrees abeam Yakutat 2230, requested change of altitude to 8,000'. (2213)
- 5- ARTC cleared Flight 324 to descend to and maintain 8,000' Descent begun immediately (2215)
- 6- Cruising at 8,000' at 2222 (2224)
- 7- Abeam Yakutat 2230, 8,000', estimating southwest leg of Yakutat range at 2259 (2234)
- 8- Southwest leg Yakutat range 2302, 8,000', estimating southwest leg of Gustavus range at 2231 (2305)
- 9- Southwest leg Gustavus range 2330, 8,000', estimating southwest leg of Sitka range at 2357 (2335)
- 10- No. 1 propeller feathered, proceeding to Sandspit (0003, 1-19-52)
- 11- Southwest leg Sitka range 0004, 8,000', estimating southwest leg of Annette range at 0059 (0010)
- 12- CAA INSAC at Yakutat relayed information that No. 1 propeller feathered to NWA Flight Control, Seattle (0020)
- 13- Oil cooler No. 1 engine broken Proceeding to Sandspit (0029)
- 14- NWA Flight Control, through CAA communications relay, asked Flight 324 if it was proceeding to Sandspit and advised that Seattle weather was satisfactory Message not delivered to flight. (0040)
- 15- Annette radio, upon request from the flight, furnished 0030 Sandspit, Annette, and Port Hardy weather (0041)
- 16- Flight 324, at 0047, requested terminal forecasts for Annette, Sandspit, and Port Hardy Message relayed to NWA, Seattle, and forecasts relayed back PAA Flight 908 overheard weather being relayed to Flight 324 only a few minutes before the accident
- 17- Southwest leg of Annette range 0059, estimating Sandspit at 0128 (0103)
- 18- Flight 324 advised Annette radio that it was leaving 8,000' and would thereafter be in communication with Sandspit (0126)
- 19- Flight 324 contacted Sandspit radio during initial approach. Last radio contact with the flight Crashed at approximately 0138



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

Investigation and Hearing

The Civil Aeronautics Board was notified of this accident by CAA Communications at approximately 0200 on January 19, 1952. An investigation was immediately initiated by the Department of Transport of the Canadian Government and in accordance with procedures of the International Civil Aviation Organization, a representative of the Board participated as an official observer.

The Board's investigation proceeded concurrently with the Canadian investigation and was immediately initiated upon notification of the accident in accordance with the provisions of Section 702 (a)(2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was ordered by the Board and was held in the Washington Athletic Club, Room 400, 6th and Union Streets, Seattle, Washington, on April 2 - 4, 1952. An invitation was extended to the Canadian Government for one of its representatives to attend the Board's hearing, and an official of the Department of Transport was present as an observer for his government.

Air Carrier

Northwest Airlines, Inc., is a Minnesota corporation, with its principal offices at 1885 University Avenue, St. Paul, Minnesota. The company is engaged in the transportation by air of persons, property, and mail under certificates of public convenience and necessity issued by the Civil Aeronautics Board, and an air carrier operating certificate issued by the Civil Aeronautics Administration for operations over the route described in this report. Northwest Airlines operates airlift flights across the North Pacific pursuant to a contract with the U. S. Air Force; the flight involved was such a military contract flight.

Flight Personnel

Captain John J. Pfaffinger, age 38, was employed by Northwest Airlines, Inc., on August 4, 1942. He was the holder of a valid airman certificate with an air transport rating for multi-engine land aircraft. Captain Pfaffinger had a total of 8,557 flying hours, of which 1,762 were in DC-4 equipment, and 1,197 hours of instrument flying time. His last instrument check was accomplished on October 22, 1951, and his last en route check was given on November 17, 1951. Captain Pfaffinger received a CAA physical examination on September 24, 1951.

First Officer Kenneth H. Kuhn, age 32, was employed by Northwest Airlines, Inc., on September 13, 1945. He was the holder of a valid airman certificate with commercial pilot and instrument ratings. He had a total of 4,197 flying hours, of which 1,698 were in DC-4 aircraft. His last CAA physical examination was accomplished on August 20, 1951.

Stewardess Jane Cheadle had been employed by Northwest Airlines, Inc., since April 1, 1950.

The Aircraft

N 45342, a Douglas DC-4 (C-54E), Serial No. 27279, owned by Trans World Airlines, Inc., was operated on lease by Northwest Airlines. It had a total of 18,859 flying hours and was currently certificated by the Civil Aeronautics Administration. The aircraft was equipped with four Pratt & Whitney R-2000 engines and Hamilton Standard 23E50 propellers. A No. 2 check on the aircraft was completed at Seattle, Washington, on January 15, 1952.