

## CIVIL AERONAUTICS BOARD

**ACCIDENT INVESTIGATION REPORT**

Adopted: November 9, 1955

Released: November 14, 1955

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

Introduction

This report is a revision of the Board's original accident investigation report released September 15, 1952.

In accordance with the Board's policy of keeping accident investigations open for consideration of new evidence, continuing study was carried out by the Bureau of Safety Investigation subsequent to release of the original report. This study resulted in the disclosure of nose gear malfunctions by review of service difficulties on DC-4 aircraft for a considerable period subsequent to the accident, the development of additional facts by detailed examination of the nose gear wreckage of N 45342, and the submittal of supplemental information relative to the handling characteristics of the DC-4 during takeoff with three engines operating. The weight of the new evidence warranted adoption of a revised report with a new Probable Cause.

The Accident

Northwest Airlines' Flight 324, a Douglas DC-4, N 45342, crashed in Hecate Strait less than a mile offshore (See Attachment II), following an attempted precautionary landing at the Sandspit, British Columbia, airstrip, January 19, 1952, about 0138.1/ Seven of the 40 passengers but none of the three crew members survived. The aircraft was substantially damaged upon impact, and subsequently was destroyed by action of tides.

History of the Flight

The flight originated at Tokyo, Japan, for McChord Air Force Base, Tacoma, Washington, via Shemya and Anchorage, Alaska. 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 Anchorage, with the new crew consisting of Captain John J. Pfaffinger, First Officer Kenneth H. Kuhn, and Stewardess Jane Cheadle.

The pilots were briefed on weather and route information prior to departure from Anchorage. Forecasts indicated that weather conditions at the planned

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

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 Anchorage via Amber Airway No. 1 to Whittier, Alaska; Military Route to Middleton Island 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-Tacoma and Boeing Field. The flight from Anchorage to McChord Air Force Base was to be nonstop.

Flight 324 departed Elmendorf Air Force Base at Anchorage at 2111, January 18, with the same 40 passengers, all military personnel, 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. 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.<sup>2/</sup> 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, proceeded without further incident on three engines, and made an approach for landing.

The aircraft touched down at a point about one-third down the runway.<sup>3/</sup> After a short roll, power was applied at about the mid-point of the strip and the aircraft took off without striking plow-piled snow on either side of the runway. It cleared a low fence of driftwood, some two feet high, at the end of the runway.

The Sandspit radio operator heard shouting, concluded that the aircraft had crashed in Hecate Strait, and immediately sent notification messages to place Search and Rescue facilities in operation. The wreckage could not be

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<sup>2/</sup> See Attachment I.

<sup>3/</sup> See Attachment II.

seen because of limited visibility. In company with a Canadian customs official, he took his small boat from winter storage, launched it, and after considerable difficulty from rocks in shoal water, rescued seven persons who had been in the near freezing water for about 1-1/2 hours. Two other aircraft in the area were alerted by Annette Flight Control. They attempted unsuccessfully to light the area with flares and locate the wreckage.

### 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 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.<sup>4/</sup>

One of the survivors was First Lieutenant Donald E. Baker, a U.S.A.F. navigator. Shortly after departure from Anchorage he was invited forward by the captain. He stayed in the cockpit until the start of the final approach at Sandspit, when 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 Flight Control was notified of the difficulty at 0003 and 0029, 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.

The captain followed company procedures in electing to land at the first available airport, which in this instance was Sandspit, a company approved emergency airport. Annette Airport, although equipped with better facilities and slightly closer than Sandspit at the time the propeller was feathered, was not available for precautionary landing due to poor weather conditions.

Shortly after the propeller was feathered a small amount of ice formed on the forward cockpit window. The aircraft was climbed on three engines and level flight was resumed at approximately 1,000 feet above the previously approved flight altitude of 8,000 feet, stopping 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 flew from the left seat while the first officer made the radio contacts.

Lt. Baker advised that the descent at Sandspit appeared normal in light turbulence. He thought that the approach was somewhat high and touchdown was made with little flare-out. Lt. Baker saw runway lights flash by, power was applied, and the aircraft took off. He heard the hydraulic pumps operating and felt vibrations which he 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 all cabin lights went out. The aircraft bounced and seemed to slip to the left. The second impact occurred with the left wing slightly down and the aircraft swung to the left as it came to rest. Survivors' statements indicated that deceleration was rapid, but not violent.

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<sup>4/</sup> See Supplemental Data: Investigation and Hearing.

Northwest Airlines considers three-engine operation as a potential, not an actual, emergency. Since no ditching was anticipated, the passengers had not been instructed to don life vests or otherwise prepare for an abnormal landing. 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. While an accurate check on evacuees was impossible, the record shows that all or nearly all of the passengers evacuated the aircraft. 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.

The left cabin emergency exit, the main cabin door, and the astro dome 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. All seven survivors clustered on this wing tip.

The local weather at 0130 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. Snow showers in the area reduced ceilings and visibilities.

The aircraft carried one 15-man life raft stowed forward in the crew compartment, and two 20-man life rafts stowed near the main door, with sufficient life vests for all aboard. Information on the use of this equipment was given to passengers in 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 strenuous but futile attempts to get the 15-man life raft out through the astro dome opening.

Northwest Airlines transpacific crews are trained in ditching and survival as well as 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 the required training in these matters.

The landing strip had been cleared with snowplows and had a thin coating of packed snow and ice, with braking action reported fair. The strip was lighted along its length with kerosene flarepots since plowed snow had covered the electric lights. 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 and a Canadian customs official, who watched the approach and start of the go-around through the radio room windows. The latter 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. Both thought that 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.

Unsuccessful attempts were made to tow the aircraft to shallow water where more detailed examination might be made. Divers estimated by feel that the wing flaps were extended 40 degrees; the left wing panel was found to have sheared outboard of the No. 1 nacelle. The No. 1 power plant was missing as were propellers and nose sections from Nos. 3 and 4 engines. After a few days recovery attempts were abandoned.

On June 9, 1952, a representative of Northwest Airlines and a representative of the Air Line Pilots Association revisited the scene during an unusually low tide. Debris along the shore yielded nothing of any significance. The aircraft was almost completely disintegrated by this time due to tide action and corrosion. It was ascertained that both main landing gears were fully retracted. 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.

The nose gear washed up on the beach shortly after the accident. It was later transported to Seattle for certain examinations; following this, it was forwarded to Washington for detailed examination by Board engineers. This latter examination disclosed that the nose gear was retracted when torn from the airframe. Normally, the nose wheel retracts before the main landing gear on this type aircraft. However, in the event of malfunction, it can retract only partially.

Review of service difficulties which were experienced on Northwest Airlines DC-4's for a considerable period after this accident disclosed a number of instances in which the nose gear failed to retract fully. All of the malfunctions occurred in cold weather operations and mainly during crosswind takeoffs which require nose wheel steering as do 3-engine takeoffs. (The subject takeoff was crosswind). Reasons for these malfunctions included broken steering cables, excessive steering paddle clearances, rapid gear retraction due to defective nose gear orifices, and slow shock strut extensions due to over-tight packings or rough centering cams. In this case the centering cams were found to be satisfactory but the other possibilities remain indeterminable.

Northwest Airlines had leased N 45342 for use in the military air lift. Its maintenance records disclosed that certain component parts of the engine installed in the No. 1 position, (this was the feathered propeller) had at the time of the accident exceeded the permissible time of 1,500 hours between overhauls. 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. Through oversight, this message was not forwarded to Northwest Airlines' St. Paul Routing Office. (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

Runway length and condition 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, may have been necessary.

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. This probably would have resulted in less loss of life.

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 briefings 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 in the use of life vests. Similar changes relative to survival equipment and procedures have been made in the Civil Air Regulations.

After No. 1 propeller was feathered, it was demonstrated that the aircraft had sufficient power from three engines to climb without difficulty in the clean configuration. Thus the power being developed at that time probably was adequate for the climb after takeoff at Sandspit, although the two situations are not directly comparable. Of course the possibility remains that the same amount of power developed in the previous three-engine climb was not being developed at Sandspit, due to possible carburetor icing or other factors which would reduce horsepower output. Since it was impossible to conduct a teardown 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 takeoff, since weather conditions at Sandspit were favorable to formation of light icing on the aircraft structure.

Pilots would normally retract flaps to 15 degrees for a go-around. The diver's estimate that the flaps appeared to be down about 40 degrees might be correct; however, the flap position may have shifted due to tide action or towing the aircraft backward. The flap handle was found in the neutral position which suggests that the pilot moved it from the full down position and retracted

flaps during acceleration. None of the evidence on this matter is conclusive, but if the flaps were at 15 degrees, climb performance would have been considerably better than at a 40-45-degree position.

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 takeoff power and with the propeller feathered on the inoperative engine. Without consideration of ground effect, these curves were computed for sea level at a gross weight of 62,479 pounds, the estimated weight of Flight 324 at the time of the accident. They show that the best 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 best 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 at the applicable weight, a climb would have been possible with flaps extended 40 to 45 degrees if proper airspeeds were maintained, three engines continuously developed rated takeoff power, the airplane was free of ice, and the landing gear retracted without malfunction.

Lt. Baker testified that he believed buffeting was present and that the aircraft was very near the stalling point during the attempted go-around. He also stated that deceleration at impact was rapid but not violent. This could indicate that the air speed of the aircraft was low and wind effect was negligible. Thus Lt. Baker's testimony indicates the possibility of insufficient airspeed for climb.

If malfunctioning of the nose gear retraction system occurred during the attempted go-around it is likely to have caused failure of the rods actuating the nose wheel well doors. The doors then could have caused the buffeting which Lt. Baker noticed. A partially retracted nose gear would also cause deterioration of the climb performance. The evidence that the nose gear was torn from the airplane while in the up and locked position does not preclude the possibility of malfunction. Service experience indicates that extension of the landing gear after nose gear malfunction, followed by a second retraction, usually results in completion of the retraction cycle. The time interval between the takeoff and the crash was probably sufficient for the above sequence of events.

The directional controllability of the DC-4 during three-engine takeoffs is such that the effect of a fully deflected rudder is insufficient to counteract the turning moment due to the unsymmetrical thrust at any speed appreciably below the safe takeoff speed. As a result, pulling the nose wheel off the ground in an attempt to take off at these lower speeds results in the aircraft veering off the runway. Since, in this case, the aircraft did not strike the snow banks lining the runway, it is apparent that the takeoff was not made at any speed appreciably lower than the recommended takeoff and climb speed.

In regard to the overtime of No. 1 engine: It is obvious 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.

### 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 the first available airport, rather than continue to destination on three engines.
4. The landing at Sandspit was aborted and a go-around was started.
5. When last observed by a ground witness, the aircraft was in a shallow left bank at low altitude.
6. During the attempted climbout, the aircraft 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.
7. While all or nearly all of the passengers evacuated the aircraft with no known serious injuries, drownings and exposure accounted for 36 fatalities due to near freezing air and water temperature.
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 use life rafts stowed at the rear of the cabin.

### Probable Cause

The Board determines that the probable cause of this accident was a nose gear retraction difficulty in connection with an icing condition or a power



loss, which made the aircraft incapable of maintaining flight.

BY THE CIVIL AERONAUTICS BOARD:

/s/ ROSS RIZLEY

/s/ JOSEPH P. ADAMS

/s/ JOSH LEE

/s/ HARMAR D. DENNY

Chan Gurney, Member, did not participate in the adoption of this report.

## 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. The hearing was reopened at St. Paul, Minnesota, on August 10, 1955.

### 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.



ATTACHMENT I

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

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

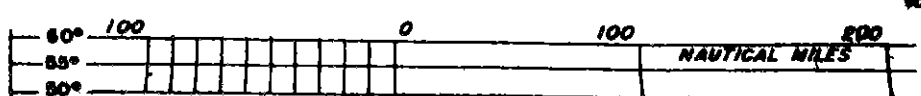
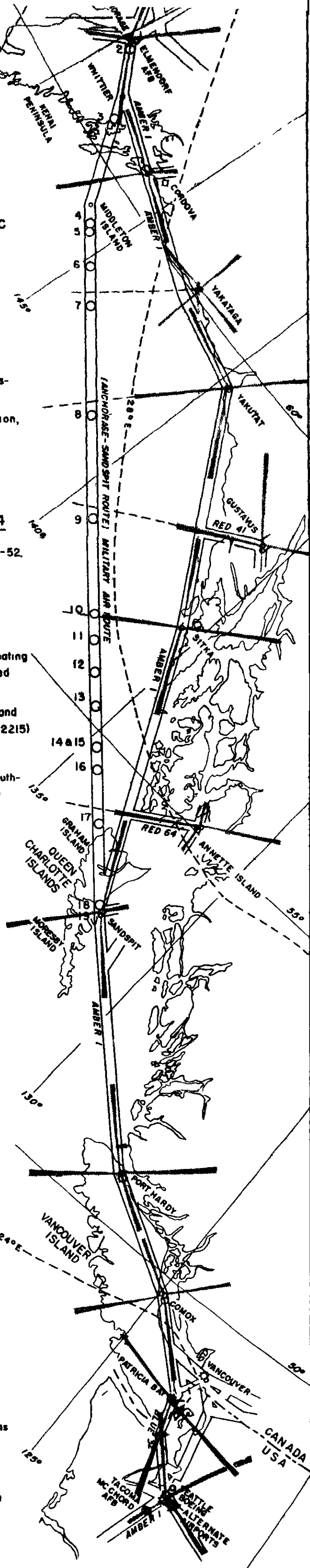
Positions are approximate, based on dead reckoning position of the flight at time of transmission or receipt of messages by the flight

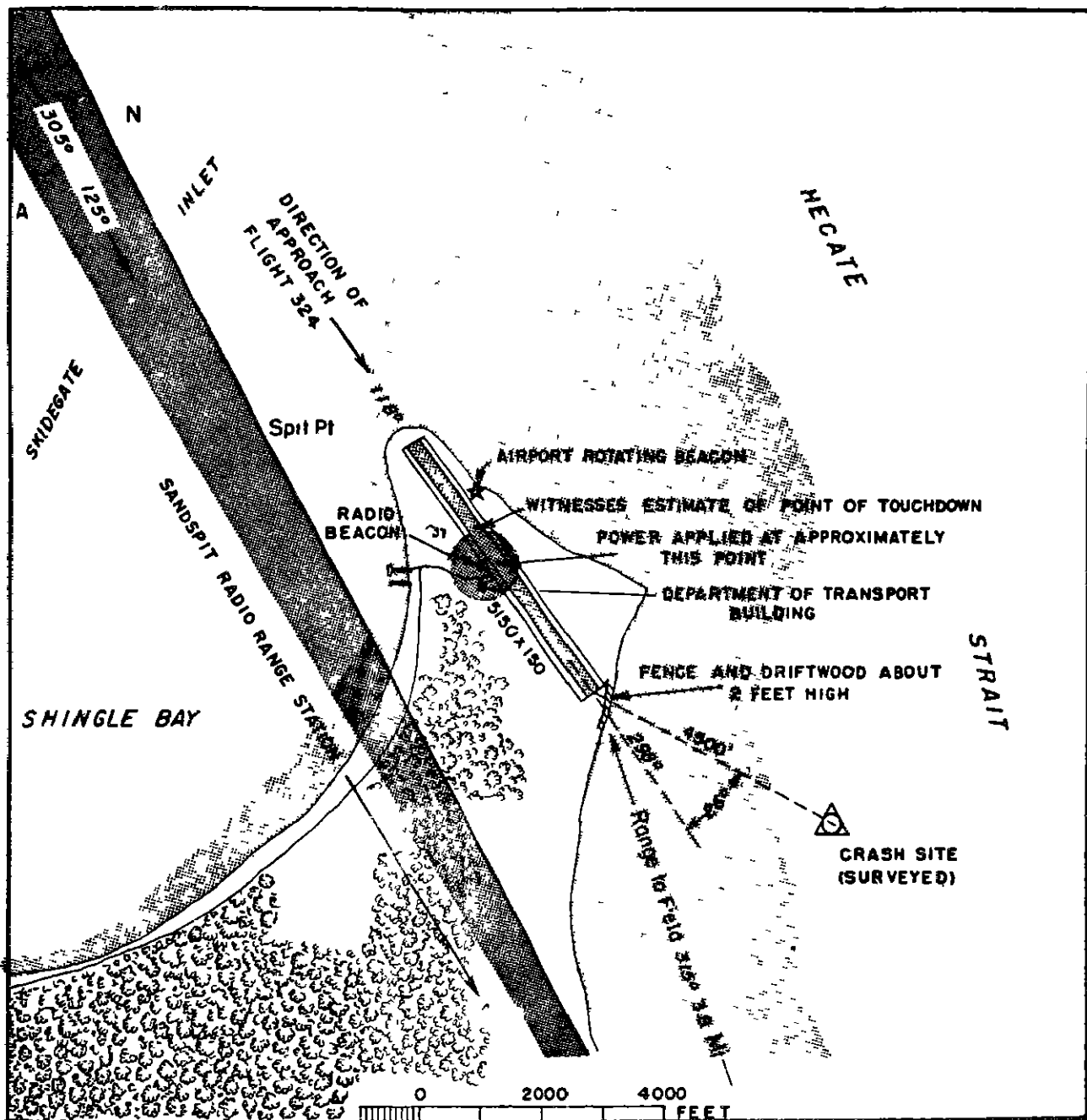
Prepared by the Bureau of Safety Investigation,  
Civil Aeronautics Board

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





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.