CIVIL AERONAUTICS BOARD

# ACCIDENT INVESTIGATION REPORT

Adopted: August 13, 1954 Released: August 18, 1954

WESTERN AIR LINES, INC. - NEAR WRIGHT, WYOMING,
FEBRUARY 26, 1954

## The Accident

A Western Air Lines Convair 240, N 8407H, crashed in level open country near Wright, Wyoming, at approximately 1032,1/ February 26, 1954. The crew of three and all six passengers were killed, and the aircraft was demolished.

## History of the Flight

Western Air Lines' Flight 34 departed Los Angeles, California, on a scheduled flight to Minneapolis, Minnesota, with intermediate stops scheduled at Las Vegas, Nevada; Cedar City and Salt Lake City, Utah; Casper, Wyoming, and Rapid City, South Dakota. The flight was routine to Salt Lake City, where a relief crew consisting of Captain M. R. Cawley, First Officer R. E. Crowther and Stewardess Mary Grace Creagan took over the flight in accordance with company crew assignment schedules. Prior to departure from Salt Lake City the aircraft was refueled to a total of 1,000 gallons, which filled all tanks. Flight 34 departed from the Salt Lake City ramp at 0721, but returned a few minutes later because of a broken nose wheel steering cable. The cable was replaced and Flight 34 was off the ground at 0850. According to company records, at takeoff the gross weight was 36,990 pounds, 2,144 pounds less than the maximum allowable weight of 39,134 pounds; the load was properly distributed so that the center of gravity of the aircraft was within approved limits. There were six passengers. The flight plan filed with Air Route Traffic Control specified Instrument Flight Rules at 15,000 feet via Green 3 and Blue 76 Airways.

Eastward from Salt Lake City the Casper weather went below company minimums and Flight 34 elected to overfly this scheduled stop. After being advised of this action by the company Casper radio, Air Route Traffic Control issued a new clearance for the flight to descend to and maintain 13,000 feet to the Rapid City range station via Blue 37 and Red 2 Airways. However, an altitude change to 17,000 feet was requested by the flight and this was authorized by ARTC. At 1010 N 8407H reported 17,000 over Casper, estimating the Wright intersection (122 miles west of Rapid City)at 1027. The Flight reported as being over the Wright intersection at 1025, at 17,000 feet, estimating Rapid City at 1050. The Casper company radio operator gave the flight the 0930 en route weather and the 1010 Rapid City Special #2 terminal weather. This, the last radio contact, was acknowledged by the flight at 1027. At 1041 the Rapid City radio operator attempted unsuccessfully to contact the flight to deliver a clearance for an instrument approach to Rapid City. Attempts con-

1/ All times herein are Mountain Standard Time and are based on the 24-hour clock.

tinued until 1053 and at that time the Denver company dispatcher was advised that contact with the flight had been lost. At 1106 emergency procedures were initiated.

Intermittent snows and restricted visibilities hampered intensive air search efforts. The wreckage was sighted by a Western Air Lines pilot the afternoon of February 28, and ground parties reached the scene that night.

The aircraft had crashed in an isolated ranch area and all nine occupants had been killed.

Investigation

The time of the accident is established as being approximately 1032. The finding at the scene of one wrist watch, impact-stopped at 1032, plus the testimony of several persons, located from five to ten miles west of the crash, placing at approximately 1030 the time of an aircraft passing low eastbound substantiates this figure. No other timepieces, either aircraft or personal, were found.

Investigators canvassed the sparsely inhabited area approximately ten miles on each side of the airway and thirty miles back on the flight path for possible witnesses. Due to the heavy snow falling at the time of the accident, there were no eyewitnesses. Twelve persons were located who heard an aircraft overhead in the storm the morning of the accident.2/ All of them are in accord that from the sound the aircraft was at a low altitude and much lower than aircraft usually pass over. Six persons, west of the crash point, place the time around 1030 with the aircraft heading east at a low altitude and the engines sounding loud but normal. No variation in heading or altitude was noted by a majority of these witnesses. However, two witnesses stated that the aircraft was heard twice in a short period of time and from different directions, as if it had circled.

The scene of the accident is in Campbell County, 19 miles east-northeast of Wright, Wyoming. This location is two miles north of the centerline of Civil Airway Red-2, 102 miles west-southwest of the Rapid City LF (Low Frequency) range station. The relatively level, sagebrush covered terrain is at an elevation of 4,700 feet MSL (mean sea level).

The aircraft first contacted the frozen ground on a heading of 22 degrees magnetic. The angle of impact was nearly flat with the aircraft in a slightly left-wing-low attitude. The impact force was of great magnitude as shown by the completely disintegrated and widespread wreckage which was found in an area 1,500 feet long and 450 feet wide. Within this area a few small flash ground fires occurred. Search was made for fallen parts back along the flight path with negative results; no components of the aircraft were found away from the impact area.

Due to the severity of weather conditions only a limited examination of the wreckage could be made at the scene; the wreckage parts were identified or numbered and their location plotted on a distribution chart. All wreckage was then transported to Ellsworth Air Force Base, Rapid City, South Dakota.

2/ See Attachment A.

There the aircraft structural parts were laid out in their proper relative positions on a hangar floor and studied. The engines and propellers were disassembled and examined at Denver for evidence of failure or malfunction. Examination of all components of the aircraft indicated that the following conditions existed at ground impact: aircraft structure intact with no determinable evidence of structural failure or control malfunctioning; no evidence of structural failure or malfunction in engines or propellers; both engines in high blower; condition of the propeller blades indicated rotation with blades at angles greater than for normal cruising range; electric and vacuum turn and bank, horizon and compass gyros rotating; the ADF receivers were found to be set on frequencies used by aircraft in the general area of the flight; landing gear and wing flaps retracted; passenger loading stair retracted; heat source and heat anti-icing valves in the open (heat demand) position; the cabin altitude selector at a setting of 17,000 feet aircraft altitude; no evidence of in-flight fire or fire damage on any component. The broken webbing of the safety belts of the pilot seats indicates that both pilot seats were occupied.

The aircraft was not equipped with an automatic pilot or a flight recorder. A thorough review of its maintenance records disclosed no irregularities that could be considered pertinent in this accident.

A study of the history of the flight crew discloses that both Captain Cawley and First Officer Crowther were qualified on the aircraft and route involved. Captain Cawley had accumulated 10,565 hours, of which 899 hours were in Convair 240's. First Officer Crowther had accumulated 3,738 hours, of which 2,018 hours were in Convair 240's. Investigation disclosed that Captain Cawley had been the pilot in two of three incidents of power interruption (in the type aircraft involved) due to carburetor icing, reported to the company. However, he had attended a number of ground courses with other company pilots on the proper operation of Pratt & Whitney CB-16 engines and was thoroughly familiar with the prescribed method of using carburetor heat. A number of Western Air Lines pilots testified at the hearing that ample carburetor heat is quickly available, upon demand, for all weather conditions.

Three small pieces of ice, approximately the size and shape of a man's curved little finger, were found lying on the screen of one carburetor at the crash scene. However, there were several thaws and freezes occurring between the day of the crash and the day the wreckage was first examined. These small pieces of ice matched the folds of the rubber adapter boot which was attached above the carburetor screen. The bottom sides of the ice pieces did not bear the imprint of the screen indicating that the pieces had fallen from the folds of the rubber adapter during movement of the wreckage. The carburetor and adapter boot were detached from the engine by impact and lying on the ground in a position to receive moisture during the snows occurring during and after the accident. Ice of similar texture was found in an overturned lid of a film container that had been part of the aircraft cargo. (See subsequent discussion of this factor.)

According to the loading manifest and testimony there were 900 pounds of cargo loaded on the six front seats of the cabin. This cargo, consisting of moving picture film containers and various other packages, was secured in the seats by the seat belts and then wrapped with blankets and roped around the seat bases. Portions of cargo were found throughout the wreckage area. It

could not be determined if the cargo fastenings had loosened allowing the cargo to shift prior to impact.

There were several other company flights in the general area at the time of the Flight 34 accident. Western 53 (a DC-3) en route from Billings to Denver landed at Casper at 0918 and held until 2005 due to Casper weather. Western 50 (a DC-3) en route from Cheyenne to Great Falls, when between Cheyenne and Douglas at 0900, re-estimated Douglas 14 minutes later due to encountering moderate to severe turbulence and moderate wing icing. This flight later reversed course and returned to Cheyenne because Casper weather was below minimums. Western 31 (a Convair) en route from Rapid City to Casper overflew Casper at 0952 because of weather and proceeded to Salt Lake City. While holding east of the Casper range at 14,000 feet for 12 minutes awaiting ARTC clearance to Salt Lake City, Flight 31 encountered moderate to occasional heavy turbulence and light to moderate wing ice. Flight 31, at that time, advised Flight 34 direct (when 34 was eastbound over Sinclair) of these conditions. Flight 34, in acknowledging this message, advised that it was not in turbulence.

Investigation - Weather

The crew of Flight 34 obtained their briefing in the company dispatch office at Salt Lake City where surface weather reports, surface maps, forecasts and upper air reports were available. The dispatcher on duty assisted the crew in the briefing.

The surface synoptic weather map for 0530, February 26, 1954, showed a cold front extending eastward from southern Oregon into southwestern Idaho, then north of Pocatello into Wyoming north of Rock Springs, Casper and Douglas and south of Chadron and Valentine, Nebraska. The cold front was moving southward and reached Casper, Wyoming at 0850, several hours earlier than the forecast time of passage. At the time of the accident the cold front had moved into southeastern Wyoming.

The United States Weather Bureau forecasts for the route involved, available to the crew before departure from Salt Lake City, indicated broken clouds with bases 7,000 to 9,000 feet and tops 20,000 to 25,000 feet MSL, rain and snow showers along the frontal zone, moderate to locally heavy icing in shower clouds above 10,000 feet MSL and moderate to heavy turbulence in the frontal zone. In central and eastern Wyoming the forecast indicated mostly overcast with bases 6,000 to 8,000 feet MSL. Showers were expected following passage of the front, changing to snow with ceilings dropping to 400 - 600 feet and visibilities one-half mile in moderate snow. Icing was expected in snow areas and in clouds, with the freezing level at 9,000 feet MSL ahead of the front and dropping to near the surface behind the front. Heavy turbulence was expected as the front passed with locally heavy to severe turbulence and strong downdrafts along the east slope of the mountains south of the front.

Most of the weather connected with the frontal system was occurring behind the front due to the potential instability of the warmer air mass being released as it was lifted by the cold air wedge. The front passed Casper at 0850, with snow beginning soon after the frontal passage. Flight 34 had probably been above a cloud layer as it approached Sinclair at 14,000 feet. It appears that the top of this cloud layer rose behind the front and may account for the flight's request for 17,000 feet cruising altitude. Analysis indicates that the clouds built up behind the front to several thousand feet above the

17,000-foot level and that the flight was on instruments by the time it was over Casper.

Weather analysis indicates that the flight was also continuously on instruments from Casper to the crash area. At this time cumulus cells were building to high altitudes. These developing cells contained rather large quantities of subcooled water droplets. As Flight 34 intermittently entered these cells conditions for both aircraft and carburetor icing suddenly increased with indications that icing became at least moderate and turbulence became heavy to possibly severe.3/ A strong air current or jet stream existed at about 25,000 feet and contributed to the severity of the weather encountered by the flight.

Analysis

At the start of the descent of Flight 34 from 17,000 feet MSL (approximately 12,000 feet above the ground) it was operating on instruments under probable conditions of moderate to heavy icing and moderate to severe turbulence. The reason for the descent from the assigned altitude, shortly after ending a normal and routine radio contact with the company radio at Casper, is undetermined but the Board is of the opinion that weather was a major factor in the accident. Whatever emergency occurred resulted in the aircraft striking the ground within approximately five minutes after a normal radio contact and only 10 miles east of its last radio position, as computed from the Rapid City ETA (estimated time of arrival) ground speed.

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3/ U. S. WEATHER BUREAU DEFINITIONS OF ICING

"Light -An accumulation of ice which can be disposed of by operating de-icing equipment, and which presents no serious hazard. Light icing will not cause alterations in speed, altitude, or track.

Moderate -An accumulation of ice in which de-icing procedures provide marginal protection; the ice continues to accumulate, but not at a rate sufficiently serious to affect the safety of the flight unless it continues over an extended period of time.

Heavy -An accumulation of ice which continues to build up despite de-icing procedures. It is sufficiently serious to cause marked alteration in speed, altitude, or track, and would seriously affect the safety of the flight."

U. S. WEATHER BUREAU DEFINITIONS OF TURBULENCE

"Light -Usually associated with small cumuliform clouds or with low-level flight over rough terrain. Some passenger discomfort.

Moderate -Associated with towering cumulus, average frontal conditions, and in the vicinity (but not interior) of isolated thunderstorms. General passenger discomfort.

Heavy -Usually associated with the interior of thunderstorms, either frontal or isolated. Difficult to maintain flying altitude.

Severe -Rarely encountered. Usually impossible to control aircraft. May cause structural damage."

Assuming that Flight 34 was over Wright intersection, 17,000 feet at 1025 as reported and then over a position computed from the estimated ground speed of 294 MPH ten miles east at 1027, there remain only ten miles and two minutes' flight time to the crash at 1032 if an easterly heading was maintained. This leaves an unaccountable three minutes in the air. If the aircraft, for some undetermined reason, went out of control and lost altitude immediately after the end of the radio contact and regained partial control while circling over the area east of Wright the widely scattered locations of the witnesses who heard the aircraft passing overhead and the three minutes of unaccounted for flight time are explained, as is the apparent circling inferred by two of the witnesses.

A high speed at impact is shown by the severity of the disintegration of the aircraft and by the widespread wreckage distribution. A flat attitude with a considerable sinking component in the impact velocity is indicated by localization of the most severe structural damage to the bottom surfaces of the aircraft.

During the investigation at the scene and later the damaged components were carefully examined for indications of failures or malfunctions that could explain the facts mentioned in the previous paragraphs. Many possible causes were considered and checked thoroughly. Any elimination of the possibilities is restricted to an evaluation of the physical evidence available in the wreckage and does not preclude the possibility of the substantiating evidence being destroyed or undeterminable due to the severe damage to all components.

Analysis - Possibilities

A. Incapacitation of the Crew

This is not considered probable due to the normal tone of voice and absence of any emergency report or any unusual circumstance during the numerous radio contacts with the Casper company radio operator. Air contamination is discounted by reason of the lack of scorching and arcing marks on electrical equipment. The heating and ventilating ducts showed no signs of discoloration from smoke or fire. There was no evidence to indicate use of oxygen masks which were available in the cockpit. Both pilots were in their seats with safety belts fastened at the time of the accident.

B. Fire in Flight

A few small pieces of wreckage were found indicating fire damage but these were definitely from ground flash fires. Mating of these pieces revealed no consistent fire pattern, indicating that the fire damage occurred during the ground fire after the pieces had torn free from adjacent parts.

C. Explosion in Flight

No evidence in wreckage and aircraft was intact at impact.

D. Structural Failure

Although all components of the aircraft were found in the

wreckage area the damage to these components was so severe that it was impossible to determine definitely whether a minor structural failure or malfunction of any of the components had occurred. Major aircraft components and systems were reconstructed sufficiently to indicate that the aircraft was intact at ground impact.

E. Control Malfunctioning

Items which would affect the controllability of the aircraft, such as leading edge material, surface hinges, engine cowling, or control system parts, were carefully examined for evidence of failure or malfunctioning, but none was found. The possibility of some object lodging in the control system and then breaking loose during impact exists since it is extremely difficult, if not impossible, to find evidence of such a condition from a study of the wreckage. Consequently, control system malfunctioning remains a possibility.

F. Loss of Control at Altitude Due to Icing

The probable heavy icing conditions existing at 17,000 feet MSL, coupled with the heavy to possibly severe turbulence, could have caused temporary loss of control resulting in loss of altitude. The possibility of carburetor ice causing temporary power interruption also exists, despite the unanimous testimony of pilots that ample carburetor heat is available, upon demand, for extreme weather conditions. Although Captain Cawley had experienced power interruption due to carburetor ice (carburetor heat not on) twice before it is highly improbable that power loss because of carburetor icing could have continued long enough to cause an altitude loss of 12,000 feet. This conclusion is based upon the efficiency of the carburetor heat system. Undoubtedly the aircraft was also encountering wing icing but the thermal wing deicing of the Convair, although only certificated for light icing, is efficient and would probably dissipate ice buildup in a short time. This deicing would have been aided by the descent to the low altitude above the ground where the snow was melting as it reached the surface. Examination of the wreckage disclosed that the heat source and anti-ice heat valves were in the open or heat demand position.

G. Cabin Cargo

The loosening of ropes securing the cabin cargo and the consequent shifting of cargo could have created a hazard. Investigation disclosed that the cargo had been adequately secured and further, that the company had never experienced any previous trouble with similarly secured cabin cargo.

H. Lightning Strike

None of the ground witnesses saw lightning and there was no indication of it in the weather records. No evidence of a lightning strike was found on the wreckage.

I. Sabotage

There was no evidence of sabotage found in the wreckage

and a check of the cargo contents revealed nothing suspicious.

J. Power Plants

The extensive impact damage prevented a determination of the amount of power development at the time of the crash. However, examination revealed that both propellers were rotating and in positive pitch at impact. This, coupled with witnesses hearing engines operating at low altitude, some miles back on the flight path, definitely indicates power development during whatever emergency occurred. The examination revealed the engines to be operating in the high blower position. The fact that engines are normally operated in low blower below 10,000 feet further points out the critical situation confronting the flight crew that interfered with normal aircraft operation.

## Findings

Upon consideration of all available evidence, the Board finds that:

1. The carrier, the aircraft and the crew were properly certificated.

2. The flight was dispatched in accordance with company procedures.

3. The total weight at takeoff was less than the maximum allowable of 39,134 pounds and the disposable load was properly distributed.

4. Weather was a major factor in the accident as heavy to possibly severe turbulence and heavy icing existed in the area.

5. The flight was routine until approximately five minutes before the crash.

6. A sudden emergency or difficulty of undetermined origin occurred that resulted in rapid descent to the ground; no emergency was declared.

7. Both engines were developing power at impact.

8. Due to the disintegration of the wreckage it was impossible to definitely determine if structural failure or control malfunctioning had occurred prior to impact.

## Probable Cause

The Board, after intensive study of all evidence, determines that the probable cause of this accident was a sudden emergency of undetermined origin under adverse weather conditions resulting in rapid descent and impact with the ground at high speed.

BY THE CIVIL AERONAUTICS BOARD:

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ JOSH LEE

Oswald Ryan and Joseph P. Adams, Members, did not participate in the adoption of this report.

# SUPPLEMENTAL DATA

## Investigation and Hearing

The Civil Aeronautics Board was immediately notified of this accident by telephone call from the CAA at Standiford Airport. An investigation was immediately initiated in accordance with the provisions of Section 702 (a)(2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was held at Louisville, Kentucky, on November 23 and 24, 1953.

## Air Carrier

Resort Airlines is a North Carolina corporation with its principal offices at International Airport, Miami, Florida. It engages in both irregular and scheduled operations. The company possesses a letter of registration issued by the Civil Aeronautics Board and an air carrier operating certificate issued by the Civil Aeronautics Administration.

## Flight Personnel

Captain Wharton E. Moller, age 33, was employed by Resort Airlines in February 1951. He held a valid airman certificate with an air transport rating and type rating for C-46 aircraft. Captain Moller had, according to company records, a total of approximately 7,500 flying hours, of which 4,634 were acquired in C-46 equipment. His last first-class physical examination was completed on April 30, 1953.

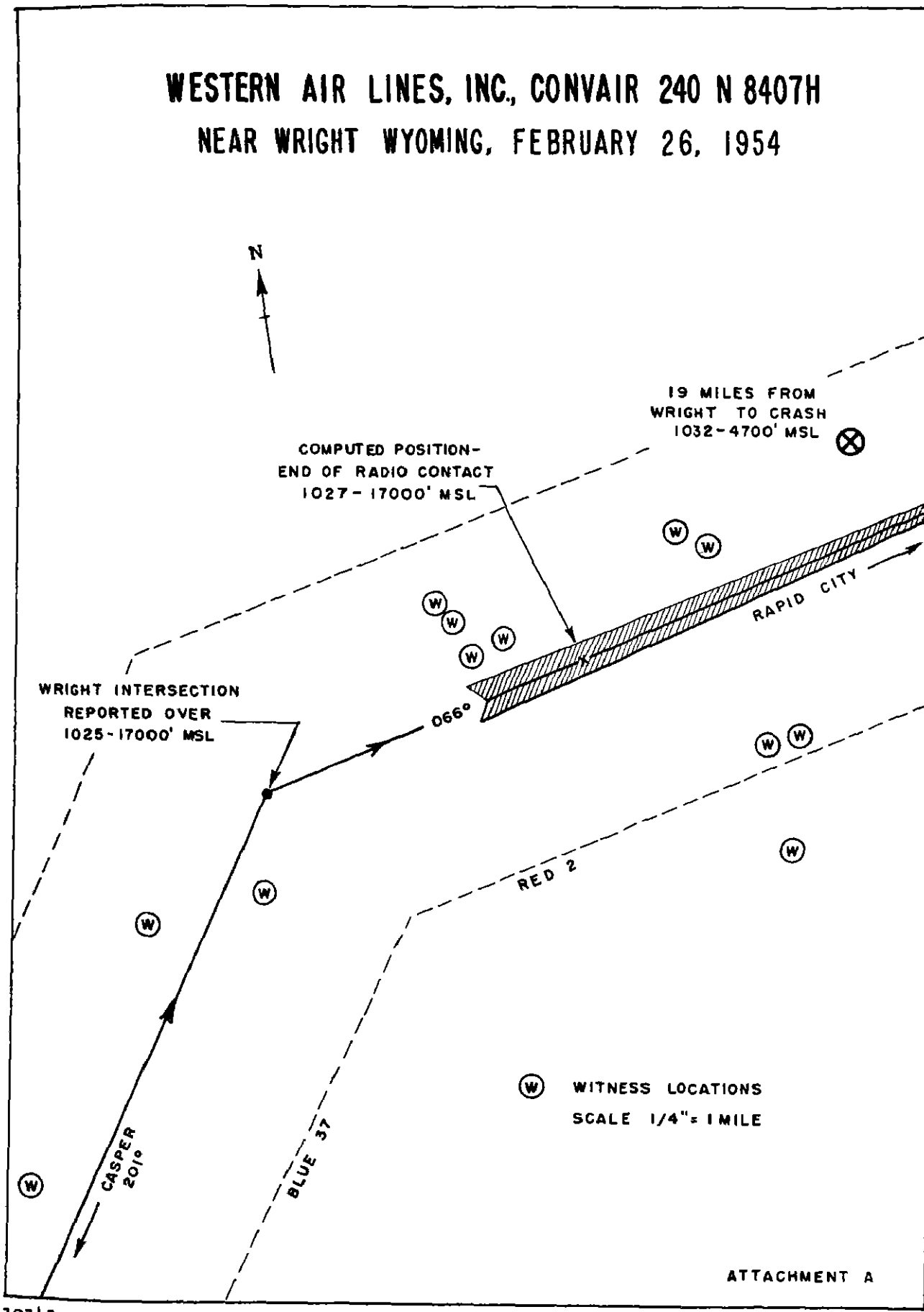
First Officer John D. Pickel, age 32, was employed by Resort Airlines on April 9, 1951. He held a valid airman certificate with an air transport rating and type rating for C-46 aircraft. Company records indicated that Mr. Pickel had approximately 6,850 flying hours, of which about 2,300 had been acquired in C-46 aircraft. Mr. Pickel's last first-class physical examination was received on May 18, 1953.

Stewardess Dorothy J. Bush, age 22, was employed by Resort Airlines on January 7, 1953.

## The Aircraft

N 66534, a Curtiss-Wright C-46F, serial number 22384, was leased by Resort Airlines from the U. S. Air Force in December 1949. It had 6,952 hours when the accident occurred. The aircraft was equipped with Pratt and Whitney R2800-75 engines and Hamilton Standard 23E50 propellers, blade model 6491A-6.

# WESTERN AIR LINES, INC., CONVAIR 240 N 8407H
## NEAR WRIGHT WYOMING, FEBRUARY 26, 1954




ATTACHMENT A

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