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REPORT OF THE CIVIL AERONAUTICS BOARD

On the investigation of an accident
involving aircraft of United States
registry NC 14715 near Ukiah,
California on January 21, 1943

An accident, involving an aircraft of United States registry, NC 14715, a Martin M 130 flying boat, which was being operated by Pan American Airways, Inc. in scheduled air carrier service between Honolulu, Territory of Hawaii and San Francisco, California occurred in Latitude 39°04'N, Longitude 123°17'W (about 7 miles SSW of Ukiah, California), elevation approximately 2500 feet, at about 7:30 a.m. (PWT)^{1/}, on January 21, 1943. The flight was identified by the air carrier as Trip No. 62100 of January 21, 1943 and was further identified for purposes of communications as Flight V-1104. The aircraft was completely destroyed by impact and subsequent fire. The nine members of the crew and ten passengers were fatally injured.

CONDUCT OF INVESTIGATION

The Santa Monica Office of the Civil Aeronautics Board (hereinafter referred to as the Board) received notification at 10:00 p.m., on Saturday, January 30, that the wreckage had been located and the Board immediately initiated an investigation in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended.^{2/} Air safety investigators of the Board proceeded to the scene of the accident immediately and arrived there about 5:00 p.m. on January 31. The wreckage of the airliner had been placed under United States Army guard and was so kept until a complete examination had been made by investigators of the Board.

^{1/} All times referred to herein are Pacific War Time unless otherwise specified.

^{2/} Section 702 (a)(2) provides that it shall be the duty of the Board to "Investigate such accidents and report to the Authority the facts, conditions, and circumstances relating to each accident and the probable cause thereof."

Hearing

In connection with the investigation a private^{3/} hearing was held in San Francisco, California, February 8 and 9, 1943.

Allen P. Bourdon, Chief, Investigation Division, Safety Bureau of the Board, was presiding officer and the following personnel of the Safety Bureau participated in the hearing: John M. Chamberlain, Assistant Director of the Safety Bureau; Senior Air Safety Investigator Ralph H. Reed; and Air Safety Investigator A. E. Cabana.

Upon the basis of all the evidence accumulated during the investigation, the Board now makes its report in accordance with the provisions of the Civil Aeronautics Act of 1938, as amended.

SUMMARY AND ANALYSIS OF EVIDENCE

Air Carrier

At the time of the accident Pan American Airways, Inc. (hereinafter referred to as Pan American), a New York corporation, was operating as an air carrier under a certificate of public convenience and necessity and an air carrier operating certificate, both issued pursuant to the Civil Aeronautics Act of 1938, as amended. These certificates authorized it to engage in air transportation with respect to persons, property and mail between various points, including Honolulu, Hawaii and San Francisco, California.

Flight Personnel

The crew of V-1104 consisted of Robert M. Elzcy, Captain, Orven K. Judd, First Officer, G. F. Asbel, Pilot, John Maynard, Navigator, C. P. Thompson, First Radio Officer, G. W. Angus, Second Radio Officer, John Hill, Flight Steward, L. A. Mackota, First Engineer Officer, and J. J. Egan, Second Engineer Officer.

^{3/} Private hearings are held when, for reasons of National security, public hearings are inadvisable.

Captain Elzey, aged 36, was graduated from Temple University in 1929 in Aeronautical Engineering. He later graduated from the Naval Air Station, Pensacola, Florida, where he accumulated 200 hours of flight training, 350 hours on twin-engined boats in patrol squadron, and over 600 hours as a flight instructor. He also flew about 250 hours at various other Naval Reserve bases. Up to January 14, 1943, he had accumulated approximately 4941 flying hours, of which 3359 were while in the employ of Pan American. He entered the employ of Pan American on November 30, 1936, and had served in their Eastern, South American, Atlantic and Trans-Pacific Divisions. He held an airline transport pilot certificate with 120-7200 h.p. multi-engine, seaplane ratings, as well as a radio telegraph certificate, second class. His last physical examination, required by the Civil Air Regulations, was completed January 11, 1943. Since his assignment to the Trans-Pacific Division, Elzey had completed five trips from San Francisco to Honolulu, four trips from Honolulu to San Francisco, and two round trips to Auckland, New Zealand.

First Officer Judd, aged 23, held a commercial pilot certificate with single-engine land 0-80 h.p., instrument and flight instructor ratings. He also held a restricted radio telephone certificate. He had completed five courses of the Civilian Pilot Training Program, including primary, secondary, student instructor, cross-country and commercial refresher. In CPT Ground School, he had covered navigation, meteorology, engine and aircraft construction, and maintenance. His last physical examination, required by the Civil Air Regulations, was completed March 24, 1942. As first officer, he had completed 21 trips from San Francisco to Honolulu, and 20 trips from Honolulu to San Francisco. He had accumulated approximately 694 solo hours as of January 14, 1943. His flight time before he was employed by Pan American, on November 3, 1941, was about 240 hours.

John R. Maynard, aged 28, graduated from the University of Washington, Seattle, completed a navigation course at night school and had had practical navigation experience on cruises during the summer while attending the University. He had completed five trips from San Francisco to Honolulu and four trips from Honolulu to San Francisco. He was employed by Pan American on August 12, 1942, and was listed on Operation Specifications as Second Officer (navigator) on December 21, 1942.

All of the balance of the crew were properly certificated, were physically qualified and, by reason of their training and experience, were qualified for the flight and equipment involved.

The Aircraft

The aircraft, NC 14715, was a Martin 130, 4-engine flying boat, Serial No. 557, and had been flown a total of 14,628 hours and 5 minutes. It was manufactured by Glenn L. Martin Aircraft Corporation and was purchased by the registered owner, Pan American, on November 14, 1935. It had been flown 1980 hours and 46 minutes since the last major overhaul and was last inspected on January 20, 1943. Numerous modifications from the original design had been reported to the CAA by means of Repair and Alteration forms. The weight at the time of take-off from Honolulu was the maximum authorized weight of 52,203 pounds. The aircraft was equipped with 4 Pratt and Whitney S2A5G engines, each of which had been operated 37 hours and 23 minutes since the last major overhaul, and 4 Hamilton Standard hydromatic 3-bladed propellers.

History of the Flight

Flight V-1104 departed from Pearl Harbor at 0030 Greenwich Civil Time on January 21 (5:30 p.m., PWT, January 20) with its estimated arrival time at San Francisco as 1718 GCT the same date (10:18 a.m. PWT.) The dispatch

of the flight from Honolulu was in order and according to sound operating practices, both as to the mechanical condition of the aircraft, engines, radio, and navigation equipment, and weather reports which outlined conditions known and anticipated. The progress of the flight was entirely normal, and two-way radio contact by CW was maintained with the Island and the Mainland until 1030 GCT (3:30 a.m. PWT). At about 1235 GCT (5:35 a.m. PWT) Pan American Flight Watch Office at Treasure Island, San Francisco, received a message from V-1104 giving its due time at San Francisco as 1335 GCT (6:35 a.m. PWT), which was about $3\frac{1}{2}$ hours ahead of the previously estimated arrival time of the flight.

Satisfactory two-way radio telephone communication between V-1104 and Pan American, at Treasure Island, San Francisco was established about 6:16 a.m. and at 6:18 a.m. V-1104 corrected the estimated arrival time to 7:10 a.m. At 6:22 a.m. Treasure Island gave the flight a surface weather report as follows: "Weather, heavy rain, wind south, force 44 to 48, ceiling 900-1000, visibility 1 mile to 2 miles, Kollsman 999 millibars. We feel that San Diego is the only possibility unless it would be possible to hold until after daylight. Landing conditions are such you could not land before daylight." Treasure Island then asked V-1104 again, "How do you feel about San Diego? Impossible to land here before daylight." The flight acknowledged the message with, "Roger, thank you." Treasure Island asked again, "Will you give us what you might intend to do as quickly as you have decided. Go ahead." The flight answered, "Roger, we will let you know as soon as we decide. Standing by." Later V-1104 asked Treasure Island, "If we set around until daylight, how will our surface conditions be then. Go ahead." Treasure Island then gave the flight the anticipated surface report for 9:00 a.m. "North Bay, weather, light rain, wind southwest, force variable, ceiling 900-1000,

visibility 2 miles, that is, anticipated for 9:00 a.m." The message was acknowledged by the flight. At 6:32, Treasure Island gave the flight a position report as "Latitude 37.29 north, Longitude 123.49 west" and asked them to confirm this position. Before this position was confirmed, Treasure Island sent them a new position report at 6:50 a.m., "We have a new position on you - a new plot - you are now in Latitude 37.30 north, Longitude 123.22 west." The report of this position, which would be approximately 43 nautical miles west-southwest of San Francisco, was acknowledged by the flight. The flight next reported itself as over the Farallone Islands (about 25 nautical miles west of San Francisco) at an altitude of about 5000 feet, and proceeding to the vicinity of WFO transmitting station in San Francisco. At about 7:15 a.m. V-1104 advised Treasure Island that the flight had "been over the area but -- now taking a course due west." Treasure Island confirmed this message by saying, "Pan American Treasure Island back, you are now taking a course due west, you are taking a course due west to sea. Is that correct? Go ahead." V-1104 answered, "That's correct." Treasure Island then queried the flight regarding their altitude and flying conditions, to which V-1104 answered, "Flying conditions very poor, required change of altitude to 7000 feet." Treasure Island confirmed the message, signed off, and called the Airway Traffic Control Station at Oakland so that Oakland could work V-1104. Upon hearing this call, estimated to have been made at 7:20 a.m., V-1104 called Treasure Island back and stated, "We are not interested in setting up

on Oakland quite yet. We would like to have a fix, please, so would you arrange that? Go ahead." This was the last message received from V-1104. Treasure Island then checked with the Pan American launch, which was standing by in the North Bay awaiting the arrival of V-1104. At 7:26 a.m., Treasure Island attempted to contact V-1104, presumably to give them their requested fix. Evidence indicates that communication between plane and ground was satisfactory, despite periods of heavy rain static.

For the next twelve hours Treasure Island, KPO, CAA, and other radio stations employing both CW and telephone, attempted to contact V-1104 but the flight was not heard from again. Weather reports to the flight were sent "blind" by CW and telephone until after 6:00 p.m., when officials were satisfied that V-1104 could not be still aloft.

Anticipating stormy weather in the vicinity of San Francisco and making provisions for the possible necessity of having to use San Diego as an alternative destination, the flight was fueled at Honolulu for an estimated 24.2 flying hours. Due to the favorable tailwinds during the last half of the route, the flight had proceeded only about an even fourteen hours up to the time of the accident (7:30 a.m.) leaving fuel for at least an additional ten hours of flying time, or until about 5:00 p.m.

Captain Elzey was aware of this and, in all probability, had considered San Diego as an alternate but intended to hold in the vicinity of San Francisco in the belief that the weather would improve there around 9:00 a.m. and if it did not, he still had ample fuel to proceed to San Diego.

Search and Discovery of the Wreckage

Around 10:00 a.m. Pan American notified the Civil Aeronautics Administration and the Western Sea Frontier of the circumstances surrounding the flight, and in the afternoon of the same day the Commander of the Western Sea Frontier notified Pan American that they would take charge of the search for the missing aircraft. Ground and air searching parties, made up of units from the Army and Navy and Pan American employees, instituted an immediate search. The search continued intensively until the late afternoon of January 30 when a Pan American captain, W. M. Price, searching in the Clear Lake area, advised by radio that he had located the wreckage. Naval searching parties, a United States Army detachment and Pan American officials arrived at the wreckage early Sunday morning, January 31. The scene was at an elevation of approximately 2500 feet just below a mountain ridge and about 7 miles SSW of Ukiah, approximately 90 miles north of San Francisco and about 22 miles east (inland) from the Pacific coast line.

Examination of the Wreckage

The condition of the wreckage offered little evidence of value except that the aircraft had sheared a number of small trees in its path about 75 feet immediately before impact, establishing that the aircraft had struck the ground on a downward angle estimated at approximately 10° headed in a northerly direction. The instruments were in such a completely demolished and shattered condition that examination revealed little or no reliable information. One radio receiver was found tuned in the general band for "telephone" broadcast. Both the master and the

individual ignition switches were in the normal "on" positions. The automatic pilot control was in the "off" position. All four propellers, while badly damaged, indicated that power was being applied at the time of impact. The major portion of the wreckage and the bodies of the victims had been subjected to fire which followed impact.

Radio Aids

Pan American's Assistant Communications Superintendent testified that the electric power in the vicinity of San Francisco, while it did not fail, began to fluctuate at about 7:07 a.m. and the voltage dropped from 220 volts to 190 volts. He stated that his receivers did continue to operate satisfactorily and he believes that they transmitted messages during that period. He stated further, "There were other power failures on broadcast stations which the captain might have been using at the time. The Chief Engineer of the National Broadcasting Company in San Francisco informed us that KFO went off the air at 1412 GCT (7:12 a.m. PWT) when he was operating on his normal power of 50 kilowatts and resumed operation at 1414 GCT (7:14 a.m. PWT) on reduced power of 10 kilowatts. The broadcasting station at Monterey, KDON, went off the air at 1416 (7:16 a.m. PWT) and came back on at 1442 (7:42 a.m. PWT) * * * * Also, I understand that the Oakland radio was off the air from 1403 (7:03 a.m. PWT) until 1406 GCT (7:06 a.m. PWT)." He stated that the Superintendent of Lighthouses in San Francisco informed Pan American that the Marine radio beacons operated normally and were not affected by any power failures.

Although slight interruptions were found to have occurred in the operation of other radio aids to navigation within a radius of several miles of San Francisco, none was considered particularly significant in

view of the fact that KPO and the radio range station at Oakland are the facilities normally used by Pan American flights in the Bay area. Inasmuch as the only interruption to service from the Oakland range occurred prior to 7:06 a.m., and the interruption at KPO occurred prior to 7:14 a.m., the fact that the last transmission from the plane gave no hint of difficulty with radio aids and was received at approximately 7:20 a.m., would seem to indicate that such interruptions were of no real consequence to the flight.

Weather

The Pan American flight was advised before departure from Honolulu that on reaching the coast at San Francisco moderate to moderate intermittent rain, with ceiling 1000 and wind SW 24 knots, would be expected. A revised forecast was radioed to the flight en route at 4:30 a.m., giving an expected frontal passage in the San Francisco area at about 8:00 a.m., followed by wind SSW 40 knots, ceiling 1000 feet, visibility 3 miles, and intermittent rain.

The following weather observations were filed by the Weather Bureau on January 21, 1943:

6:30 a.m.

San Francisco Airport, instrument; ceiling 1200 feet, overcast, visibility $1\frac{1}{2}$ miles, light rain and heavy rain squalls; sea level barometric pressure 998.3, temperature 57°, dew point 55, wind SSW 40, strong gusts, altimeter setting 29.47.

Oakland, contact; ceiling 1100, overcast, light rain; sea level barometric pressure 999.3, temperature 55°, dew point 53, wind SSE 26, altimeter setting 29.50.

7:30 a.m.

San Francisco, instrument; ceiling 1000 feet, overcast, visibility 2 miles, light rain, heavy rain squalls; sea level barometric pressure 997.3, temperature 58°, dew point 57, wind SSW 45, strong gusts, altimeter setting 29.44.

Oakland, contact; ceiling 1100 feet, overcast, light rain; sea level barometric pressure 998.6, temperature 56°, dew point 54, wind SSE 32, altimeter setting 29.48.

On the morning of January 21, an intense low pressure area was centered a short distance off the coast of the extremely northern part of California and southern Oregon, with a warm front extending southward off the coast and a cold front extending southwestward into the Pacific. Although the center of this low pressure area reached the coast considerably north of the San Francisco Bay region, the maximum severity of the storm appears to have entered in the general vicinity of the Bay region. Due to the steep pressure gradients, the winds were very strong aloft, and low ceilings existed ranging from about 1000 feet to as low as 400 feet, with heavy rain squalls. The wind on the surface was also quite strong, ranging mostly from 30 to 45 m.p.h. with strong gusts, from the south-southwest, making landing on water quite hazardous. Due to clouds and storm conditions, actual measurement of winds aloft was not possible. However, it appears that southwest winds prevailed aloft with probable velocities ranging from about 80 m.p.h. at 3000 feet, to as high as 100 or more m.p.h. at 10,000 feet in the Bay district. It appears that the velocities would have been somewhat less in the region of Ukiah, probably ranging from about 64 m.p.h. at 3000, to about 82 m.p.h. at 10,000. As the air mass involved was quite warm, icing did not appear likely below

10,000 feet until after the accident had occurred. Considerable turbulence would have prevailed up to 2000 or 3000 feet above the surface due to the strong winds. This would be particularly true over the more mountainous terrain. Otherwise no very great amount of turbulence was indicated, except that some increase would be expected up to quite high elevations at the time of the cold front passage.

After the passage of the front, and later a trough line behind the front, cooler air moved into the area and the icing level lowered to probably the neighborhood of 7000 feet. The warm front passed inland over the Bay region near 5:30 a.m., and was followed by the cold front at approximately 7:00 a.m. However, the change in air mass with the passage of these fronts was slight and the situation aloft did not greatly change until later when colder air followed the passage of a trough line inland. Only one front, viz., an occlusion, passed inland to the north of the San Francisco Bay area, and the two fronts that passed over San Francisco became occluded before proceeding but a short distance inland.

Following the course of the flight across the Pacific, it would be expected that it would have first encountered northwesterly winds when coming into the influence of the storm area, followed by westerly, and finally southwesterly winds near the California coast. In view of the fact that the intensity of this storm had not been realized, the strength of the winds would not have been anticipated. It appears very probable that, due to these wind conditions, the plane was carried a considerable distance north of where the captain expected to be after reaching the California coast.

Witnesses

Depositions secured from three persons, who observed Flight V-1104 at different points from the ground between 7:15 and 7:20 a.m., agreed that the engine s seemed to be functioning normally and that the plane appeared to be flying just above the trees. One stated that the flight was headed north, another that it was on a course north-northwest, and the third, and probably the last one to observe the aircraft before its destruction, estimated its course as north-northeast and stated, "It seemed to be coming down in the valley." All witnesses stated the plane was flying very low, one stating, "It was very low, in fact it was so low I was alarmed over the possibility of the plane hitting the trees near the house." The witnesses lived in Madocine County at distances varying from 3 to 11 miles from the scene of the accident. The last witness referred to above lives approximately 4 miles east and slightly north of Boonville and the wreckage was found approximately 3 miles north of her home. It seems apparent, therefore, from the witnesses who observed the aircraft just prior to the impact and from persons who examined the wreckage, that the flight was proceeding in a general northerly direction at the time of the accident.

Captain Elzey had notified Treasure Island that he had "been over the area out - - now taking a course due west." According to the testimony of Pan American's chief pilot for this division this would probably mean a westerly magnetic heading, or 270° , which when corrected for the variation of 18° east would result in a true heading of 288° . This, together with the extremely strong south-southwest wind, estimated by the U.S. Weather Bureau to have been between 60 and 80 m.p.h. at altitudes of from 3000 to

7000 feet, would make it quite evident that he was actually proceeding on a track closer to 350° . If this was the case, and the evidence so indicates, the flight was actually traveling in a direction more nearly north than west.

All witnesses agreed that there was an unusually severe wind and rain storm in progress. All testified that they could see the blurred outline of a very large airplane but could not identify it. Its navigation lights were observed by all witnesses.

Another airplane left Honolulu on January 21, at 0538 GCT and arrived over San Francisco at 10:13 a.m. PTT, about 2-3/4 hours after the subject accident. By that time, the storm had abated somewhat. The pilot of this plane testified that he let down from 9,000 feet through the overcast to 500 feet but being unable to get contact he returned to 3,500 feet and by using the radio compass homed on the Mills Field Radio Range. He proceeded over the range, homed on Oakland and let down on the southwest leg of the Oakland range to about 1500 feet when he observed the water in San Francisco Bay. He then proceeded to his destination and landed. He reported the ceiling at that time to have been around 1000 feet, visibility about 1 to 3 miles. He stated that at 1000 feet the air was very rough and there was a very strong south wind but that he encountered no icing conditions at any time.

CONCLUSIONS

Findings

1. The accident, involving Pan American Trip No. 62100, of January 21, further identified as Flight V-1104, and resulting in fatal injuries to all persons aboard (nine crew and ten passengers), occurred approximately

7 miles SSW of Ukiah, California at about 7:30 a.m. (PMT) on January 21, 1943. The aircraft was completely destroyed by impact and fire.

2. At the time of the accident Pan American held a certificate of public convenience and necessity and an air carrier operating certificate authorizing it to conduct the flight. Both certificates were currently effective.

3. Captain Elzey, First Officer Judd, Navigator Maynard, Radio Officer Thompson and the remainder of the crew were physically qualified and held certificates authorizing them to perform their duties on the subject flight.

4. The aircraft, NC 14715, was currently certificated as airworthy at the time of the accident.

5. Pan American's Trip No. 62100, of January 21, originated at Honolulu, Hawaii with San Francisco, California as its final destination. It departed from Honolulu at 0030 GCT (5:30 p.m. PMT, January 20), having been cleared in accordance with company procedure to San Francisco.

6. The operation of the trip was normal until its reported arrival over the Farallone Islands in the San Francisco area at 6:50 a.m. at an altitude of about 5000 feet and was prevented from landing at San Francisco by darkness and an unusually severe wind and rain storm which resulted in poor sea conditions.

7. Satisfactory two-way radio telephone communication between the flight and Pan American Traffic Control Office at Treasure Island, San Francisco had been in progress from 6:16 a.m. to about 7:20 a.m. when the last message was received from the flight.

8. While proceeding in the overcast awaiting daylight and more favorable surface conditions, the aircraft, under power and in controlled

flight, crashed in mountainous terrain at an elevation of about 2500 feet.

9. There was no evidence of failure of any part of the aircraft, prior to impact.

10. The flight was advised by Pan American Traffic Control that San Diego was suitable for an alternate destination and that weather forecasts indicated a landing would be possible at San Francisco at about 9:00 a.m.

11. Captain Elzey was aware that he had sufficient fuel to remain aloft for about 10 hours after having arrived over the Bay area and, therefore, knew he could remain in the vicinity of San Francisco until at least 9:00 a.m. for more favorable landing conditions before deciding whether or not to proceed to San Diego.

12. The evidence indicates that the pilot did not accurately fix his position at the time of entering the San Francisco Bay area or at any time thereafter.

13. The fact that at 7:15 a.m. Captain Elzey reported having been over the area, and proceeding due west to sea, indicates that at the time of the accident he believed he was over the ocean and, therefore, free to descend to a lower altitude.

14. Due to the unusually high velocity of the south-southwest wind, the flight, instead of being over the ocean, was carried a considerable distance farther northward and eastward than the pilot anticipated or realized.

15. There is definite evidence that the flight was proceeding north by west over the mountains approximately 90 miles north and slightly west of its base at Treasure Island and about 22 miles east (inland) of the coast line when the accident occurred.

Due consideration has been given to all possible factors which might have forced the flight to descent; such as carburetor ice, wing ice, power plant failure, structural failure, etc., but there was no evidence to indicate the existence of any of these, with the possible exception of carburetor ice. However, Pan American has had extensive experience with this model aircraft and substantiated the fact that they had always been able to control any carburetor icing condition heretofore encountered with this model. Furthermore, the atmospheric conditions existing in the area at the time were not of such severity that unusual carburetor icing conditions would have been expected. The fact that during the last 11 miles of flight the aircraft was quite obviously in controlled level flight further tends to substantiate this fact. Neither was there evidence to indicate that the pilot had voluntarily descended from his last reported altitude of 7000 feet, although it was stated by the operator that had he chosen so to do, he would not necessarily have reported the fact immediately to Treasure Island. That the captain had not accurately fixed his position as being over the mountains seems clearly indicated by the fact that whether the descent was forced or voluntary, he would not knowingly have continued on the same course at such a low altitude.

PROBABLE CAUSE: Failure of the captain to determine his position accurately before descending to a dangerously low altitude under extremely poor weather conditions during the hours of darkness.

- RECOMMENDATIONS:
1. That a radio marker or facility be installed on the Farallone Islands or some equally suitable location to be used as an inner marker for all aircraft entering the San Francisco Airway Traffic Control zone from the Pacific.
 2. That Pan American establish specific holding procedures for flights in the Bay area when landings are delayed on account of weather.

APPROVED:

/s/ L. Welch Pogue
L. Welch Pogue

/s/ Harllec Branch
Harllec Branch

/s/ Josh Loo
Josh Loo

Warner and Ryan, Members of the Board, did not take part in the decision.