CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: June 25, 1954 Released: June 30, 1954

EASTERN AIR LINES, INC. - NEW YORK INTERNATIONAL AIRPORT, JAMAICA, NEW YORK, OCTOBER 19, 1953

The Accident

At 0056,1/ October 19, 1953, Eastern Air Lines' Flight 627, a Lockheed Constellation, Model 749, N 119A, crashed on the New York International Airport a few seconds after becoming airborne. The aircraft was severely damaged by the crash and fire which developed upon impact. The 27 occupants of the aircraft, five of whom were crew members, successfully exited. Two of these passengers, after exiting, received burns which proved fatal.

History of the Flight

The crew of Flight 627 consisted of Captain C. C. Foxworth, Captain E. M. Engle (first officer), Flight Engineer L. P. Devries, Flight Attendant A. J. Folli, and Flight Attendant A. L. Krause. On departure from the ramp, the gross weight of the aircraft was 95,838 pounds; allowable gross takeoff weight was 105,530 pounds. The load was distributed so that the center of gravity of the aircraft was within the approved limits.

Flight 627 initially taxied out at 2345, October 18, for takeoff from Runway 7R. This flight and a preceding flight returned to the ramp because fog drifted in and reduced visibility below the approved minimum of one-fourth mile while they were awaiting clearance for takeoff.2/ Neither flight was issued takeoff clearance, although according to Captain Foxworth, they held at Runway 7R about 15 minutes. The captains of both flights reported that when they arrived at Runway 7R the existing visibility was well over the required one-quarter mile, as they could see beyond the far end of the 8,200-foot runway, and so advised the control tower.

About 15 minutes after returning to the ramp, Captain Foxworth was advised by Eastern Operations that visibility had improved, and the flight again taxied out, following another Eastern aircraft, Flight 623W. While

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

2/ Flight 627 was operating under the provisions of Part 41, Civil Air Regulations, as it was to be conducted outside the continental limits of the United States to San Juan, Puerto Rico. Reference is made in this Part to provisions of the air carrier operating certificate, wherein takeoff limitations are specified. Eastern Air Lines' operating certificate specifies that no takeoff is to be made unless the ceiling is 200 feet or more and at least one-fourth mile visibility exists.

they were taxiing, the tower suggested that takeoff be made on Runway 22L and advised that visibility to the south-southeast, from tower location, was three miles. Since both flights had taxied beyond this runway at the time this information was conveyed to them, they turned around and Captain Foxworth, now in the lead, took position for takeoff near the end of Runway 22L.3/

The tower advised Flight 627 that the weather was now being reported as thin obscuration, one and one-half miles visibility, fog, and smoke.4/ Captain Foxworth opened the left side "clear-view" window for maximum visibility. The runway lights were turned to full intensity, and the landing lights of the aircraft were on. Captain Foxworth observed that visibility appeared to be at least one-fourth mile, and stars could be seen. He could see the runway border lights and down the runway centerline for some distance. He said that he was unable to see past the intersection. The engines were run up, cockpit checks completed, and airways clearance via Long Beach, Sully, and Woolf intersections was received. Takeoff clearance was issued at 0055, October 19.

Captain Foxworth, flying from the left, made the takeoff using the runway border lights and centerline as visual reference guides. The first officer also maintained visual reference except when he briefly directed his attention to retraction of the landing gear. In the takeoff run the captain noticed that visibility was variable due to fog and seemed to get progressively worse, but later stated that he had "expected to come out on top almost any second" after becoming airborne; he did not go on instruments. Takeoff seemed normal. Shortly after calling for retraction of the gear, Captain Foxworth observed that air speed was approaching 110 knots. He said that he lost all ground references at about the intersection of Runways 19L, 25L, and 22L, at or shortly after becoming airborne. A few seconds later he heard the first officer shout a warning and they struck the ground while at takeoff power.

A second or two after the first officer moved the landing gear handle to retract position and again directed his attention outside, he saw they were quite low, grabbed for the control wheel to pull the nose up, and simultaneously shouted a warning. He did not recall whether he got his hands on the wheel before impact. The aircraft struck the ground to the left of Runway 22L at Taxiway F. It bounced, and following the second impact skidded to a stop in an undeveloped part of the airport south of Taxiway G.

An intense fire immediately developed in the left wing at No. 2 engine position. The pilots, flight engineer, and one passenger left through the crew door, located just to the rear of the cockpit on the right side; all other occupants exited in orderly fashion through the main cabin door at the left rear side of the aircraft.

3/ See Attachment.

4/ The complete observation from which this information was taken was Special No. 3, 0048, containing the data unlimited ceiling, thin obscuration, 1-1/2 miles visibility, fog, smoke, wind east estimated three m.p.h., altimeter 30.30", surface visibility 1/4 mile.

Investigation

The captain testified that he cut the master switches of all four engines as soon as they stopped, then he and the first office immediately went to the passenger cabin while the flight engineer opened the crew door. The captain said that when they entered the cabin, only five or six passengers were still in the aircraft near the main cabin door. He and the first officer went back to the rear of the cabin to check for any injured passengers. After the last passenger and the stewardess got out the pilots went forward, checking for passengers on the way. Finding none, they exited through the crew door, and ran around to the rear to help. The fire to the left side of the cabin spread very quickly with only small patches of ground fire on the right side of the aircraft. The emergency exits were not used. The crew members stated that there was no panic and everyone got out very quickly before there was any fire in the cabin.

The steward and stewardess, seated in the rear of the cabin, unfastened their seat belts just before the second impact and were pitched out of their seats. The steward struck his head on the base of a seat and was dazed for a moment. However, he got up quickly and opened the main cabin door while the stewardess was handling the emergency rope. He stated that the heat was so intense as he opened the door that he stepped back a couple of steps, turned around and saw the passengers heading for the door, and upon quickly surveying the situation outside, decided that the best chance of survival for all was to exit through the door and run to the left and rear. He jumped out and ran to the left to a safe distance with passengers following him. The stewardess was temporarily blocked at the door with her back to the passengers. She next recalled being outside, lying on the ground, but got up without assistance and away from the fire, where she helped the other crew members with the passengers.

Examination of the wreckage revealed no indication of fire prior to impact, nor failure or malfunction of engines, propellers, or other component. The pilots and flight engineer stated that no malfunctions or failures occurred.

First contact with the ground was made just north of Taxiway F. No. 3 engine separated from the aircraft soon after initial impact. The aircraft bounced into the air just south of Taxiway F and struck the ground a second time, coming to rest 1,126 feet east of Runway 22L and 264 feet south of Taxiway G.

It was determined that upon initial impact the aircraft was approximately eight degrees nose up and two degrees left wing down. The right wheel well doors had not yet closed when impact occurred but those on the left had. Propeller slashes on Taxiway F indicated that the aircraft was on a course of 192 degrees magnetic. From the slash marks it was indicated that the aircraft struck the ground at approximately 117-118 knots. Normal climb speed for this type aircraft is 120-130 knots.

No. 2 engine was torn free of its nacelle and lay just forward of the left vertical fin, having passed rearward through a portion of the wing chord.

The fuel and hydraulic shut-off valves for No. 2 engine were found closed The fuel valve closes electrically when the cable-controlled hydraulic shut-off valve is closed. The flight engineer stated that he did not close the shut-off valve. Examination of the wreckage indicated that the valves were closed by impact.

The left inner wing panel failed at impact and pivoted approximately 40 degrees rearward; the left wing was destroyed by fire. Although the left aileron and its trim tab were burned, it was ascertained by the position of the trim tab and the trim tab actuating shaft that the trim tab was full down.

The right wing was generally intact except for fire damage across the chord at No. 3 engine position. The right landing light was extended; the left landing light was destroyed by fire. The right wing flap was in take-off position. The right aileron and trim tab were intact and the aileron was still attached to the wing. The trim tab and its actuating mechanism were found in the full-down position.

A continuous cable serves both aileron trim tabs and is rigged so that down movement on one tab causes up movement of the other. The upper portion of the cable in the left wing was found severed. The lower portion of the cable in this area pulled rearward to such an extent that both the left and right tab drums were brought to their extreme positions, tabs full down.

Fire burned and melted the left side of the fuselage about two-thirds of its length, as well as gutting the cockpit and passenger cabin. Some fabric was burned off the tail group. The landing gear selector was in the "up" position. Other cockpit controls and indicators, with the exception of the aileron trim tab indicator, were destroyed by fire. The aileron trim tab indicator was found in the full right wing down position. The aircraft control boost was found in the "on" position and the actuating cylinders operated normally when tested, with the exception of the left aileron boost actuating cylinder, which was damaged by fire to the extent that it could not be tested.

Investigation of weather conditions revealed that there was a weak on-shore flow of moist air during the night of October 18-19, with no frontal activity. The land surface was much colder than the ocean due to radiation. This resulted in a shallow layer of air near the ground being cooled as the moist, relatively warm air moved over it, thereby forming low stratus clouds and radiation ground fog. Forecasts and reports of the U. S. Weather Bureau and the company for New York International Airport were revised during the evening hours to reflect deteriorating weather conditions.

Shortly after 1900, October 18, New York International Airport became overcast with visibility four to six miles. Soon after 2200, cloud cover decreased to scattered, and ground fog began forming and visibility lowered. At 2245 visibility was reported as one mile, with unlimited ceiling. Visibility was reported as zero at 2339, with thin obscurement of the sky. It was during these latter conditions that Flight 627 taxied to Runway 7R and varified the observation of the other pilots that visibility of one mile or better existed on Runway 7R. At 0037 the Weather Bureau observation showed an improved condition -- ceiling unlimited, thin obscurement, and visibility one-fourth mile. Just prior to receiving takeoff clearance at 0055,

Flight 627 was advised by the tower of the latest weather report: ceiling unlimited, thin obscurement, and visibility one and one-half miles.

When visibility becomes three miles or less, the official visibility observations are made by the control tower and are immediately transmitted to the Weather Bureau Airport Station. These are supplemented by Weather Bureau visibility observations and are incorporated in the complete weather report made by the Weather Bureau. The surface visibility is added in "Remarks" if it significantly differs from that furnished by the tower. As an example, the 0048 Weather Bureau special observation included information that surface visibility was one-fourth mile. The complete observation was transmitted to the tower by teleautograph before the flight was cleared for takeoff.

Fog conditions were variable during the late evening hours, resulting in wide differences in visibility from one part of the field to another and the pattern, as well as the depth of the fog, changed as it drifted. Ten minutes before the accident, the tower made the following visibility observations: north, one-fourth mile; east, one and one-fourth miles; south, three miles; west, one and one-half miles. Ten minutes after the accident visibility observations were again taken in the cardinal directions and all were the same as those noted above except that visibility to the east was observed to be worse, estimated to be one-fourth mile.

The control tower is 173 feet above the ground. Testimony disclosed that the tower was at times shrouded in fog and at other times was above the fog. At the time Flight 627 took off, the ground fog at about the intersection of the runways was approximately 100 feet deep.

The high-intensity lights on Runway 22L are spaced 200 feet apart except at the intersection of the three runways. One light on each side of the runway is offset 27.1 feet outboard of the two lines of lights bordering Runway 22L. Owing to the width of the intersecting runways, the offset light is 459 feet from the last light before the intersection and 440 feet from the first light beyond the intersection, or about double the distance between the other runway border lights.

At the time of takeoff, no other runways were lighted. The blue taxiway lights associated with Runway 22L were on, thus lighting Taxiways C and E, Taxiway F from Taxiway CC across Runways 25L and 22L to Runway 19L, and Taxiway G from Taxiway CC across Runway 25L to Runway 22L. Taxiway G was not lighted between Runways 22L and 19L.

The last light on the east side of Runway 22L before the intersection was found to be missing the morning of the accident. Inspections of the lights are made daily by New York Port Authority personnel and the last inspection was made at 2325, about an hour and a half before the accident. The New York Port Authority employee who made the inspection testified that the light was functioning at that time and the inspection vehicle was not driven closer than 25 feet to the light. Between this last inspection and the time of the accident no other vehicles were known to have been on the runway, thus indicating the light was broken after the accident. Tire tracks in the area of the missing light showed that it was broken by an automobile; the light was not recovered.

Investigation disclosed that with one-fourth mile visibility, 1,320 feet, more than one-fourth mile of lighted runway lights of the type installed at New York International Airport can be seen. The Sperry Flight Research Department made actual bad weather observations on the south end of the same runway in May, 1952, and learned that with reported visibility of one-fourth mile, the lights of the runway were visible from 1,890 to 2,580 feet: with one-eighth mile visibility, 660 feet, the same runway lights were visible in excess of 1,200 feet. By application of Allard's Law, an empirical formula accepted by engineers to determine the limit of light sources, the high intensity lights installed on Runway 22L would be visible for about 2,460 feet during nighttime with one-fourth mile visibility. Therefore if one-fourth mile visibility existed along the runway, Captain Foxworth should have been able to discern lights beyond the intersection.

Captain Foxworth stated that he remembered seeing the air speed between 92 and 95 knots before becoming airborne, when passing V_1 speed of 94 knots. He did not recall reaching V_2 (105 knots) while still on the ground; later, while airborne, he noted the air speed above V_2. 5/ The flight engineer noted that the indicated air speed was approximately 100 knots when the landing gear was retracting. The two pilots and the flight engineer testified that takeoff appeared normal.

Company records indicated that both pilots had currently demonstrated their competence during instrument checks. Examination of maintenance records for the aircraft disclosed no evidence to indicate that it was not airworthy at takeoff. The company, the pilots and flight engineer, and the aircraft were currently certificated.

Analysis

The patches of fog drifting across the airport were continually changing in depth, location, and density. Weather conditions observed at the tower and the U. S. Weather Bureau Airport Station therefore differed from observations at other points in the area, as evidenced by the visibility observation of more than a mile down Runway 7R by the two airline crews when the current official observation indicated zero visibility.

Captain Foxworth stated that at the time he started takeoff on Runway 22L, visibility met the one-fourth mile requirement and the ceiling was unlimited. During the takeoff run, visibility deteriorated. Fog at the intersection reduced visibility to such an extent that the captain lost ground references; this probably contributed to losing directional control.

The flight engineer stated that no reduction from takeoff power was made. There was little variation in the distance between slash marks made by each propeller, and since the marks on Taxiway F were light and clearly defined, these first blade contacts had little effect on engine r.p.m. or deceleration of the aircraft. This evidence was therefore indicative that all engines were producing approximately equal high power at impact.

5/ V_1 - Critical engine failure speed.
V_2 - Best takeoff speed.

Since the aircraft struck the ground with takeoff power being developed there was adequate power available to climb. The speed at which it struck the ground, some 3,500 feet from the start of the takeoff roll, was 117-118 knots. In this distance the airplane could have accelerated to a speed of 105 knots and climbed to approximately 150 feet altitude. However, since a greater speed was attained some of the available engine power must have been expended on accelerating the airplane rather than on continuing the climb. If the nose had been pulled up too sharply and the airplane had settled, the speed at impact would have been much lower. The speed and attitude at which it struck, therefore lead to the conclusion that the airplane was flown into the ground.

The No. 2 engine hydraulic and fuel fire wall shut-off valves were in the closed position when recovered. The hydraulic shut-off valve is manually controlled from the cockpit through a cable system. Closing of this valve operates a switch which in turn causes the fuel shut-off valve to be electrically closed. The cable which actuates this valve system was broken. The loads which caused separation of this cable most likely closed the hydraulic shut-off valve prior to interruption of electrical power to the fuel shut-off valve system with the result that it performed normally by closing. The oil shut-off valve which is a part of this system was destroyed by fire. The crew stated that all engines operated normally and the flight engineer further stated that he did not close any fire wall shut-off valves.

Both aileron trim tabs were found in the full-down position. These are also cable-controlled. Their common cable was severed and showed evidence of having been placed under excess tension. Thus it was evidenced that the tab positions were altered by severance and tension on the cable.

Findings

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

1. The company, the aircraft, and the crew were currently certificated.

2. The gross weight of the aircraft was less than maximum allowable and the center of gravity was within approved limits.

3. The general visibility figure given to the flight at about the time clearance was issued for takeoff was ceiling unlimited, visibility one and one-half miles.

4. From his position at the end of the runway, the captain estimated visibility to be about one-fourth mile, which was within the CAA-approved limits.

5. A visual takeoff was made by the captain with the first officer also maintaining visual reference to the ground.

6. Near the main intersection, slightly more than one-fourth mile from start of the takeoff run, the aircraft encountered fog which greatly reduced visibility.

7. Although the aircraft became airborne, it did not penetrate the top of the fog.

8. The first officer saw the ground an instant before impact, but the aircraft struck before corrective action could be taken.

9. There was no evidence of failure or malfunction of the aircraft, engines, or propellers before impact.

Probable Cause

The Board determines that the probable cause of this accident was the captain's loss of visual reference and orientation when he encountered drifting fog shortly after becoming airborne on takeoff, and the resultant inadvertent assumption of a descending flight path.

BY THE CIVIL AERONAUTICS BOARD:

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ OSWALD RYAN

/s/ JOSEPH P. ADAMS

Josh Lee, Member, did not participate in the adoption of this report.

SUPPLEMENTAL DATA

Investigation and Hearing

The Civil Aeronautics Board was notified of this accident at 0103, October 19, 1953. 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 ordered by the Board and was held in New York, New York, on November 18-19, 1953.

Air Carrier

Eastern Air Lines is a Delaware corporation which 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 between New York, New York and San Juan, Puerto Rico, among other points. Flight 627 was operating under the provisions of Part 41 of the Civil Air Regulations.

Flight Personnel

Captain Cecil C. Foxworth, age 45, was employed by Eastern Air Lines as a pilot on July 17, 1935, and was promoted to captain on February 15, 1939. He possessed a valid airman certificate with an air transport rating and aircraft type ratings for several aircraft including the Lockheed Constellation. His last physical examination was accomplished on August 25, 1953. At the time of the accident Captain Foxworth had 19,000 flying hours, of which 3,813 were in Constellations, and 2,238 hours of instrument flight time, 45 hours of the latter having been acquired within the 90 days prior to the accident. During this 90-day period he had flown 200 hours, 90 per cent of which was at night; 10 night takeoffs were made at New York International Airport. His last instrument check was accomplished on October 13, 1953, and his last line check on February 28, 1953. Captain Foxworth received training in emergency evacuation procedures in September 1952.

Captain Elwin M. Engle, age 33, was employed by Eastern Air Lines as a pilot on September 6, 1945, and was promoted to reserve captain on October 1, 1951. He possessed a valid airman certificate with an air transport rating and was qualified on several transport type aircraft. His last physical examination was given on June 9, 1953. Captain Engle had a total of 5,040 flying hours with 3,415 hours in Constellations, 555 hours of instrument flying time, and had flown 63 hours as a copilot on Constellation equipment during the 90 days preceding the accident, plus 111 hours as captain on Martin 404 equipment. Of this time during the 90-day period, he flew 6:15 hours instrument time. He made one night takeoff at New York International Airport in the 90 days. His last instrument check was given on September 26, 1953, and last line check on May 18, 1953. Captain Engle received training in emergency evacuation procedures in September 1952.

Flight Engineer Lawrence P. Devries, age 30, was employed by Eastern Air Lines on March 15, 1947. He possessed flight engineer and A and E

mechanic certificates issued by the CAA. Mr. Devries had 4,769 hours in Constellation equipment. He completed training in emergency evacuation procedures during August 1952.

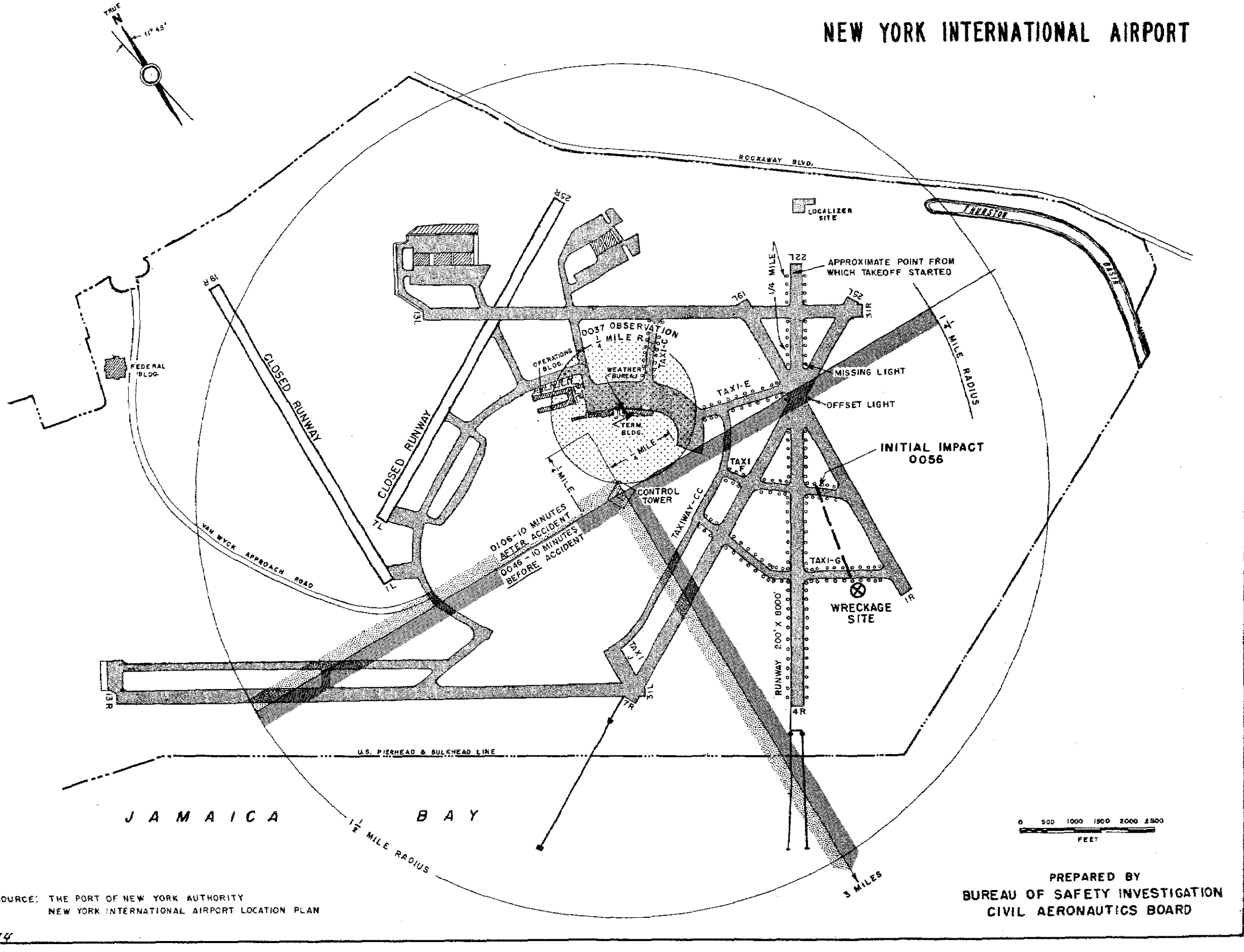
Miss Anne L. Krause completed Eastern Air Lines' Flight Attendant training on August 16, 1946, and last received refresher training in emergency evacuation procedures on August 22, 1952.

Mr. Albert J. Folli completed Flight Attendant training on September 20, 1946, and last received refresher training in emergency evacuation procedures on August 4, 1952.

The Aircraft

N 119A, a Lockheed Constellation, Model L 749, serial number 2616, was owned and operated by Eastern Air Lines, Inc. It had a total of 13,725 flying hours and was currently certificated by the Civil Aeronautics Administration. It was equipped with Wright engines, Model 749C18BD-1, and Hamilton Standard 43E60 propellers.

NEW YORK INTERNATIONAL AIRPORT



SOURCE: THE PORT OF NEW YORK AUTHORITY
NEW YORK INTERNATIONAL AIRPORT LOCATION PLAN

PREPARED BY
BUREAU OF SAFETY INVESTIGATION
CIVIL AERONAUTICS BOARD

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