

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: September 22, 1950

Released: September 26, 1950

EASTERN AIR LINES, INC. AND P-38 AIR COLLISION—NEAR WASHINGTON NATIONAL AIRPORT, WASHINGTON, D. C., NOVEMBER 1, 1949**THE ACCIDENT**

Eastern Air Lines' Flight 537, a DC-4, N-88727, and a P-38 aircraft bearing identification NX-26927 collided at approximately 11 46,¹ November 1, 1949, while both planes were on final approach for landing at the Washington National Airport, Washington, D C. All of the 51 passengers, including two babies in arms, and the flight crew of four in the DC-4 were killed, the pilot of the P-38 was seriously injured. Both aircraft were completely destroyed.

HISTORY OF THE FLIGHTS

On November 1, 1949, Eastern's Flight 537 was flying from Boston via intermediate points to Washington. Over Beltsville, 15 miles northeast of the Washington National airport, it contacted the Washington Control Tower on 119.1 megacycles voice communications and was cleared by the tower to enter a left traffic pattern for landing on Runway 3. One minute before, at 11 37, the P-38 flown by Erick Rios Bridoux, a Bolivian national, had taken off from Runway 3 at Washington National Airport.

Rios was test flying the P-38 for acceptance by the Bolivian Government. Previously, he had notified the tower through Paul M Aubin, that he intended to make the flight and that his communications with the tower would be accomplished over VHF radio, Channel B on 126.18 megacycles. Rios also stated that he requested Aubin to notify the tower to give him a light if radio contact could not be established. This message was not transmitted to the tower and Aubin denied hearing Rios make this last request. Throughout the entire ground operation of the P-38, including clearance for take-off, no difficulty was experienced by either the tower or

Rios in communication. Departure of the P-38 was noted by the tower to be at 11 37, and from that time until after the accident, visibility in the vicinity of the airport remained at 15 miles, ceiling was 6,500 feet with scattered clouds at 3,500, and surface wind was from the northeast 20 to 25 miles per hour.

Testimony of control tower personnel and that of the pilot of the P-38 were in conflict. Rios stated that he had taken off not from Runway 3, but from Runway 36, turning left at an altitude of about 300 feet. His climb was made, he said, to the north of the Pentagon, and because of the erratic operation of the right engine, he decided to land as soon as possible. Continuing to climb to about 2,500 feet or more, he made a second left turn so as to fly south, parallel to Runway 36, and when abeam of the control tower, he transmitted, "Washington Tower, this is Bolivian P-38. I got engine trouble—request landing instructions." His testimony continues to the effect that because no answer was received, he turned left again to circle the field where he could see light signals from the tower. He stated that he received none, but that when he was between Bolling Field and the National Airport and at about 3,500 feet altitude, the tower asked, "Bolivian P-38, you were asking landing instructions?" Rios stated that he answered, "Yes, I have engine trouble. I am in a hurry," and that the tower at that time responded, "Bolivian P-38 cleared to land number two on Runway 3." Rios stated that the tower did not inform him that the aircraft ahead of him was an Eastern DC-4. Rios said that he continued to turn left, and at a reduced speed of 150 miles per hour, started a descent of 500 to 600 feet per minute, completing a second 360-degree turn around the airport until reaching an altitude of approximately 2,400 feet.

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

Rios said that a downwind leg was flown at about 1,500 feet, and when about five miles south of the field, he turned left 90 degrees, flying east on a short base leg at an altitude of about 1,200 feet. During his downwind leg, he observed a C-60 or C-45 on approach to Runway 3 or 36, and while on his base leg, he saw it complete its landing and turn off the runway to the left. Rios made a left turn from the base leg to an approach course of 20 degrees for landing on Runway 3. As soon as the turn had been completed, Rios transmitted, "Washington Tower, this is Bolivian P-38 on approach." The tower responded, said Rios, "Bolivian P-38 cleared to land on Runway 3." Rios stated that his approach was made a little higher than normal, for safety reasons, and that one minute after leaving the base leg, he extended the flaps, the landing gear having been put down previously when he was west of the field. Rios heard the tower say, "Clear to the left, clear to the left," but he stated that he did not know for whom it was intended because the tower did not use any call sign. Almost immediately afterwards, he felt the shock of the collision with the DC-4.

According to control tower personnel, the P-38 took off from Runway 3, turned left, and proceeded in a climb 10 miles west of the field. Then a second left turn was made, and the aircraft, still climbing, continued in a southerly direction. The P-38 was next observed from the control tower circling left, south of Alexandria at an estimated altitude between 3,000 and 4,000 feet. The tower operators stated that while the P-38 was circling south of Alexandria, they received, "Washington Tower, this is Bolivian 927 requesting landing instruction." After the controller had asked if Bolivian 927 had requested landing instructions, and the pilot had replied affirmatively, the controller instructed the P-38 to enter a left traffic pattern for Runway 3 and to report when west of the tower on downwind leg. When the instruction was not acknowledged by Rios, it was repeated. Prior to these instructions, the tower had cleared the Eastern flight to land number one on Runway 3.

Shortly after the Eastern DC-4 was observed 1 1/2 miles west to southwest from the end of Runway 3, making a continuous left turn from the downwind leg to final approach, tower personnel observed the P-38 on a long

high final approach. The controller thereupon requested Rios to make a 360-degree turn to his left, saying that he was number two to land following an Eastern DC-4 turning on its final approach below. Since there was neither acknowledgment nor compliance with this second instruction, another transmission was made to the P-38, which was identified as Bolivian 927, and Rios was then told "Turn left, turn left," and was again told that the DC-4 was turning on final approach below. Again there was no response or compliance by the P-38, whereupon the tower then instructed the Eastern DC-4 to turn left. The DC-4 promptly acted in response to this instruction, but before 5 degrees of turn were made, the two aircraft collided at an approximate altitude of 300 feet about 1/2 mile southwest of Runway 3.

In addition to the foregoing, there were two additional sources of information as to the communications between the tower and the two planes involved in the collision.

National Airlines' Flight 53, a DC-4 flying the same route as the Eastern flight, received when over Beltsville at approximately 11 41 a clearance from the Washington National Control Tower to enter the traffic pattern. The copilot of this flight stated that immediately before, he had overheard the Washington tower give the Eastern flight a clearance to enter the traffic pattern. At about 11 44, three minutes after the National plane had received its clearance to enter the traffic pattern (Eastern's DC-4 was at this time north of the airport in the traffic pattern on its downwind leg), the National copilot heard the tower tell the Eastern crew that there was a P-38 in traffic. The National copilot further stated that about two minutes after this transmission to the Eastern flight, he overheard the tower tell the Eastern flight in a rather alarmed voice, "Look out for the P-38." (Eastern at this time had just completed its turn onto final.) He did not recall hearing a request for landing instruction or the tower giving landing instructions to the Eastern crew. The captain in the National DC-4 had no recollection of these transmissions described by the copilot.

Sgt. William S. Buckwalter, who was serving as a controller in the Bolling Field tower, which had a speaker tuned to Channel B, testified that he heard an alarmed voice

saying, "Bolivian, Bolivian, Bolivian," and looked up just in time to see the crash. He also remembered having previously heard routine landing instructions transmitted to the P-38, but did not recall hearing any acknowledgments of such instructions.

RECONSTRUCTION OF EVENTS

From the testimony summarized above and from all other evidence which was received during the course of the investigation and hearing, the following events and their sequence appear to be supported by the preponderance of evidence.

Following take-off, Rios climbed straight ahead to approximately 300 feet, then turned left and continued to climb on a westerly heading. In the turn, engine speed and manifold pressure of the right engine became erratic, so Rios decided to land as soon as possible. Rios, however, did not believe this erratic operation of the right engine was serious enough to warrant any emergency action. He attained an altitude of 3,500 feet on the westerly heading, leveled off, turned left for a second time, and then flew south. The weight of the evidence indicates that Rios was confused as to his location and that the tower personnel were correct in their statements that the P-38 was circling at a high altitude about 5 miles south of National Airport. Rios was unable to identify any landmarks south of the airport and stated that "this (i.e., navigation by landmarks) is not my way to fly. I do not take care of the small details on the ground." W. T. Snead, a witness with considerable experience in aviation,² observed from the Hybla Valley Airport, near Alexandria, a P-38 flying with its landing gear up at about 3,000 or 4,000 feet in the vicinity of Alexandria. Thus, the weight of the evidence indicates that Rios circled at a high altitude about 5 miles south of the airport and made a long, high final approach toward Runway 3. A direct approach from this location and altitude would, of course, require a rapid rate of descent in order to reach the end of Runway 3.

² Snead is a flight instructor at the Hybla Valley Airport.

The evidence shows that the traffic around the Washington National Airport was light during the critical period, 11 37 to 11 46, and the only aircraft other than the P-38 and Eastern's Flight 537 which could have constituted landing traffic was a United States Air Force B-25 which made a practice instrument approach to Runway 36. This aircraft, however, according to the landing records, passed over the field without landing at 11 43, about three minutes before the accident.

A careful scrutiny of the tower's records (which record every aircraft take-off and landing at National Airport) fails to reveal any C-45, C-60, or similar aircraft which landed during the period of the flight of the P-38. Neither the tower personnel, the representatives of the Bolivian Government who were watching the flight, nor other eye witnesses were able to recall seeing such an aircraft land.

At approximately 11 44, Eastern's Flight 537 was cleared to land number one on Runway 3. This clearance was given when Eastern was on its downwind leg west of the field. Eastern made a continuous turn from its downwind leg west of the field to a final approach to Runway 3. During this turn, the P-38 was south of the end of Runway 3 on a high straight-in approach for landing on the same runway on which Eastern had been cleared to land—runway 3.

Following the DC-4's clearance to land, instructions were given to Rios to enter left traffic pattern and to call the tower when west of the field. These instructions, although repeated by the tower, were neither acknowledged nor complied with. Instead, the P-38 started a straight-in approach on an approximate heading of 20 degrees. Rios was then requested to make a 360-degree turn to the left and to land number two following the Eastern DC-4 turning on final approach below him.

As the Eastern DC-4 rolled out of its left turn onto final approach, approximately 3/4 mile from the end of Runway 3, and as the P-38 continued to descend above and behind the DC-4, the tower transmitted to Rios either, "Turn left, turn left," or "Clear

to the left, clear to the left"³ Since the P-38 still did not comply, and a collision now appeared imminent, the tower switched to the DC-4 frequency⁴ and instructed the Eastern crew to turn left because a P-38 was on the approach behind them. The Eastern flight responded immediately by applying power, leveling off, and turning left. But, before more than 5 degrees of turn were made, the two aircraft collided at a point in line with and 1/2 mile from the approach end of Runway 3 at an altitude of 300 feet.

TRAFFIC PATTERN AT WASHINGTON NATIONAL AIRPORT

A full understanding of the facts surrounding this accident requires consideration of the traffic pattern which was in effect at the Washington National Airport at the time of the accident. This pattern which had been originally designed to provide an orderly flow of traffic was modified to reduce noise over the congested area around the airport. The pattern as approved and published by the Administrator⁵ required an aircraft when approaching from the northeast for landing on Runway 3 to fly west until west of the Pentagon, then south so as to pass south of the City of Alexandria, then north over the Potomac River, turning left so as to arrive over the Potomac Railroad Yards from where a right turn could be made to line up with Runway 3. The flight path, as described, was to be flown at a minimum altitude of 1,200 feet until the aircraft arrived over the Potomac River.

Investigation disclosed that because the Washington traffic pattern was long, involved,

³ It is impossible to determine which of these warnings was given, (or whether the call sign "Bolivian 927" was used) due to the lack of corroborating evidence. There were no recordings of any of the conversations with the P-38 because they were made from the "A" position (Local Control Position). The CAA did not have sufficient funds to record all positions, and priority was given to the "C" position (Approach Control Position) and the radar position (Ground Control Approach Position). This policy was established during the Summer of 1949, several months before the collision.

⁴ The P-38 was on a frequency of 126.18 megacycles, while Eastern was on a frequency of 119.1 megacycles, and, consequently, neither plane could hear the transmissions between the tower and the other plane. However, simultaneous transmissions could have been made on both frequencies if the operator had simply held two frequency toggle switches "on" instead of one.

⁵ See Appendix I.

and required an S-turn on final approach for landing on Runway 3, it was not consistently followed. A general practice, which became common usage, was to turn to final approach for Runway 3 from a downwind leg which was flown relatively close to the airport. It was the general understanding among pilots and tower personnel that permission from the tower to turn to final approach was implied by the tower's clearance to land number one, that is, that "clear to land number one" meant "clear to turn to final approach and land."

ANALYSIS

Conceivably, a good part of the tower's instructions to the P-38 may not have been received. If Rios had been calling the tower at the same time the tower was attempting to give him instructions, neither the tower nor Rios would have received the intended messages, since the transmission and reception on any one particular radio frequency cannot be effected simultaneously. However that may be, a landing approach should not have been initiated *until clearance to land was received*. Although Rios stated that he had been given a clearance to land, the preponderance of testimony indicates he was given clearance to *enter traffic pattern* only. The first clearance to Rios was to enter a left traffic pattern and the later clearance, not given until after a landing approach was started, was to land number two behind an Eastern DC-4. He was never given a clearance to land number one.

It is also possible that Rios, when he was told to enter the left traffic pattern and later to land number two following the Eastern DC-4, believed that the B-25 which had made a simulated instrument approach to Runway 36 was the number one aircraft that had been referred to by the tower. However, Rios insisted that he saw the number one aircraft land and taxi off the runway to the left whereas the B-25 passed over the runway without landing. Moreover, Rios stated that he did not see a B-25 but a C-45 or C-60 and that because of his Air Force training in aircraft recognition, it would be difficult for him to be confused on this point. The evidence clearly indicates that no C-45 or C-60 landed at that time.

Even assuming that Rios was confused as to which aircraft was number one, the fact

remains that a clearance to land number one was not given to Rios. Weather at the time was clear, and the DC-4 could have been observed with the exercise of reasonable care even if Rios had not received the advisory information from the tower to the effect that Eastern was on base leg ahead of and below him. For although visibility from the cockpit of the P-38 was limited in a forward and downward direction, the aircraft could readily have been maneuvered so that any aircraft ahead could have been seen. Since Rios was making a long, high final approach, he should have maneuvered the P-38 so that he could make sure that there were no aircraft in front of him. Even accepting Rios' statement that he flew a downwind leg, a base leg, and then made a final approach which was only a few hundred feet higher than a normal approach, the fact remains that he could easily have seen the DC-4 while he was on his base leg and should have kept track of its position. Accordingly, it must be concluded that the landing approach of the P-38 was made not only without assurance from the tower that there was no conflicting traffic, but also without the exercise of the vigilance required in initiating and pursuing his long, very steep straight-in final approach. As a result, the P-38 overtook and struck the DC-4.

The full examination of the facts and circumstances of this accident cannot, however, terminate with the conclusion as to the responsibility of Rios. Consideration must also be given to the actions of the Eastern crew and the control tower. Insofar as Eastern's flight is concerned, it had a clearance to land number one which, as previously explained, is commonly understood by the tower and airline crews serving Washington as a clearance to turn to a final approach, and as an indication from the tower that the approach path is clear. The crew of the DC-4, therefore, could reasonably have expected to be able to complete their approach and landing without interference from other aircraft. Although the Eastern crew had a duty to maintain a reasonable lookout under all the circumstances, in view of the fact that during the critical period they were engaged in turning from downwind leg to final approach, and that they were engrossed in the task of landing, for which they had been cleared, the crew did not act in a manner inconsistent with such duty if under these circumstances

they failed to observe the P-38. And if the crew of the DC-4 had observed the P-38, they could not reasonably have been expected to conclude that the P-38 constituted conflicting traffic in relation to the DC-4.

It remains to be determined whether those in the control tower discharged their duties as prescribed by Civil Air Regulations and by the Administrator's rules. The Civil Air Regulations require all flights to conform with air traffic control instructions⁶ and the Administrator's rules, which supplement the regulations, provide that an airport traffic controller shall issue clearances and other information which may be necessary for the prevention of collision.⁷ Duties of the control tower personnel, therefore, include alertness for the presence of all aircraft in a traffic pattern and advice to pilots engaged in landing aircraft of the presence and position of other aircraft which might constitute a collision hazard.

According to the testimony of the tower operators, the P-38 started its "straight-in" approach five miles or more from the end of the runway.⁸ At an air speed of 150 mph, which Rios testified he had, it would require approximately 1 3/4 minutes for him to fly to the point of the collision. During this time, the flaps and gear of the P-38 were extended, and the airplane descended rapidly as it flew toward the end of Runway 3. Eastern, having been given a clearance to land number one, actually was turning from its downwind leg to final approach. When the P-38 did not comply with the "Turn left, turn left," or "Clear to the left, clear to the left," radio communications, the tower then warned Eastern. Two other alternative or additional courses of action were available to the tower in an effort to persuade Rios to discontinue his approach or otherwise to avoid the disaster. The first was the use of the red light after Rios failed to acknowledge or comply with the second instruction from the tower to make a holding turn.

⁶ Civil Air Regulations 60.19 Air Traffic control instructions. "No person shall operate an aircraft contrary to air traffic control instructions in areas where air traffic control is exercised."

⁷ Section 26.26-65 (Administrator's Rules) "An airport traffic controller shall issue such traffic clearances and other information as are necessary for the prevention of collisions between aircraft under his jurisdiction."

⁸ Transcript of Testimony, pp 98, 182

The second was the earlier use of the radio to warn Eastern. An accurate appraisal of whether either or both of these courses of action should have been employed or would have averted the disaster requires the assessment of facts with a precision not possible from the record.

The use of the red light might have altered Rios' course and avoided the accident. On the other hand it might have confused the crew of Eastern, as the tower feared it would, and hastened the accident. Rios might not have seen the light, or having seen it disregarded it.

Eastern might have received an earlier instruction to alter its course. The accident might have thus been avoided. On the other hand, Rios' rapid pursuit of his conduct to the point of apparent collision left only seconds available for observation and decision. The tower relied upon radio contact with Rios and the control of his actions. Such contact had been established only a matter of one or two minutes before, the response had been slow but there was reception. It can not be said with certainty whether the moment when this course of action should have been abandoned became apparent in sufficient time to make another course of action effective.

We impute poor judgment to the tower in its adherence to the single course of guiding and corrective action which it selected even though normally it had every right to expect such action to be effective. Full alertness and dispatch on the part of personnel trained to anticipate and cope with critical traffic situations called for an earlier effort to notify Eastern's pilot of the position and course of the P-38 in an additional effort to avoid the collision. We can not, however, under all the circumstances and particularly Rios' unpredictable actions, assert that a different or additional course of action by the tower in the time available to it to reasonably select such action, would have averted the accident.

FINDINGS

1 Eastern Airlines, its crew, and its aircraft were properly certificated.

2 Erick Rios Bridoux held a valid limited pilot certificate issued by the Administrator of Civil Aeronautics, but the aircraft which he flew was not certificated, nor had

any authorization been given by the United States Government for its flight of November 1.

3 No difficulty was experienced in the operation of the Eastern Air Lines' DC-4 or any of its components, including the radio.

4 Other than the erratic engine speed and manifold pressure of the right engine of the P-38, there was no mechanical trouble experienced in its operation.

5 Visibility in the vicinity of the Washington National Airport at the time of the accident was 15 miles, ceiling was 6,500 feet, and surface wind was from the northeast at 20 to 25 miles per hour.

6 Approximately two minutes before the collision, Eastern Air Lines' DC-4 was on downwind leg, at which time it was cleared to land number one on Runway 3.

7 The P-38 was 2 1/2 to 3 miles south of the end of Runway 3 on a high straight-in approach to that runway when the tower observed the Eastern flight in a continuous turn from the downwind leg to the final approach about 1 1/2 miles west so southwest of the approach end of Runway 3.

8 The pilot of the P-38 attempted to land the airplane without obtaining the required clearance from the tower, and without maintaining a proper lookout for other aircraft.

9 The P-38 and the Eastern DC-4 collided at a point in line with and 1/2 mile from the approach end of Runway 3 at an altitude of 300 feet.

10 The tower did not act with the requisite alertness and promptness in communicating to Eastern the position of the P-38 in the critical traffic situation which confronted it, but this cannot be said to have contributed to the cause of the accident.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the execution of a straight-in final approach by the P-38 pilot without obtaining proper clearance to land and without exercising necessary vigilance

BY THE CIVIL AERONAUTICS BOARD

/s/ OSWALD RYAN

/s/ JOSH LEE

/s/ HAROLD A JONES

/s/ RUSSELL B ADAMS

Supplemental Data

INVESTIGATION AND HEARING

The Civil Aeronautics Board was notified of this accident at 11 57 EST, November 1, 1949, by telephone from the Washington National 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 ordered by the Board and was held in Washington, D C, November 9, 10, 11, 12, and 14, 1949. After the hearing, the Board continued its investigation by gathering additional evidence and by taking depositions of additional witnesses.

AIR CARRIER

Eastern Air Lines, Inc, is a Delaware corporation and operates as an air carrier under a certificate of convenience and necessity and an air carrier operating certificate issued pursuant to the Civil Aeronautics Act of 1938, as amended. These certificates authorized Eastern Air Lines to engage in air transportation with respect to persons and property between various points in the United States, including Washington National Airport, Washington, D C.

FLIGHT PERSONNEL

Captain George Ray, age 33, was employed by Eastern Air Lines December 27, 1937, as a mechanic and was employed July 1, 1939, as a pilot. He received basic training during the years of 1934, 1935, 1936, and 1937. Mr Ray was promoted to captain on October 6, 1941. He held a valid airline transport pilot rating Certificate No 32731. His last CAA physical examination was successfully passed May 16, 1949. Captain Ray had a total of 9,033 flying hours, of which 888 hours were in DC-4 type equipment.

Pilot Charles R Hazelwood, age 28, was employed by Eastern Air Lines as a pilot March 22, 1946. He had received his basic training with the U S Air Forces. Mr Hazelwood had successfully passed his last CAA physical examination February 8, 1949. He held a valid commercial pilot Certificate No 267897. Of his total flying hours of 4,396, 26 hours were in DC-4 type equipment.

Erick Rios Bridoux, the pilot of the P-38, was a citizen of Bolivia but had a good command of the English language. His flight training started in 1938 in his own country,

and from 1942 through 1945, he received additional flight training with the U S Air Forces. In addition to the above, Mr Rios received instructional training with a U S air carrier and with the CAA. Mr Rios was issued a limited pilot certificate by the CAA July 30, 1947. At one time, Rios failed an examination for an airline transport pilot certificate. However, such a certificate was not necessary to fly a P-38 because a limited pilot certificate permitted Rios to pilot multi-engine aircraft except that passengers and goods could not be carried for hire. Before Mr Rios had been granted the limited pilot certificate, he passed an oral examination on the contents of the portion of the Civil Air Regulations pertaining to air traffic rules. This oral examination also showed that Rios had the ability to speak and understand the English language. The information for his application showed that he had a total of 3,600 flight hours, and he had reported a total of 80 hours in P-38-type aircraft.

THE AIRCRAFT

N-88727 was a currently certificated DC-4 aircraft model C54B-DC. It had a total of 12,161 hours of flight time. An examination of all Eastern Air Lines' maintenance records pertaining to N-88727 indicates that the aircraft was in an airworthy condition until the time of the accident. No mechanical discrepancies of any nature had been reported for the flight from Boston to New York, and none are known to have occurred during the flight to Washington.

The P-38 had been delivered to the Army Air Force on April 13, 1945, by the manufacturer, Lockheed Aircraft Corporation, and shortly after, it was declared war surplus. At that time, it had a total of 15 hours flight time. The aircraft was transferred to the Reconstruction Finance Corporation January 4, 1946, and stored at Walnut Ridge, Arkansas, Army Air Forces Base. The aircraft was flown to Seymour, Indiana, in 1946, where it remained until the first of October, 1949, when purchased by Universal Air Marine and Supply Company for the Bolivian Government. The ownership of the P-38 is the subject of a legal dispute. The Board takes no position on this question because it is not pertinent to the Board's investigation of the probable cause of the accident.

Complete records were not available for the P-38, the only ones being found consisting of Army forms, CAA registration certificates, two periodic inspection reports, and a ferry permit. These records show that the aircraft had been built for the military services, had been declared surplus, and had been sold by the War Assets Corporation. Later, it was given an NX certificate for participation in the National Air Races. On October 3, 1949, a second periodic inspection was performed on the aircraft for the issuance of a ferry permit for a flight from Seymour, Indiana, to Schrom Field, Maryland. None of the above certificates or periodic inspections were current at the time of the November 1 flight, and no authorization of any type from the Administrator has been found during the course of this investigation which would have authorized the aircraft to be flown at the time of the accident.

During the time the P-38 had been on the Washington National Airport, two external 165-gallon fuel tanks had been installed, and maintenance work had been accomplished on the hydraulic and fuel systems and on the radio equipment. Insofar as the actual operation of the aircraft during the flight was concerned, no evidence of any malfunction has

been found other than the erratic operation of the right engine, which Mr. Rios described.

INVESTIGATION OF THE WRECKAGE

Examination of the DC-4 fuselage showed that it had been cut by the left propeller of the P-38 at station 524, which is just forward of the trailing edge of the wing. This cut extended on both sides of the fuselage from the top down to the emergency escape hatches. From the emergency escape hatches for the remainder of the way around the fuselage, the structure had been torn in two. The aft portion of the aircraft, from station 524 rearward, fell on the west bank of the Potomac River, and numerous small pieces were found in the Potomac Railroad Yards and on the adjacent highway. The forward portion of the aircraft fell into the river. The P-38 had dived into the river from the point of collision. Matching and mating of the various parts of the DC-4 fuselage, and a study of markings on the structure of both the DC-4 and the P-38 showed that the P-38, at the time of impact, was at a lateral angle of three degrees to the right of the longitudinal axis of the DC-4 with the left engine nacelle centered over the DC-4.

Appendix I

WASHINGTON NATIONAL AIRPORT APPROACH AND LANDING TRAFFIC PATTERN

Patterns are designed for landings on each runway under VFR conditions (Caution Note) Heavy traffic at Anacostia, Bolling, and Andrews Field, and the area between them

Remain as high as possible over residential areas and descend over water whenever possible When landing in the Northern Quadrant pass to the south of the City of Alexandria whenever possible Runway 18-36 will be utilized as much as possible Takeoff on Runway 21 or landing on Runway 3 will be utilized infrequently, depending on the force of the wind

Landing on Runway 36

1 Standard left hand pattern remain above 1200' until over the Potomac River and on final approach

2 (Upon Request) Southwest bound traffic may use right hand pattern Proceed well to the east of Anacostia and Bolling Fields

Landing on Runway 3

1 Remain above 1200' until over Potomac River, make approach over Potomac River, make left turn upon passing PEPCO plant, and line up with Runway 3

Landing on Runway 9

1 Standard left hand pattern remain above 1200' until turning on final approach

Landing on Runway 15

1 Northwest bound, north bound, right hand pattern remain above 1200' until turning on base leg west of Pentagon

2 Southwest bound flight may proceed either via east of the Capitol or via the Northwest Passage Flights to remain above 1200' until east of Capitol or over the river at the Georgetown Reservoir (Pilots to advise on "in range" report which is desired)

3 (Upon Request) Left turn in may be made - remain above 1200' until on base leg or west of Pentagon

Landing on Runway 18

1 Northwest bound and north bound - right hand pattern - remain above 1200' until over the Potomac River on base leg Follow a pattern to the west and north of the Pentagon

2 Southwest bound flights may proceed either via east of the Capitol or via the Northwest Passage Flights to remain above 1200' until east of Capitol or over the river at the Georgetown Reservoir (Pilots to advise on "in range" report which is desired)

3 (Upon Request) Left turn in may be made - avoid restricted area

Landing on Runway 21

1 Southwest bound - remain above 1200' until pass the Washington National Guard Armory

2 Southeast bound, northeast bound and north bound - remain above 1200' until turning on base leg or east of Anacostia and Bolling Fields

3 (Upon Request) Right turn in remaining above 1200' until over the river past Georgetown Reservoir

Landing on Runway 27

1 Left hand pattern - remain above 1200' until on final approach

2 (Upon Request) Right hand pattern - for southwest bound flights only

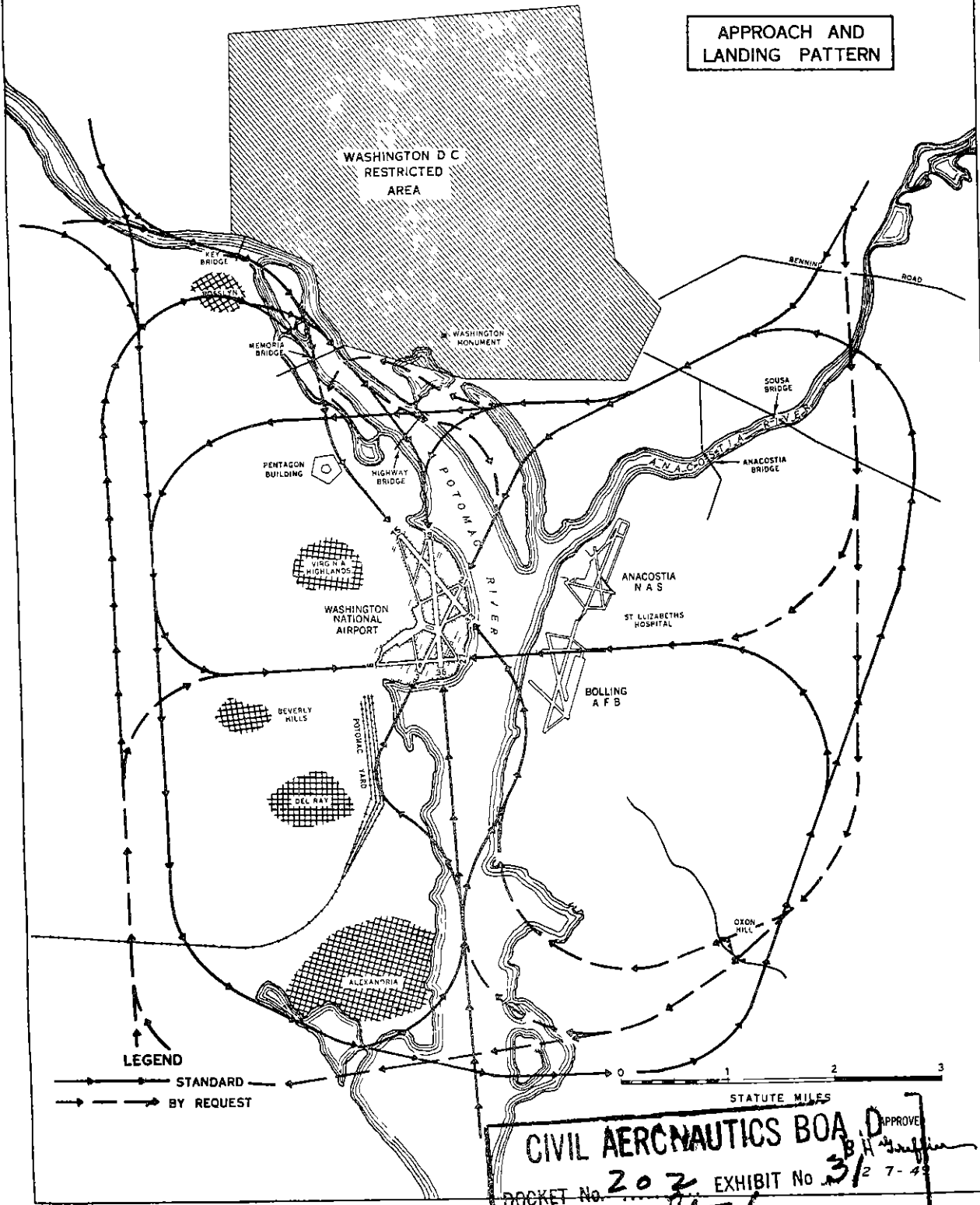
Landing on Runway 33

1 Left hand pattern - remain above 1200' until on final approach or over the Potomac River

2 (Upon Request) Right hand pattern - for southwest bound flights Proceed east of Anacostia and Bolling Fields and remain above 1200' until on final approach.

WASHINGTON NATIONAL AIRPORT

APPROACH AND LANDING PATTERN



LEGEND

- STANDARD
- BY REQUEST



CIVIL AERONAUTICS BOARD APPROVE
DOCKET No. 202 EXHIBIT No. 312 7-43
WITNESS *Stork*
DATE