6-1-41

Adopted: October 7, 1941
Released: October 8, 1941

REPORT OF THE CIVIL AERONAUTICS BOARD

Of the investigation of an accident involving civil aircraft of the United States NC 25667 and NC 1941, which occurred near Wichita, Kansas, on June 1, 1941.

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CONDUCT OF INVESTIGATION

A collision accident involving aircraft NC 25667 and NC 1941 occurred at the Wichita Municipal Airport at Wichita, Kansas, on June 1, 1941, about 2:25 a.m. (CST).[1] At the time of the accident NC 25667 was operating in scheduled air carrier service between Brownsville, Texas, and Chicago, Illinois, as Flight 2 of Braniff Airways, Inc.[2] NC 1941 was operating in scheduled air carrier service between Los Angeles, California, and New York, New York, as Flight 6 of Transcontinental and Western Air, Inc.[3] The accident resulted in major damage to both aircraft. None of the 15 passengers and three crew members of NC 25667 was injured, nor were any injuries received by any of the 15 passengers and four crew members aboard NC 1941.

Inspection and Preservation of the Wreckage

The Kansas City office of the Civil Aeronautics Board[4] received notification of the accident at approximately 3:50 a.m. Upon receipt of this notification, the Board immediately initiated an investigation of the accident in accordance with the provisions of Section 702(a)(2) of the Civil Aeronautics Act of 1938, as amended, and sent an investigator to the scene of the accident. The investigator arrived there about 11:30 a.m., June 1, 1941. The airplanes involved had been taxied from the scene of the accident to a hangar on the airport, but had not otherwise been disturbed.

1/ All times referred to herein are Central Standard Time
2/ Hereinafter referred to as "Braniff".
3/ Hereinafter referred to as "TWA".
4/ Hereinafter referred to as "the Board".

Upon arrival, the investigator of the Board examined the airplanes involved and they were later released to their owners.

Public Hearing

In connection with the investigation, a public hearing was held at Wichita, Kansas, on June 6 and 7, 1941. Robert W. Chrisp, an Attorney for the Board, acted as Presiding Examiner, and was assisted by the following personnel of the Safety Bureau of the Board: Robert D. Hoyt, Assistant Director; James H. Douglas, Assistant to the Chief, Investigation Division; Raymond P. Parshall, Investigator-in-Charge of the Fifth Region; and Benarthur C. Haynes, Air Safety Specialist in Meteorology.

All of the evidence available to the Board at the time was presented at the hearing. Twenty-four witnesses testified and thirty-two exhibits were received in evidence.

While the Examiner and the representatives of the Safety Bureau were the only ones designated to ask questions directly of the witnesses, the Presiding Examiner, acting under instructions from the Board, announced at the opening of the hearing that any person who had any evidence, questions or suggestions to present for consideration in the proceeding, might submit them to the Examiner. In accordance with this suggestion, 22 written questions were so submitted and each one was propounded and answered during the hearing.

Upon the basis of all the evidence accumulated in 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 Carriers

Braniff, an Oklahoma corporation, was operating at the time of the accident 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. These certificates authorized it to engage in air transportation with respect to persons, property and mail between various points including Brownsville, Texas, and Chicago, Illinois, via Corpus Christi, Texas; San Antonio, Texas; Austin, Texas; Fort Worth, Texas; Dallas, Texas; Oklahoma City, Oklahoma; Ponca City, Oklahoma; Wichita, Kansas; and Kansas City, Missouri.

TWA, a Delaware corporation, was operating at the time of the accident 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. These certificates authorized it to engage in air transportation with respect to persons, property, and mail between various points including Los Angeles, California, and New York, New York, via Boulder City, Nevada; Albuquerque, New Mexico; Wichita, Kansas; Kansas City, Missouri; St. Louis, Missouri; Pittsburgh, Pennsylvania; and Philadelphia, Pennsylvania.

Flight Personnel

On Braniff Flight 2 the flight crew consisted of Captain Vernon I. Powers and First Officer Oliver M. Huff.

Captain Powers, age 43, had logged a total flying time of approximately 10,984 hours and was the holder of an airline transport pilot certificate. His last physical examination, taken on March 20, 1941, as required by the Civil Air Regulations, showed him to be in a satisfactory physical condition. Captain Powers had been flying over part of the route from Dallas, Texas, to Chicago, Illinois since 1929 and had been flying over all of the route since 1934. As captain for Braniff he had made frequent stops at the Wichita Municipal Airport in Douglas DC-3 airplanes.

First Officer Huff, age 31, had logged approximately 1680 hours and held a commercial pilot certificate with an instrument rating at the time of the accident. He had been employed by Braniff on May 29, 1940. His last physical examination, taken on March 1, 1941, as required by the Civil Air Regulations, indicated that he was in a satisfactory physical condition.

On TWA Flight 6 the flight crew consisted of Captain Edward Z. Boqua and First Officer David W. Richwine. There was also present in the cockpit, sitting in the jump seat, Captain Stanley M. Kasper.

Captain Boqua, age 36, had accumulated approximately 7600 hours flying time and held an airline transport pilot certificate. His last physical examination, taken on May 10, 1941, as required by the Civil Air Regulations, showed him to be in a satisfactory physical condition.

He had been employed by TWA since June 17, 1934. Although he was regularly assigned to the TWA operations between Kansas City, Missouri, and New York, New York, he had previously flown regularly over the TWA route from Albuquerque, New Mexico, to Kansas City, Missouri, and had made familiarization flights over this route so that he was currently qualified to fly it. He had made frequent stops at the Wichita Municipal Airport.

First Officer Richwine, age 26, had accumulated approximately 1700 hours of flying time and held a commercial pilot certificate with an instrument rating. His last physical examination, taken on February 20, 1941, as required by the Civil Air Regulations, indicated that he was in satisfactory physical condition. He had been employed by TWA as a First Officer since September 15, 1940.

Thus, it appears from the evidence that the crew of Braniff Flight 2, Captain Powers and First Officer Huff, and the crew of TWA Flight 6, Captain Boqua and First Officer Richwine, held the proper certificates of competency, were physically qualified, and by reason of their training and experience were qualified for the flights and equipment involved.

Airplanes

Airplane NC 25667, which was being operated by Braniff on Flight 2 at the time of the accident, was a Douglas Model DC-3 powered with two Wright Cyclone G-102 engines, each rated at 1100 horsepower for take-off, and equipped with Hamilton Standard constant speed full-feathering propellers. It had been manufactured by the Douglas Aircraft Company of Santa Monica, California, and had been placed in service by Braniff about June 27, 1940. This aircraft and its equipment had been approved by the Civil Aeronautics Administration for air carrier operation, over routes flown by Braniff, with 21 passengers and a crew of three. It had been certificated for operation with a standard gross weight of 24,400 pounds 5/ and a provisional gross weight of 24,800 pounds. The use of the airplane was restricted so that no take-off could be made at the Wichita Municipal Airport, except on the hard-surfaced north-south runway, if its weight at the time of take-off exceeded the standard gross weight. At the time of the accident the gross weight of the aircraft was 23,258 pounds.

NC 1941, which was being operated by TWA on Flight 6 at the time of the accident, was also a Douglas Model DC-3 which had been manufactured by the Douglas Aircraft Company. It had been placed in service by TWA about December 23, 1940. It was powered with two Wright Cyclone G-202-A engines, each rated at 1200 h.p. for take-off, and was equipped with Hamil-
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5/ The standard gross weight of an aircraft is the maximum allowable gross weight for landing, while the provisional gross weight of an aircraft is the maximum allowable gross weight for take-off. When an aircraft takes off at its maximum provisional gross weight, the weight of the aircraft must be reduced by gasoline consumption at least to the standard gross weight for landing prior to arrival at its next scheduled stop. If sufficient gasoline has not been consumed between the time of take-off and any emergency landing, gasoline can be dumped by the use of tested and approved dump valves in order to reduce the total weight to the approved gross weight for landing.

Standard constant speed, full-feathering propellers. This aircraft and its equipment had been approved by the Civil Aeronautics Administration for air carrier operation over routes flown by TWA with 24 passengers and a crew of four. The airplane had been certificated for operation with a standard gross weight of 24,400 pounds and a provisional gross weight of 25,200 pounds. The use of the airplane was restricted so that no take-off could be made at the Wichita Municipal Airport except on the hard-surfaced north-south runway if the weight of the airplane exceeded the standard gross weight. The gross weight of the aircraft at the time of the accident was 24,269 pounds.

History of the Flights

TWA Flight 6, which had originated at Los Angeles, proceeded eastward on the evening of the accident from Albuquerque, New Mexico, with Captain Kasper and First Officer Richwine at the controls. The flight landed at the Wichita Municipal Airport at approximately 10:45 p.m., slightly ahead of schedule. Since it had been anticipated that Captain Kasper upon his arrival at Wichita would have flown nearly the maximum 85 hours for the month of May,[6/] Captain Boqua had been detailed to make a flight from Kansas City to Wichita to relieve Captain Kasper on Flight 6 there.

TWA Flight 6, with Captain Boqua in command, took off from the Wichita Municipal Airport on schedule at 11:06 p.m. and proceeded toward Kansas City, Missouri. When the flight was in the vicinity

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6/ The Civil Aeronautics Act of 1938 requires the air carriers to comply with decision No. 83 of the National Labor Board, made on May 10, 1934. This decision of the National Labor Board establishes 85 hours as the maximum number of hours to be flown by any airline transport pilot during any month.

of Cassoday, Kansas, approximately 44 miles northeast of Wichita, thunderstorms and turbulent air were encountered. Captain Boqua deemed it advisable to return to Wichita and await an improvement in the weather. The flight landed at Wichita at approximately 11:35 p.m. About 1:45 a.m. Captain Boqua conferred with the captain of Braniff Flight 1, which had just flown from Kansas City to Wichita. He then telephoned the TWA flight superintendent at Kansas City, who at 2:03 a.m. released Flight 6 for flight to Kansas City on instruments.

Meanwhile, Braniff Flight 2 had proceeded from Brownsville, Texas, to Dallas, Texas. Captain Powers and First Officer Huff had been assigned to pilot the flight from Dallas to Chicago. Prior to departure from Dallas, Captain Powers had prepared a flight plan, the Wichita-Kansas City portion of which indicated that Captain Powers intended to cruise, after leaving Wichita, at 5,000 feet above sea level, and to descend to 3,000 feet above sea level at DeSoto, Missouri. DeSota is a radio fix for flights operating under instrument conditions between Wichita and Kansas City, and is approximately 23 miles southwest of Kansas City.

Braniff Flight 2 took off from Dallas on schedule at approximately 11:30 p.m. and proceeded to Ponca City, Oklahoma. The Wichita-Kansas City part of the flight plan was filed by Braniff with the Airway Traffic Control Center at St. Louis[7/] at 1:53 a.m. and was approved by it shortly

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7/ The St. Louis Airway Traffic Control Center supervised instrument flights on the civil airways within certain designated airway traffic control areas. Wichita was not within any airway traffic control area. Flights from Wichita to Kansas City entered such an area, however, at a point 25 miles northeast of the Wichita radio range station.

thereafter. After Captain Powers had left Ponca City and when he was nearing the Wichita Municipal Airport at 1:54 a.m., he talked by radio with the captain of Braniff Flight 1, who had taken off from Wichita after conferring with Captain Boqua. The captain of Flight 1 advised Captain Powers to cruise at "minimum altitude" north of Wichita. Because of severe static conditions, Captain Powers was unable to make out this message, and the Braniff radio operator at Wichita, who had intercepted the message, relayed it to him. Captain Powers landed at Wichita at 2:03 a.m., taxied onto the loading ramp and at 2:05 a.m. parked the airplane close to NC 1941, TWA Flight 6.

Braniff Flight 2 was met at the Wichita loading ramp by the Braniff radio operator and the passenger agent. There was no one in the Braniff radio room at this time. Captain Powers testified that, within two or three minutes after he parked the airplane, he personally requested one of the Braniff ground personnel to obtain approval of a change in his flight plan to "minimum altitude"[8/] for the flight to Kansas City. About the same time, when one of the ground personnel delivered the clearance for his approval, Captain Powers wrote on the form "Request minimum altitude". A copy of this form was then returned to the ground personnel. A light rain began to fall about 2:10 and the radio operator left the ramp momentarily to obtain raincoats for the ground crew. Upon his return he entered the gasoline distribution on the clearance form which had been signed by Captain Powers. About 2:15 the passenger steps and nose ladder were removed.

As Captain Powers started to taxi away from the ramp, at approximately 2:16, the radio operator and passenger agent returned to their

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8/ This is not a standard air traffic control term. The meaning attributed to it by Captain Powers is explained on page 20.

office in the airport administration building, arriving about a minute and a half later. There was still a light rain falling at this time. None of the Braniff ground personnel remained on the ramp to control by signal the movements of the Braniff airplane prior to the take-off. 9/ Nor did Captain Powers, after taxiing out to the point from which he intended to start his take-off, stop the airplane in such a position that he could have observed such signals had they been used. Witnesses stated that they could see clearly the boundary lights on the south side of the airport, approximately 3500 feet away. The Braniff passenger agent, who had carried the copy of the clearance form for Flight 2 back with him, left it in the radio room.

In the meantime, after Captain Boqua had obtained a release for TWA Flight 6 from the TWA flight superintendent at Kansas City, he had prepared a flight plan for the flight from Wichita to Kansas City. This flight plan, which indicated that he would cruise at 3,000 feet, was transmitted to the Airway Traffic Control Center at St. Louis, Missouri, at 2:15 a.m. and was approved by the Airway Traffic Control Center at that time. Captain Boqua understood from the information given by Airway Traffic Control that Braniff Flight 2 was to cruise at 5,000 feet and cross DeSota at 3,000. He was in the TWA radio room at the airport administration building at this time and observed through the window that Braniff Flight 2 was preparing to leave. A few seconds later he saw Braniff Flight 2 start down the taxi strip

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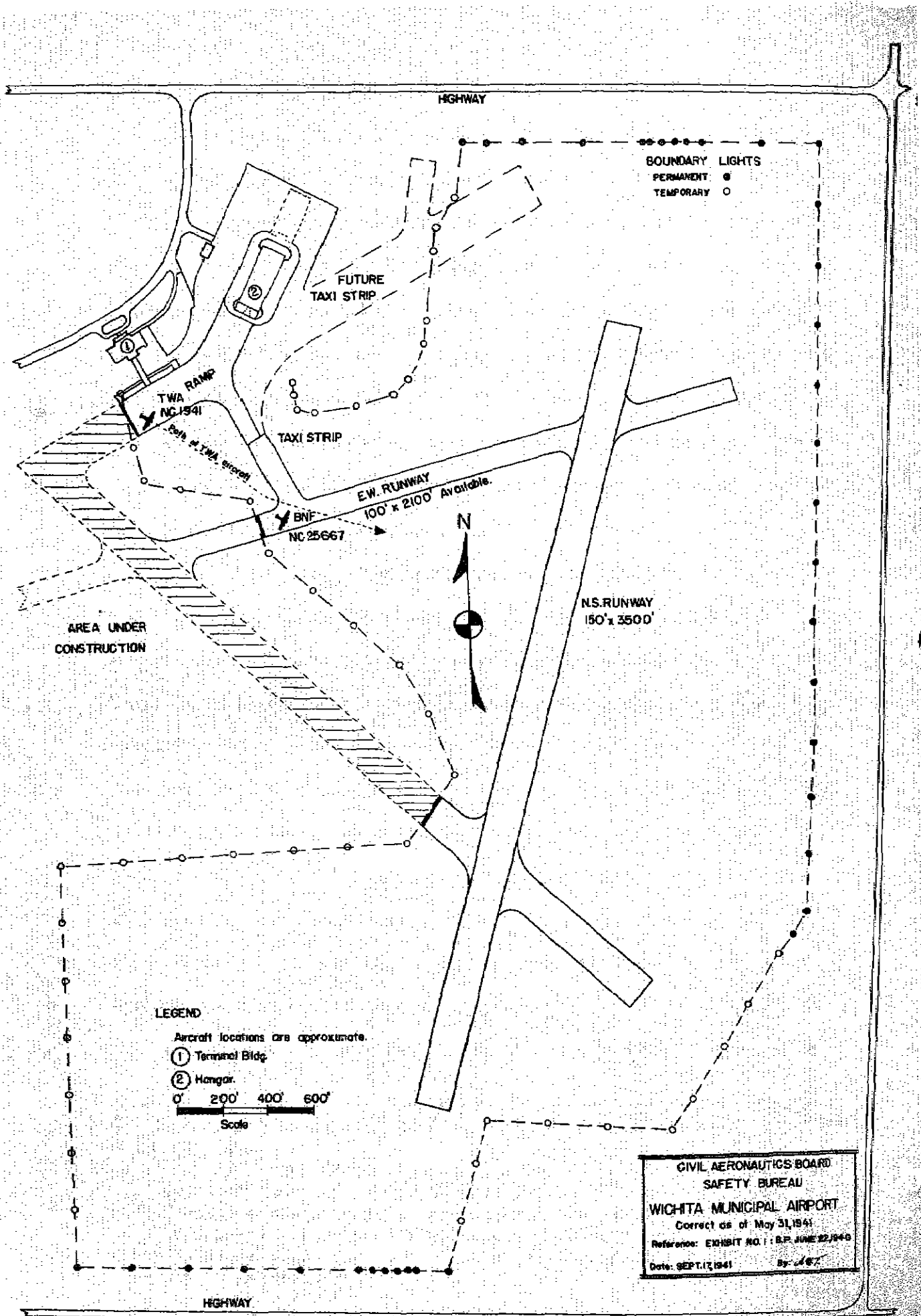
9/ Paragraph 4 of Page 5252 of the Braniff Operations Manual provided as follows:

"After the plane is signalled away from the ramp, the movements of the plane shall be governed by the control tower. Where a control tower is not in use, the station employees will use red and white flags for signalling planes for take-off during daylight and red and green light signals for take-off during darkness."


HIGHWAY
BOUNDARY LIGHTS
PERMANENT
TEMPORARY
FUTURE
TAXI STRIP
TWA RAMP
TWA
NC 1941
Path of TWA aircraft
TAXI STRIP
E-W. RUNWAY
100' x 2100' Available.
BNF
NC 25667
N
N.S. RUNWAY
150' x 3500'
AREA UNDER
CONSTRUCTION
LEGEND
Aircraft locations are approximate.
1 Terminal Bldg.
2 Hangar.
0' 200' 400' 600'
Scale
CIVIL AERONAUTICS BOARD
SAFETY BUREAU
WICHITA MUNICIPAL AIRPORT
Correct as of May 31, 1941
Reference: EXHIBIT NO. 1 : B.P. JUNE 22, 1942
Date: SEPT. 17, 1941
By:
HIGHWAY

DU-1821

toward the south as if to take off. He then waited in the radio room for a few moments with the intention of establishing a time-separation between Braniff Flight 2 and his flight. When he walked out of the airport building he could not see Braniff Flight 2. He then went aboard the TWA airplane. Neither he nor First Officer Richwine, who had been in the cockpit while Captain Boqua was in the radio room, could see the Braniff airplane on the field. They therefore concluded that it had taken off.

Captain Powers of Braniff Flight 2, after leaving the ramp at 2:16, had taxied toward the south along the taxi strip to a point approximately 700 feet from the ramp and close to the temporary white lights which marked the west boundary of that part of the airport available for use. 10/ He stated subsequently that he taxied to this point in order to gain a better view of the temporary boundary lights which had been moved frequently as the result of an airport construction program. After reaching this point, Captain Powers had switched his landing lights off and turned the airplane into the wind, which was then about 30 m.p.h. from the southeast and gusty. At 2:18 he checked the wind and altimeter setting with the Braniff radio operator at the airport.

At 2:19 while he was still in this position and warming up the engines, Captain Powers called the Braniff radio operator asking for information with respect to his requested change in flight plan to

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10/ See map facing this page.

"minimum altitude". The Braniff radio operator and passenger agent testified that this was the first knowledge that either of them had of Captain Powers' desire to change his flight plan. The Braniff radio operator contacted the Airway Traffic Control Center at St. Louis by way of the Braniff office at Kansas City at 2:20 a.m. for approval of the requested change. At 2:22 a.m. he received a message from Airway Traffic Control inquiring whether Captain Powers wished to fly according to contact flight rules as long as possible and then on instruments at 3,000 feet, or solely according to contact flight rules. This inquiry was immediately transmitted to Captain Powers, who replied that he wished to fly according to contact flight rules as long as possible and then at 3,000 feet on instruments.

Captain Powers at this time intercepted messages between Wichita and Kansas City which referred to the fact that TWA Flight 6 was also to fly between Wichita and Kansas City at 3,000 feet. Captain Powers did not know at this time that the TWA plane on the ramp was TWA Flight 6 and was bound for Kansas City. Because of his interception of the radio messages he became concerned and decided not to take off until he knew where TWA Flight 6 was located, and, if such flight was eastbound, until he could obtain a time-separation. The Braniff radio operator experienced great difficulty during this period because of static conditions in establishing contact with the Braniff office at Kansas City, which office was contacting the Airway Traffic Control Center at St. Louis. He found it necessary to relay messages via the Braniff radio stations at Ponca City and Dallas.

The control tower at the Wichita Municipal Airport was operated only between 6:15 a.m. and 8:00 p.m. Nevertheless, an interphone system which had been installed in September, 1940, provided communication between the Braniff, TWA, Civil Aeronautics Administration communications, and Weather Bureau offices. The Braniff microphone to the interphone system was located in the Braniff radio room just to the left of the operator's normal position. It was the usual practice of Braniff and TWA ground personnel to advise each other when their respective flights reported that they were off the ground on take-off. Apparently no system had been worked out whereby they reported to each other the locations of their airplanes when taxiing away from the loading ramp. Despite the fact that Braniff Flight 2 had been away from the ramp for almost 10 minutes the Braniff radio operator did not report to TWA the fact, which was known to him, that Flight 2 had not yet taken off. He stated that he failed to do this because of his difficulty in obtaining the Airway Traffic Control Clearance for Flight 2. On the other hand, the TWA radio operator, who knew that Braniff Flight 2 had taxied out about 2:16, did not inquire of Braniff whether Flight 2 had left the ground, and did not advise Braniff that TWA Flight 6 was about to taxi out for a take-off.

A weather observation made at Wichita at 2:20 indicated contact weather, ceiling at an estimated height of 6000 feet, lower broken clouds, a mild thunderstorm, light rain, visibility 10 miles or more, wind southeast 34 m.p.h. with strong gusts, altimeter setting 29.74.

Captain Boqua, believing that Braniff Flight 2 had taken off before he came out of the airport administration building, taxied away from the loading gate at approximately 2:21. He decided to start his take-off from the west end of the loading ramp so as to have all of the available area for his take-off, and therefore taxied the airplane to a point on this end of the ramp approximately 750 feet behind the Braniff airplane. He switched the landing lights on and warmed up the engines. About 2:23 the rain increased in intensity from light to moderate but the visibility remained good. Witnesses stated that they could still see the airport boundary lights on the south side of the airport.

Thus, to summarize the movements of the two aircraft involved, it appears that Braniff Flight 2 had arrived at Wichita at 2:03 a.m.; had taxied away from the ramp at 2:16 a.m.; had parked in the take-off area about 2:17 a.m. TWA Flight 6 arrived at Wichita from Albuquerque at 10:45 p.m.; departed for Kansas City at 11:06 p.m. but returned to Wichita due to adverse weather conditions and landed at 11:35 p.m. Flight 6 was redispatched and departed from the loading gate at 2:21 a.m. The accident occurred at 2:25 a.m.

After warming up the engines Captain Boqua started the take-off toward the southeast, into the wind and parallel to the line of temporary boundary lights on the west side of the airport.[11/] After the airplane had accelerated to a speed sufficient for Captain Boqua to raise the tail, both he and First Officer Richwine made out the shape of the Braniff airplane a short distance ahead and almost directly in their path. Captain Boqua immediately closed the throttles, applied full left brake and rudder, and rolled the control wheel fully to

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11/ See map facing page 11.

the left in an effort to avoid the Braniff airplane. The TWA airplane swerved to the left, and, although its right wing had been raised by the operation of the control wheel, this wing struck and passed over the left wing of the other airplane. The collision occurred at approximately 2:25 a.m. After the TWA plane had been brought to a stop some distance beyond the point of impact Captain Boqua taxied back to the ramp. Immediately after the impact Captain Powers stopped the engines on the Braniff airplane and then waited for ground personnel to come to his assistance before moving it. Captain Boqua stated that he had apparently mistaken the tail light of the Braniff airplane for one of the temporary boundary lights on the west side of the airport, near which he was taking off.

An examination of NC 1941, the TWA aircraft, disclosed that the right wing had been seriously damaged. The wing covering was badly wrinkled and parts of the wing structure extending backward from the leading edge were broken or crushed. The right aileron was also broken. There was apparently no further damage. Examination of NC 25667, the Braniff airplane, revealed that the left wing tip and aileron were broken off and that the left wing covering was severely wrinkled. A check was made of its right navigation light, tail light, and landing lights. All of them operated normally. There was no damage apparent other than to the left wing.

The 2:35 weather sequence report for Wichita indicated instrument weather, ceiling estimated as 1600 feet, lower broken clouds, visibility 2 miles, mild thunderstorm, heavy rain, temperature 64, dew point 64, wind southeast 30 m.p.h. with strong gusts, altimeter setting 29.75.

Conduct of the Flight

An extensive construction program had been under way at the Wichita Municipal Airport for a considerable period of time prior to the accident. The construction was part of a general expansion program, consisting of the building of additional concrete runways, and the leveling and seeding of areas outside the runways. This work necessitated the use of numerous temporary boundary lights around the areas under construction and, as the work progressed, the frequent moving of such temporary boundary lights. Each time a boundary light or line of boundary lights was moved the airport management notified the Civil Aeronautics Administration of such fact and worked out with Civil Aeronautics Administration employees an appropriate Notice to Airmen to be transmitted over the teletype and to be published in the Weekly Notice to Airmen. In addition, construction progress maps had been published weekly by the engineer in charge of construction and had been transmitted to the local station managers of the airlines operating at the airport. It appeared that Captain Powers and Captain Boqua had both received ample notice of the condition of the airport as it was on the night of May 31-June 1.

At the time of the accident there were available for use at the airport the paved 3500-foot north-south runway and the paved 2100-foot east-west runway, at the east end of which 400 feet of sod were also available. Approximately 1200 feet of the southeast end of the proposed 3500-foot northwest-southeast runway had been completed, but the northwest end of this runway and the northwest section of the

airport were still under construction. The area in the northwest part of the field on which work was being done was marked off by temporary white boundary lights.[12/] The Director and Executive Officer for the Board of Park Commissioners of the City of Wichita stated at the hearing that he expected that the northwest-southeast runway would be completed within 90 days.

On take-offs toward the southeast it was necessary to take off from the sod surface paralleling the incompleted northwest-southeast paved runway. The distance from the west end of the loading ramp to the southeast boundary of the airport, along Captain Boqua's intended take-off path, was in excess of 3400 feet, which would allow him the maximum usable distance for take-off toward the southeast. The distance from the point where the Braniff airplane was parked to the boundary of the airport along the same take-off path was 2850 feet. The terrain used for take-offs to the southeast is covered with a heavy sod and is sufficiently firm to accomodate heavily loaded aircraft under conditions existing on the date of the accident.

A comprehensive set of rules and regulations had been promulgated on September 12, 1940, by the City of Wichita to control traffic on and in the vicinity of the airport. Rule 11 provided:

> "No take-offs are to be started from the taxi strip or ramp adjacent to buildings, or within 300 feet therefrom."

The Superintendent of Maintenance and Operation of the airport testified, however, that the enforcement of this rule had been relaxed in the interest of safety during the period of construction. It seems clear

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12/ See map facing page 11.

that the relaxation of the enforcement of Rule 11 was proper under the circumstances since pilots were thus permitted to take advantage of an additional 500 feet of take-off area in taking off toward the southeast and since this rule had originally been promulgated less in the interest of safety than for the convenience of spectators and persons working in and near the Administration Building.

A flood light located about the center of the east boundary of the airport was available at the time of the accident. It appeared that this had been used very infrequently by the airlines. Neither Captain Boqua nor Captain Powers requested that this flood light be turned on for his take-off on the evening of the accident. Since their take-off paths would have been almost directly toward this light and since the light was not equipped with a shadow-bar to eliminate glare, it appears that they exercised good judgment in not requesting the use of the light.

The weather conditions at the time of the accident were the result of pre-frontal thunderstorm activity within a warm tropical air mass. 13/ Ceilings ranged from 2000 feet to 5000 feet in the thunderstorm areas in Kansas and visibilities were two miles or more. As previously stated, the 2:20 a.m. weather sequence report for Wichita indicated a mild thunderstorm, light rain, and visibility 10 miles or more. A moderate rain began to fall at approximately 2:23 a.m.

13/ See Appendix A for the pertinent (1) weather sequence reports from Wichita, (2) Weather Bureau forecasts, and (3) Braniff and TWA forecasts.

Visibility 14/ at this time and at the time of the accident, 2:25 a.m., was probably better than two miles. There was no fog or haze. As noted before, the 2:35 weather sequence report, even though it indicated heavy rain, reported that the visibility was two miles. In the light of these facts it is not felt that restricted visibility contributed to the accident.

The Braniff radio operator knew, before Captain Powers landed at Wichita, that Captain Powers had been advised by the captain of Braniff Flight 1 to fly at "minimum altitude" between Wichita and Kansas City. In view of this he should have made an effort to ascertain as quickly as possible whether Captain Powers desired to change his flight plan. As noted before, Captain Powers testified that he personally requested one of the two Braniff ground personnel to obtain approval of a change in flight plan. The Braniff radio operator and passenger agent each testified that this request was not made of him. In view of this conflict of recollection we do not reach a conclusion with respect to the oral request. However, the radio operator should have paid particular attention to the copy of the clearance form returned to him by Captain Powers since it was the usual procedure for a captain to request a change in flight plan on this form. If he had noticed

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14/ Visibility at night is determined by observing lights at known distances. The visibility is defined as the greatest distance toward the horizon that moderate lights are visible.

Captain Powers' request for a change in flight plan on this form when it was returned to him about 2:10, he could have eliminated much of the subsequent delay of Flight 2.

Captain Powers, when he requested a change in his flight plan, requested that he be allowed to fly at "minimum altitude". An Airway Traffic Control Center when approving flight plans must have information indicating whether a flight is intended to be in accordance with contact flight rules or in accordance with instrument flight rules. A request for "minimum altitude" is confusing in that it does not indicate which of these alternatives is desired. It appears, therefore, that Captain Powers should have specified in his request whether he intended to fly contact or on instruments. If he had done so, some of the delay in obtaining the clearance from the Airway Traffic Control Center would have been eliminated.

The control tower at the Wichita Municipal Airport was not operating at the time of the accident. There was normally no control tower operator on duty between 8:00 p.m. and 6:15 a.m. There were on occasions, sightseeing trips from the airport between 8:00 p.m. and 11:00 p.m. TWA Flight 6 was scheduled to arrive at Wichita at 10:57 and depart at 11:07 p.m. every evening. Another TWA flight, this one west-bound, was scheduled to arrive at Wichita at 1:07 a.m. and depart at 1:17. A south-bound Braniff flight was scheduled to arrive at 1:10 a.m. and depart at 1:17. Braniff Flight 2 was regularly scheduled to arrive at 2:08 a.m. and depart at 2:16 a.m. Occasional use was also made of

the airport, during the hours when the control tower was not in operation, by private planes and Army aircraft. Under these circumstances it is believed that there should be continuous 24-hour operation of the control tower at the Wichita Municipal Airport. It is evident that if the control tower had been in operation on the night of May 31-June 1 the accident under discussion would not have occurred.

Even though the control tower was not in operation at the time of the accident, the accident could probably have been averted if the Braniff ground personnel had remained on the ramp until the Braniff airplane had taken off. As has already been noted, the Braniff Operations Manual expressly provided for such a procedure. If the ground personnel had followed the prescribed procedure and remained on the ramp to signal the Braniff airplane until it had taken off, Captain Boqua would have had ample notice that the Braniff aircraft was still on the field and thus would have been warned against taking off until after the Braniff plane had cleared the field.

Moreover, the interphone system which was in use at the time provided communication between the airport offices of Braniff, TWA, Civil Aeronautics Administration Communications, and the Weather Bureau. Although the airport control tower was not in operation at the time of the accident, this interphone afforded a means of communication which, if properly used, would have averted the accident. The procedure whereby Braniff and TWA notified each other by interphone only of the fact that their flights had left the ground on take-off appears, however, to have been inadequate. To operate with a proper degree of safety in the absence of control tower operation, Braniff and TWA

should report to each other not only when each flight has left the ground at take-off, but also when each flight is approaching the field, and is preparing to take off.

Thus, the Braniff radio operator should have notified the TWA office by interphone that Braniff Flight 2 had taxied out and was still on the field. The difficulty in obtaining a clearance for Flight 2 was stated by the Braniff radio operator to have been the reason for his failure so to notify TWA. This delay was occasioned partly by the failure of the radio operator to note the request for a change on the clearance form, partly by the insufficiency of the request of Captain Powers, and partly by the static conditions existing at the time. Especially in view of this delay the Braniff radio operator should have informed TWA that Braniff Flight 2 had not yet taken off.

The TWA ground personnel were also at fault in that they failed to make proper use of the interphone. The TWA radio operator knew that Braniff Flight 2 was scheduled to depart at 2:16. He knew that it was customary for Braniff to report over the interphone when its flights had left the ground. He had received no such report from Braniff with respect to Braniff Flight 2. Despite this fact, he did not notify TWA flight 6 that Braniff had not reported off the field, and did not inquire of Braniff if Flight 2 had left the field. Nor did he inform Braniff that TWA Flight 6 was taxiing out for a take-off.

Captain Powers had observed the TWA airplane at the loading ramp when he taxied to the ramp at 2:05. He should have realized, since it was on the ramp before he arrived, that it might be taking off

before or [illegible] about the same time he did. Under these circumstances it seems that Captain Powers was careless when, after taxiing out before the TWA plane to a point 700 feet from the loading ramp, he turned off his landing lights and remained headed into the wind and away from the loading ramp for approximately eight minutes without notifying Braniff ground personnel his position on the field and requesting them to notify TWA that he had not taken off.

Captain Boqua had allowed a reasonable time for the departure of Braniff Flight 2 when he taxied to the west end of the loading ramp for his take-off. Although the airport traffic rules forbade take-offs beginning within 300 feet of the loading ramp, the enforcement of these rules, as noted before, had been relaxed in the interest of safety during the construction program. Since it was necessary when taking off to the southeast to use the wet sod alongside the yet uncompleted northwest-southeast runway and since Captain Boqua was taking off with a heavily loaded ship, it seems that he exercised good judgment in seeking to take advantage of all available take-off area.

The Civil Air Regulations provide:

> "A take-off shall not be commenced until there is no risk of collision with other aircraft during such take-off." 15/

The manifest object of this section is to prohibit the reckless operation of aircraft and to impose upon pilots the duty of exercising the care required by the circumstances in ascertaining whether or not there is risk of collision with other aircraft before commencing a take-off. Therefore, it was the duty of Captain Boqua to exercise reasonable care

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15/ Civil Air Regulations, Section 60.3301

before beginning his take-off, to ascertain that his take-off area was clear. He stated that he looked out over the field, in an attempt to determine the position of Braniff Flight 2, both when he came out of the airport administration building, and when he entered the cockpit of the TWA airplane. At neither time did he see the Braniff aircraft. The fact that he had observed Braniff Flight 2 taxi away from the ramp previously and could not see that airplane on the field was certainly indicative to Captain Boqua that Braniff Flight 2 had already taken off. One witness, a service man employed by the airport, stated that he had seen the Braniff airplane parked on the field while he was servicing the TWA plane. Several other witnesses, however, testified that they had looked out over the field at this time and had failed to see the Braniff airplane. First Officer Richwine, who looked out at the field just before Captain Boqua started to taxi away from the loading gate, did not see the Braniff airplane at this time and reported to Captain Boqua that all was clear.

When Captain Boqua had taxied to the west end of the loading ramp and was about to take off, he and First Officer Richwine both looked over the field very carefully to determine their position relative to the temporary boundary lights on the west side. Power was applied and the take-off was begun, but it was not until after the airplane had traveled a distance sufficient for the captain to raise the tail that they could see the other airplane, even though they had their landing lights on.

Under these circumstances it appears that Captain Boqua exercised reasonable care in determining whether his take-off area was clear.

Captain Boqua cannot be criticized for mistaking the tail light of the Braniff airplane for a temporary airport boundary light. The tail light was of the same color and very nearly the same size as the boundary lights, and the Braniff airplane was in such a position that its tail light appeared to Captain Boqua to be the last in a row of temporary boundary lights on the west side of the field. It was brought out at the hearing that the present type tail light of an airplane which is required by the Civil Air Regulations and International Regulations may be easily mistaken for an airport boundary light and that it may also be mistaken when in the air for a star. This difficulty had long been recognized, and a substantial amount of research and experimentation had been conducted. This work has been greatly accelerated as a result of this accident and a tail light which should easily be identified at night is being developed and is nearing readiness for a practical service test.

CONCLUSION

Findings

Upon all of the evidence available to the Board at this time we find that the facts relating to the accident involving Braniff aircraft NC 25667 and TWA aircraft NC 1941 which occurred at the Municipal Airport, Wichita, Kansas, on June 1, 1941, are as follows:

1. The accident occurred at approximately 2:25 a.m. to Braniff Flight 2 and TWA Flight 6, and resulted in major damage to both aircraft, but none of the passengers or crew members of either were injured.

2. At the time of the accident both Braniff and TWA held currently effective certificates of public convenience and necessity and air carrier operating certificates authorizing them to conduct the flights.

3. Captain Powers and First Officer Huff, the Braniff flight crew, and Captain Boqua and First Officer Richwine, the TWA flight crew, were physically qualified and held proper certificates of competency and appropriate ratings to operate as air carrier pilots over the routes involved.

4. Braniff aircraft NC 25667 and TWA aircraft NC 1941 were both currently certificated as airworthy at the time of the accident and were loaded within their approved loading limits.

5. Captain Powers, in charge of Braniff Flight 2 en route to Kansas City, taxied away from the loading ramp at the Wichita Municipal Airport at 2:16 a.m. to a point approximately 700 feet from the ramp and close to the temporary white lights which marked the west boundary of the usable area of the airport. He then turned the airplane into the wind toward the southeast and switched his

landing lights off. He decided to remain at this point on the airport until he had obtained approval of a newly requested flight plan. He remained in this position on the airport for approximately eight minutes without requesting the Braniff ground station to notify TWA that he had not yet taken off.

6. At 2:21 a.m. Captain Boqua taxied away from the loading gate to a point on the west end of the loading ramp approximately 750 feet to the rear of the Braniff aircraft. Captain Boqua turned his landing lights on and began his take-off toward the southeast. After the tail of the TWA aircraft had left the ground Captain Boqua and First Officer Richwine first observed the Braniff aircraft almost directly ahead of them. Captain Boqua immediately closed the throttles, applied full left brake and rudder and rolled the control wheel to the left in order to raise the right wing. Captain Boqua had used reasonable care under the circumstances.

7. The right wing of the TWA aircraft struck the left wing of the Braniff aircraft with resultant damage to both aircraft.

8. There was a moderate rain falling at the time. The visibility was probably better than two miles.

9. An extensive construction program was in progress at the Wichita Municipal Airport at the time and this necessitated the use and frequent relocation of temporary boundary lights. Both captains had been adequately advised of the condition of the airport.

10. During the construction of the northwest-southeast runway it was the practice for air carrier aircraft to take off on the sod paralleling this runway. Take-offs to the southeast were frequently made starting from on or near the ramp.

11. Although the airport rules and regulations forbade beginning take-offs within 300 feet of the loading ramp, the enforcement of

these rules had been relaxed in the interest of safety during the construction program. Under the circumstances Captain Boqua displayed good judgment in beginning his take-off from the loading ramp so as to be able to use all available take-off area.

12. The control tower was not in operation at the airport at the time of the accident.

13. Neither Braniff Flight 2 nor TWA Flight 6 was properly cleared by its respective ground personnel. Braniff ground personnel did not remain on the ramp to signal the Braniff airplane for take-off, as required in the Braniff Operations Manual. There was in use at the time an interphone system connecting the airport offices of Braniff and TWA. Neither the Braniff nor the TWA radio operator made proper use of this interphone and notified the other of the position of their respective flights.

PROBABLE CAUSE:

On the basis of the foregoing findings and all of the evidence available to the Board at this time, the Board finds that the probable cause of the accident was the action of the captain of Braniff Flight 2 in remaining in the take-off area of the airport for an abnormal length of time without requesting the Braniff ground station to inform TWA that he had not yet taken off.

CONTRIBUTING FACTORS:

1. Failure of Braniff ground personnel to observe the movements of Braniff Flight 2 after leaving the ramp and inform TWA personnel that Flight 2 had not taken off.

2. Failure of TWA ground personnel to ascertain definitely whether or not Braniff Flight 2 had taken off, and discovering that it had not done so to advise the captain of TWA Flight 6.

3. Failure of Braniff and TWA to establish an adequate procedure whereby ground personnel at Wichita would consult with each other so as to coordinate flight activities in the Wichita area.

4. The ease with which a white tail light of the type required by the Civil Air Regulations may be confused with the variety of white lights on the ground.

Approved;

/s/ Harllee Branch

Harllee Branch

/s/Edward Warner

Edward Warner

/s/ Oswald Ryan

Oswald Ryan

/s/ G. Grant Mason, Jr.

G. Grant Mason, Jr.

/s/ George P. Baker

George P. Baker

APPENDIX A

I. Airway Weather Reports, U. S. Weather Bureau Airport Station, Wichita, Kansas

The following reports are taken from a copy of Form 1130-AER for June 1, 1941:

Regular Weather Report, Wichita, Kansas 1:35 a.m. CST	Classification contact. Ceiling 1800 feet, high overcast, lower broken clouds, pressure 1006.8 millibars, temperature 66, dewpoint 64, wind east southeast 26, altimeter 29.77, lightning in all quadrants.
Special Weather Report, Wichita, Kansas 2:10 a.m. CST	Classification contact. Ceiling estimated 6000 feet, high overcast, lower broken clouds, visibility 10 miles or better, mild thunderstorm, light rain showers, pressure 1006.1, temperature 66, dewpoint 64, wind southeast 33, altimeter setting 29.76, lightning in all quadrants.
Check Observation, Wichita, Kansas 2:20 a.m. CST	Classification contact. Ceiling estimated 6000 feet, high overcast, lower broken clouds, visibility 10 miles or better, mild thunderstorm, light rain showers, pressure 1006.1, temperature 66, dewpoint 64, wind southeast, 34, strong gusts, altimeter setting 29.74, lightning in all quadrants.
Special Weather Report, Wichita, Kansas 2:35 a.m. CST	Classification instruments. Ceiling estimated 1600 feet, high overcast, lower broken clouds, visibility 2 miles, mild thunderstorm, heavy rain showers, pressure 1006.1, temperature 64, dewpoint 64, wind southeast 30 strong gusts, altimeter setting 29.75, lightning in all quadrants.

II. U. S. Weather Bureau Forecasts Issued by The Airway Forecast Center at Kansas City, Missouri, Covering the Period From 10:30 p.m. CST, May 31 to 6:30 a.m. CST, June 1.

Wichita Terminal

Thunderstorms vicinity during period accompanied by broken to overcast, 5 to 5 thousand, visibility 6 miles or more, lowering in precipitation to 1 or 2 miles.

Airway Forecast Kansas City-Amarillo; Kansas City-Indianapolis; Kansas City-Chicago - 10:30 p.m. to 6:30 a.m. CST:

Thunderstorms Texas Panhandle northeastward through central Indiana locally severe eastern Kansas with thunderstorms ending eastern Missouri eastward through district by 0100 CST but continuing west in Missouri southwestward through district. Ceilings generally 3 to 5 thousand, visibility 1 to 3 miles accompanying thunderstorms except lowering to 1 to 2 thousand, visibility 1/2 mile in severe storms eastern Kansas. Very low stratus clouds forming northeastern Illinois, ceilings 2 to 4 hundred and visibility lowering 1 to 3 miles account fog by midnight lowering to near dense fog by 0500 CST. General fog forming southeastern Nebraska by midnight lowering visibility to 1 to 3 miles by 0200 CST and near zero after 0400 CST. Continuing CAVU eastern Oklahoma through northeastern Arkansas and after thunderstorms dissipate. Visibility outside precipitation and for areas generally unrestricted lowering visibility cities account smoke eastern portion district to 2 to 4 miles by 0300 CST.

III. Company Forecasts

1. The Braniff clearance form issued at Dallas contained the Weather Bureau forecasts issued at 10:30 p.m. CST, May 31, by the District Forecast Center in Kansas City, Missouri.

2. The TWA clearance form issued at Wichita contained the U. S. Weather Bureau forecasts issued at 4:30 p.m. CST, May 31, covering the period ending at 12:30 a.m. CST, June 1, and the forecasts issued at 10:30 p.m. CST covering the period ending 6:30 a.m. CST.

Attached to the TWA clearance was a TWA Airway and Terminal forecast issued by the Meteorological Department of TWA at Kansas City which gave as the terminal forecast for Wichita from 10 p.m., May 31, to 2:30 a.m., June 1: "High broken clouds".