SUPPLEMENTAL DATA

Investigation and Hearing

The Civil Aeronautics Board received notification of the accident at 0715 October 3, 1946 and immediately initiated an investigation in accordance with the provisions of the Civil Aeronautics Act of 1938, as amended. Air Safety Investigators of the Board's New York office arrived at Harmon Field at 2330 the same day and were later assisted by other investigators of the Safety Bureau staff. A public hearing was ordered and held at New York, N. Y., October 11, 1946.

Air Carrier

American Overseas Airlines is incorporated under the laws of the State of Delaware and maintains its headquarters at New York, N. Y. At the time of the accident American Overseas Airlines was operating as an air carrier under a certificate of public convenience and necessity and an air carrier certificate, both issued pursuant to the Civil Aeronautics Act of 1938, as amended. These certificates authorized the company to fly persons, property and mail between various points in the United States and the British Isles, including New York, N. Y. and Shannon, Ireland.

Flight Personnel

Captain William Rogers Westerfield, age 31, of New York, N. Y., was pilot of the aircraft and had been employed by the company since February 19, 1946. He possessed an airline transport pilot rating and at the time of the accident he had accumulated a total of 3,926 hours' flying time of which 1,561 hours had been obtained on DC-4 equipment.

scheduled departure the flight crew was briefed at the United States Army Air Forces Operations at Harmon Field concerning the weather involved in the proposed flight. At approximately 0445 the captain requested take-off clearance from the control tower operator at Harmon Field and was instructed to proceed to Runway 30. As the aircraft was being taxied toward the take-off end of Runway 30, the control tower anemometer indicated the wind from 90 degrees at 9 mph. The control tower operator, therefore, advised the flight that a change in runway would be necessary and cleared the aircraft for take-off on Runway 7.

At 0500 the aircraft departed Harmon Field on a magnetic bearing of approximately 70 degrees. About one minute after take-off the control tower operator requested a ceiling check from the flight and, in acknowledgment, was advised to "wait". This was the last radio contact with the flight. Personnel on the airport who witnessed the take-off observed that about 2 minutes and 30 seconds after the ship had left the ground a glow of fire appeared approximately 7 miles from the field almost directly in line with the runway on which Aircraft 904 took off. Several attempts were made to contact the aircraft by radio and, inasmuch as none of these was successful, it was presumed that it had crashed. Search operations were initiated immediately by the United States AAF personnel at Harmon Field. The first search party arrived at the scene of the accident several hours after the accident had occurred and found that the aircraft had been demolished as a result of impact and subsequent fire and that all 39 occupants had been killed instantly.

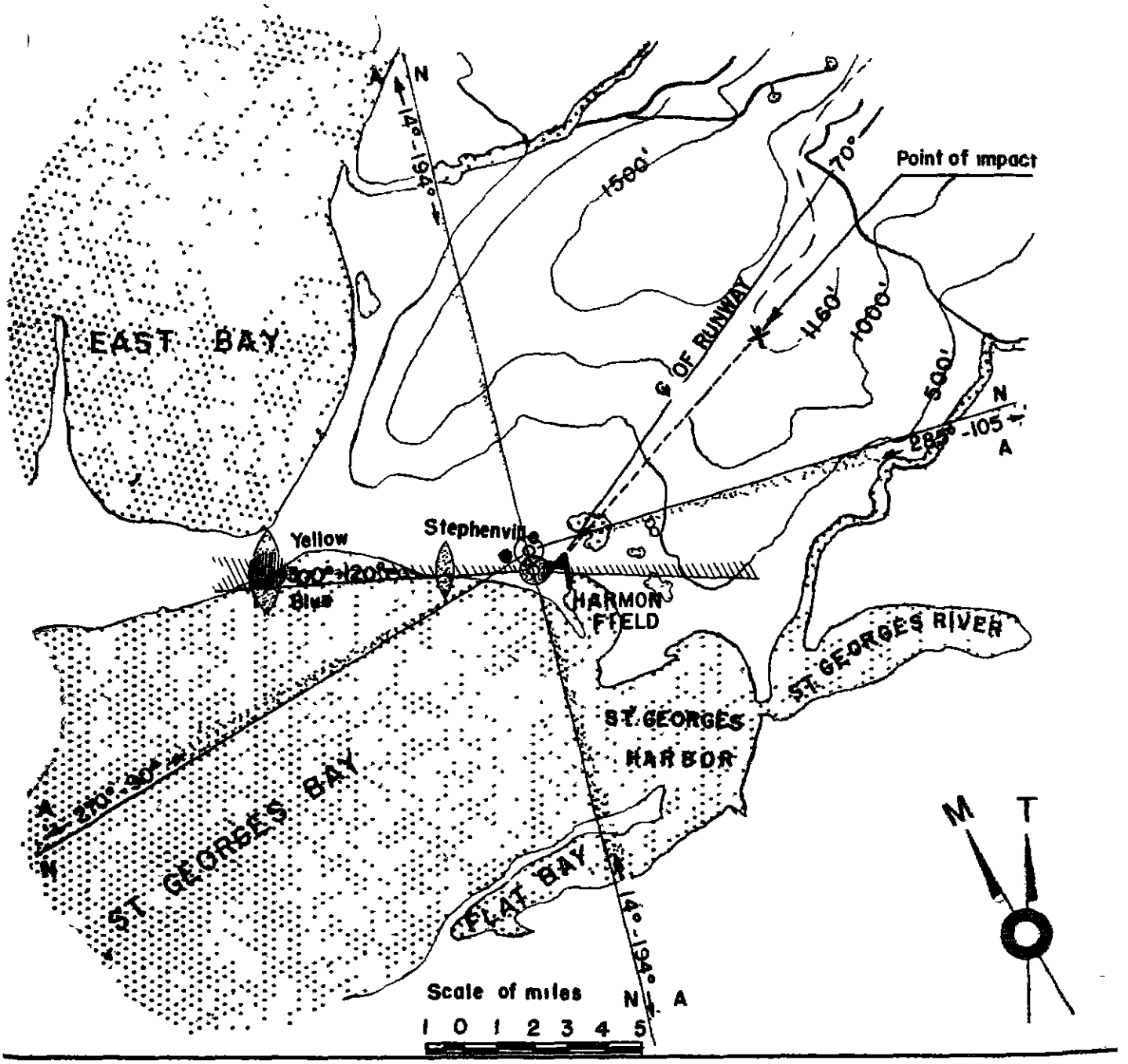

CHART OF THE STEPHENVILLE AREA

The above chart shows the aproximate flight path of Aircraft 904 after take-off from Harmon Field, and the point of impact. The contours clearly illustrate that a turn may have been safely made following take-off from Runway 7 and that a climb could have been accomplished away from the high terrain north of the field.

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Investigation

The aircraft had crashed against a steep ridge at a point 7.1 miles from the take-off end of Runway 7 at a magnetic bearing of 76 degrees 45 minutes from the center of the airport and at an elevation of 1,160 feet.* The elevation of Harmon Field is 22 feet. An inspection of contour charts of this area indicates that the terrain northeast of Harmon Field rises to an elevation in excess of 1,500 feet through an azimuth extending from approximately 20 degrees magnetic to 90 degrees magnetic. Directly in line with Runway 7 and approximately 7-1/2 miles from the airport lies a depression the lowest elevation of which is slightly under 1,000 feet. The terrain toward the southeast is relatively flat. The field is bounded by St. George Bay toward the south. Toward the northwest several hills rise to an elevation between 1,000 and 2,000 feet.

The evidence at the scene of the accident disclosed that impact had been made against the side of a hill, the slope of which was approximately 80 degrees. It was apparent that fire had broken out immediately after impact and the aircraft burned severely for approximately 9 hours after the time of the accident. The destruction resulting from impact and fire was so complete that inspection of the wreckage provided little information as to the condition of the aircraft immediately prior to impact. However, marks of contact with the hill indicated that the aircraft was approximately in straight and level flight at the moment of impact and no evidence was observed which indicated structural failure or malfunctioning prior to impact.

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* All elevations are given in feet above sea level.

No take-off restrictions or any special procedures to be employed after take-off from any runway at Harmon Field had been established. Investigation disclosed, however, that the Air Transport Command of the AAF had restricted the use of this runway and required its DC-4 operation to take-off over water in all instances in which the wind velocity was less than 10 mph. Testimony of control tower personnel indicated that it was a general practice for flights utilizing this runway to make a right turn shortly after take-off.

Maintenance records and pilots' reports indicated that the aircraft was in an airworthy condition at the time of this flight. All previous flight crew reports had been given proper attention and the corrective action in each instance had been indicated on the appropriate aircraft form. Testimony of company maintenance personnel at Harmon Field revealed that the aircraft and powerplants were functioning properly prior to take-off and appeared to be operating normally during take-off.

At the time of the take-off of Aircraft 904, the weather was being reported as: Ceiling 5,000 feet, overcast; visibility 10 miles; wind northeast 10 mph. Approximately 15 minutes later, the wind was reported 4 mph but no changes in other weather elements were observed. Neither the moon nor stars were visible through the overcast, and the unlighted terrain in the vicinity of Harmon Field was therefore not visible either in flight or from the airport.

Captain William R. Westerfield had considerable experience in DC-4 type aircraft both while he was flying with the Air Transport Command and in the preceeding nine months with the company.* A substantial portion of his flight experience had been accumulated over this particular route including several operations into and out of Harmon Field. The other members of the crew were also experienced in DC-4 operation involving flight over the North Atlantic route.

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* See supplemental data.

.Discussion

Prior to the investigation of this accident the requirements of the Civil Air Regulations, with respect to air carrier operations, and the application by the Civil Aeronautics Administration of the transport category rules, had been regarded as providing adequate coverage of terrain clearance in the immediate vicinity of the airport during and following take-off. Part 41 of the Civil Air Regulations requires that take-offs shall be made only from such airports, in such directions, and under such gross weight limitations that, in the event of failure of one engine during the take-off, a vertical clearance of at least 50 feet will be assured in the subsequent flight on the remaining engine or engines. Since the application of these limitations is dependent upon peculiarities of terrain which differ for each airport and therefore make impracticable uniform regulatory treatment, the determination of the extent of the area within which these regulations shall be applied is left to the discretion of the Civil Aeronautics Administration. In practice, the Civil Aeronautics Administration has confined its surveys to an area within a radius of approximately 3 miles of the airport.

Approval by the CAA of this operation into Harmon Field was granted on the basis of the transport category requirements discussed above. The engineering data submitted by the company to the Civil Aeronautics Administration with respect to Harmon Field was reviewed in the course of the investigation of this accident and it was apparent that the high terrain into which Aircraft 904 crashed lay beyond the area normally surveyed for

the purpose of airport approval. Since an area of three miles radius from the center of the airport provides ample room for aircraft presently in service to maneuver so as to avoid obstructions lying beyond that distance, this approval appeared to be appropriate.

Although there exists a saddle or pass in the terrain northeast of Harmon Field directly in line with Runway 7, the horizontal distance across this pass is not sufficient to render practicable the passage of aircraft through it as a normal and safe climb procedure, and it is unlikely that the pilot was attempting such a procedure in this instance. Since the hills on both sides of the pass are unlighted and the contour of the terrain is not visible under the conditions of darkness experienced at the time of this flight, navigation through the pass at night would be very difficult. In order to guarantee a minimum terrain clearance, therefore, the existence of this pass must be disregarded for determining the climb procedure after take-off.

Irrespective of whether this particular flight had been complicated by some mechanical malfunctioning not apparent in the investigation, with a normal rate of climb following take-off from Runway 7, a safe margin of clearance over the terrain northeast of Harmon Field could not be obtained. From the facts disclosed during the investigation it must be concluded that take-off from Runway 7, under the conditions which existed the morning of October 3, was hazardous unless the flight crews were aware of the high terrain northeast of the airport and so maneuvered as to avoid it. Regardless of the wind, safe take-off procedure when using Runway 7 requires a turn shortly after take-off and a climb to a safe altitude away from the high terrain.

It is the responsibility of the carrier to supply the pilot with all the navigational data required to provide a safe operation. The navigational data carried in the cockpit of this aircraft adequately described the terrain in the vicinity of Harmon Field, and all the information necessary to permit the pilot to determine a climb procedure which would avoid obstructions in the direction of take-off was available to him. Since the direction of climb following take-off, which was 35 degrees to the left of the proposed route, was maintained toward the high terrain northeast of Harmon Field, it can be concluded that the captain was not alert to the procedure necessary for a safe climb from this runway.

It is apparent that modern air carrier operation is burdening the pilot with the necessity for evaluation of an increasing number of details. Since this problem is particularly critical during the take-off and climb, it appears that some provisions must be made to assure the execution of a safe climb procedure regardless of the complexity of such other factors as aircraft instrumentation, weather, navigation, and traffic control. In this respect, it appears that the burden upon the pilot may, to a large measure, be relieved in operations of this nature by clearly defining the procedures required for climb after take-off at night or under instrument conditions. Such procedures have been established by the air carrier since the date of the accident, however, none were in existence at the time of this flight. While the Civil Air Regulations are not intended to regulate all details of air transportation and, therefore, have not specifically required that climb procedures be established at such airports as Harmon Field, some regulatory direction may be required in instances such as this. Because the necessity for climb procedures exists at several domestic airports as well as at fields

employed in international operation, the Board has circulated proposed regulations which are designed to indicate specifically the responsibility of all U. S. air carriers in this regard.* These regulations would require the carrier to define clearly the procedures for climb from each airport in the vicinity of which terrain or other obstructions present a hazard to flights at night or under instrument conditions. Furthermore, the Board is reviewing the subject of airport approval for scheduled air carrier operations with a view toward revision of the Civil Air Regulations in order to assure a complete understanding throughout the industry of the nature and extent of airport surveys and the areas to which take-off limitations apply.

Findings

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

1. The aircraft, crew, and company were properly certificated.

2. The aircraft was loaded within approved limits with respect to both center of gravity and its maximum gross weight.

3. The pilot was cleared by the control tower operator at Harmon Field, Stephenville, Newfoundland, to use Runway 30 for take-off.

4. While taxiing into position, the pilot was advised by the tower to change to Runway 7.

5. With Shannon, Ireland, as its destination, the aircraft took off from Runway 7 at Harmon Field at 0500.

6. Two minutes and 30 seconds after taking off on Runway 7 at Harmon Field, the aircraft crashed against a ridge 7 miles northeast of the airport at an elevation of 1,160 feet.

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* Draft Release 47-7, May 6, 1947 (Proposed Regulation Requiring the Establishment of Take-off and Climb Procedures for Night or Instrument Flight Conditions).

7. No restrictions had been placed on the use of runways for take-off and no special procedures had been established for climbing to cruising altitude following take-off from Harmon Field.

8. The navigational data carried in the cockpit of the aircraft were sufficiently complete and accurate to have enabled the pilot to determine a satisfactory climb procedure following take-off from Runway 7.

Probable Cause

On the basis of the foregoing, the Board determines that the probable cause of this accident was the action of the pilot in maintaining the direction of take-off toward higher terrain over which adequate clearance could not be gained.

BY THE CIVIL AERONAUTICS BOARD:

/s/ J. M. LANDIS

/s/ OSWALD RYAN

/s/ JOSH LEE

/s/ CLARENCE M. YOUNG

Harllee Branch, Member of the Board, did not take part in the decision.

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Robert Beckman Lehr, of Middle Village, New York, was copilot and had been employed by the company since July 16, 1945. He possessed a commercial pilot certificate and an instrument rating and until the date of the accident he had accumulated a total of 1,707 hours, of which 805 hours had been obtained in DC-4 equipment. John T. Tierney, Jr., senior navigator; Jerome Lewis, junior navigator; Mark Spelar, flight engineer; James N. Berry, radio officer; Herbert D. Ewing, purser, and Peggy Ann Burleigh, flight stewardess, comprised the remainder of the crew. Both pilots were properly certificated for the flight and the captain had qualified over the route.

Aircraft

The Douglas DC-4, NC-90904, was manufactured in March 1945 and had accumulated a total of 3,731 hours. It was equipped with four Pratt and Whitney R-2000-9 engines on which were installed Hamilton Standard hydromatic propellers. The total times logged for the engines were: 1,857 hours, 1,561 hours, 1,394 hours and 1,509 hours for the Nos. 1, 2, 3 and 4 engines, respectively. Since the last major overhaul the engines had logged the following times: 401 hours, 754 hours, 833 hours and 833 hours. At the time of departure from Stephenville the total weight of the aircraft was 200 pounds less than the approved maximum take-off weight of 71,800 pounds and the load was distributed with respect to the center of gravity within approved limits.