NOTATION

March 12, 1948

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TO: Chairman, Civil Aeronautics Board

FROM: Assistant Director, Safety Bureau
Investigations-Analysis

SUBJECT: Comments of the Civil Aeronautics Administration Staff Concerning the Investigation Report, Eastern Air Lines, Alexandria, Virginia, October 11, 1946

On February 16, 1948 Mr. F. B. Lee, Deputy Administrator of Civil Aeronautics Administration, transmitted to the Board comments of Mr. A. S. Koch, Assistant Administrator for Safety Regulation, on the subject matter. A copy of this memorandum is attached hereto. The questions raised in this memorandum were given careful consideration by the Safety Bureau and there follows herein a brief summary of our study of the matters contained therein.

The procedure for instrument approach to the Washington National Airport which is outlined in detail in the CAA memorandum does not conform to the procedures established by the Administrator of Civil Aeronautics for instrument approach to that airport. It will no doubt be of interest to the Board to know that the Form 511 which establishes the only approved procedure for Washington National Airport contains no such procedure as outlined in the CAA memorandum. Any deviation from the instrument approach procedures contained in the Form 511 would be in violation of the Civil Air Regulations, which state specifically that:

> "When instrument authority is authorized, standard instrument approach procedure shall be established by the operator for each radio range station used or to be used for letting-down-through, and approved by the Administrator and included in the air carrier operating certificate. The letting-down-through methods, procedures, and minimums specified, shall be strictly adhered to." (Part 61, Section 61.751).

Furthermore, the CAA memorandum recommends passing the station at "the established altitude at 600 feet". The Eastern Air Lines' procedure which was approved by the CAA required that the aircraft pass over the range station at an altitude of 687 feet above the elevation of the airport or 700 feet mean sea level. The procedure of instrument approach to Washington National Airport as contained in the Eastern Air Lines' operation manual conforms to that outlined in the Form 511 current at the time of the accident. I am obliged to conclude therefore that the CAA Staff was not conversant with the procedures promulgated by the Administrator and that it has overlooked the requirements of the Civil Air Regulations in this matter.

It is not known whether the above instrument approach procedure is proposed as a straight-in approach or as an alternative circle-underneath approach. In either case two observations must be made: This approach cannot be construed as being a straight-in approach since SRI 349 specifically states that a straight-in approach procedure must permit a turn of less than 30 degrees in order to land; if this procedure contemplates following circle-underneath

approach minimums, then the procedure is irrelevant because circle-underneath minimums are prescribed by the Administrator as those minimums necessary for circling the airport in such a manner as to permit landing on any runway at that airport which the existing conditions may necessitate.

Regardless of whether or not the approach procedure outlined in the C.A.A. memorandum conformed to the procedures approved by the Civil Aeronautics Administration, some comments are in order with respect to the merits of the procedure itself. The procedure outlined in the C.A.A. memorandum indicates a distance of 1.13 miles out the northeast course of the range, which is at a point 1500 feet east of the boundary of the Washington National Airport and a distance of 2850 feet from the approach end of Runway 33. In this relatively short distance the pilot would be required to turn 70 degrees to the left and, possibly, descend 500 feet. At 140 mph a DC-4 would cover 2850 feet in approximately 15 seconds. Since it may well be necessary for the aircraft to descend 500 feet in this period of time the average rate of descent would be approximately 2000 feet per minute. The radius of turn necessary to land on Runway 33 from a point in the middle of the Potomac River 2850 feet SSE from the approach end of Runway 33 would be approximately 1100 feet which, at 140 mph, would require an angle of bank not less than 49 degrees, which is approximately three times a standard rate turn at that airspeed. Should it have been possible for the pilot to continue descent below 500 feet before reaching a point

1.13 miles northeast of the range station, a steep turn for final approach would be necessary at a correspondingly lower altitude. In addition, such a procedure would require the pilot to forego use of the instrument runway and use instead a runway which is shorter by 1840 feet and which is not equipped with approach lights. On the basis of the foregoing, it appears that, although it is physically possible to complete an approach on the basis of the procedures outlined in the CAA memorandum, as a matter of routine air carrier operations it cannot be considered good practice.

The CAA memorandum refers to the Airport Obstruction Plan and Profile for Washington National Airport dated October 1947. This profile was prepared approximately one year after the date of the accident and obviously the early investigation of this accident did not permit scrutiny of this chart. Since the obstruction plan was not available at the time, in order to determine the elevation of obstructions in the vicinity of the airport, it was necessary for your Staff to use the instrument approach and airport plates which are also prepared by the Coast and Geodetic Survey, as well as the plates contained in the Jeppesen Airway Manuals, which manuals are widely used by air carriers including several which serve Washington National Airport. Since the Civil Air Regulations require that the operations manuals utilized by scheduled air carriers be in a form acceptable to the Administrator, it is presumed that the use of the Jeppesen Airway Manuals by scheduled air carriers has met the approval of the Civil Aeronautics Administration.

The CAA memorandum states that, according to the Coast and Geodetic Survey chart, only one obstruction higher than 300 feet above the elevation of the airport lies within the two-mile area. Since the elevation of the Washington National Airport is but 17 feet above sea level all obstructions referred to in the Board's report were indicated in mean sea level elevations. The following obstructions are noted on this same chart (Airport Obstruction Plan and Profile of October, 1947) and are enumerated for your information:

1.7 miles east - a stack 316 feet high.

1.9 miles north - Washington Monument 596 feet high.

2 miles northeast - flag pole 320 feet high.

2 miles northeast - a ridge 310 feet high.

1.7 miles west - a tank 315 feet high.

In addition to these obstructions the Jeppesen Chart for Washington National Airport showed a radio tower 300 feet in elevation and a stack 290 feet in elevation within two miles of the airport. Since the publication of the Coast and Geodetic Survey obstruction plan, these obstruction elevations have been amended in the Jeppesen Manual to 161 feet and 214 feet, respectively.

Within 2½ miles of the airport boundary there exist the following obstructions:

The Masonic Memorial 442 feet in height, 2.5 miles south-southwest.

The Capitol dome 379 feet in height, 2.4 miles northeast.

The old Post Office tower 322 feet in height, 2.4 miles north.

In addition to these obstructions, the Jeppesen chart showed an obstruction approximately 2.5 miles southwest, 400 feet in height. This obstruction has since been deleted from the Jeppesen Manual.

It is significant that the Airport Obstructions Plan and Profile for Washington National Airport carries a notation to the effect that not all obstructions are noted on this chart; however, within a two-mile area surrounding the boundary of the airport there are at least 32 obstructions between 200 feet and 300 feet in height. It must be apparent, therefore, that the basic reference of 200 feet as the mean obstruction level can hardly be substantiated; as an indication of the maximum obstruction reference, the elevation of 200 feet is completely without justification. The recent review of the Coast and Geodetic Survey Airport Obstruction Plan and Profile, therefore, permits me to conclude that it is even more apparent at this time that the minimum altitude at Washington National Airport is at least 100 feet too low.

Considerable discrepancy exists between the elevations of obstructions contained in the Jeppesen Manuals as compared with the same obstructions contained in the Coast and Geodetic charts. Since difficulty was encountered in determining the exact height of these obstructions because of the absence of a profile plan for Washington National Airport, your Staff utilized the most conservative published elevations. However, in evaluating the effect of such obstructions upon approach procedures at Washington, the result of these discrepancies was one of degree rather than substance.

The Safety Bureau nevertheless regards these discrepancies as being sufficiently serious to warrant some corrective action and is therefore notifying the CAA of this situation.

The observation in the CAA memorandum concerning the probability that the pilot did not execute a standard missed approach procedure following the first missed approach is specifically indicated in the Board's report.

It is with considerable satisfaction that the Safety Bureau has noted that the navigation facilities for instrument approach at Washington National Airport have been augmented during the past year by the installation and operational utilization of ILS and GCA. These facilities were, however, not commissioned at the time of this accident.

In view of the foregoing, it is recommended that the proposed reply attached hereto be addressed to the Deputy Administrator of the Civil Aeronautics Administration for his information.

E. K. Andrews

Attachment

PROPOSED REPLY

Mr. F. B. Lee
Acting Administrator
Civil Aeronautics Administration
Washington, D. C.

Dear Mr. Lee:

This will acknowledge receipt of your letter of February 16, 1948, in which you enclose a copy of the comments of Mr. A. S. Koch, Assistant Administrator for Safety Regulations, concerning the Board's report of the accident involving Eastern Air Lines at Alexandria, Virginia, October 11, 1946.

For your information the instrument approach procedure outlined in the above memorandum does not conform to the procedure approved by the Civil Aeronautics Administration for Eastern Air Lines operation into Washington National Airport with respect either to the track or to the minimum altitudes proposed. May I invite to your attention Civil Air Regulation 61.751, which states that instrument approach procedures established by the air carriers must be approved by the Administrator of CAA, and "strictly adhered to". Moreover, it is doubtful that the procedure outlined in the above memorandum can be considered good practice in view of the fact that it would authorize an operation which may require, for a DC-4, a descent of more than 2,000 feet per minute and an angle of bank in excess of 49 degrees at an altitude less than 500 feet above the surface. It must be remembered, furthermore, that the designation of a circle-underneath minimum altitude is applicable regardless of the runway to be used and should be sufficiently high to permit circling the airport through 360 degrees. The fact that an obstruction may not be located within an approach area is irrelevant to the question of the adequacy of a particular circle-underneath minimum.

The Board takes note of the comments concerning obstruction elevations contained in the Coast and Geodetic Survey Obstruction Plan and Profile for Washington National Airport as compared with the elevations indicated in the Board's report. Since the above obstruction plan and profile was not published until one year after the accident, the early investigation of the Board did not permit scrutiny of this chart. Difficulty was therefore experienced in determining precisely the elevations of obstructions in the vicinity of Washington National Airport, and the Board utilized the most conservative obstruction elevations published. In several instances, the correct elevations of these obstructions were found by the Coast and Geodetic Survey to be lower than those indicated in the sources employed by the Board. Since the elevation of Washington National Airport is but 17 feet above sea level, all references made in the Board's report were in terms of sea level elevations.

In spite of the fact that some discrepancies in the precise elevations may have resulted from the absence of a complete survey by the Coast and Geodetic Survey, the Board is of the opinion that the observations contained in its report are in substance correct. Your attention is invited, for instance, to the fact that there exists within the 2 mile area surrounding Washington National Airport a total of 38 obstructions higher than 200 feet (mean sea level). Of these, 22 are higher than 225 feet, 8 are higher than 250 feet, 6 are higher than 275 feet, and 5 are higher than 300 feet. The existence of so great a number of obstacles above the 200-foot elevation was not known to the Board until the opportunity was had for review of the Coast and Geodetic Survey Obstruction Plan. In view of the fact that so numerous obstructions

are located in the 2 mile area and since, according to Coast and Geodetic Survey, this chart does not purport to show all obstructions over 200 feet, it appears that a minimum altitude of 500 feet is insufficient to guarantee a 300-foot clearance above obstructions in the vicinity of the airport during a circle-underneath approach.

Sincerely yours,

OSWALD RYAN
Acting Chairman

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
Washington 25

Office of the Administrator

February 16, 1948

TO: Chairman, Civil Aeronautics Board

FROM: Deputy Administrator

SUBJECT: Civil Aeronautics Board Report of Accident at Alexandria, Virginia, October 11, 1946.

The subject report has been reviewed by this Administration and we have noted that on Pages 9 to 11 inclusive some exception has been taken to the minimums described by the Administrator for ins rument approaches to Washington National Airport.

I requested the Assistant Administrator for Safety Regulation to comment on these pages of the report, and I attach hereto a copy of his memorandum dated February 9, 1948, which has my approval.

This memorandum is submitted for your information in the event that further consideration of such operations becomes necessary.

/s/ F. B. Lee

F. B Lee

Attachment
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