



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

Date: November 21, 1994

In reply refer to: A-94-186 through - 188

Honorable David R. Hinson
Administrator
Federal Aviation Administration
Washington, D.C. 20591

The National Transportation Safety Board's investigation of a recent accident involving a landing approach, in instrument meteorological conditions, at Washington Dulles International Airport (IAD), has revealed software discrepancies with the minimum safe altitude warning system (MSAW) and low level windshear alert system (LLWAS) operating at IAD at the time of the accident. The discrepancies are believed to affect the accuracy of the warning systems. The Safety Board believes that action is required to correct the discrepancies at IAD, and may be required to correct similar discrepancies at other airports throughout the country.

The investigation found two apparent discrepancies in the site variables used in the MSAW program at IAD. Both were identified from the Absolute Assembly of MSAWD for A305-LO Dulles (IAD) document, dated October 29, 1993. The first discrepancy was found in the document on page 9, line 6570. This site variable is the definition of the runway 1R threshold in Cartesian coordinates (distance) relative to the air surveillance radar antenna. The Safety Board was informed by the Federal Aviation Administration (FAA) that the Automated Radar Terminal System (ARTS) III software at IAD was programmed for a 10^o west variation, which is the current angular difference between true north and magnetic north at the Dulles airport. However, when a 10^o variation was applied to establish the coordinate

reference, the resultant position for the runway 1R threshold did not correlate to the actual geographic runway location. It was found that the radar established position was 700 feet to the northeast from the actual runway threshold. It was determined that when a 7° west variation was used to establish the radar coordinate reference (instead of the correct 10° west variation) the coordinates for the runway 1R threshold corresponded to the actual location. The apparent 700-foot error in the radar position for the runway 1R threshold resulted in a similar displacement of the radar MSAW capture box from its intended position with respect to the actual approach path to runway 1R. This displacement might compromise the protective intent of the MSAW system.

Although the Safety Board examined the coordinates for the runway 1R threshold only, the Board believes that similar discrepancies exist in the radar locations for the other runway thresholds at Dulles.

The second discrepancy identified in the MSAW program was the defined minimum descent altitude (MDA) for the runway 1R capture box. Document NAS-MD-633, Section 3.2 states:

ILS localizer only MDA should not be used where another nonprecision approach exists. Nevertheless, some locations may, because of particular operational characteristics; e.g., absence of another nonprecision approach to a runway, need to adapt ILS localizer only MDA.

The lower limit for the runway 1R capture box was 267 feet above ground level (agl). This altitude was derived by subtracting the 313-foot field elevation and a 100-foot margin from the localizer-only MDA of 680 feet mean sea level (msl). However, runway 1R has a nondirectional beacon (NDB) approach with an MDA of 760 feet msl. Based on the information and criteria provided to the Safety Board, it appears that the NDB approach MDA should have been used in establishing the runway 1R capture box lower limit. This would produce an alarm at 347 feet agl, 80 feet higher than the existing capture box. The Safety Board has not been provided with a written rationale, if one exists, for using the 267-foot base rather than a 347-foot base for the capture box. The offset of the MSAW capture box should be corrected, and it would seem prudent to conduct a one-time campaign of all MSAW programs to ensure that they are correctly configured. In addition, the

lower limit of the MSAW capture box should conform to published criteria, or documentation that details the allowable deviations from the criteria should be published.

An FAA memorandum, dated July 7, 1994, responding to an official investigative request for information about the IAD LLWAS, stated that the geometric configuration file (GCF) in use was actually the GCF for Tampa International Airport, Florida. The memorandum further stated:

It seems likely that IAD was using the incorrect LLWAS configuration at the time of the incident. However, IAD is currently using the correct configuration file.

Although the Safety Board believes that the basic windshear detection function of LLWAS would be unaffected by the discrepancy, the FAA Environmental Support Engineering Branch (AOS-220) advised us that to realize the capability of the enhanced Phase II LLWAS software, to provide optimum microburst detection, it is necessary to input an appropriate GCF that is distinct and unique to the airport of concern.

The Safety Board notes that the GCF at IAD has been corrected, but it is concerned that other airports with LLWAS installations may also have installed inappropriate configuration files.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Review the calculations establishing the runway threshold coordinates for all runways at IAD with respect to the air surveillance radar to verify proper alignment of the MSAW capture boxes. (Class II, Priority Action) (A-94-186)

Conduct a complete national review of all radar environments using MSAW systems. This review should address all user-defined site variables for the MSAW programs that control general terrain warnings, as well as runway capture boxes, to ensure compliance with prescribed procedures. (Class II, Priority Action) (A-94-187)

Ensure that all airports equipped with the Phase II (enhanced) LLWAS are using geometric configuration files appropriate to those facilities. (Class II Priority Action) (A-94-188)

Chairman HALL, and Members LAUBER, HAMMERSCHMIDT and VOGT concurred in these recommendations.

By: 
Jim Hall
Chairman