

**DOCKET NO.: SA-517
EXHIBIT NO. 3-R**

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.**

**SAFETY RECOMMENDATION LETTER TO THE FAA
dated NOVEMBER 21, 1994, AND RESPONSES**

(22 pages)



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

FILE COPY

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 Dunes 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-L0 Dunes (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° west variation, which is the current angular difference between true north and magnetic north at the Dunes airport. However, when a 10° 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 1 R. 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 Dunes.

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



U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

JAN 26 1996

The Honorable James E. Hall
Chairman, National Transportation
Safety Board
490 L'Enfant Plaza East, SW.
Washington, DC 20594

Dear Mr. Chairman:

This is in further response to Safety Recommendation A-94-187 issued by the Board on November 21, 1994, and supplements our letters dated January 24, 1995, March 20, 1995, and September 27, 1995. This safety recommendation was issued as a result of the Board's investigation of an accident involving a landing approach in instrument meteorological conditions at Washington Dulles International Airport (IAD). The investigation revealed software discrepancies with the minimum safe altitude warning (MSAW) system and the low level windshear alert system operating at IAD at the time of the accident. The discrepancies are believed to affect the accuracy of the warning systems.

A-94-187. 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.

FAA Comment. The Federal Aviation Administration (FAA) has completed its review of 190 air traffic control facilities (128 operational ARTS IIA sites and 62 operational ARTS IIIA sites) to ensure that all user-defined site variables for the MSAW program are in compliance with prescribed procedures. As of October 1995, proper alignment of the MSAW capture boxes has been verified at all ARTS IIA and ARTS IIIA sites.

I consider the FAA's action to be completed on this safety recommendation.

Sincerely,

David R. Hinson
Administrator

460088
A-94-187
6473
Rodriguez

R.5



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**Federal Aviation
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Office of the Administrator

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Washington, D.C. 20591

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SEP 27 1995

The Honorable James E. Hall
Chairman, National Transportation
Safety Board
490 L'Enfant Plaza East, SW.
Washington, DC 20594

951030
A-94-186+187
6473
Rodriguez

Dear Mr. Chairman:

This is in further response to Safety Recommendations A-94-186 and -187 issued by the Board on November 21, 1994, and supplements our letters dated January 24, 1995, and March 20, 1995. These safety recommendations were issued as a result of the Board's investigation of an accident involving a landing approach in instrument meteorological conditions at Washington Dulles International Airport (IAD). The investigation revealed software discrepancies with the minimum safe altitude warning (MSAW) system and low level windshear alert system operating at IAD at the time of the accident. The discrepancies are believed to affect the accuracy of the warning systems.

A-94-186. 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.

FAA Comment. The Federal Aviation Administration (FAA) completed its review of the calculations and adaptation values for runway threshold coordinates for all runways at IAD and has verified proper alignment of the MSAW capture boxes.

I consider the FAA's action to be completed on this safety recommendation.

A-94-187. 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.

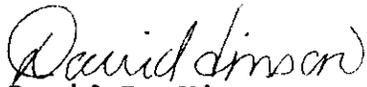
FAA Comment. Reviews are being conducted at 190 air traffic control facilities (128 operational ARTS IIA sites and 62 operational ARTS IIIA sites) to ensure that all user-defined site variables for the MSAW program are in compliance with prescribed procedures. To date, proper alignment of the MSAW

R-6

capture boxes has been verified at 56 ARTS IIA sites and 30 ARTS IIIA sites. The verification review is taking longer than originally anticipated. The FAA will complete verification of the proper alignment of the MSAW capture boxes at the remaining facilities by December 1995.

I will keep the Board informed of the FAA's progress on this safety recommendation.

Sincerely,



David R. Hinson
Administrator



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JUN 1 1995

The Honorable James E. Hall
Chairman, National Transportation
Safety Board
490 L'Enfant Plaza East, SW.
Washington, DC 20594

950617
A-94-188
6473
Rodriguez

Dear Mr. Chairman:

This is in further response to Safety Recommendation A-94-188 issued by the Board on November 21, 1994, and supplements our letter dated January 24, 1995. This safety recommendation was issued as a result of the Board's investigation of an accident involving a landing approach in instrument meteorological conditions at Washington Dulles International Airport (IAD). The investigation revealed software discrepancies with the minimum safe altitude warning system and low level windshear alert system operating at IAD at the time of the accident. The discrepancies are believed to affect the accuracy of the warning systems.

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

FAA Comment. As stated in the Federal Aviation Administration's (FAA) letter dated January 24, 1995, when new software is released to the field, the FAA attaches a checklist to ensure that the software has been loaded correctly and that the geometric configuration files for the airport have been reinstalled. These current procedures properly address the installation and loading of new software in the field.

To address procedures for loading the software after repair of the equipment, the FAA revised Order 6560.13B, Maintenance of Aviation Meteorological Systems and Miscellaneous Aids, to include a performance check to verify that the correct geometric configuration files have been installed on the computer following repairs. Appendix 2, paragraph 58, requires a verification of the airport configuration upon placing any central processing unit into service. I have enclosed a copy of the revision to Order 6560.13B for the Board's information.

R-8

I believe that the FAA has addressed this safety recommendation completely, and I consider the FAA's action to be completed.

Sincerely,

David R. Hinson
David R. Hinson
Administrator

Enclosure

R-9

Section 1. PERFORMANCE CHECKS (Continued)

<i>Performance Checks</i>	<i>Reference Paragraph</i>	
	<i>Standards and</i>	<i>Maintenance</i>
(a) FA-10240, FA-10240/1, and FA-10387 systems	5b(1)(a), (b), (b-1), (c), (d), (e)	47
(b) FA-10239 system	5b(2)	47
(2) Verify that windspeed and wind direction data is accurately shown on all controller display units.	5b(3)	48
c. Perform the following telemetry checks.		
(1) Check the following on all radio equipment.		
(a) Transmitter power output	9a(1)	49; IB
(b) Vswr (at transmitter)	9a(2)(a)	50; IB
(c) Vswr (at antenna or pigtail connector)	9a(2)(b)	Order 6580.5
(d) Transmitter frequency	9a(3)	51
(e) Frequency deviation	9a(4)	51
(f) Receiver sensitivity	9b	52
(2) Check the following on all land lines	Order 6000.22 ¹	Order 6000.22
(a) Frequency response.		
(b) Line loss.		
(c) Signal/noise ratio.		
(d) Insulation resistance.		
d. Play back the recorded LLWAS data, if applicable (FA-10240/1, FA-10240, and FA-10239).	10	53
e. Run the system diagnostics test.		
(1) FA-10240 and FA-10240/1 systems	11	IB par 5.4.5
(2) FA-10239 system	11	IB par 7.2.3.2
(3) FA-10387 system	11	IB par 3.3.2
26. BIENNIALY	5a(3)	56
Check anemometer base orientation (other than steel poles).		
27. EVERY THREE YEARS	5a(3)	56
Check anemometer base orientation (steel poles).		
* 28. AS REQUIRED	NA	58
Check airport configuration file.		
29. RESERVED.		

¹Order 6000.22, Maintenance of Analog Lines.

R-10

55. CALIBRATION STANDARDS.

a. **Object.** To check the system clock and the remote station calibrated input display.

b. **Procedure.**

(1) **FA-10239 System Clock.** Use the edit screen to set the clock.

(a) Access the edit screen. Move the cursor to the Utilities column and down to the clock function.

(b) Press Enter to access the clock update screen.

(c) Move the cursor down to the Time option.

(d) Enter the time for the next scan of WWV.

(e) After changing the time, move the cursor to SET and press Enter at the precise WWV mark.

(f) Verify the LLWAS program time.

(2) **FA-10239 Remote Station Test Function.** Use the EDIT screen and select a remote station for testing. Exit the EDIT screen. Use the NORMAL screen to verify that after 30 seconds the station under test reports a windspeed and direction within the tolerances shown in chapter 3 of this appendix. Use the edit screen to restore the test remote station to normal. Exit the EDIT screen. Use the NORMAL screen to verify that within 2 minutes the station reports normal data. Repeat this test for all remotes.

56. ANEMOMETER BASE ORIENTATION.

Using magnetic declination angle obtained from the current sectional aeronautical chart, verify base orientation to magnetic north by one of the following methods.

a. Checking reference point.

b. Solar azimuth alignment fixture.

c. Survey.

57. SPARE CENTRAL PROCESSING UNIT (CPU).

* a. **Object.** To verify the operation of the spare CPU and to divide hours of operation between the two CPUs. *

b. **Procedure.** Switch operations from the primary central processing unit (cpu) to the spare cpu after performing the scheduled memory dump. Turn ac power off and move all cables on the back of the cpu to the same positions on the spare cpu. Restore ac power for the connected cpu.

*** 58. AIRPORT CONFIGURATION FILE.**

a. **Object.** To verify the correct airport configuration file is installed and operating on the central processing unit (cpu).

b. **Discussion.** Perform a verification of the airport configuration upon placing any cpu into service. This will ensure the default airport configuration file is not functional.

c. **Procedure.**

(1) **FA-10239 System.** Access the EDIT screen and verify the three-letter airport identification is correct.

(2) **FA-10240 System.** Access the HELP menu. Press the BREAK key. At the "\$" prompt, enter the following command: TYPE ALAUNIQUE.INI <ret>. The airport configuration file will scroll. Press Ctrl-S to stop the scroll. Press Ctrl-Q to resume the scroll. Verify the three-letter airport identification is correct. Return to the HELP menu by entering the following command: @HELP. *

59.-69. RESERVED.

Section 2. OTHER MAINTENANCE TASKS PROCEDURES**70. AC POWER FAIL.**

a. **Object.** Check for ac power fail indication.

b. **Procedure.**

(1) **Systems Other Than FA-10387.** On systems with an ac power fail function at centerfield and remote stations, turn the ac power switch to OFF for at least 10

minutes. Observe that the ac power fail message appears on the maintenance terminal. Turn the ac power on again, and observe that the ac power fail message clears in approximately 10 seconds.

(2) **FA-10387 Systems.** Turn the ac power switch at the site to be tested to OFF for at least 5 minutes. At the MDT, enter option 12 (test one station), and observe that the



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MAR 20 1995

The Honorable James E. Hall
Chairman, National Transportation
Safety Board
490 L'Enfant Plaza East, SW.
Washington, DC 20594

950358
A-94-186 & 187
6473
Rodriguez

Dear Mr. Chairman:

This is in further response to Safety Recommendations A-94-186 and -187 issued by the Board on November 21, 1994, and supplements our letter dated January 24, 1995. These safety recommendations were issued as a result of the Board's investigation of an accident involving a landing approach in instrument meteorological conditions at Washington Dulles International Airport (IAD). The investigation revealed software discrepancies with the minimum safe altitude warning system and low level windshear alert system operating at IAD at the time of the accident. The discrepancies are believed to affect the accuracy of the warning systems. The 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.

A-94-186. 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.

FAA Comment. The Federal Aviation Administration (FAA) will conduct a review of the calculations for runway threshold coordinates for all runways at IAD to verify proper alignment of the MSAW capture boxes. The review will begin in April and conclude in July 1995.

I will keep the Board informed of the FAA's progress on this safety recommendation.

A-94-187. 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.

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FAA Comment. Each air traffic control facility in the radar environment using MSAW systems will review the MSAW site variables to ensure compliance with prescribed procedures. This review will address all user-defined site variables for the MSAW program that control general terrain warnings and runway capture boxes to ensure compliance with prescribed procedures. The review will begin in April and conclude in July 1995.

I will keep the Board informed of the FAA's progress on this safety recommendation.

Sincerely,



David R. Hinson
Administrator

R-13



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**Federal Aviation
Administration**

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Office of the Administrator

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JAN 24 1995

The Honorable James E. Hall
Chairman, National Transportation
Safety Board
490 L'Enfant Plaza East, SW.
Washington, DC 20594

95014/
A-94-186 thru 18
6473
Rodriguez

Dear Mr. Chairman:

This is in response to Safety Recommendations A-94-186 through -188 issued by the Board on November 21, 1994. These safety recommendations were issued as a result of the Board's investigation of an accident involving a landing approach in instrument meteorological conditions at Washington Dulles International Airport (IAD). The investigation revealed software discrepancies with the minimum safe altitude warning system and low level windshear alert system operating at IAD at the time of the accident. The discrepancies are believed to affect the accuracy of the warning systems. The 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.

A-94-186. 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.

A-94-187. 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.

FAA Comment. The Federal Aviation Administration (FAA) agrees with these safety recommendations. A program is being developed for the review of Washington Dulles International Airport and other airports which use minimum safe altitude warning systems. I will provide the Board with the FAA course of action to address these safety recommendations by March 31, 1995.

R-14

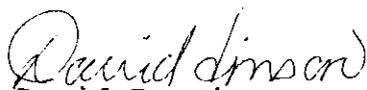
A-94-188. Ensure that all airports equipped with Phase II (enhanced) LLWAS are using geometric configuration files appropriate to those facilities.

FAA Comment. The FAA agrees with the intent of this safety recommendation. When a new software is released to the field, the FAA attaches a checklist to ensure that the software has been loaded correctly and that the geometric configuration files for the airport have been reinstalled. When the computer is replaced, procedures are contained in the instruction book to load the local geometric configuration files for the appropriate airport.

The FAA will revise Order 6560.13B, Maintenance of Aviation Meteorological Systems and Miscellaneous Aids, to include a performance check to verify the correct geometric configuration files are installed. In the interim, the FAA will issue a notice to all field personnel to remind them to install the correct geometric configuration files after the computer has been repaired.

I will provide the Board with a copy of the revision to Order 6560.13B as soon as it is revised.

Sincerely,


David R. Hinson
Administrator

R-15

ATR-214

FEB 13 1995

**ACTION: Minimum Safe Altitude Warning (MSAW)/CA
Validation**

Acting Manager, Automation Software Policy
and Planning Division, ATR-200

All Regional Air Traffic Division Managers,
National Automation Field Support Division, AOS-400

During an aircraft accident investigation at one of our ARTS sites, the NTSB discovered adaptation errors in the facility ARTS site adaptation. As a result the NTSB recommended that the Federal Aviation Administration review the calculations establishing the runway threshold coordinates and to review all user defined site variables for the MSAW program that control general terrain warnings, and capture boxes, to ensure compliance with prescribed procedures.

We have added the Conflict Alert program as well since there is site adaptation in that program that will need to be verified to ensure compliance with prescribed procedures.

Facilities where the magnetic variation has changed by two degrees or more, or have had a radar upgrade project, (a relocate of 300 feet or more) or have added or deleted an instrument approach are prime candidates for possible changes.

Regional Air Traffic Division Managers shall ensure their ARTS facilities conduct a verification of the ARTS site adaption listed above. The review and verification should commence by April 1, and conclude by July 1, 1995.

Regions are to advise ATR-200 on the results of the verification.

If you have any questions or require further information, please have your staff contact Mr. Frank Cote, ATR-214, (202)-267-7092

for *Donnie Barnhill*

Jerry C. McCaleb

cc: ATR-200/210
ATR-214:FCote:mrf:77092:2/13/95
File No. 2980
WP: NSB186 7.RGN

R-16

ARU-200's response to queries posed in e-mail message from John Canoles entitled Guam dated 8/19/97

REFERENCE NTSB recommendation 94-187

How was the review conducted:

Memo generated 2/13/97 requesting to "review all user defined site variables for the MSAW program that control general terrain warning, and capture boxes, to ensure compliance with prescribed procedures".

Who requested the review: The Automation Software Policy and Planning Division, ATR-200, through all Regional Air Traffic Division Managers and the Manager of National Field Support and Engineering, AOS-400.

Who conducted the review: Unknown, memorandum requested that Regional Air Traffic Managers coordinate with their ARTS facilities to conduct a regional verification of the ARTS site adaptation.

What records of the review were kept: Within Washington Headquarters we have the following records.

02/13/95 - original memorandum mailed to regions requesting review with completion date of July 1, 1995.

7/24/95 - e-mail from Central region reported that all Central region ATC facility's had conducted a verification of the ARTS site adaptation and no deficiencies were noted.

8/8/95 - e-mail sent out by ATR-200 to all regions informing them that only 3 reports had been received and responses were now overdue. e-mail or telephone responses were acceptable.

8/14/95 - request with copy of original letter was faxed to all regions again explaining the need for a timely response. Copies of successful fax transmission reports have been retained.

8/17/95 - Record of telephone conversation with ASO-514.4 reported all ASO facilities had completed MSAW validation

8/23/95 - Update was sent from ATR-200 to ATR-3 with list of facilities that had completed the validation.

8/28/95 - Memo received from ANM-500 reported all ARTS facilities in their region had completed the validation.

8/29/95 - e-mail from AAL-500 stated non-receipt of earlier memo. The memo was retransmitted on 8/14/97 and received. AAL-500 stated projected completion date November 1995.

10/13/95 - Update was provided to ATR-3 that stated all ARTS IIA and ARTS IIIA facilities had complied with NTSB recommendation 94-187. The dates were included.

Was Quam reviewed: The report reflects completion of the review on 7/95.

Who reviewed it: Unknown. This information could possibly be obtained from Regional/Facility records.

Who certified it: Unknown. Air Traffic does not certify MSAW. The specialist who inputs the information follows guidelines set forth in National Airspace System Configuration Documentation (NAS-MD's).

If we certified that there was proper alignment of the capture box as of October 1995 for Guam, how then can the alignment now be off?: Unknown. Air Traffic does not certify MSAW.

What are the prescribed procedures that we reference as being used for the review in 1995? There were no set procedures. The letters mailed to the Regions requested that air traffic facilities "review all user defined site variables for the MSAW program that control general terrain warnings, and capture boxes, to ensure compliance with prescribed procedures." An additional review of the variables for the conflict alert program was requested. The focus of the effort was centered around those facilities with one of the following: a magnetic variation change of two degrees or more, a radar upgrade project, (a relocate of 300 feet or more) or an instrument approach procedure which had been added or deleted. (Copy of memorandum attached.)

The prescribed procedures discussed above would be in adherence to the NAS-MD procedures applicable to the conflict alert and MSAW adaptation standards and guidelines.

#3 of 8/19

NTSB RECOMMENDATION: A-94-187: Conduct a complete National Review of all radar environments using MSAW systems. This review is to 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.

Air Traffic Response: A total of 192 air traffic control facilities (130 ARTS-IIA sites and 62 ARTS-IIIA sites) were directed to review all user-defined site variables for the MSAW program. As of October 1995, Proper alignment of the MSAW capture boxes has been verified at all ARTS-IIA and ARTS-IIIA sites.

The following lists are ARTS IIA and IIIA sites verified.

ARTS IIA SITES

	Facility Name	ID	Verified
1	Abilene, TX	ABI	8/95
2	Akron-Canton, OH	CAK	7/95
3	Allentown, PA	ABE	7/95
4	Amarillo, TX	AMA	8/95
5	Anchorage, AK	ANC	10/95 (D#1)
6	Anchorage, AK	ANZ	10/95 (D#1)
7	Andrews AFB, MD	ADW	7/95
8	Ashville, NC	AVL	8/95
9	Aspen, CO	ASP	8/95
10	Atlantic City, NJ	ACY	7/95
11	Augusta, GA	AGS	8/95
12	Austin, TX	AUS	8/95
13	Bakersfield, CA	BFL	7/95
14	Bangor, ME	BGR	10/95 (D#2)
15	Baton Rouge, LA	BTR	8/95
16	Beaumont, TX	BPT	8/95
17	Billings, MT	BIL	8/95
18	Binghamton, NY	BHM	7/95
19	Bismark, ND	BIS	7/95
20	Boise, ID	BOI	8/95

21	Burlington, VT	BTV	10/95
22	Casper, WY	CPR	8/95
23	Cedar Rapids, IA	CID	7/95
24	Champaign, IL	CMI	7/95
25	Charleston, SC	CHS	8/95
26	Charleston, WV	CRW	7/95
27	Charlottesville, VA	CHO	7/95 (D#3*)
28	Chattanooga, TN	CHA	8/95
29	Clarksburg, WV	CKB	7/95
30	Colorado Springs, CO	COS	8/95
31	Columbia, SC	CAE	8/95
32	Columbus, GA	CMH	8/95
33	Corpus Christi, TX	CRP	8/95 (D#4)
34	Daytona Beach, FL	DAB	8/95
35	Duluth, MN	DLH	7/95
36	Elmira, NY	ELM	7/95
37	Erie, PA	ERI	7/95
38	Eugene, OR	EUG	8/95 (D#5)
39	Evansville, IN	EVV	7/95
41	Falmouth, MA (Otis AFB)	FLM	10/95 (D#6)
42	Fargo, ND	FAR	7/95
43	Fayetteville, AR	FYV	8/95 (D#7)
44	Fayetteville, NC	FAY	8/95
45	Flint, MI	FNT	7/95
46	Florence, SC	FLO	8/95
47	Fort Meyers, FL	RSW	8/95
48	Fort Smith, AR	FSM	8/95 (D#7)
49	Fort Wayne, IN	FWA	7/95
50	Fresno, CA	FAT	7/95
51	Grand Rapids, MI	GRR	7/95
52	Great Falls, MT	GTF	8/95
53	Green Bay, WI	GRB	7/95
54	Greensboro, NC	GSO	8/95
55	Greer, SC	GSP	8/95
56	Griffis AFB, NY	RME	7/95
57	Guam CERAP, MI	AWP	7/95
58	Gulfport, MS	GPT	8/95
59	Harlingen, TX	HRL	8/95 (D#4)
60	Harrisburg, PA	CXY	7/95
61	Hilo, HI	ITO	7/95
62	Huntington, WV	HTS	7/95
63	Huntsville, AL	HSV	8/95
64	Idaho Falls, ID	IDA	8/95
65	Jackson, MS	JAN	8/95

66	Kalamazoo, MI	AZO	7/95
67	Knoxville, TN	TYS	8/95
68	Lafayette, LA	LFT	8/95
69	Lake Charles, LA	LCH	8/95
70	Lansing, MI	LAN	7/95
71	Lexington, KY	LEX	8/95
72	Lincoln, NE	LNK	7/95
73	Little Rock, AR	LIT	8/95
74	Longview, TX	GGG	8/95
75	Loring AFB, ME	PQI	10/95 (D#2)
76	Lubbock, TX	LBB	8/95
77	Macon, GA	MCN	8/95
78	Madison, WI	MSN	7/95
79	Manchester, NH	MHT	10/95
80	Mansfield, OH	MFD	7/95
81	Medford, OR	MFR	8/95 (D#5)
82	Meridian, MS	NMM	8/95
83	Midland, TX	MAF	8/95 (D#8)
84	Missoula, MT	MSO	8/95 (D#9)
85	Mobile, AL	MOB	8/95
86	Moline, IL	MLI	7/95
87	Monroe, LA	HLU	8/95
88	Monterey, CA	MRY	7/95
89	Montgomery, AL	MGM	8/95
90	Moses Lake, WA	MWH	8/95
91	Muskegon, MI	MKG	7/95
92	Myrtle Beach, SC	MYR	8/95
93	Nantucket, MA	ACK	10/95 (D#6)
94	Palm Springs, CA	PSP	7/95
95	Pasco, WA	PSC	8/95 (D#10)
96	Pensacola, FL	PNS	8/95 (D#11)
97	Pensacola (Navy Whiting)	NNN	8/95 (D#11)
98	Peoria, IL	PIA	7/95
99	Portland, ME	PWM	10/95
100	Pueblo, CO	PUB	8/95
101	Reading, Pa	RDG	7/95
102	Reno, NV	RNO	7/95
103	Richmond, VA	RIC	7/95 (D#3)
104	Roanoke, VA	ROA	7/95
105	Rochester, MN	RST	7/95
106	Rockford, IL	RFD	7/95
107	Saginaw, MI	MBS	7/95
108	San Angelo, TX	SJT	8/95 (D#8)
109	Santa Barbara, CA	SBA	7/95

58	Tampa, FL	TPA	8/95
59	Tucson, AZ	TUS	7/95
60	Tulsa, OK	TUL	8/95
61	Washington (Dulles), VA	IAD	7/95
62	Washington (Nat'l), VA	DCA	7/95