



# National Transportation Safety Board

Washington, D.C. 20594  
Safety Recommendation

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Date: August 17, 1993

In reply refer to: A-93-94 through -96

Mr. Daniel S. Goldin  
Administrator  
National Aeronautics and  
Space Administration  
Washington, D.C. 20546

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On February 9, 1993, about 0930 eastern standard time, the launch sequence for an Orbital Sciences Corporation (OSC) Pegasus expendable launch vehicle (ELV) was aborted by the National Aeronautics and Space Administration (NASA) range safety officer, in accordance with a previously established launch constraint. Several seconds later, the launch sequence was reinitiated by the OSC test conductor, and the missile separated uneventfully from its carrier aircraft. The ignition and staging of the Pegasus and its subsequent deployment of two satellites into low earth orbit were also uneventful. There were no injuries to personnel involved in the mission and no damage to mission assets.<sup>1</sup>

The Safety Board investigated this anomaly, at the request of the Department of Transportation, in accordance with a Memorandum of Agreement dated June 5, 1989.

The Safety Board's investigation uncovered numerous deficiencies in

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<sup>1</sup>For more detailed information, read Special Investigation Report--"Commercial Space Launch Incident, Launch Procedure Anomaly, Orbital Sciences Corporation, Pegasus/SCD-1, 80 Nautical Miles East of Cape Canaveral, Florida, February 9, 1993" (NTSB/SIR-93/02)

the premission planning, organization, and approval processes, as well as last-minute improvisations during the launch countdown activities. The Safety Board believes that these deficiencies stemmed from the overall lack of clearly delineated command, control, and communications assignments on the part of the key participants. They created an unsafe situation that could have led to an accident or the intentional but unnecessary destruction of the Pegasus ELV following its release from the NB-52B.

An examination of the interphone conversation transcripts and descriptions of interphone procedures given to the Safety Board by participants revealed serious communications problems that jeopardized the success of the mission. Also, a lack of clear interphone channel assignments, especially during the final stages of the countdown, contributed greatly to the confusion that existed just prior to the deployment of the ELV.

A basic shortcoming that became evident during the investigation was that the controllers at the Wallops Flight Facility (WFF) had no way of knowing which communications intercom net was being used when they heard communications over the speakers or in headsets. WFF personnel overcame this shortcoming, to a certain extent, because they recognized the voices of various speakers. However, staff at OSC and Dryden Flight Research Facility (DFRF) were unfamiliar with the WFF staff or their voices. Also, basic intercom protocol of identifying the intercom channel in every transmission would have helped in the coordination of communications. Accordingly, the Safety Board believes that WFF should study the feasibility of installing indicator lights on its communications consoles that will illuminate whenever an intercom channel is in use. Such lights would allow each addressee of a message to determine quickly the channel in use and would thereby significantly reduce message length and channel use.

Another serious communications problem revealed during the investigation was the fact that the OSC test conductor and DFRF's ground-to-air communications coordinator (NASA-1), who were the individuals most involved in proceeding with the launch during the period of maximum confusion, were not monitoring channels 1 and 10, which were the channels most involved with range safety. Further, the WFF personnel having the overall safety responsibility for the launch (with the exception of WFF's range control officer) were not monitoring intercom channels 4 and 12, which were the channels most involved with the operation of the NB-52B launch platform.

If WFF's range safety officer had been allowed direct radio access to the NB-52B on February 9, he could have quickly indicated to the aircraft commander that an altitude abort situation had developed much earlier than actually occurred. The countdown could have been stopped at that point, and a mission recycle could have been contemplated. As it happened, confusion in terminology occurred because the WFF range safety officer and NASA-1 did not differentiate between "Get an altimeter reading" and "Say altimeter" and the more precise phrases "Determine his altitude" and "What is your altitude?" The copilot on the airplane first responded, as most pilots would, with the barometric altimeter setting, rather than the altitude of the airplane that he later provided. Thus, resolving the altitude problem took so long that for some launch participants, particularly the OSC test conductor, the potential altitude abort became confused with the supposed command receiver dropout abort that occurred later.

The Safety Board believes that the true decision makers should be allowed access to, and input concerning, real-time information, rather than receiving second-hand information, or, in some cases, none at all. Specifically, to prevent the type of communications problem that occurred in this incident, the Safety Board believes that NASA and OSC should study the feasibility of allowing the key safety individual on the launch team--the range safety officer--direct radio access to the airplane for Pegasus launches.

The investigation also revealed that several intercom channels were not recorded on February 9. Although the lack of recordings did not materially affect the Safety Board's understanding of the launch anomaly or the outcome of the investigation, the absence of such recordings could become a problem under different circumstances. Therefore, the Safety Board believes that WFF should test the operability of all recording systems prior to each launch from its facility.

Therefore, as a result of its investigation of this incident, the National Transportation Safety Board recommends that the National Aeronautics and Space Administration:

- o Study the feasibility of installing at the Wallops Flight Facility indicator lights on communications consoles that illuminate whenever an intercom channel is in use. (Class II, Priority Action) (A-93-94)
- o Study the feasibility of allowing the Range Safety Officer direct

radio access to the launch airplane for Pegasus launches. (Class II, Priority Action) (A-93-95)

- o Test the operability of all recording systems prior to each launch from the Wallops Flight Facility. (Class II, Priority Action) (A-93-96)

Also, the Safety Board issued Safety Recommendations A-93-87 through A-93-93 to the Department of Transportation and A-93-97 through A-93-103 to the Orbital Sciences Corporation.

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HAMMERSCHMIDT and HART concurred in these recommendations.

By:   
Carl W. Vogt  
Chairman