



United States General Accounting Office  
Washington, DC 20548

Office of Special Investigations

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November 3, 1999

The Honorable Charles E. Grassley  
Chairman  
Subcommittee on Administrative Oversight and the Courts  
Committee on the Judiciary  
United States Senate

Subject: Transportation Safety: Information Concerning Why a 1980 Aircraft Report Was Not Provided Earlier to the National Transportation Safety Board

Dear Mr. Chairman:

In connection with your ongoing concerns about the July 1996 TWA flight 800 crash of a Boeing 747 aircraft, you asked us to determine why a Boeing report entitled *Center Wing Fuel Tank Heating Study* (also referred to as the *Panama Study*) dated March 14, 1980, was not provided to the National Transportation Safety Board (NTSB) until June 1999. To develop this information, we reviewed relevant documents and interviewed knowledgeable representatives of NTSB, Boeing Commercial Airplane Group, Boeing Military Group, and U.S. Air Force Oklahoma City Air Logistics Command (Air Force OC-ALC). We conducted our investigation from August 30, 1999, to October 28, 1999, in Washington, DC; Seattle, Washington; and Oklahoma City, Oklahoma.

The following sections present the information we obtained on why the 1980 *Panama Study* was prepared; attempts by NTSB during the crash investigation to obtain relevant information that Boeing possessed; how and when the study finally surfaced; and views of Boeing, the Air Force and NTSB on the relevance of the study to the TWA flight 800 crash.

### **1980 *Panama Study***

Because the Air Force was experiencing problems with the center wing fuel tanks overheating in the Boeing E-4B aircraft, the military version of the Boeing 747, it contracted with Boeing to conduct a study to determine the cause of the problem and recommend solutions. Boeing's Military Group conducted the study and issued a report to the Air Force in 1980. The study concluded that under certain circumstances, the air conditioning wiring that ran through the fuel tank could create a potential safety problem. The *Panama Study*—named for the country in

which it was conducted—did not recommend changes to the E-4B aircraft; instead, it recommended taking mitigating actions to address the problem, such as flying the aircraft with one of its tanks—the center wing fuel tank—empty.

### **Investigation of TWA Flight 800 Crash**

NTSB, among other government entities, was involved in the investigation of the TWA flight 800 crash. As a party to the investigation, Boeing assigned technical experts on the design and construction of the aircraft from its Commercial Airplane Group to work full-time with NTSB.

The NTSB Chairman and Director of Aviation Safety told us that as part of its investigation, Boeing was requested to search its database for any information concerning heating problems with the center wing fuel tanks. Both NTSB and Boeing officials told us that at that time the Boeing Commercial Airplane Group told NTSB that Boeing had no data on tests conducted on the heat buildup inside the center wing fuel tank of a 747 aircraft. Officials of Boeing's Commercial Airplane Group admitted to us that the *Panama Study* should have been located and turned over to NTSB in 1996, even though the Boeing Military Group prepared it for the Air Force. They stated that human error caused an incomplete search to be made of the Boeing records system for information on heat studies involving center wing fuel tanks.

NTSB's Chairman and Director of Aviation Safety also informed us that during the initial stage of this TWA flight 800 investigation, Boeing officials told them that the temperature inside the center wing fuel tank on the 747 was incapable of rising above a certain level. The Director said that only after tests conducted by both Boeing and NTSB subsequent to the crash caused Boeing to back away from its initial claim. As a result of its investigation of TWA flight 800, NTSB issued safety recommendations to the Federal Aviation Administration (FAA) in December 1996. These safety recommendations concerned potential heat buildup in center wing fuel tanks of 747s. Since the crash, FAA has issued a number of airworthiness directives and in October 1999 issued a Notice of Proposed Rule Making to implement additional safety recommendations concerning center wing fuel tanks of 747s and other aircraft.

### **Surfacing of the 1980 *Panama Study***

A Boeing Military Group official told us that the *Panama Study* came to the group's attention in December 1997 when a librarian in the Boeing Aerospace Operations Facility (part of the Boeing Military Group) in Midwest City, Oklahoma, discovered the study during a "housecleaning" effort. Because the Boeing Military Group determined that the report was the property of the Air Force, Boeing turned the results over to Air Force OC-ALC.

In 1998, Air Force OC-ALC initiated an Independent Review Team (IRT) to discuss center wing fuel tank issues connected with the E-4B aircraft in light of the safety recommendations that NTSB issued as a result of the TWA flight 800 investigation. In March 1999, Air Force OC-ALC held an IRT meeting to continue to review safety issues concerning the center wing fuel tank of the E-4B aircraft. As part of that meeting, the Air Force included the *Panama Study* on the meeting agenda. Participants at this meeting included representatives from Boeing's Commercial Airplane Group and Military Group and NTSB. Officials of both Boeing Commercial

Airplane Group and NTSB told us that this was the first time they had heard about the *Panama Study*. The NTSB Director told us that after this meeting, NTSB requested a copy of the entire study but instead received just a summary from the Air Force. In June 1999, after your Subcommittee's intervention, the Air Force provided the entire study to NTSB.

### **Views Concerning the Relevance of the 1980 *Panama Study***

Air Force OC-ALC officials told us that when Boeing brought the *Panama Study* to their attention, it was placed on the IRT meeting agenda for discussion. These officials told us that they did not intentionally withhold the *Panama Study* from the NTSB, because both civilian and military personnel within Air Force OC-ALC believed the *Panama Study* to be an operational or readiness study, not a safety study. They added that they continue to believe that the *Panama Study* was not relevant to the NTSB investigation.

We questioned Air Force OC-ALC officials about the apparent inconsistency in not believing the study to be safety-related, even though it had been placed on the agenda of the IRT to be considered in a review and validation of its current safety procedures. We were told by Air Force officials that the *Panama Study* was placed on the agenda to show that the E-4B aircraft was equipped somewhat differently and was capable of operating under more difficult conditions than the commercial 747 version. They said that for this reason, the study was not placed on the agenda for safety concerns.

Officials of both Boeing's Military and Commercial groups told us that to their knowledge, no one intentionally withheld this study from NTSB. Like the Air Force, Boeing Military Group officials characterized the *Panama Study* as an operational or readiness study, rather than a safety study. Officials of Boeing's Commercial Airplane Group concluded that the *Panama Study* was of limited use to NTSB's investigation of TWA flight 800 because although the E-4B and 747 aircraft are similar in design, the two aircraft have many internal differences. However, they admitted that the *Panama Study* would have at least given NTSB some initial data concerning a center wing fuel tank heating study of an aircraft that was the Boeing military version of the 747.

NTSB's Chairman and Director of Aviation Safety stated that had NTSB received the *Panama Study* in 1996 following the crash of TWA flight 800, it would have saved valuable time and resources in conducting its investigation. They added that this report would have been particularly significant in that, at the start of the TWA flight 800 investigation, Boeing officials initially told NTSB that the temperature inside the center wing fuel tank on the 747 aircraft was incapable of rising above a certain level. As we noted earlier, the Director said that subsequent tests conducted by both Boeing and NTSB did not support this claim.

The Chairman and Director also stated that the *Panama Study* might have been very helpful to NTSB in its 1990 investigation of a Boeing 737 aircraft explosion at Manila Airport in the Philippines. The explosion occurred in the aircraft's center fuel tank. According to both the Chairman and Director, it is possible that if they had received this study in 1990, safety recommendations made as a result of the TWA flight 800 investigation concerning fuel tanks may have been issued sooner. The Director told us that safety recommendations issued by NTSB routinely follow investigations of aviation accidents to prevent similar occurrences.

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We will make copies of this letter available to others on request. If you have any questions, please contact me on (202) 512-7455 or Assistant Director Ron Malfi at (202) 512-6722. Senior Special Agent Patrick F. Sullivan made a significant contribution to this report.

Sincerely yours,



Robert H. Hast  
Acting Assistant Comptroller General  
for Special Investigations

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