



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: January 27, 2000

In reply refer to: A-00-19 and -20

Honorable Carl T.C. Gutierrez
Governor
Territory of Guam
Agana, Guam 96910

On August 6, 1997, about 0142:26 Guam local time,¹ Korean Air flight 801, a Boeing 747-3B5B (747-300), Korean registration HL7468, operated by Korean Air Company, Ltd., crashed at Nimitz Hill, Guam. Flight 801 departed from Kimpo International Airport, Seoul, Korea, with 2 pilots, 1 flight engineer, 14 flight attendants, and 237 passengers² on board. The airplane had been cleared to land on runway 6L at A.B. Won Guam International Airport, Agana, Guam, and crashed into high terrain about 3 miles southwest of the airport. Of the 254 persons on board, 228 were killed,³ and 23 passengers and 3 flight attendants survived the accident with serious injuries. The airplane was destroyed by impact forces and a postcrash fire. Flight 801 was operating in U.S. airspace as a regularly scheduled international passenger service flight under the Convention on International Civil Aviation and the provisions of 14 Code of Federal Regulations Part 129 and was on an instrument flight rules flight plan.⁴

The National Transportation Safety Board determined that the probable cause of this accident was the captain's failure to adequately brief and execute the nonprecision approach and the first officer's and flight engineer's failure to effectively monitor and cross-check the captain's execution of the approach. Contributing to these failures were the captain's fatigue and Korean Air's inadequate flight crew training. Contributing to the accident was the Federal Aviation

¹ All times in this letter are Guam local time, based on a 24-hour clock.

² Six of the passengers were Korean Air flight attendants who were "deadheading," that is, traveling off duty.

³ Three passengers (including one deadheading flight attendant) initially survived the accident with serious injuries but died within 30 days after the accident. According to 14 Code of Federal Regulations Section 830.2, such fatalities are to be included in the total number of fatal injuries. A passenger with serious injuries died at the U.S. Army Medical Center in San Antonio, Texas, on October 10, 1997, but is not officially listed as a fatality because the passenger's death occurred more than 30 days after the accident.

⁴ For more detailed information, see National Transportation Safety Board. 2000. *Controlled Flight Into Terrain, Korean Air Flight 801, Boeing 747-300, HL7468, Nimitz Hill, Guam, August 6, 1997*. Aircraft Accident Report NTSB/AAR-00/01. Washington, DC.

Administration's (FAA) intentional inhibition of the minimum safe altitude warning (MSAW) system⁵ at Guam and the agency's failure to adequately manage the system.

Emergency Notification of the Flight 801 Accident

The Agana tower controller said that Korean Air flight 801 made initial radio contact about 0140:55. The tower controller also said that, when flight 801 did not visually appear within 3 to 4 minutes after the airplane was cleared to land (about 0141:01), he commenced a communications search for the aircraft.⁶ The controller attempted to contact flight 801 about 0145:13 and 0150:06. Between about 0150 and 0151, the tower controller queried the Guam Combined Center/Radar Approach Control (CERAP) controller, the ramp controller, and an Andersen Air Force Base⁷ controller about flight 801.

About 0154:44, the CERAP controller contacted the flight crew of Ryan International flight 789 (which had previously established contact with the CERAP) and stated, "ryan seven eighty nine roger we may have lost an airplane...." About 0156:03, the CERAP controller requested the Ryan flight crew to "...look for signs of an accident west of the airport." About 0156:35, a Ryan flight crewmember advised the CERAP controller, "...about fifteen minutes ago we saw the clouds light up bright red it was kinda weird we thought it was just our eyes or something." About 0156:58, the crewmember advised the controller, "we got a big fireball on the hillside up here...about our three o'clock and two miles—ah a mile."

About 0158, after receiving notification of the accident from the CERAP controller, the Agana tower controller alerted ramp control about the crash of Korean Air flight 801.⁸ According to airport ramp control logs, ramp control initiated the required emergency notifications at 0202, including a call at 0208 to the Naval Regional Medical Center to place its personnel on standby.

Emergency Response

Although a fire station was located about 1 mile from the accident site, the first emergency response equipment (dispatched from a different fire station about 3 ½ miles from the accident site) did not arrive on scene until approximately 52 minutes after the accident. Safety Board investigators attempted to determine the reason(s) for the slow emergency response and the extent to which it could have been reduced or avoided.

⁵ The purpose of the ground-based MSAW system is to provide air traffic controllers with a visual and an aural warning whenever an airplane descends, or is predicted to descend, below a prescribed minimum safe altitude. This information can then be relayed to the pilots so they can take remedial action.

⁶ FAA Order 7110.65, "Air Traffic Control," paragraph 10-3-1(b), states that controllers are to declare, in a timely manner, a flight that is overdue.

⁷ Andersen Air Force Base, located at the northeastern end of the island, has two runways that are oriented in the same manner as those at Guam International Airport.

⁸ According to the Guam airport emergency response guidelines, ramp control is responsible for providing all communication/dispatch functions in the event of an emergency.

Because of the air traffic controllers' delayed discovery of the accident, ramp control personnel were not aware of the accident until 0158, about 16 minutes after the crash occurred. The Safety Board determined that, if the CERAP controller had been monitoring the flight more closely, this delay might have been eliminated or reduced.⁹

After being notified of the accident by Guam airport ramp control, the Guam Fire Department (GFD) communications center dispatched GFD Engine No. 7, which was stationed about 3 ½ miles from the crash site, at 0207. However, Engine No. 7's departure from the station was delayed by 12 minutes because its brake system needed to be recharged with air. Engine No. 7 departed the station at 0219, and its en route response time was 15 minutes. Engine No. 7 was the first emergency response vehicle to arrive at the NIMITZ VOR¹⁰ access road (at 0234, 52 minutes after the accident).

The nearest fire station to the accident site was the U.S. Navy Federal Fire Department (located about 1 mile from the accident site). According to Federal dispatch facility logs, that station was not notified of the accident until 0234. The station's Engine No. 5 was then immediately dispatched and arrived at the accident scene at 0239 (a response time of 5 minutes). The Chief of Staff for the Commander, U.S. Naval Forces, Marianas, notified Navy "first responders" to stand by after she learned of the accident at 0216.¹¹ However, the Navy had not yet received a request for specific Federal firefighting and medical resources; therefore, it would have been inappropriate for the Chief of Staff to have dispatched these resources.

The emergency response was further delayed because the VOR access road—a partially paved, single-lane road that was the only ground access to the accident site—was blocked by a section of severed pipe¹² when emergency responders arrived. Emergency responders had to walk to the crash site through steep, muddy terrain and dense vegetation until 0334, when a truck-mounted winch removed the pipe. Fire and rescue personnel stated that only small, isolated fires remained when they were finally able to reach the accident scene with firefighting equipment.

A U.S. Navy emergency medical technician assigned to the Naval Regional Medical Center reached the accident site on foot between 0245 and 0300. He stated that emergency responders established two triage areas to treat survivors. He added that transport of the survivors to hospitals was delayed because of the terrain and limited access to the crash site and

⁹ The CERAP controller failed to monitor the flight after the frequency change to the tower controller. (The CERAP controller was required to continue monitoring the flight because radar service had not been terminated in accordance with FAA Order 7110.65, paragraph 5-1-13.) As a result, the CERAP controller did not immediately recognize that the airplane was overdue. If the CERAP controller had been properly monitoring the flight on one or both of the radar displays he had available to him (the en route display and/or the terminal display), he might have observed flight 801 disappear on final approach. Also, the controller might have noticed the approach path warning (low-altitude MSAW alert) that was generated on the en route radar display, which began about 6 seconds before impact and continued until at least 23 seconds afterward.

¹⁰ VOR stands for very high frequency omnidirectional radio range.

¹¹ The Chief of Staff learned of the accident when an airport official called her husband, the airport director, at home to inform him that a Korean Air 747 was missing over the Nimitz Hill area.

¹² The airplane's landing gear had struck an oil pipeline on the side of the road and pushed portions of the pipeline into the road.

the necessity to stabilize patients in triage. The first survivors were transported to hospitals between about 0300 and 0330. Rescue personnel testified at the Safety Board's public hearing on this accident¹³ that the pace of evacuations increased after the pipe blocking the access road was removed and a landing area for helicopters was set up near the VOR.

The Safety Board is concerned that the first emergency response equipment did not arrive at the accident scene until about 52 minutes after the accident. Although the harsh terrain and the broken pipeline could not have been controlled, the delay caused by air traffic controllers' initial unawareness of the accident, the need to recharge the brake system on the GFD Engine No. 7, and the lack of timely notification to the Federal Fire Department could have been avoided. Thus, the Safety Board concludes that a substantial portion of the delayed emergency response was caused by preventable factors.

The autopsy reports indicated that at least one seriously injured passenger was treated at the accident site. Although the autopsy report for this passenger did not identify a single cause of death (her remains showed evidence of multiple internal injuries but no burns or soot in the airways), the report indicated that she was alive when medical personnel arrived, was treated aggressively, and might have survived if earlier medical intervention and evacuation had occurred. Therefore, the Safety Board concludes that the delayed emergency response hampered the timely evacuation of injured persons, and at least one passenger who survived the initial impact and fire might not have died if emergency medical responders had reached the accident site sooner.

According to public hearing testimony by Guam's Civil Defense Director, at the time of the accident, Guam emergency response authorities had a memorandum of understanding (MOU) with the U.S. Air Force for emergency response but did not have agreements with the U.S. Navy or U.S. Coast Guard. The director further stated that, before the accident, a joint disaster drill had been conducted at the airport, but no drills had been conducted for off-airport crash emergencies. At the public hearing, the Guam Civil Defense Director and other Guam officials stated that a committee, including representatives from Guam, the U.S. Navy, the U.S. Coast Guard, and the U.S. Air Force, had been formed to develop an MOU; an off-airport aircraft accident drill was planned for September 1998; and new radios had been purchased to allow interagency communication and coordination during emergency responses. However, Guam Civil Defense officials told the Safety Board in June 1999 that no MOU had been signed and that a draft of standard operating procedures for joint emergency response was being circulated to agencies for review. Further, Guam Civil Defense officials stated that the planned September 1998 off-airport aircraft accident drill did not take place and that such an exercise was still in the planning stage.

Although it is pleased with the purchase of new emergency radios, the Safety Board concludes that improved formal coordination among Guam's emergency response agencies has not been implemented, and off-airport drills to identify and correct deficiencies in disaster

¹³ The Safety Board held a public hearing on this accident from March 24 to 26, 1998, in Honolulu, Hawaii. Five issues were addressed at this hearing: controlled flight into terrain accidents, operation of navigational devices at the Guam airport, MSAW systems and practices related to these systems, search and rescue operations, and U.S. and foreign government oversight of foreign air carriers operating into the United States.

response planning before an accident occurs have still not been conducted in the more than 2 years since the flight 801 accident. Thus, the Safety Board also concludes that actions taken by Guam's emergency response agencies after the accident have been inadequate because they failed to ensure that emergency notifications and responses would be timely and coordinated.

Therefore, the National Transportation Safety Board makes the following recommendations to the Governor of the Territory of Guam:

Form, within 90 days, a task force comprising representatives from all emergency response agencies on the island, including the appropriate departments within the government of Guam, Federal Aviation Administration, Guam International Airport Authority, U.S. Navy, U.S. Air Force, U.S. Coast Guard, Federal Emergency Management Agency, and all other affected agencies, to define and coordinate emergency notification and response procedures to ensure that timely emergency notifications are made to all local and Federal agencies according to need, location, and response time capability. (A-00-19)

Require periodic and regularly scheduled interagency disaster response exercises, including an off-airport aircraft accident scenario, in addition to those response drills already required at Guam International Airport in accordance with 14 Code of Federal Regulations Section 139.325. (A-00-20)

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "...to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations A-00-19 and -20 in your reply.

By: Jim Hall
Chairman