

This page intentionally left blank.



Linda Werfelman

In the late 1990s, the U.S. National Transportation Safety Board (NTSB) faced a dilemma: what to do with accident investigators’ painstaking reconstruction of what remained of Trans World Airlines (TWA) Flight 800, the Boeing 747 that exploded and struck the Atlantic Ocean after departure from Kennedy International Airport in New York on July 17, 1996, killing all 230 occupants.

The 747, pulled in pieces from the ocean and reassembled during the months-long investigation, was stored in a Long Island, New York, hangar for which the federal government paid US\$2 million a year in rent. Never before had accident investigators put back together so large

a section of a broken airplane, and they were convinced that the 93-ft (28-m) midsection of TWA Flight 800 would be an invaluable tool for training future investigators — but not if it remained in storage.

“We had this incredible piece of aircraft fuselage that told an amazingly tragic story, and no one was getting the benefit ... those who could learn from it and hope to prevent that kind of thing from happening again,” said NTSB Chairman Mark V. Rosenker. “Taking it away from that storage hangar and bringing it to a place where people studying accident prevention could gain from the impact of seeing it — that made great sense.”

So, with a goal of combining classroom space with the learning opportunities made possible because of the presence of what Rosenker called an “incredible piece of accident research,” construction began in 2000 on the NTSB Training Center — initially called the NTSB Academy — 30 mi (48 km) west of Washington in Ashburn, Virginia, U.S., on the Virginia campus of George Washington University.

LESSONS

The 72,000-square-ft (6,689-square-m) facility is owned by the university and leased by the NTSB, which has signed a 20-year agreement due to expire in 2021. The remains of TWA Flight 800 were moved to the Training Center in 2002, and the first accident-investigation classes were taught there in 2003.

The environment is unique, Rosenker said, not only because the coursework deals almost entirely with accident investigation procedures and techniques but also because the courses are able to use the reassembled 747 as a teaching tool.

He noted that there have been suggestions that the Training Center might someday house some of the recovered parts from Pan American Airlines Flight 103, which was destroyed Dec. 21, 1988, when a terrorist’s on-board bomb exploded over Lockerbie, Scotland. All 259

people in the airplane, as well as 11 people on the ground, were killed.

A side-by-side display of key pieces of wreckage would be especially useful in illustrating the differences in damage caused by detonation of an on-board bomb and an exploding fuel tank, Rosenker said. The Pan Am wreckage currently is stored in a hangar at Farnborough (England) Airport.

Training Center classes have attracted employees of accident investigation agencies worldwide. Other training facilities exist — both in the United States and in other countries — and some universities offer classes in accident investigation, but they usually don't focus on investigational forensics and their efforts "are nowhere near as elaborate" as the Training Center's, Rosenker said.

The NTSB states the Training Center's mission, in part, as "to promote safe transport by ensuring and improving the quality of accident investigation through critical thought, instruction and research; communicating lessons learned, fostering the exchange of new ideas and new experience and advocating operational

excellence; [and] providing a modern platform for accident reconstruction and evaluation."

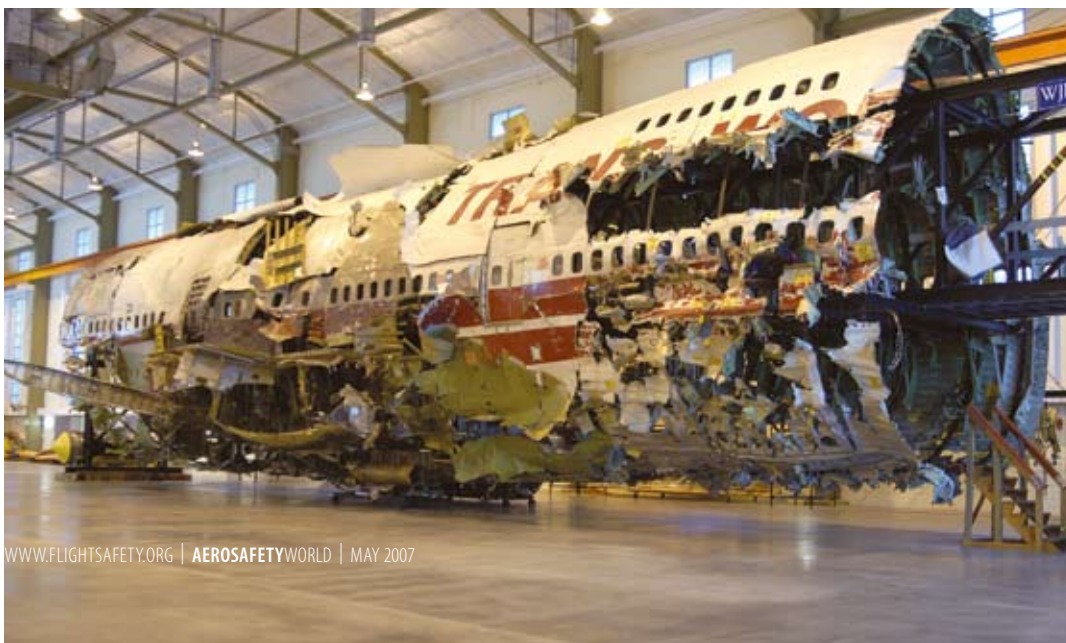
Another provision of its mission statement calls for "utilizing its high-quality training resources to facilitate family assistance and first-responder programs," as well as programs for other federal agencies. As a result, some Training Center classes deal with how to help the families of those killed in aircraft accidents — a responsibility assigned to the NTSB in legislation passed by Congress after the TWA Flight 800 accident. The legislation also gave the NTSB the responsibility of coordinating the response of federal, state, local and volunteer agencies to aviation accidents.

Classes — taught in the Training Center's five classrooms, all with Internet connectivity and advanced audio-visual equipment — are the heart of the facility. Subjects involve accident investigation in all modes of transportation, but many focus on aircraft accident investigation, and cite TWA Flight 800 as an example of how to recover parts after an accident, how to reassemble an accident aircraft and how an analysis

FROM THE WRECKAGE

The NTSB Training Center uses the reassembled remains of TWA Flight 800 as the centerpiece in its wide-ranging classes for aviation accident investigators.

BY LINDA WERFELMAN





that allowed excessive voltage to enter [the tank] through electrical wiring associated with the fuel quantity indication system.”

The classes typically are not for beginners who have no knowledge of aviation but rather for people in the aviation industry who need to learn

how the NTSB handles its investigations — typically because at some time, they may be working with NTSB personnel during an investigation. An actual investigation is not a good environment for basic instruction, NTSB officials say, citing the huge volume of investigative work that must be done.

“The last thing you want when you get a catastrophic accident — where you are dealing with a whole host of issues — is to have folks getting on-the-job training,” Rosenker said. “You want them to have some understanding ahead of time of what we will do and what is expected of those who participate.”

Other aviation-specific classes on the Training Center’s 2007 calendar include survival factors in aviation accidents, managing communications during aircraft disasters and airport preparedness.

Some classes apply not only to aviation but also to other fields, such as biomechanics of high-impact injuries, investigation of human fatigue factors, interview procedures, human factors, accident site photography, disaster family assistance, accident/incident report writing, media training for NTSB investigators, and conducting effective technical presentations and meetings. Classes also are offered on issues that involve investigation of accidents in other modes of transportation.

Some classes are reserved for NTSB personnel, but most also are open to people who may someday work with the NTSB in investigating

of individual pieces can help lead to a conclusion about the probable cause of an accident.

For example, the forward portion of TWA Flight 800 shows no indication of smoke damage while the rear section, behind the wing, is charred. Virtually all of the pieces of metal on the right side twist and bend inward — an indication of an explosive force that originated outside the cabin, and an indication that it was the airplane’s right side that struck the water. Each of these observations was crucial to investigators’ efforts to find the cause of the crash.

In its final report on the accident, the NTSB said that the probable cause was “an explosion of the center-wing fuel tank (CWT), resulting from ignition of the flammable fuel/air mixture in the tank.” The investigation did not identify the source of the spark that touched off the explosion, but the report said that the most likely source was “a short circuit outside of the CWT



U.S. National Transportation Safety Board

Linda Werfelman

an accident, such as employees of airlines or other government agencies.

The Training Center's family assistance classes address all modes of transportation; attendees at one recent session came from airlines, cruise ship operators and railroads, as well as government agencies outside the transportation field.

About 1,700 people a year — most of them from outside the NTSB — enroll in the Training Center's classes, and NTSB officials say that they are working to increase the number of classes, to bolster enrollment and to provide more classes for NTSB employees. These were among items discussed in a November 2006 report by the U.S. Government Accountability Office (GAO), the investigative arm of Congress.

The report said that the Training Center has been under-utilized and recommended that the NTSB consider more aggressive marketing of its courses, subleasing some of the space within the Training Center and developing more courses that are tailored to NTSB personnel, who historically have attended courses offered by other institutions. The report also said that, although these strategies could increase revenues or decrease costs associated with the Training Center, "vacating the space may be the least-cost strategy."

In response, Rosenker said that the NTSB already has developed and submitted to Congress a business plan for the Training Center and is working to "improve the utility and cost-effectiveness of the facility."

The Training Center's classrooms already are available, for a fee, to other government agencies and outside organizations — typically those involved in transportation issues or education. In addition, several government agencies have contracted with the NTSB to lease space in the Training Center under "contingency of operations plans" — which require federal agencies to have access to office space away from Washington where key employees can continue their work in the event that their Washington routine is disrupted by events such as a major power failure, a severe storm or a terrorist attack.

The immediate goal, expected to be accomplished by fall 2007, is to contract with a vendor to provide teachers and new coursework for the Training Center, and eventually to expand the number of classes offered there each year from about 20 to 40 or 50, Rosenker said. NTSB personnel would continue to appear as guest lecturers, but professional instructors would teach most of the classes.

Five years from now, he said, the goal is to have established "an effective, self-sufficient training center, which provides value to the students and anyone who is participating in an investigation." ●

Further Reading From FSF Publications

FSF Editorial Staff. "Boeing 747 In-Flight Breakup Traced to Fuel-Tank Explosion." *Accident Prevention* Volume 58 (May 2001).



Linda Werfelman

A BAE Jetstream 41 is used in Training Center discussions of accident survival factors.