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In-Flight Fires an Unresolved Safety Threat

Smoke Causes Planes to Be Diverted on a Daily Basis, Data Show

By Del Quentin Wilber
Washington Post Staff Writer
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The regional jet with 30 passengers aboard was cruising at 37,000 feet over Missouri when the pilots smelled something burning. A warning light came on. Then smoke billowed into the cockpit from vents below the co-pilot's window.

The pilots donned oxygen masks, and the co-pilot began fighting a small blaze with a hand-held fire extinguisher.

As the pilot dodged thunderstorms in an emergency descent, the smoke thickened. By the time the [Embraer](#) ERJ-145 neared the ground, the pilots could barely see out the windows.

The plane, operated by Trans States Airlines for American Airlines, landed safely April 29 at Springfield-Branson National Airport. The co-pilot suffered minor burns to her wrist, and one passenger was taken to the hospital with an injury from the evacuation, according to Federal Aviation Administration reports and interviews with those familiar with the incident.

The emergency landing was dramatic -- and not unusual -- according to a review of statistics compiled by the FAA. On average, nearly one flight a day in the United States is diverted because of smoke in the cabin or cockpit, the statistics show.

In recent years, major crashes and deaths have declined sharply as authorities and manufacturers have worked to reduce many aviation risks by making changes in airline safety. But the Missouri incident and a flurry of recent diversions have renewed concern over a major safety issue -- in-flight smoke and fire.

Smoke diversions represent only a small portion of commercial flights -- there are about 30,000 departures a day in the United States. Nevertheless, smoke has resulted in the crashes of three airliners in the past decade in North America, killing more than 560 people.

Worldwide, in-flight fires have been the fourth leading cause of commercial aviation fatalities in recent decades, experts say. In 2000, there were 5.3 diversions for smoke per 100,000 flights in the United States. That number dropped to 2.3 in 2003. It rose steadily to 320 diversions in 2005, a rate of 3.2 per 100,000 flights. The number increased to 181 diversions in the first six months of this year, a rate of about 3.8 diversions per 100,000 flights, according to FAA statistics analyzed by The Washington Post.

Regulators, airlines and pilots groups have scrambled in recent years to eliminate some of the smoke-related risks, but some outside experts say more can be done. "One of the most horrific things you can face is an in-flight fire," said Dave Thomas, former head of accident investigation for the FAA. "You are in an aluminum cylinder by yourself, and you have nowhere to go."

The FAA is concerned that planes are getting older and are loaded with more wiring -- the source of the majority of the smoke and fires -- as aircraft offer expanded on-board high-tech equipment and in-flight entertainment systems. Last year, the agency proposed new rules to stiffen requirements on the

maintenance, installation and care of wiring. It has also worked to reduce the amount of flammable materials on board.

Still, in a two-day period late last month, authorities reported several incidents. A Delta Airlines flight was evacuated at Boston's Logan International Airport when the pilot smelled smoke after landing. Another Delta flight from Paris to Atlanta was diverted to Knoxville, Tenn., after passengers reported smelling smoke. And a Chicago-bound American Airlines flight was diverted to a New Hampshire airport after passengers reported a burning smell.

Stephen Syta, a passenger on the American Airlines flight, said the flight crew didn't explain why the aircraft was diverted until after it landed.

"You see the fire trucks [on the runway] and you realize something is wrong with your plane," said Syta, 50. "I guess frightened isn't a good enough word to describe it. Terror. It was terror."

The U.S. aviation world has experienced a particularly safe period in recent years. Only one major commercial jet crash has occurred since late 2001, when 49 people were killed in August after pilots tried to take off on a runway that was too short.

The good safety record is because of the elimination of the most glaring aviation risks, experts say. One of the biggest advances: an on-board computer system that warns pilots when they're approaching mountains, the ground or other terrain -- once a leading cause of aviation fatalities.

"One of the challenges in the safety community is that all of the obvious stuff has been done," said John Hickey, director of the FAA's aircraft certifications services. "We are in a period now where accidents are so few and far between that they aren't really linked to each other. They are pretty random. And it is more difficult to decide where to invest our safety dollars."

Hickey and safety consultants said the FAA and the aviation industry have made strides in reducing the risk of in-flight fires. In the 1980s, regulators pushed to ensure that aircraft had better smoke detectors and extinguishers in lavatories, and forced airlines to use less-flammable material in aircraft cabins.

Next, they turned to improving aircraft wiring and stripping out flammable insulation and other material that could burn. Airlines have begun to concentrate on removing debris, such as lint and dirt, that builds up in hidden places and could sustain a blaze. Smoke detectors and automated fire extinguishers were installed in cargo holds.

Those efforts followed the crashes in 1996 of a ValuJet plane in the Florida Everglades and of TWA 800, a Boeing 747 that exploded in mid-flight after a spark apparently set off vapors in a center fuel tank. Two years later, a Swissair jet crashed off the coast of Nova Scotia after insulation near the cockpit was ignited by short-circuited wires, investigators say.

Researchers are studying ways to allow flight attendants to reach such inaccessible areas as behind aircraft walls to discharge fire extinguishers, after several incidents in which crews couldn't get to small blazes.

To streamline procedures for pilots -- who are often caught off guard by smoke incidents and must react quickly -- [Boeing Co.](#) plans soon to issue new simplified fire checklists for all of its planes. Studies suggest that pilots may have no more than 15 to 20 minutes to get a burning aircraft on the ground before a fire leads to catastrophe.

Pilots groups have been pushing for such checklists, which are expected to begin with a warning: "A Diversion May Be Required," said H.G. "Boomer" Bombardi, a pilot who has worked on fire safety for the Air Line Pilots Association.

John Cox, a former investigator with ALPA who recently wrote a lengthy report on smoke and in-flight fires, pointed to several recent incidents as examples of why regulators need to study the issue further.

On a flight to Cincinnati in December, fire broke out in avionics equipment below the pilot's seat on a Comair regional jet, causing the loss of all electronic flight displays. A week later, a similar fire occurred on a Atlantic Southeast Airlines regional jet, creating confusion for the pilots as they struggled with "cascading" failures of equipment and audible warnings, a government report shows.

Those fires and five others on the Bombardier regional jets were caused by moisture that seeped into the equipment, according to the National Transportation Safety Board.

Investigators found that two of the fires threatened the pilot's oxygen supply line. If the oxygen was ignited, the fire could have developed into a more hazardous situation," said Bob Swaim, an NTSB investigator who looked into the incident.

Pilots groups want manufacturers to develop and install sensors throughout aircraft to help pilots find the source of smoke.

And they would like the FAA to better fund efforts of its own scientists. FAA chemist Richard Lyon and his bosses say he has developed a super fire-resistant plastic. But the scientist has faced problems in getting chemical companies, aircraft manufacturers or the FAA to fund full-scale tests.

The last fatal crash blamed on an in-flight fire in North America was the Swissair accident in 1998. As a result, pilots are now trained to land a plane if they cannot quickly locate the source of smoke -- a reaction that the FAA's Hickey and others think contributes to the level of diversions.

"We are very pleased with that safety culture," Hickey said, adding, however, that the number of diversions is "a concern for me and a concern for the community."

Database editor Sarah Cohen contributed to this report.

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