High Anxiety over Flights Through Ozone

Pilots and flight attendants who work on long-range jetliners say ozone poisoning is a serious threat to airline safety

"I was on a flight from Los Angeles to Japan," recalls Inez Sharp, a stewardess for Pan American World Airways. "We were at about 43,000 feet, and had been flying for about 9 hours. I remember many of the passengers coughing. I personally experienced severe chest pains to the point where I was not comfortable walking around anymore. I had to sit down. Every time I took a deep breath, my whole chest felt as if I were breathing in fire.

"After that trip, I suffered what seemed like a cold and sore throat for about a week. I decided to avoid the Los Angeles to Tokyo flight. I knew I was sick from that trip, but I did not know why."

Today she does.

Ozone is a colorless gas that forms a layer of the atmosphere between 35,000 and 150,000 feet above the earth. Its concentration is greater in the northern latitudes, especially from late February to early May, during which time fingers of the gas descend to around 25,000 feet. The cruising altitude of a jetliner going from New York to Chicago is around 35,000 feet. Long-range international jetliners fly to a height of 45,000 feet; the Concorde flies at up to 55,000 feet. Symptoms of ozone poisoning include shortness of breath, headaches, dizziness, coughing, eye irritation, burning of the nose and throat, chest pains, loss of coordination, decreased ability to concentrate, and drowsiness.

Complaints of ozone-related illnesses have been climbing among airline passengers and crew. Eight of the 11 crew members on Sharp's flight to Tokyo had severe chest pains. Pan American, which runs many long-distance international flights, says that in 1978 it received 645 such complaints from flight crews. In 1976 it received 53.

Despite the magnitude of the problem, Sharp and fellow flight attendants say the Federal Aviation Administration (FAA) is dragging its feet. In September 1977, the FAA proposed a rule to limit ozone in airline cabins. But airline associations complained that equipment to remove the ozone would cost $122 million and that hundreds of flight hours would be lost during installation. They asked for further study of the problem. Pilot and flight attendant associations, on the other hand, called for immediate action, and asked for an even more stringent regulation than the one proposed by the FAA. To date, the FAA has not issued a final rule.

To pressure the FAA, Sharp and several medical specialists testified on 18 July at a hearing sponsored by the House subcommittee on oversight and investigations, chaired by Bob Eckhardt (D-Tex.). They presented new studies that confirm the link between high-altitude flying and ozone poisoning.

The problem developed after the oil crisis of 1973, when higher prices for petroleum sent jetliners flying to higher altitudes—where thinner air means more miles per gallon. But complaints from flight service crews also picked up. "A few pilots laughed this off as a form of hysteria," says Paul Roitsch, the Air Line Pilot Association's (ALPA) central air safety chairman for Pan American. "Most tried to help by increasing the airflow and checking cabin pressure, but were mystified by the complaints since they were rare, random, and nonrepeatable in the experimental sense. At first we suspected poor cabin air quality due to smoke and inadequate air flow. Later we began to look at low humidity as the culprit."

Then, in April 1976, Pan American inaugurated its nonstop service between New York and Tokyo with the brand-new Boeing 747SP (an especially high-flying, long-range 747). These polar flights went through the northern latitudes and therefore through the greatest concentrations of ozone. The number of complaints soared. Not long afterward, the source of the problem was identified.

Debate now centers on what quantity of ozone is dangerous. In October 1978, the FAA proposed to limit ozone concentrations in airplanes to 0.1 part per million on the average, with a top concentration of 0.3 part per million. These figures are based on standards set by the Occupational Safety and Health Administration (OSHA) for industrial workers exposed to ozone on a daily basis. ALPA says exposure under the FAA proposal allowing exposures of up to 2 hours at 0.3 part per million could seriously damage health. Airline associations, on the other hand, say that exposures should be allowed to go even higher than the FAA proposal. Almost everyone agrees that eventually something will have to be done. Data from the National Air and Space Administration's Global Air Sampling Program (GASP) show that ozone in passenger cabins sometimes goes as high as 1.2 parts per million—four times the peak level set by OSHA.

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Some physicians fear that especially susceptible persons might not be protected by the standards proposed by FAA. Donald Tierney, past president of the American Thoracic Society, says there may be dangers for passengers with heart and lung problems. He has asked the airlines to warn such travelers. An exposure of 0.2 part per million might not immediately affect an asthmatic, for example, but it could trigger a delayed reaction. Ozone makes them "very sensitive to agents that produce asthma, and this effect could last for several days," he recently told the House hearing. "I

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option of avoiding beer and Scotch. But they should be advised to stay clear of carrot juice and beet juice as well, for they also contain relatively high concentrations of nitrosamines.

Congress Relents, Spares OES Bureau

After a harrowing summer, the State Department's Bureau of Oceans and International Environmental and Scientific Affairs (OES) is expected to glide safely home to port this fall when Congress returns from its August recess and takes up the appropriations bill for the State Department. The OES, which handles negotiations for fishing agreements and scientific and technological exchanges, earlier this year ran afoul of Representative William Alexander (D-Ark.). He slashed both the budget and the staff of the OES in half when they came before a subcommittee on which he sits (*Science,* 8 June 1979).

The funds were restored after a $1^1/_2$-hour debate on the floor of the House on 12 July in which Alexander reported thirdhand that Henry Kissinger had once told another official that OES "is where the Department of State places its incompetents." He continued: "I would rather have one good horse than a whole team of lame nags that sit grazing at the trough of public expense. . . ."

When the harangue was over, several congressmen chided Alexander for failing to hold any hearings on his charges. Representative Clement Zablocki (D-Wis.) spoke of the "unfortunate record" and said the budget slash was adopted "without any consideration and chiefly at the urging of one individual, our good friend, the gentleman from Arkansas." The House then voted to restore the budget; a conference report cleared the House on 2 August; and all that is lacking is the Senate's approval.

An OES official, Leslie Brown, said, "A lot of us were surprised not only by the depth but by the breadth of support" that came through for OES at the last moment. Rep. Alexander had boasted that he would win the battle if it ended up on the House floor. He plainly underestimated the opposition.

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would be doubly concerned about an asthmatic with a common cold."

Greatest concern centers on pilots—and understandably so. The picture of a flight crew incapacitated by ozone is not a very pretty one. Yet most pilots refuse to talk about any problems they may have encountered. This too is understandable. Mere mention of "chest pains" might be equated with "heart trouble," which could mean the loss of a pilot's medical certification to fly.

The most vocal complainers are flight attendants. If they seem to have more problems with ozone than passengers and pilots, Tierney notes, it is probably because they work harder. A person at rest breathes about 5 liters of air per minute. A person pushing a heavy cart up and down an aisle breathes 15 to 20 liters per minute—and thus takes in many times more ozone.

Though flight attendants raise a fuss, the companies they work for are often noncommittal. Trans World Airlines, which operates 11 regular 747's, says it is waiting to see if the FAA regulations go into effect. It will then add ozone-removing equipment.

Pan American says that its 29 regular 747's will get catalytic converters to break down ozone sometime in 1980, and that the ozone problem has already been solved on its very long-range, high-altitude planes. Charcoal filters (each weighing 800 pounds) were installed on all ten of Pan American's 747SP's in March 1978. Since then, there have been only two passenger complaints. The 645 complaints by flight crews in 1978, says a Pan American spokesperson in New York, have to do with politics involving union wage settlements. "As far as we're concerned, there are many more passengers than crew," says James Arey. "Based on the complaint figures, we have done the job. There are no more problems."

Flight attendants, however, say that a wage contract has long been reached—and that complaints are still being sent to New York. "In fact," says Carmen Azzopardi of the Independent Union of Flight Attendants, "Pan Am just settled out of court with two flight attendants for ozone-related injuries. One had developed bronchitis, the other asthma." She also notes that passengers have never sent in many complaints, for few understand the problem.

A spokesperson for Boeing says that Pan American is the only airline putting in filters and catalytic converters. The other airlines can get them as optional equipment, he says, but so far none have. He also says that the FAA regulations will probably never come out, since the problem is so rare. "I've traveled around the world in a 747 and never had a single problem," says Leonard Weiss. "This ozone thing has been vastly overplayed by the news media."

To give credence to their side of the story in the face of industry skepticism, flight attendants presented a 1330-person survey at the House hearing in July. Performed by Dwayne Reed, an epidemiologist with the California State Department of Health Services, the survey looked at flight attendants from Pan American, which flies high-altitude international flights; from Trans World Airlines, which flies both international and lower-altitude flights; and from Pacific Southwest Airlines (PSA), which flies only low-altitude flights within California. The survey tabulated symptoms for five consecutive flight days. With fatigue, backache, nausea, and vomiting, there was little difference between airlines. Chest pain, however, was experienced by 19 percent of the Pan American flight attendants, 13 percent of those on TWA, and 5 percent of those on PSA.

What worries many is lack of data about long-term effects. Ozone, for instance, is a mutagen and is known to cause biochemical changes in the bloodstream of exposed persons. But it is not known if high rates of miscarriages and children with birth defects among flight attendants are a result of ozone exposure.

Even if the FAA does make a ruling on ozone, ALPA fears that the airlines will not take the time and money to put on equipment that really works. As part of the FAA regulation, therefore, ALPA wants a requirement for on-board systems to monitor ozone levels—thus checking the effectiveness of ozone removal equipment.

A few months ago the FAA said the ozone ruling, if it is made, would come in September. Now it has pushed that back to October. Asked how long the airlines would have to comply with a ruling, Ray Ramakis of the FAA's safety regulations division said: "The notice of proposed rule-making said 6 months. It could go to a year. I don't know. There is no set formula." If the airlines have their way, it will take a while. In January the Air Transport Association, which represents the nation's airline companies, told the FAA how long it thought the conversion to ozone-removal equipment would take. The estimate came to somewhere between 4 and 6 years.

—WILLIAM J. BROAD