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PAUL SCHOELLHAMER, Chief of Staff
SANTO ESPOSITO, Chief Counsel

U.S. House of Representatives
COMMITTEE ON PUBLIC WORKS
AND TRANSPORTATION

SUITE 2165 RAYBURN HOUSE OFFICE BUILDING

WASHINGTON, DC 20515

(202) 225-4472

MEMORANDUM

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JACK SCHENENDORF, Minority Staff Director

TO: Members of the Subcommittee on Aviation

FROM: Committee's Aviation Staff

DATE: May 16, 1994

RE: SUMMARY OF SUBJECT MATTER for the hearing on AIR LINER CABIN AIR QUALITY, Wednesday, May 18, 1994, at 9:30 a.m.

Efforts to improve airliner cabin air quality for the benefit of passengers and crew go back over a decade, and include legislation, rules, studies, three hearings by this subcommittee (including today's), and citizen and flight attendant activism. The effort focused initially on smoking, culminating in the ban on smoking on all domestic flights of six hours or less. With the air somewhat cleared, concern has turned to the broader universe of contaminants, including the use of pesticides in airplanes with passengers and crew aboard (required by certain foreign countries), and the continued infliction of second-hand smoke on flight attendants on international flights.

Despite findings of various studies that airliner cabin air is generally safe for healthy people, complaints from flight attendants who spend their working lives in this environment; concerns for the transmission of disease, including tuberculosis,

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in this as in other small, confined and densely populated areas; and conviction by many passengers that they suffer respiratory and other problems after prolonged flight, continue to be voiced.

Today's hearing will concentrate on the overall quality of air in the cabin; on the technology and practices to ensure healthful air; on the health effects of smoking on international flights; and on the use of pesticides on occupied aircraft.

BACKGROUND

The quality of air in the airliner cabin has until recently been inextricably bound to the issue of smoking on aircraft.

The Federal Government first regulated smoking on commercial aircraft in 1973, when it promulgated regulations separating smokers from nonsmokers, and required that all commercial flights provide non-smoking sections large enough to accommodate every non-smoker.

In 1979, airlines were further required to specifically segregate cigar and pipe smokers, ban smoking when the aircraft ventilation system was not functioning properly, ensure that non-smokers were not unreasonably burdened when sandwiched between two smoking sections, and guarantee seating to non-smokers in non-smoking sections.

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In 1984, the now-sunset Civil Aeronautics Board (CAB) issued revised rules that prohibited smoking on airline aircraft under 30 seats, cigar and pipe smoking on all flights, and smoking when the aircraft was on the ground.

During the 1984 rule review, the CAB considered and rejected a proposal to ban smoking on short flights because it found health and safety reasons did not justify such a ban, and because it found the administrative and practical problems of enforcing a short-term smoking ban and the resulting confusion outweighed the additional comfort provided to non-smokers by a short-term smoking ban.

Public Law 98-466, enacted in October, 1984, required the Secretary of Transportation to commission an independent study by the National Academy of Sciences (NAS) to determine whether the requirements governing airline cabin air were comparable to non-aviation requirements, and adequate to maintain public and occupational health for passengers and crew.

The Act also required Department of Transportation (DOT) to submit the report, along with its own comments and recommendations, to Congress. DOT's instructions to NAS covered a number of cabin air conditions and pollutants, including tobacco smoke. NAS was then tasked to recommend remedies for problems discovered.

The Report, "The Airliner Cabin Environment: Air Quality and

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Safety," was presented to DOT in August, 1986. The Report found that:

" . . . if the lowest rate of ventilation permitted by current equipment design were used under conditions of full or nearly full passenger loads, the resulting ventilation rate would be at the minimum determined to provide acceptable air quality when smoking is not permitted and other contaminant sources are not present. In the absence of sources of contamination, this rate does not constitute a health hazard."

The Report made 21 recommendations, including a ban on smoking on all domestic commercial flights. In February, 1987, DOT submitted its follow-up "Report to Congress on Airline Cabin Air Quality." That Report recommended a further study, which was undertaken in April, 1989, and presented to Congress in December, 1989.

The DOT Report, "Airliner Cabin Environment: Contaminant Measurements, Health Risks, and Mitigation Options," was tasked to develop information to be used for determining health risks from exposure to Environmental Tobacco Smoke (ETS) and other pollutants for airliner occupants. Selected ETS contaminants, carbon monoxide, ozone, microbial aerosols, carbon dioxide and other environmental variables were measured on 92 randomly selected smoking and non-smoking flights.

The study concluded that:

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- Levels of Environmental Tobacco Smoke were highest in the smoking sections;
- Carbon dioxide levels were frequently above the level recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to satisfy ~~comfort~~ (odor) criteria;
- Relative humidity levels on monitored flights were quite low, averaging near 15% on smoking flights and near 20% on non-smoking flights;
- Average levels of other pollutants (ozone, carbon monoxide, bacteria, and fungi) were relatively low on virtually all monitored flights.

The Report's recommendations included that "Consideration should be given to a total ban on smoking on all flights . . . as a means of eliminating the ETS risks currently faced by non-smoking passengers and non-smoking cabin crew members."

It also recommended that the airlines take further mitigation measures against cosmic rays and carbon dioxide (CO₂) and found that "No actions need to be taken to reduce currently prevailing levels of ozone or biological aerosols."

More recently two other studies have been conducted, one by the Air Transport Association, the airlines' trade association, and one by the ABC network for a 20/20 program which aired last Friday

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night. Participants in both studies will testify at the hearing.

The Subcommittee on Aviation held hearings on smoking on airliners in October, 1987 and June, 1989.

In December, 1987, Public Law 100-202 banned smoking on all domestic flights of 2 hours or less duration, for the 2-year period 1988 to 1990. The current ban on smoking on all domestic flights of 6 hours or less took effect in 1990 (P.L. 101-164).

Smoking is still permitted in the passenger cabin of U.S. airlines on international flights. Individual airlines have established their own policies for smoking in the cockpit.

ISSUES

While the majority of flyers are healthy passengers, evaluation of air quality must consider as well the flight attendants who spend their working lives in the cabin, and passengers who are ill, possibly suffering from immuno-compromised diseases, and those allergic or hypersensitive to certain substances.

THE AIRPLANES

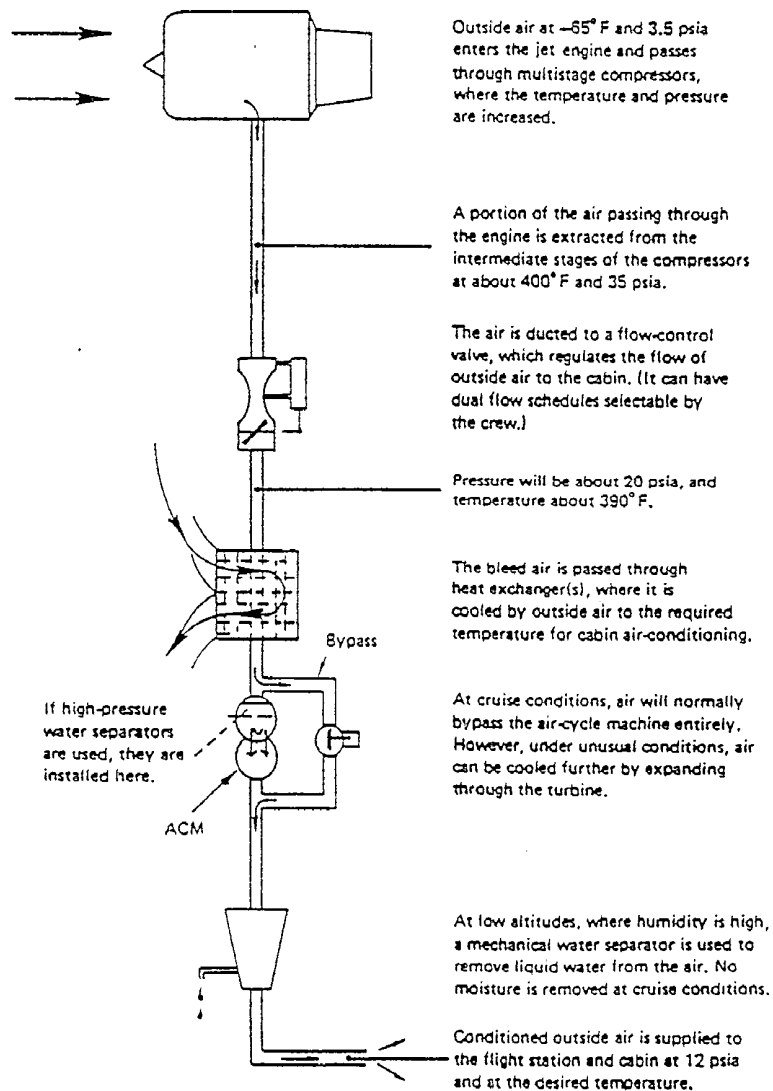
Older model airplanes, including the DC-9, the B-727, and half the DC-10s, provide 100% fresh air to the cabin.

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To conserve fuel, newer models, including the MD-80, DC-10, B-737, 747, 757, 747 and A-300, 320 and 310, provide up to 50% recycled air.

THE VENTILATION SYSTEMS

Below is a generic picture of airline ventilation systems.



Operation of aircraft environmental control unit in cruise conditions at 35,000 ft.

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On the ground, the plane may use air supplied by the engine, by the Auxiliary Power Unit (APU) or by high pressure carts. It is outside air, and can be contaminated by fuel and exhaust fumes and any other ambient air pollutants. The air may be filtered before it enters the cabin.

In flight the air is supplied by the engines. Outside air from the engines is adjusted for temperature and humidity prior to being pumped into the cabin.

Recirculated air is channeled through filters before being mixed with fresh air. Some planes use High Efficiency Particulate Air (HEPA) filters which are used in hospitals and can remove particles down to 0.3 microns. This is sufficient to catch bacteria, but not viruses or gases, including some components of ETS.

Efficiency depends on filter maintenance. Airlines state that they maintain the filters strictly according to manufacturers' directions.

In flight, the captain has the authority to adjust the flow of air to the cabin by turning down or off one or more of the "packs," or Environmental Control Units (ECUs).

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AIR QUALITYContaminants of Concern:

Federal Aviation Administration (FAA) regulations establish standards for carbon dioxide, carbon monoxide, and ozone. Guidelines on other contaminants have been set by Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), the American Conference of Governmental Industrial Hygienists (ACGIH) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

FAA requires cabin pressure to be no more than 8,000 feet altitude, but sets no requirements for airflow.

Below is a chart of contaminants commonly found within the airliner cabin for which standards or guidelines have been established by various agencies and associations. Note that the FAA intends to bring its carbon dioxide standard into line with OSHA's.

US STDS FOR EXPOSURE SELECTED SUBSTANCES					
SUBSTANCE	EPA	OSHA	ACGIH (7)	ASHRAE	FAA
CO ₂ (ppm)	none	5000	5000	2500(1)	30,000
CO (ppm)	9 (2) 35 (3)	50	50	9 (2) 35 (3)	50
NO ₂ (ppm)	.05 (4)	5	3	.05 (4)	none
PARTICUL- ATES TSP ug/cu.m	75 (5) 260(6)	1500 (RSP)(2)	1500 (RSP)	Same as EPA	none
OZONE(ppm)	.12 (3)	0.1	0.1	.05	.10 .25(7)

Notes:(1) As odor surrogate; (2) 8 hr.; (3) 1 hr; (4) 24 hr
(5) Annual; (6) 24 hr; (7) Time Weighted Ave.

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Carbon dioxide: FAA on May 2, 1994, proposed lowering its standard from 30,000 parts per million (ppm) to 5,000 ppm, bringing it in line with OSHA's guidelines.

Ozone: Concentrations were not considered to pose health problems by the studies, but Sue Ludwig will discuss her work on this particular gas.

Viruses cannot be easily sampled for, if at all, with current technology, and are not included in the studies.

Biological contaminants and fungi: were found in studies to be below concentrations generally thought to pose risk of illness. However, there have been cases, which Dr. Hinman of CDC will address, where tuberculosis is suspected to have been transmitted via cabin air.

Cosmic rays: Flight and cabin crews receive cumulative doses of these galactic rays. The NAS and DOT studies recommended that FAA consider restricting exposure of pregnant crew members. Dr. Cone will discuss work he is conducting on the effects of cosmic rays on human reproductive systems.

Pressure: FAA regulations require cabin pressure to be maintained at no more than 8,000 feet, which may pose some hazard to at-risk populations.

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Humidity: is generally below 25% in airplanes.

Temperature: is maintained at about 75 degrees.

Environmental Tobacco Smoke (ETS)

ETS is generally considered to pose considerable risk of cancer and other diseases to non-smokers, with the body of evidence continuing to grow. The NAS study recommended a total ban, while the DOT study (conducted during the ban on smoking on flights of two hours or less) recommended that "consideration be given" to a total ban.

Depending on the ventilation system employed, ETS has been found throughout the cabin, impacting allergic people despite their distance from smoking sections. It also reaches the cockpit on some configurations.

Flight attendants who spend their working lives in the close, smoke-filled environment on international flights will describe the deleterious effects they have suffered on international flights, where smoking is still permitted.

Pesticides

Certain countries require cabins to be sprayed with pesticides (against hitch-hiking insects) just prior to landing -- while passengers and crew are still on board. Spraying is either done by

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flight attendants walking down the aisles with spray cans, or through the ventilation system. Despite label warnings that a commonly-used pesticide is hazardous if breathed or absorbed through the skin, they do get on peoples' skins and into the eyes and lungs. Passengers are not warned in advance, and people who are chemically sensitive, asthmatic or suffer from respiratory diseases can suffer severe reactions. Flight attendants who are frequently exposed are especially at risk. In the case of flight attendants, repeated exposures have led to claims of permanent disability.

The U.S. terminated this practice in 1979 because of health concerns and doubts about the efficacy of spraying.

The Department of Transportation in mid-April requested countries requiring spraying to provide information on which pesticides were used, in order to establish a passenger notification system; and urged them to reconsider the requirement for spraying while the cabin is occupied.

The Environmental Protection Agency has recently required one of the pesticide suppliers to submit additional acute toxic effect data on certain pesticides used on airplanes.

One widely-used pesticide, Aerosol Aircraft Insecticide, is the same formulation as Black Knight Roach Killer.

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LEGISLATION

Representatives Nadler and De Fazio have introduced the Safe Cabin Air Quality Act (H.R. 2985) which would require FAA to issue regulations requiring airlines to provide passengers with not less than 20 cubic feet of fresh air per minute, monitoring of recirculating air filters, a minimum standard of humidity, and monitoring of ozone levels to assure compliance with current regulations.

The legislation would also establish a toll-free telephone number for passengers to report illnesses relating to air travel, and require the FAA to publish, on a quarterly basis, the reports of air travel-related illnesses and violations of standards established by the Act.

WITNESSES

Witnesses will include Members of Congress, representatives of DOT, FAA, EPA and CDC; flight attendants; the industry; scientists involved in cabin air studies; experts in relevant fields; and representatives of anti-smoking organizations.

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