Review of FAA Response to NRC Committee Recommendations

Prepared by the Association of Flight Attendants, AFL-CIO
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What follows is a review of the actions taken by the FAA in response to the recommendations published in the 2002 National Research Council report by the “Committee on Air Quality in Passenger Cabins of Commercial Aircraft”. There is a serious discrepancy between the findings of this review and the claim made by Federal Air Surgeon, Jon Jordan that the “FAA has addressed the NRC recommendations with a plan to define and resolve air quality issues” during the 5 June 2003 Hearings before the House Aviation Subcommittee.

**NRC Recommendation #1 – Air Quality Regulations**

“FAA should rigorously demonstrate in public reports the adequacy of current and proposed FARs related to cabin air quality...”

**FAA response:** “Existing FAA air quality regulatory requirements reflect a general consensus of aircraft manufacturers that minimum levels of CO [carbon monoxide] and CO₂ [carbon dioxide] are good indicators of overall air quality. Existing design standards have assured airplane passengers and crewmembers an acceptable cabin environment during normal operations.” The FAA included cited a review of a limited subset of published data, excluding well known published peer-reviewed papers and official government sources that are contrary to their position. Finally, the FAA said that it is “tasking an Aviation Rulemaking Advisory Committee (ARAC) to review existing standards and propose revisions or new standards.”

**Concerns:**

1. It is not appropriate to consult airplane manufacturers on matters of occupant health and air quality.

2. Public/occupational health experts are best suited to review existing standards and propose revisions or new standards. Members of an industry-dominated ARAC group are best suited to provide input on the feasibility of and technical considerations necessary to install such equipment. The FAA has not reported that it plans to include experts with appropriate industrial hygiene/medical expertise, and has postponed ARAC activity until the Boeing/ASHRAE study is completed (early 2007).

3. The FAA standard for carbon dioxide is five times higher than the ASHRAE standard that is widely applied in non-industrial work sites. Also, the FAA’s carbon monoxide standard is simply the OSHA 8-hour standard. It is inappropriate not to modify OSHA’s carbon monoxide standard for application in a reduced oxygen environment where the effects of exposure to carbon monoxide are exacerbated. It is also inappropriate to cite an OSHA standard for the general public. Worker health experts, NIOSH and the ACGIH,
deem the OSHA standard for carbon monoxide to be inadequate to protect workers, even in ground-based industrial environments where it is applied.

4. The FAA does not clarify on what basis aircraft air quality been rated as “acceptable.” This rating is generally inconsistent with those of our members and, anecdotally, of the flying public as a whole.

5. The FAA does not clarify how its standards protect against, or mitigate the impact of, exposure to pesticides, flying through ozone plumes and flares of cosmic radiation, contamination of the air supply systems with heated oils and hydraulic fluids, and substandard supply air drawn into cabin during ground operations due to the air intake generally being located adjacent to diesel-powered ground service vehicles and aircraft deicing and/or fueling operations.

**NRC Recommendation #2 – Regulations for Ozone**

“FAA should take effective measures to ensure that the current FAR for ozone is met on all flights, regardless of altitude…”

**FAA response:** “Although additional research may be needed…ozone concentration does not represent a threat to the occupants of large transport category airplanes.” To support this statement, FAA cited the ozone monitoring results on: (1) Three flights along the west coast of the US in July 1990; and (2) Eight flights, half domestic and half international, in July 1998. The FAA also said “the ARAC review will address design mitigation strategy and means of compliance.”

**Concerns:**

1. Public/occupational health experts are best suited to address the need for ozone control and monitoring. (As has been already been done by the NRC committee.) Members of an industry-dominated ARAC group are best suited to provide input on the feasibility of installing necessary equipment. The FAA has not reported that it plans to include experts with appropriate industrial hygiene/medical expertise, and has postponed ARAC activity until the Boeing/ASHRAE study is completed (early 2007).

2. The maximum allowable (peak) ozone concentration cited in the FAR is 2.5 times higher than even the NIOSH standard for occupational exposure to ozone, and even then, there is no assurance that the FAR is being met because in-flight monitoring is not required.

3. The FAA selected a very limited – and somewhat irrelevant – subset of ozone monitoring data. Specifically:

   - The three flights that NIOSH monitored on two MD80 aircraft were operated along the west coast of the US and did not include any high altitude/latitude flights where ozone is a particular concern. (The primary intent of this sampling was to characterize levels of CO, not ozone.) Also, ozone levels at flight altitudes
are naturally elevated in late winter/early spring, not July when these samples were collected. Interestingly enough, three of four flight attendants reported some symptoms consistent with ozone exposure on one of these flights during which the average ozone concentration measured was considerably higher than on the other two flights, but still 18 times lower than the FAA limit for average ozone concentration. The peak ozone level during that one flight was the highest measured, but still only one-third of the FAA peak limit. On the remaining two flights, all four flight attendants reported that the air quality was normal or better than average, consistent with the relatively low levels of ozone and other contaminants that were measured. The NIOSH researchers reported that they conducted the air sampling from three seats, spaced throughout the cabin. Research has shown that sampling at seat level can underestimate ambient ozone levels by up to 40% (van Heusden and Mans, 1978). Finally, the numbers of hours that the ozone converters had been in service, relative to the industry norm, were not reported.

- Regarding the B777 sampling conducted by Consolidated Safety Services and Lockheed Martin, only half of the eight flights were on international routes; the other half were domestic flights where ozone levels are largely not expected to be a particular concern, relative to high latitude/polar flights. Also, again, the sampling was conducted in July, not when ozone levels at flight altitudes are naturally elevated. Finally, the number hours that the ozone converters had been in service, relative to the industry norm, were not reported.

4. The FAA appears to put more credence in the two research papers described above than on the NRC committee review of all available research. Of particular concern is the recent NIOSH ozone sampling results reported by NIOSH Director, John Howard, during his June 5 testimony, namely, that ozone exceedances (relative to the FAR) were identified on five of 37 monitored flights. The FAA funded this work, but did not appear to consider the results. Independent of the NRC committee recommendations, the FAA did not appear to consider published studies that have reported an association between reports of ozone-related symptoms and high altitude flights. For example:

- **Tashkin et al., 1983.** UCLA researchers published their comparison of respiratory symptoms of flight attendants during high-altitude flight on 747SP to those on lower-flying 747 aircraft. Flight attendants were significantly more likely to report ozone-related symptoms on the 747SP flights than on the 747 flights, despite the fact that this methodology would seem to dilute any effect of ozone-related symptoms, because 747 aircraft still fly high enough to encounter ozone. The authors also concluded that ozone could not be to blame for the 21 flight attendants who reported moderate to severe symptoms after 747SP flights, because their lung function tests conducted 10-14 days later were normal.

- **Reed et al., 1980.** CAHDS reported their analysis of questionnaire data obtained from 1,330 flight attendants working for three different airlines. They found that
"ozone-toxicity type symptoms were reported three to four times more frequently by flight attendants with airlines flying at high altitudes than by those with low-flying airlines…[and] symptoms were significantly associated with flight altitude, duration, and type of aircraft."

- **van Heusden and Mans, 1978.** Researchers reported ozone measurements taken during two transatlantic flights in March 1977 on a DC10-30 aircraft. They noted that "peak readings up to [0.580ppm] were obtained and, for many consecutive hours, the [threshold limit value] was greatly exceeded…It is clear that the [monitored] flights can certainly be described as unfavorable, but it is also true that ozone concentrations during other flights might be even higher."

In conclusion, the relevant NRC committee recommendations have not been met. The potential for ozone exceedances are clear. One could maintain that, to properly put all of this ozone exposure potential information in context, it is necessary to have more information on whether ozone converters were on board, and if so, how many hours they had been in service, and how did the service hours compare to the norm. This would indeed be helpful. However, it must be noted that the FAA does not require operators to install ozone converters. The FAA considers ozone converters (and even then, not explicitly) as one means to comply with the ozone FAR (AC 120-38). Other acceptable means include a statistical analysis based on “acceptable atmospheric ozone statistics” or “flight planning procedures” that include adjustments to the altitude or route flown.

### NRC Recommendation #3 – Air Cleaning Equipment

> “FAA should investigate and publicly report on the need for and feasibility of installing air cleaning equipment…”

**FAA response:** “FAA…is in the process of tasking an ARAC to review the existing standards and, if they are found to be inadequate, to propose new standards.”

**Concerns:** Public/occupational health experts are best suited to address the need for air cleaning equipment. Members of an industry-dominated ARAC group are best suited to provide input on the feasibility of installing such equipment. The FAA has not reported that it plans to include experts with appropriate industrial hygiene/medical expertise, and has postponed ARAC activity until the Boeing/ASHRAE study is completed (early 2007).

### NRC Recommendation #4 – Carbon Monoxide Monitoring

> “FAA should require CO monitor in the air supply ducts to passenger cabins and establish standard operating procedures for responding to elevated CO concentrations.”

**FAA response:** “Available data do not suggest that a continuously operated air quality monitoring system will add significant benefit for passengers and crew, especially relative to the added cost…FAA’s internal review has shown that air quality events or failures that impact
cabin air quality are highly improbable (i.e., between $10^{-5}$ and $10^{-7}$). As noted above, the issue of air contaminant isolation will be included in FAA rulemaking activities.”

Concerns:

1) Public/occupational health experts are best suited to address the need for air contaminant isolation. (As has been already been done by members of the NRC committee.) Members of an industry-dominated ARAC group are best suited to provide input on the feasibility of and technical considerations necessary to install such equipment. The FAA has not reported that it plans to include experts with appropriate industrial hygiene/medical expertise, and has postponed ARAC activity until the Boeing/ASHRAE study is completed (early 2007).

2) On the one hand, the FAA says that its internal data indicate that contamination events are “highly improbable”; on the other, the FAA recognizes that its “estimates may understate actual occurrences...because there is currently no requirement that crewmembers report ‘air quality’ events” (page 10).

3) The NRC committee considered in-flight exposure to carbon monoxide a serious enough threat to recommend that it be continuously monitored on all aircraft. Immediate notice to pilots of elevated carbon monoxide levels could prevent accidents. Monitoring data would assist affected passengers and crew in obtaining appropriate medical treatment, and in the case of crews, prevailing in their workers’ compensation cases.

**NRC Recommendation #5 – Allergens**

“Because of the potential for serious health effects related to exposures of sensitive people to allergens, the need to prohibit transport of small animals in aircraft cabins should be investigated...”

**FAA response:** The FAA issued Advisory Circular 121-36 (12/31/02), listing tips for passengers to avoid exposure to peanuts and small animals that may be on board.

**Concern:** There are individual cases (such as guide dogs) where it may be necessary for small animals to enter the passenger cabin. However, the benefit of issuing an Advisory Circular remains to be seen; health-based Advisory Circulars issued by the FAA have a history of being widely ignored.

**NRC Recommendation #6 - Health Information**

“Increased effort should be made to provide cabin crew, passengers, and health professionals with information on health issues related to air travel...”

**FAA response:** “FAA has established and will continue to enhance a readily accessible portion of the CAMI website to provide appropriate health and medical information and recommendations that it is as up-to-date as possible.”
**Concerns:** The information is not accessible and is extremely limited. Visiting the FAA website (the most likely entry point for passengers) the only relevant links are “Safety Tips” and “Air Travelers [sic] Info.” Both links connect to the same page that gives passengers tips for what to wear to the airport and how to pack for their trip. Even if a passenger know to go to the “CAMI” website, which seems very unlikely, the only health-related information posted is on SARS. Other aircraft air quality problems, cosmic radiation, and pesticides are not mentioned.

**NRC Recommendation #7 – Ventilation Shutdown**

*“The committee reiterates the recommendation of the 1986 NRC report that a regulation [emphasis added] be established to require removal of passengers from an aircraft within 30 minutes after a ventilation failure or shutdown on the ground...”*

**FAA response:** The FAA issued Advisory Circular 121-35 (1/16/03) instead of a regulation, including a recommendation that “air carriers whose airplanes do not have the systems to provide cabin ventilation on the ground carefully consider the possible adverse effects of periods of time on the ground without cabin ventilation.”

**Concern:** AFA concurs with the FAA’s recommendation that “airplanes that have systems to accommodate cabin ventilation and cooling on the ground should use full ventilation” and “a failure or shutdown of the ventilation system should trigger active passenger management such as passenger removal or the introduction of ventilation ground carts”, but it is highly unlikely that this Advisory Circular will have any impact on daily operations. Health-based Advisory Circulars issued by the FAA have a history of being widely ignored.

**NRC Recommendation #8 – Surveillance Program**

*“To be consistent with the FAA’s mission to promote aviation safety, an air quality and health surveillance program should be established...The health and air quality components should be coordinated so that the data are collected in a manner that allows analysis of the suggested relationship between health effects or complaints and cabin air quality.”*

**FAA response:** “With the cooperation and coordination of the airlines, flight attendants, and other parties, a health effects survey could be used [emphasis added] on a small number of monitored flights (NRC’s report suggests 100 flights) to support linkage of air quality sampling and comfort and health effects...FAA could provide [emphasis added] some laboratory analytical support for [an] ad hoc sampling program...Each of the [other NRC suggestions such as reviewing aircraft maintenance records, focusing on “problem aircraft”, and analyzing contaminants in air filtration systems] will require further investigation [emphasis added] by both government and industry to determine feasibility and potential effectiveness.”

**Concerns:** The FAA only comments on what it could do, not on what it is doing or plans to do. It is true that the FAA has contributed $50,000 to a Boeing-led study conducted under the auspices of ASHRAE, and has allocated $500,000 to the Johns Hopkins Applied Physics Laboratory to develop monitoring equipment on two aircraft. However, as AFA and other
crewmember unions have said for years, the Boeing/ASHRAE study will simply assess air quality on a handful of clean planes, and not answer any of the “unanswered” questions about aircraft air quality, such as the incidence of supply air contamination events, an assessment of air quality during ground operations (anecdotally, known to be problematic), and whether “gaspers” can be used to reduce the risk of infectious disease transmission between neighbors. Further, it does not seem an effective use of funds to spend $500,000 to equip two aircraft with complex monitoring equipment that would be prohibitively expensive – and probably unnecessary – to apply fleet-wide.

**NRC Recommendation #9 – Research Program**

“To answer specific questions about cabin air quality, a research program should be established...” [Note: NRC committee characterized the following as “high priority”: characterizing the relationship between occupant health and: ozone concentration; cabin pressure; outside air flow, especially infectious disease transmission; exposure to toxic chemicals when heated oil or hydraulic fluid enters the air supply system; pesticide exposure; and low relative humidity.]

**FAA response:** “A preliminary sampling of a number of aircraft could help [emphasis added] define the ozone concentration levels and, if a number of aircraft without ozone converters are sampled, a preliminary finding on the effectiveness of ozone converters could be developed [emphasis added]...An in-depth review of current medical research should be conducted [emphasis added] to determine if adequate information is available to getter advise physicians and the flying public on medical fitness to fly questions...[CAMI and NIOSH are evaluating the potential spread of biological or chemical weapons materials in an aircraft...] FAA and industry knowledge of the frequency of air quality incidents would be [emphasis added] improved by requiring crewmembers to report all such events. The issue of air quality incidents will be included in FAA rulemaking activities.”

**Concerns:** See response to Recommendation 8 above.

**NRC Recommendation #10 – Research Program Lead Agency**

“The committee recommends that Congress designate a lead federal agency and provide sufficient funds to conduct or direct the research program proposed...An independent advisory committee with appropriate ... expertise should be formed to oversee the research program...”

**FAA response:** “The FAA concurs...and recommends that the FAA be designate at the lead federal agency for the air quality research program and that sufficient additional funding be appropriated...The FAA Administrator will recommend to the Secretary of Transportation that a cooperative effort with the TSA be initiated to place sensor devices [related to biological and chemical terrorism] on U.S. air carrier aircraft.”

**Concerns:** FAA has shown neither the interest nor the expertise in protecting crewmember or passenger health since it adopted jurisdiction in 1975. In addition, the FAA response did not address the recommendation for an independent and qualified oversight committee. FAA staff
does not have the necessary training in epidemiology, toxicology, medicine, or public/occupational health matters.