Anatomy of an occupational hazard: Cabin air contamination in the air transportation industry**
Part 2. Root cause

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The primary aim of the 1978 Airline Deregulation Act in the USA was to encourage competition with the effect of lowering fares, rendering air travel more accessible to a wider segment of the population. Unsurprisingly, airline revenue plummeted. The resulting need for drastic cost-cutting was partly met by neglecting costly engine maintenance which, in turn, led to cabin air contamination. Nevertheless, airlines have tended to ignore it and some now discourage pilots from diverting flights in case of a significant contamination event. The health of pilots and flight attendants has been impaired yet employees are denied compensation; the regulatory body, the FAA, has dismissed concerns and failed to adequately investigate contamination events. With hindsight, it is astonishing that vital health and safety consequences of legislation were so completely overlooked.

1. INTRODUCTION

The primary aim of the Airline Deregulation Act was to encourage competition and lower fares. It led, however, to unforeseen challenges for the industry. Revenue from airfares plummeted, leading to acquisitions, mergers, and bankruptcies. Aggressive cost cutting in the new environment found the high expense of maintaining the new, high bypass turbofan engines could not be supported as intended. This unintended consequence of deregulation ultimately engendered the cabin air quality issue that plagues the industry today. (So much a consequence was this that the subject must be addressed fully in the next Part of this occupational hazard story.) The response from industry stakeholders has been mixed. Some executives deny allegations of fumes in the cabin. To them their world is rosy. Some implement policies for the sole purpose of avoiding cost. Pilots and flight attendants have been injured yet denied workers compensation benefits for illness caused by cabin fumes. The FAA avoids investigating incidents for fear of exposing a problem that would require a public response. Public awareness of the cabin air quality issue could upset the entire air transportation system. With hindsight, it seems astonishing that vital health and safety consequences of the original legislation were so completely overlooked.

2. AIRLINE INDUSTRY RESPONSE TO COMPETITIVE MARKET FORCES

2.1 S. 2493—the Airline Deregulation Act of 1978

We have hinted at the 95th US Congress having too hastily and with little foresight ratified the Deregulation Act [1]. Why did Congress settle upon free enterprise as the saviour of the airline industry?

The very first sentence of the Act states: "To amend the Federal Aviation Act of 1958, to encourage, develop, and attain an air transportation system *which relies upon competitive market forces* to determine the quality, variety, and price of air services, and for other purposes" (emphasis added).

"Competitive market forces" were all the rage in the 1970s; this viewpoint was epitomized by Paul Samuelson, author of the what many consider to be the standard text in economics, *Economics*, fell into line with the popular interpretation that the very best economic outcome for all of society was to remove all government oversight from business enterprise. In this fashion the world's economies could benefit from the theories of the Scottish father of modern economics, Adam Smith. His still-influential work, *The Wealth of Nations* [2], asserts that regulations impinging on commerce are ill-founded and counterproductive. He then explains the theory based upon his personal ethics and "moral sentiments".[1] He explains that when a businessman pursues his own self-interest, an "invisible hand" acts to ensure that everyone else, including society, benefits.

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** Dedicated to ill and disabled crewmembers and those who continue to be exposed to contaminated cabin air.

[1] Cf. ref. 3.

Journal of Biological Physics and Chemistry **23**(2023) 20–24
Received 21 June 2022; *accepted* 31 March 2023

doi: 10.4024/17LI22A.jbpc.23.01

2.2 The airline industry after deregulation

Ticket prices began to loosen somewhat, and when the Civil Aeronautics Board (CAB) was disbanded prices fell drastically as the newly-released airlines began to compete. Revenue that had been available from CAB-promulgated airfares (that were set to service and finance costs) immediately became unavailable. Nowhere in the deregulation literature are costs of airline operations mentioned. From lawmakers to executives, it appears no one thought about it. For the air carrier executives, it was swim or sink.

Deregulation threw air carrier executives into a passionate obsession with corporate survival. From 1985 to deep into the 21st century, survival was the only option, the only goal. If we consider the histories of 24 air carriers from a 1970s list of major air carriers, we soon realize that five-sixths, 83%, failed through acquisitions, mergers or liquidation. The last important merger, U.S. Airways (Survivor)/American Airlines (acquired), occurred in December 2013. Upon merging, the victor, U.S. Airways, changed its name to American Airlines. Today only four airlines from the old days survive.[2]

A portion of the story has been told [4]. What that paper does not mention is the really ugly [5], which has evolved since CAB disbandment on 1 January 1985—toxic air insidiously began to enter occupied areas of airliner cabins where pilots and flight attendants spend their careers; and where unsuspecting passengers were now enjoying low fares.

3. FEAR

The Airline Deregulation Act of 1978 imposed a very foreign environment upon air carrier executives, micromanaged by CAB officials for 40 years; competition between carriers had been forbidden. Airline executives had no experience with competition. They did suspect unfettered competition would reduce ticket prices, which was *the one and only goal of the US lawmakers*. They didn't anticipate the overpowering need for market share. They didn't fully anticipate the aggression that would soon develop into a survival-of-the- fittest war each air carrier would visit upon rival carriers.

Zealously cutting costs to align expenses with income that had been depressed by falling ticket prices, they soon found their revenue streams remained inadequate. Prices in other industries are determined after essential costs plus a margin for profit are factored into the pricing formula. Pricing to cover costs and expenses is elementary to sound business management. The Airline Deregulation Act, a law made mostly by attorneys and economists, not businessmen, required revenue be set, first and foremost, by forces of competition, not by sound business practices. Striving for market share, airline executives went at each other tooth and nail. As revenue fell, expenses had to be lowered to match. We cannot easily view those old profit and loss statements, but we can accurately understand why bankruptcies soared. One consequence of the effort to cut costs was the necessity to avoid expensive engine overhauls. This avoidance caused gradual engine oil seal deterioration. This was, and remains, a long-term process of unmitigated wear-and-tear, which would in due course create the cabin contamination problem.

Let us look at how members of the air transportation industry reacted.

3.1 Executives and senior managers

- Did not at first believe that oil leaks would occur in a way that could affect occupants inside the aircraft. They denied all allegations. Because of the curtain of silence, we can only surmise that manufacturer design and build personnel suspected engine deterioration. If so, they should have told their customers the truth. Assuming that carrier executives were truthfully briefed, that is where the truth seems to have stopped.
- Spun untruths that have been and continue to be spoken in response to employee pleadings, employee injuries, workers compensation claims and media fume reports.
- Bewail when because of fumes a captain has to divert to an airport short of destination. The further consequences: a supernumerary airplane with crew, passenger inconvenience, crew injuries or illness, passenger illness, an extra landing fee, connecting flights missed or delayed—all resulting in additional costs.
- Some carrier managers now prohibit diversions. Their orders: fly to destinations; work through the fumes; fumes are not dangerous, if you feel ill it will soon pass.[3]

[2] https://www.airlines.org/dataset/u-s-airline-mergers-and-acquisitions/

[3] On 17 June 2022 the author received a report from a flight attendant saying that at her airline, flight attendants are required to be at work regardless of whether they: (a) have been made ill by fumes; (b) need time to recover from respiratory or neurological injuries from fumes; (c) have contracted Covid-19 and are ill from the virus. Failure to be at work, flying their schedules regardless, results in punitive demerits on their employee record.

3.2 Pilots

- Do not wish to speak of the cabin fumes problem. Their jobs are their lives. As they age and grow experience, alternative employment options decline.[4] One airline captain specifically would not chat about fumes because, he said, "I'm afraid I'll lose my job".
- Some of them defend their positions of responsibility as captains. They make in-flight decisions, especially emergency decisions, according to their education, training and experience with the risk. To them safety and health is paramount. In-flight safety and health is their responsibility and they accept it willingly. But some captains do as their employer demands. At one airline a senior management directive prohibited the flight crew from diverting to an airport short of destination. The assertion was that fumes are not dangerous. If illness results you will soon recover. Fly through it!
- In June 2023, at a memorial service for a disabled, ultimately deceased airline pilot, I met two retired captains. Both were very interested in the air contamination issue. It was soon apparent that both knew very little about the problem. One volunteered that he felt management was keeping itself "wilfully ignorant". I offered my contact information, promising to send the latest documentation. No response has been received. Do they too fear the knowledge?
- Pilots do not rely upon medical help to recover from their injuries. To do so threatens loss of medical certification and, hence, their jobs in accordance with Federal Aviation Regulations (FARs).

Serious health and flight safety issues can result (a) when pilots are not told the truth about toxic cabin air, and (b) when directed to disregard dangerous situations on an aircraft.

3.3 Flight attendants

Flight attendants normally love their job. The last three decades have not been normal. Today they:

- Fear being injured. When ill with significantly disabling symptoms, they need recovery time off. Although injured by fumes, many are denied workers compensation benefits. Their "self-insured" employer has authority over compensability. This constitutes a corporate conflict of interest. The employer's effort to support corporate profits can impose debt upon the employee. When flight attendants cannot reasonably fly and must take time off they forfeit wages. Wages loss compounded by employer refusal to cover on-the-job injuries is debilitating. It has bankrupted some.
- Have shared with the author their bankruptcy experiences. Some have become destitute. No longer able to fly, some resign without benefits.
- Are being intimidated by punitive demerits upon their work record. This is retribution, which is illegal under Occupational Health and Safety Administration (OSHA) rules. The Memorandum of Understanding (MOU) between the Federal Aviation Administration (FAA) and OSHA does not contribute to aviation health and flying safety.[5] Among the work rules infractions are:

  (i) Refusing to fly while ill or suffering from certain injuries.

  (ii) Taking time off to recover from illness and injury from fume events. These periods of incapacitation can be short-term, temporarily incapacitating, permanently disabling, and life-threatening.

  (iii) Allegedly, at some airlines flight attendants are required to work while testing positive for SARS-CoV-2.[6]

3.4 The FAA

By supporting industry defences against contaminated cabin air, the FAA is complicit. FAA authorities deny and generally dismiss toxic issues alleged concerning cabin air. The FAA and National Transportation Safety Board (NTSB) do not investigate incidents of cabin contamination.[7]

Were it not for the MOU,[5] OSHA could investigate and would doubtless easily uncover the toxic problem on aircraft, but the MOU prohibits OSHA from involving itself with any airline issue other than hazard communication, bloodborne pathogens and occupational noise.

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[4] Nearly all pilots purchase loss of licence insurance. More than a few file claims against their loss of licence insurance, but this is a measure taken *in extremis*—they would much prefer to keep working.

[5] https://www.faa.gov/sites/faa.gov/files/about/initiatives/ashp/FAA_OSHA_MOU_2014.pdf

[6] Working while ill with Covid-19 could be excessively debilitating if also recovering from CO poisoning. It is recognized that CO could be in cabin air in small quantities at all times [6]. The possibility of adverse synergy between CO poisoning and Covid-19 has been raised [7,8].

[7] An incident confirms FAA and NTSB unwillingness to investigate (the premiss is that incidents are precursors of accidents as defined in the FARs; the FAA says it investigates incidents, but it does not). U.S. Airways flight 1041 on 16 January 2010 (the return leg of service between Charlotte and St Thomas) was the final leg of a three-part schedule in the same aircraft.[8] The crew did not notice the insidious onset of fumes on the first two legs. We speculate that there was some physiological impairment as

3.5 Airline ground safety departments

The old-time concept of a ground safety department at each air carrier seems to have faded away after deregulation. For most carriers, such a department with its certified professional safety manager would have been a drain on essential revenue, a cost that airline CEOs could not easily justify. Ground safety professionals historically were limited to ground safety matters. Airline flight safety is the responsibility of pilots, who are best for flying safety, but they are ignorant of the wider scope of safety issues. In this case, toxic cabin air reaches into toxicology and environmental pollution. If ground safety professionals were still employed by the airlines, they would be imposing themselves upon the domain of the pilot. Today, no one is taking responsibility for cabin air contamination. Although I have been both a military transport pilot and a safety professional, pilots, whether active or retired, will not speak with me. Ground safety departments today appear to be managed by employees selected from within the company. Their effectiveness is uncertain, their concern about cabin air quality is absent. A certified safety professional, were they employed today, would be ethically and morally bound to investigate and take action against toxic air contamination.

4. COST CUTTING

Cost cutting is closely aligned with the "Fear" category (§2). Fear of failure to be sufficiently frugal and aggressive against cost was and to some degree remains a significant part of raw survival in the airline industry. Immediately after deregulation wages and benefits were drastically cut, along with in-flight services and other passenger comforts. Some airline executives were so cornered by insufficient funds that they offered voluntary furloughs to workers "for the good of the company". Loyal flight attendants among others stepped up. The author's daughter served her employer, U.S. Airways, without reward by taking a six-year voluntary furlough. Her sacrifice was a contribution to her employer as it navigated its bankruptcy reorganization that began in August 2002. That sacrifice may also have helped American Airlines avoid bankruptcy, the only US airline that did not file for court-managed reorganization [9].

Workers compensation insurance in the USA is governed under individual state oversight. This means that 50 different state laws must be reviewed to understand how on-the-job injuries are addressed. Commercial insurance policies that are required by law at every airline were cancelled all at once in 1980. For years the airlines had felt that relinquishing claim management to insurance companies, with premium and claim auditing by outsiders, and the insurance companies' built-in 1% profit margin, were not in their best interest.[9]

Those most hurt by the abandonment of commercial workers compensation were the employees. Flight attendants especially, all of whom receive no assistance to recover from carbon monoxide poisoning in the aircraft cabin (and other injuries that are no longer covered for medical and wage indemnity), must accept the charge on their own bank accounts. With work-related injuries incurred and uncompensated through no fault of their own, employees are at risk of developing lifelong health problems.

The largest expense to be avoided or ignored by carrier executives is major maintenance of high-bypass turbofan engines, auxiliary power units (APUs) and the environmental control systems (ECSs) of all bleed-air supplied aircraft cabins. The cost of engine overhauls encourages maintenance deferral. This is considered to be the main reason for oil seal deterioration, oil leaks and cabin fumes [1]. Lack of lawmaker's knowledge in 1978 allowed this dangerous situation to come into existence. Countless airline crew members have paid the price.

APUs use the same oil as the engines. Inadequate maintenance of APUs is a significant contributor to the problem. Some of the most debilitating injuries are caused by inadequately serviced and maintained APUs. Because they are not flight safety-critical in the way that the main engines are, they tend to receive less maintenance attention.

From 1994 to 2004, maintenance problems contributed to 42% of fatal airline accidents in the United States. Maintenance-related accidents and incidents are caused by a breakdown of organizational processes, decisions and culture.[10]

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the number of cycles—each one takeoff and one landing—and flight hours increased. Slight fumes were noticed just after departure from St Thomas. In cruise, flight attendants noticed the red eyes of both pilots. The pilots looked at each other in wonder. They did not notice any flight deck odours. Unaware of such a thing as a fume event and feeling no illness, the pilots continued to destination. Upon descent and approach both pilots had become incapacitated. Although the captain, a former USAF C-5 pilot, had experienced hypoxia during pressure chamber training, he did not equate the experience with hypoxia by other means, hence could not discern the urgent need for ready and available oxygen. The pilots managed somehow to land the aircraft at Charlotte without losing consciousness. Neither remembered landing. Both lost their medical certification. The captain took his own life six years later.

[8] https://avherald.com/h?article=425f6a41

[9] That decision by carrier management ended the author's one and only executive career path, so in a sense he is also a victim of deregulation.

[10] https://hbswk.hbs.edu/item/cost-cutting-leads-to-turbulence-in-the-airlineindustry (podcast).

5. CONCLUSION

Although the content of this paper does not emphasize the lack of official oversight, that fact is an integral part of the definition of "free markets", "free enterprise" in general, and the political lust for small government. Banking and finance, real estate, energy, transportation (rail, motor carriers), firearms are examples. Consequences are heavily weighted toward financial imperatives; physical harm is however apparent in transportation (and the USA's love affair with guns).

Consequences of the loss of official oversight for the airline industry include the slide toward monopoly, or big-business-imposed isolation of small competitors, leaving consumer health and welfare unprotected; transparency in operations and accounting are deliberately factored out; and in workers compensation, as well as in finance, fraud against employees, customers and the industry itself are apparent to those who know where to look.[11]

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[11] https://corporatefinanceinstitute.com/resources/economics/deregulation/