INTERNATIONAL AEROSPACE CONFERENCE

AIRCRAFT CABIN AIR CONFERENCE

Flight Safety and Cabin Air Quality

2 Day Conference

19-20 SEPTEMBER 2017

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OVERVIEW & MEMBERS

GCAQE

A global coalition of health and safety advocates committed to raising awareness and finding solutions to poor air quality in aircraft.

The Global Cabin Air Quality Executive (GCAQE), established in 2006, is the leading organization representing air crew (pilots, cabin crew and engineers), that deals specifically with contaminated air issues and cabin air quality. We represent over 25 organizations, and over one hundred thousand workers around the world.

The primary purpose of the GCAQE is to address the ongoing health and flight safety issues related to crewmembers, passengers and ground workers being exposed to aircraft engine oils, hydraulic and other fluids that contaminate the aircraft breathing air supply.

We are the credible, unified voice of airline workers and engineers regarding the hazards posed by exposure to contaminated ventilation supply air on aircraft. We offer practical tools to assist our member unions, and we connect our members across the globe to work together to prevent exposure to toxic fumes on aircraft.

www.gcaqe.org

CONFERENCE **ENDORSED BY:**

DA VENIAM SCRIPTIS QUORUM NON GLORIA NOBIS CAUSA, SED UTILITAS OFFICIUMQUE FUIT

INTERNATIONAL JOINT POLICY COMMITTEE OF THE SOCIETIES OF EPIDEMIOLOGY

European Sealing Association e.V.

MEDIA **PARTNERS**

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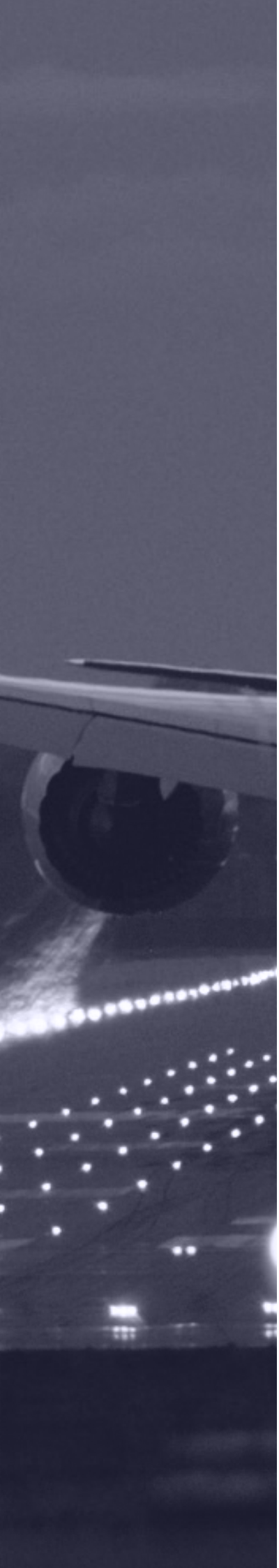
MEMBERS OF THE GCAQE INCLUDE:

- ACA – Austrian Cockpit Association;
- ACPA – Air Canada Pilot's Association;
- Aeropers – Swiss Airline Pilots Association (Swiss ALPA);
- AFAP – Australian Federation of Air Pilots;
- ALAEA – The Australian Licensed Aircraft Engineers' Association;
- APA – Allied Pilots Association;
- ALPL – Association Luxembourgeoise des Pilotes Ligne;
- APFA – Association of Professional Flight Attendants;
- AIPA – Australian & International Pilots Association;
- BASSA – British Airlines Stewards and Stewardesses Association;
- BECA – Belgian Cockpit Association;
- CUPE – Canadian Union of Public Employees;
- FPU – Flight Personnel Union, Denmark;
- FSC-CCOO – Federation of Citizen Services;
- Kapers – Kapers Cabin Crew Union;
- NFO – Norsk Flytekniker Organisasjon;
- PPU – Professional Pilots Union
- Rolls Royce Unite the Union Branch;
- SNPL – Syndicat National des Pilotes de Ligne;
- SNPNC – Syndicat National du Personnel Naviguant Commercial;
- SWEALPA – Svensk Pilotförening | Swedish Airline Pilots Association;
- Uiltrasporti – Italy
- Vereinigung Cockpit – German Airline Pilots Association;
- VIDA – Austrian Federation of Trade Unions;
- ZZPK – LOT Polish Airlines Pilots Union;



AIRCRAFT CABIN AIR CONFERENCE 2017

Dear Delegate

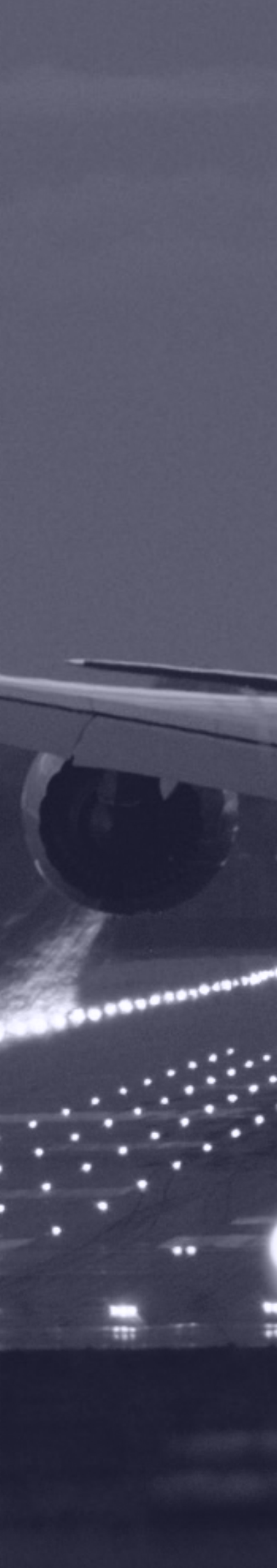
On behalf of all our sponsors and partners, welcome to the Aircraft Cabin Air Conference 2017. We are delighted to be the first conference to take place in the new Imperial College facilities you are visiting. I am certain that over the next two days, our diverse range of speakers will provide you with a unique and greater insight into the issue of contaminated air on aircraft.

I organised the last major conference held on this topic back in 2005 for the British pilot union BALPA. Twelve years ago, Pall Aerospace were part sponsors, so I am delighted they have again chosen to be part of this conference where they will also present their technical achievements over the last decade of R&D. Twelve years on from the last conference, the theme is much the same but the science and understanding of the issue has vastly improved and today we are much closer to an effective resolution of the problem.

I became involved in this issue in 2001 when I was a Captain with British Airways whilst flying the Boeing 757 and Boeing 767. At the time, I was a Health & Safety representative for the UK pilot union BALPA and part of my duties involved dealing with long-term sick pilots. A fellow Captain phoned me and informed me that he had experienced a number of exposures to contaminated air in the aircraft he flew and was being ill health retired by the company. He believed that the exposures to oil fumes we were experiencing were a serious health and flight safety issue. He mentioned the word 'organophosphate', a word I had never heard of and asked me to investigate the issue. I have been doing so ever since.

Over my sixteen year journey, I have de-briefed more than a thousand crews and passengers over 6 continents who have had contaminated air exposures. I have heard their concerns about flight safety being compromised; a reluctance to report events; pilots not using emergency oxygen when the air was suspected of being contaminated; crews becoming impaired and incapacitated; their desire to have a definitive medical test to confirm exposure to one or more of the contaminated air ingredients and their collective desire that this issue be resolved for the benefit of all in aviation. Some of these crews and passengers have lost their health and their livelihoods and some are no longer with us.

I have seen the misinformation put out by those who fear the consequences of contaminated air; I have witnessed the vested interests at work; the denial and the fear of litigation. I have sat on aerospace and Government committees; briefed regulators and safety agencies; met and discussed the issue with lubricant manufacturers, politicians, aircraft and engine manufacturers, press, doctors, scientists, union leaders and countless others. I have also made three documentaries and a feature film on the issue.



I have heard all sides of the debate. I have met many people who lack the expertise and knowledge of the issue, yet are empowered to make key corporate or operational decisions in these matters. I have heard it said that contaminated air events are some form of global mass hysteria; it's all linked to the contraceptive pill or something a person ate. On the other side, I have heard it called the asbestosis of the skies or aviation's biggest cover-up.

Having experienced the flight safety consequences of exposure, I suffered the health effects first hand and lost my own career to repeated exposure to contaminated air at the age of 44. I know it is a very real issue and one that has to be addressed.

I love aviation, I love what it has achieved and I miss the job I once had but the simple reality is that aviation has a design flaw in providing breathing air on aircraft as unfiltered bleed air from engines. The original passenger jet aircraft like the Boeing 707, DC-8, Convair 880/990 and VC-10 were designed not to use bleed air directly for pressurisation and air-conditioning and like many things in life – the first ideas are often the best.

The Boeing 787, with its revolutionary bleed free architecture, is without doubt the only sensible solution for future aircraft design. The crews who work on the 787 tell me it is a whole new world compared to other aircraft. I believe all current 'bleed air' aircraft should have an effective filtration system and warning systems installed to minimise as much as possible, the health and flight safety consequences of exposure.

In my opinion, it's not morally or ethically right to continue to debate the health and flight effects of exposure to contaminated air, whilst still allowing crews, fare-paying passengers (some pregnant) and others to be exposed to contaminated air.

In my career, I have seen aviation effectively mitigate the risk of numerous threats to flight safety: TCAS, EGPWS, CRM, the 'glass cockpit' and the advent of fly-by-wire to name a few. Aviation has the ability to resolve this problem. All it needs is the will to do so.

Most passengers I have met would pay for clean air if given a choice. They pay for nearly everything else, their seat, baggage, meals and security. All it takes is to stop the denial, fix the problem and make air travel as safe as is reasonably possible: Minimise the risk – adapt the Precautionary Principle.

United Airlines took a world lead many decades ago by being the first airline in the world to introduce HEPA filters in all their aircraft for the re-circulated air. Today, the world waits for the first airline to introduce an all 'bleed free' fleet or the introduction of an effective bleed air filtration system to all their aircraft. It is just a matter of time.

Therefore, I am glad the Aircraft Cabin Air Conference 2017 will provide an arena for delegates to better understand the contaminated air issue and conduct productive discussions towards a positive solution to this issue.

Captain Tristan Loraine BCAi
Conference Director
GCAQE Spokesperson
September 2017

DR DAVID **STEIN**

VICE PRESIDENT
STRATEGIC MARKETING,
PALL AEROSPACE

From the world's first cabin air assembly, to our state-of-the-art Advanced Cabin Air Filters, Pall Aerospace has an unparalleled legacy of innovation in the field of Cabin Air Quality.

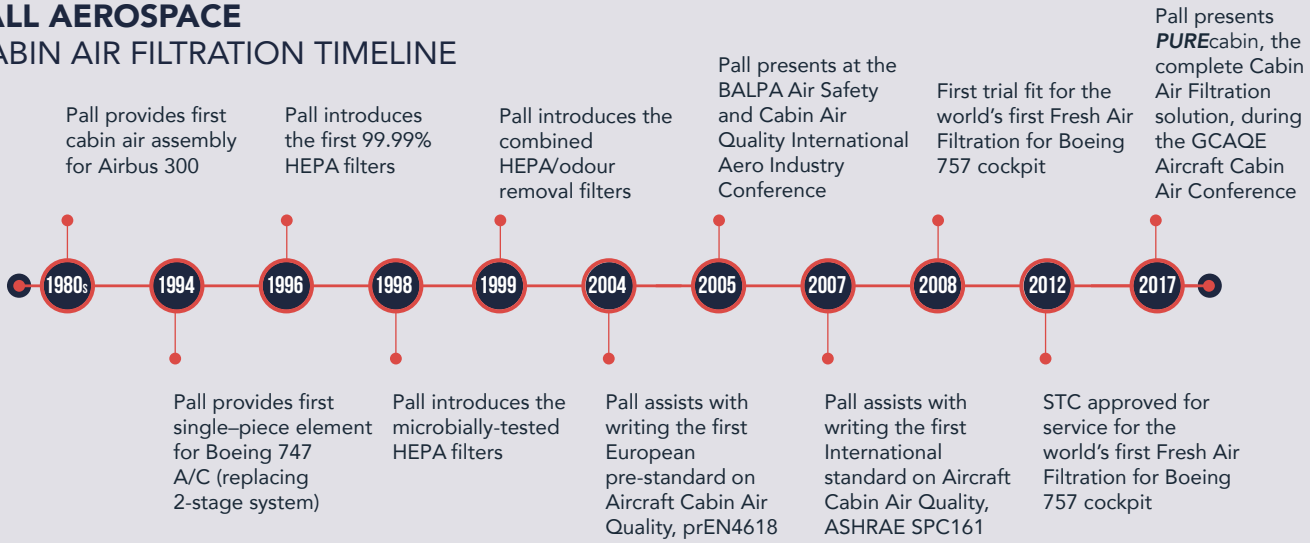
Our integrated filtration, separation, and purification solutions weave together decades of experience in developing and selecting media, designing strong and lightweight hardware, and constantly testing and refining our products to ensure they remain the best solution to both operational and business needs in the challenging aerospace environment.

For Pall Aerospace, accelerating technology development and promoting a culture of innovation is critical to the success of our business. It is through our work with agile and responsive customers that we are able to maintain our position as a global leader in filtration and separation solutions and enable our commercial partners to meet today's industry wide challenges when it comes to fleet maintenance. We work closely with Original Equipment Manufacturers (OEMs) to provide game-changing products and we address the needs of operators around the globe by designing custom-tailored solutions that seamlessly retrofit existing systems.

Our Advanced Cabin Air Filters (A-CAF) and ***PURE***cabin product lines directly address the industry's need to efficiently and effectively retrofit fleets to ensure the optimum level of Cabin Air Quality.

Pall Aerospace is pleased to be able to share details of these products at the 2017 GCAQE Aircraft Cabin Air Conference. We look forward to seeing you there.

PALL AEROSPACE
CABIN AIR FILTRATION TIMELINE



PALL Aerospace

ABOUT PALL AEROSPACE

Headquartered in New Port Richey, Florida, Pall Aerospace is a global filtration, separation and purification solution provider with worldwide offices and plants principally engaged in the research, design, a development, manufacture, integration and sustainment of Cabin Air Filtration products. For additional information, visit our website **www.aerospace.pall.com**

CONTAMINATED CABIN AIR
KEY TIMELINE 1950-2017

1930	Ortho isomers of TCP responsible for toxicity - Ginger Jake
1946	Synthetic lubricants developed
1953	Pyrolised oil contains irritant and toxic substances. Impairment causing pilot error and hazardous situation - Aero Medical Association
1953	Toxic effect of oil contamination unknown - Boeing
1954	Inhalation toxicity of jet oils related to pyrolysis of base stock at high temps - USAF
1955	Cabin air contamination problems in crew - USAF
1955	The separate compressor as a solution – This method of eliminating contamination is considered to be the most positive - North American Aviation
1955	First civil airliner flies using direct bleed air for pressurisation and air conditioning - Sud Aviation Caravelle
1959	Other ortho isomers of TCP: MOCP and DOCP 10 and 5 x more toxic than TOCP - Henschler
1960s	TCP in lubricants replaced with other phosphate esters in all markets except aviation / military
1961	Active metabolite causing TOCP toxicity identified - Casida
1962	Oils shall have no adverse effect on human health / carcinogens prohibited - MIL Specs
1965	Other Triaryl phosphate (TAP) isomers very likely to contribute to toxicity - US Navy
1969	Oil consumption mainly linked to oil leakage past seals/loss via breather - Rolls-Royce
1970	Cockpit warning systems required - FAR 1309c - Not met as of 2017
1973	Internal engine oil leakage shall not contaminate the bleed air - MIL-E-5007D
1977	Aircrew incapacitation due inhalation exposure to aerosolized or vaporized synthetic lubricating oil - Montgomery
1981	Oils being stressed to limits due increased engine temps - Royal Dutch Shell
1981	At temps >320°C oil breaks down into toxic and carcinogenic compounds - SAE
1983	Mobil Jet Oil II assumed to be causing dirty socks odour - Cone
1988	TOCP level in TCP is not a reliable indicator of potential TCP neurotoxicity - Mobil
1989	Recommendation to ban Exxon 2380 from US Navy and test all base stocks - US Navy
1990	Not possible to establish safe level of exposure to TOCP. TCP mixed isomers including TOCP considered major hazard to human health - WHO
1995	Air oils seals must be improved now! - Aerospace consortium – NASA / Allied Signal - ongoing (1950s - present)
1997	Reluctance of crews to report events to employer - fear of reprisals - ATSB
1998	Short term symptoms associated with odours on the BAe 146 and other types are substantiated - Ansett
1999	Oil fumes in cabin air represent a possible safety deficiency - ATSB
1999	TCP is toxic and Inhaling engine oil / TCP is hazardous - UK House of Commons
1999	Employee 'Suffered injury arising out of and in the course of her employment.' - Compensation Court - NSW
1999	TOCP exposure standards not adequately protective for products containing TCP / TOCP - Mobil
2001	Oil fumes seen as a nuisance / should be seen as flight safety hazard (SB/AD) - BAe Systems
2001	Recommendation that crew use oxygen at 100 %, International database established, Oil effects research – SHK
2002	Charge of reprehensible conduct appropriate if necessary precautions and measures not taken by airlines - Abeyratne (ICAO)
2002	Oil leaks and cabin / flight deck odours must be regarded as a potential threat to flight safety - CAA
2002	No aircraft airworthy as no contaminated air detection systems fitted - FAA
2003	Airline cannot guarantee a safe working environment free of oil fumes - NJS
2003	Leaking oil is hazardous - Rolls Royce
2003	Survey of British Airways Boeing 757 pilots shows 96% of all contaminated air events not reported - Michaelis
2004	Airworthiness Directives - Oil contamination - Unsafe condition / design problem - FAA
2005	International conference in London - acknowledges workplace problem - BALPA
2006	TOCP found in pilot's blood after a reported contaminated air event / ill health retired 6 months later.
2006	Under-reporting is occurring - FAA
2007	Oil fumes reported in 1% of UK flights - COT
2006	Global Cabin Air Quality Executive (GCAQE) established
2007	Cabin air quality standard - ASHRAE SPC-161
2007	Senator O'Brian reveals in Australian Senate 'cash for silence' - BAe Systems, Allied Signal, Garrett
2007	Safety Recommendations - Recommended FAA / EASA consider system to enable flight crew to identify rapidly the source of smoke by providing a flight deck warning of smoke or oil mist in the air - AAIB
2007	'Welcome Aboard Toxic Airlines' documentary film released - Fact Not Fiction Films
2007	Public Enquiry into oil fumes called for in the UK - Conservative Party, Liberal Democrats and Green Party

2007	By-products of hot synthetic turbine oil unknown - Boeing
2007-2014	Bleed air monitoring required - APH, NRC, US Senate and Congress, CASA EPAAQ, Bundestag, ASHRAE, AAIB, BFU
2007-2014	Bleed air filtration / cleaning required - APH, SAE, US Senate and Congress, CASA EPAAQ, Bundestag, ASHRAE, BFU
2008	FAA funded medical protocol for fume exposures - OHRCA
2009	Is Inhaling oil fumes safe? No - Bundestag
2009	Toxicity of oils raised with EASA and upgraded MSDS risk phrases - NYCO
2009	Investigate possibility of installing smoke warning system in bleed air ducting of B757 – IPFS Iceland
2010	1st successful civil litigation - J Turner, Australia: Oil harmful to lungs
2010	Documentaries 'Angel Without Wings' and 'Broken Wings – The BAe 146 Story' released - Fact Not Fiction Films
2010	Boeing 757 DHL aircraft - introduce PALL cockpit bleed air filters
2011	Identification of increased TCP / TAP toxicity: Durad 125, TpCP - Furlong
2011	Fumes mostly related to oil / under-reported - EASA
2011	First ever awarded PhD on contaminated air - Dr. Susan Michaelis
2011	Boeing settles legal case (Williams / USA)
2011	Blood test for TOCP exposure developed - Lockridge
2011	Boeing 787 with bleed free architecture enters commercial airline service
2012	Cabin air position statement - ECA
2012	Toxic cabin air 6th biggest engine problem - RR
2012	Air accident report - TOCP in pilots blood after incapacitation - BFU
2012/2013	All future aircraft to be bleed free - CASA EPAAQ, Bundestag, ASHRAE
2013	OSHA and ACGIH have not set exposure limits for decomposition product of synthetic jet engine oils - ExxonMobil
2013	Decomposition reactions of engine oils and toxicity largely unknown - FAA
2015	Cabin fume event guidance published - ICAO
2014	Certification does not cover all contaminated air substances or crew impairment (only Incapacitation) - BFU
2015	Feature film 'A Dark Reflection' exploring contaminated air is released - Fact Not Fiction Films
2015	Documentary 'Unfiltered Breathed in: The Truth About Aerotoxic Syndrome' released - TVBMedia
2016	Do not breathe mist or vapor from heated material / avoid eye and skin contact - Eastman Turbo Oil 2197
2016	TCP inhalation toxicity for engine oils to be undertaken by 2018 - ECHA
2016	Engineering design and operational problem - explains frequency (unairworthy system) - Michaelis
2016	ICAO monitor international actions to determine impact on health and take safety actions - Spanish CIAIAC
2017	Permanent low-level oil leakage in aircraft / >120 contaminants released from heated oils - EASA
2017	Aerotoxic Syndrome - new occupational disease? - Panorama WHO Journal
2017	GCAQE introduces Global Cabin Air Reporting System - GCARS
2017	Oil contamination will result in a fog of very fine droplets in the bleed air under most operating conditions - Jones B et al / ASHRAE / FAA
1954------>	> 100 Published papers to date on contaminated air

INDUSTRY **ACTIONS**

1999-2000	Australian Senate Inquiry
2000	UK HOL Inquiry
2001-2002	US NRC inquiry
2001-2004	UK CAA cabin air quality report
2003-2009	Cabin Air, HEACE, FACE, ICE, ISPACE = €56 million
2003-2012	FAA ACER / RITE research - > U$18 million / 66 grants
2004-2012 (2013)	ASD-STAN - air quality standards - withdrawn
2004	ExxonMobil oil MSDS citation issued by OSHA / cancelled 2005 - OSHA
2005-2007	UK COT inquiry
2007	All oil chemical ingredients must abide by regulations - SAE / FAA
2007-2011	Cranfield monitoring study
2008-2012	Australian CASA EPAAQ
1999-2012	ASHRAE studies
2009-2012	EASA A-NPA
2012/2017	US Senate / Congress CAQ bills
2011	German Parliamentary hearings
2015------>	EU CEN and SAE CAQ standards development
2017	EASA CAQ and oil pyrolysis studies
2017------>	EU Commission and EASA €2 million CAQ study

AGENDA
DAY 1

Subject to change

08:00-08:50 REGISTRATION AND REFRESHMENTS

SESSION ONE:

09:00-09:03 CONFERENCE INTRODUCTION
Captain David Hoy Conference Host

09:04-09:20 OPENING KEYNOTE SPEECH
Countess of Mar Co-Patron of the GCAQE and guest **Captain Nils Gomer**

09:21-09:40 ORIGINS OF CONTAMINATED AIR
Captain Tristan Loraine BCAi
GCAQE Spokesperson

09:41-09:57 THE JET ENGINE INTERNAL AIR SYSTEM
Professor Peter Childs
Head of the School of Design Engineering, Imperial College London

09:58-10:25 MECHANISMS OF OIL LEAKAGE INTO THE CABIN AIR SUPPLY AND REGULATORY IMPLICATIONS
Dr. Susan Michaelis PhD
University of Stirling/Consultant
Mr. John Morton
Chairman European Seals Association

10:26-10:45 AIRCRAFT CABIN AIR AND ENGINE OIL - AN ENGINEERING VIEW
Professor Dr.-Ing. Dieter Scholz MSME
Aircraft Design and Systems Group (AERO) - Hamburg University of Applied Sciences

10:46-10:59 Q&A

11:00-11:25 REFRESHMENTS AND NETWORKING

SESSION TWO:

11:30-11:39 FLIGHT SAFETY: A PERSONAL PERSPECTIVE (FILM)
Captain Ray Cockerton

11:40-12:00 ICAO GUIDELINES ON EDUCATION, TRAINING AND REPORTING OF FUME EVENTS
Dr. Antti Tuori IFALPA - HUPER Vice chair, A320 CDR, M.D, PhD

12:01-12:21 EASA AND FAA KEY FINDINGS
Captain Max Thomson GCAQE Boardmember **Mr. Jordan Bray-Stone** CUPE & GCAQE Boardmember

12:22-12:42 CABIN AIR QUALITY: THE INTERNATIONAL PERSPECTIVE
Mr. Arie Adriaensen
Vereinigung Cockpit/GCAQE

12:43-12:46 GCARS GLOBAL CABIN AIR REPORTING SYSTEM (FILM)
GCAQE

12:47-12:59 Q&A

13:00-13:50 BUFFET LUNCH AND NETWORKING

SESSION THREE:

14:00-14:15 HAIR ANALYSIS, AN INNOVATIVE BIO-MONITORING TOOL TO ASSESS TRI-CRESYL-PHOSPHATE (TCP)
Dr. Vincent Peynet PhD Directeur, Institut de Recherche et d'Expertise Scientifique - IRES

14:16-14:33 A CAPTAIN AND CABIN CREW PERSPECTIVE
Ms. Deanne DeWitt Crew
Captain Michael Kramer P-CoC

14:34-14:50 AIR ACCIDENT INVESTIGATION FINDINGS AND RECOMMENDATIONS
Captain Tristan Loraine BCAi
GCAQE Spokesperson

14:51-15:15 MOVING TOWARDS TOTAL CABIN AIR FILTRATION
Dr. David Stein, PhD
Vice President, Aerospace Global Strategic Marketing, Pall Aerospace

15:16-15:29 Q&A

15:30-15:55 REFRESHMENTS AND NETWORKING

SESSION FOUR:

16:00-16:02 FINAL SESSION INTRODUCTION
Captain David Hoy Conference Host

16:03-16:09 HUMAN INTOXICATION FOLLOWING INHALATION EXPOSURE TO SYNTHETIC JET LUBRICATING OIL
Dr. Mark Montgomery, PhD Toxicologist

16:10-16:35 HEALTH DISORDERS AND BIO-MONITORING RESULTS IN AIRCRAFT CREW MEMBERS AFTER "FUME EVENTS"
Dr. Astrid Heutelbeck MD
Occupational Physician, Germany

16:36-17:04 AEROTOXIC SYNDROME: A NEW OCCUPATIONAL DISEASE?
Dr. Jonathan Burdon MD
Consultant Respiratory Physician

17:05-17:34 HAVE YOU BEEN EXPOSED TO AIRCRAFT ENGINE OIL? - CANDIDATE BIOMARKERS OF EXPOSURE
Professor Clement Furlong
Research Professor of Medicine and Genome Sciences - University of Washington

17:35-17:55 Q&A

18:00-19:30 **DRINKS RECEPTION SPONSORED BY ROLLS-ROYCE UNITE THE UNION WORKERS**

AGENDA
DAY 2

08:00-08:50 REGISTRATION AND REFRESHMENTS

SESSION FIVE:

09:00-09:01 DAY TWO INTRODUCTIONS
Mr. Daniel Tandoi GCAQE Chairman

09:02-09:21 A WIN-WIN-WIN PATH FOR FLIGHT SAFETY, HEALTH AND CORPORATE PROFITS
Professor Colin Soskolne (Keynote Speaker) Dept of Public Health Sciences - Collegium Ramazzini and University of Alberta

09:22-09:31 THE LAST 18 YEARS (FILM)
Senator John Woodley GCAQE Co-Patron

09:32-09:52 INSTALLATION AND DATA ACQUISITION FROM A REAL TIME AIR QUALITY SENSOR (RTAQS) MONITORING PILOT BREATHING AIR
Mr Grant M. Slusher, MS Research Scientist, 711th Human Performance Wing (HPW) of the USAF: (WPAFB)

09:53-10:16 CLASSICAL 'ONE CHEMICAL AT A TIME' TOXICOLOGY CANNOT ADDRESS THE CABIN AIR QUALITY PROBLEM
Professor Vyvyan Howard Professor of Pathology (toxicology) - University of Ulster

10:17-10:41 ORGANOPHOSPHATE-BASED CHEMICALS, AXONAL TRANSPORT AND COGNITIVE DYSFUNCTION
Dr Alvin V. Terry Jr., Ph.D Chairman, Dept of Pharmacology & Toxicology - Augusta University

10:42-10:59 Q&A

11:00-11:25 REFRESHMENTS AND NETWORKING

SESSION SIX:

11:30-11:53 LUBRICANT AND LUBRICANT ADDITIVE DEGRADATION: IMPLICATIONS FOR CABIN AIR QUALITY
Dr David W. Johnson - Ph.D Chairperson, Dept of Chemistry, University of Dayton

11:54-12:17 REACH SUBSTANCE EVALUATION OF TRICRESYL PHOSPHATE (TCP)
Ms Petra van Kesteren National Institute for Public Health and the Environment (RIVM), MSc, The Netherlands

12:18-12:42 TCP MEASUREMENT METHODS USED TO IDENTIFY FLIGHT CREW AND PASSENGER EXPOSURE
Professor Chris van Netten Environmental Toxicology (Emeritus) - University of British Columbia

12:43-12:59 Q&A

13:00-13:50 BUFFET LUNCH AND NETWORKING

SESSION SEVEN:

14:00-14:24 MIND THE GAP? FALLING BETWEEN AVIATION AND OCCUPATIONAL HEALTH SAFETY REGULATIONS, HEALTH AND SAFETY MANAGEMENT AND GOOD PRACTICE IN CONTROLLING CABIN AIR QUALITY
Professor Andrew Watterson Director of Centre for Public Health and Population Health Research - University of Stirling

14:25-14:47 BA286 DIVERSION OCTOBER 2016 A CONSULTANT'S PERSPECTIVE
Dr. Susan Michaelis, PhD University of Stirling/Consultant

14:48:15:12 CONTAMINATED AIR: REAL TIME MONITORING
Mr. Chris Savage Vice President Technology, Pall Aerospace

15:13-15:29 Q&A

15:30-15:55 REFRESHMENTS AND NETWORKING

SESSION EIGHT:

16:00-16:02 FINAL SESSION INTRODUCTION
Captain David Hoy Conference Host

16:03-16:07 HARMFUL TO THE LUNGS (FILM) / EXTRACTS FROM THE DOCUMENTARY 'BROKEN WINGS'
Ms Joanne Turner Former Flight Attendant

16:08-16:28 MAKING THE CASE FOR TOXIC FUME MANAGEMENT
Mr. Cliff Edwards Aviation Risk and Hazard Management Consultant (retired), former Senior Advisor at Shell Aircraft Ltd

16:29-16:49 THE USE OF EXPOSURE STANDARDS IN AVIATION
Professor Andrew Watterson Director of Centre for Public Health and Population Health Research - University of Stirling

16:50-17:10 THE LAW UP IN THE AIR
Mr. Michael Rawlinson QC Barrister - 12KBW / Kings Chambers

17:11-17:31 FROM ASSOCIATION TO CAUSATION: A BRADFORD HILL APPROACH TO AEROTOXIC SYNDROME
Mr. David Gee Visiting Fellow, Institute of Environment, Health and Societies, Brunel University

17:32-17:45 Q&A

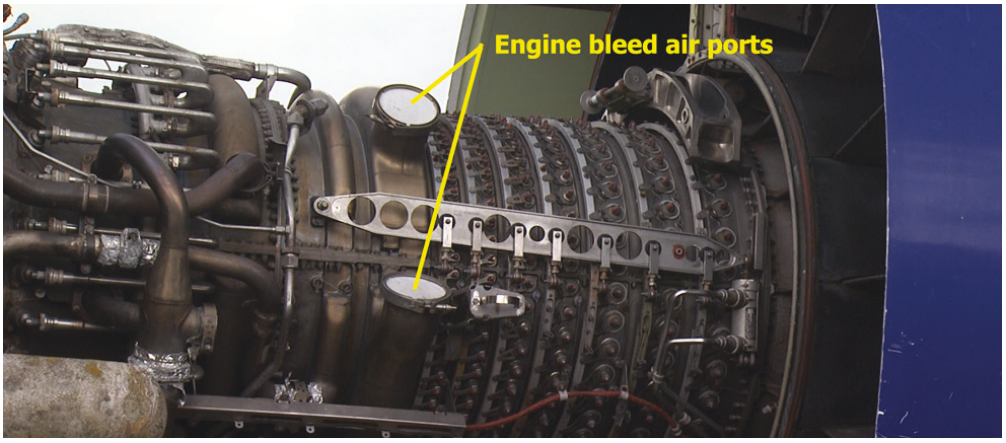
17:46-17:59 CLOSING SPEECH
Mr. Keith Taylor MEP Green MEP for SE England

‘BLEED AIR’ SIMPLIFIED

The air you breathe in-flight, onboard all currently flying commercial passenger jet aircraft (apart from the Boeing 787), originates from the compression section of the engine in a process known as ‘bleed air’ as it is bled off the engine. This air is supplied to the cabin totally unfiltered. Only the recirculated air is filtered, primarily for bacteria and viruses.

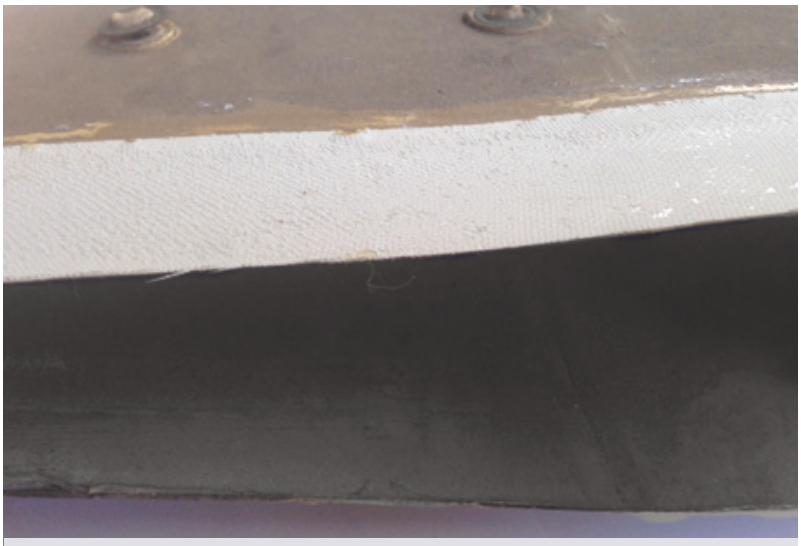
In modern jet airliner engines, ‘bleed air’ is usually provided from two regulator valves on the high stage and/or low stage engine compressor section of the engine. These usually turn on and off automatically. ‘Bleed Air’ is also used for some other purposes like engine anti-icing.

Low stage air is used during high power setting operation, and high stage air (see picture right) is used during descent and other low power setting operations. Because the low stage air is significantly lower temperature than the high stage air, the pyrolised engine oil decomposition products will differ and may provide a different smell in the cabin and cockpit due to a different chemical mixture.



The images below show the air supply ducting on a Vickers VC-10 aircraft which first flew in 1962 (the last non-bleed air aircraft before the Boeing 787 flew) removed from an aircraft at the end of its service life. Compare this to the bleed air-ducting pipe from a Boeing 737 engine, which is black from pyrolised oil contamination.

Bleed air off take port from a Boeing 737.
Interior is black from oil contamination.



Air supply ducting on a VC-10.
Interior is dirty and dusty but has no oil.

Consequently, aircraft should be designed with a ‘bleed free’ architecture, like the Boeing 787 or the ‘bleed air’ should be effectively filtered with accurate contaminated air sensors installed.
GCAQE

CONFERENCE **SPEAKERS**

ARIE ADRIAENSEN - VEREINIGUNG COCKPIT/GCAQE

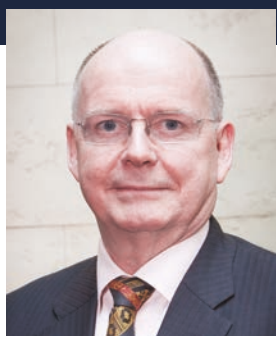
Arie Adriaensen, born in 1973, was an airline pilot until 2009. He has been medically retired after experiencing a series of fume events. He studied Human Factors and System Safety at the University of Lund, where he wrote his MSc thesis about the Competing Discourses in relation to the definition of the cabin air quality problem onboard aircraft. Arie Adriaensen also takes part as an active and observing member in several international committees on the topic of bleed air contamination and is the chairman of the Flight, Health and Environment committee of the German pilots' association, Vereinigung Cockpit.

Besides his efforts to improve the situation surrounding bleed air contamination, Arie Adriaensen is also a Human factors specialist. He researches dynamic and complex socio-technical problems.

MR. JORDAN BRAY-STONE - CUPE & GCAQE BOARD MEMBER

Jordan Bray-Stone has been a flight attendant since 2005, operating both Canadian and International routes. In 2009 he got involved in occupational health and safety through his Union, chairing various committees and dealing with issues ranging from frigid Canadian weather, cosmic radiation, fatigue, musculoskeletal injuries and cabin air quality.

Jordan took over as national chairperson for the Air Canada Component of Canadian Union of Public Employees (CUPE) Occupational Health and Safety Committee in 2015. In 2016, Jordan became a member of the Airline Division of CUPE OHS committee, and interim air quality representative. He has been a board member of the GCAQE since fall 2016.



DR. JONATHAN BURDON - MBBS, MD, M HLTH & MED LAW, FRACP, FCCP, FACLM, FAICD

Dr Burdon graduated in 1971 from the University of Melbourne and was subsequently trained at the Royal Melbourne Hospital. He spent 2 years as a post-doctural Fellow at in the Respiratory Department at McMaster University, Ontario.

Returning to Melbourne, he was appointed as Respiratory Physician at St. Vincent's Hospital in 1983, and assumed the Directorship in 1990, stepping down ten years later. He continues in private practice. He has specific interests in occupational lung disease, is an author of over 120 publications and is a past President Thoracic Society of Australia and New Zealand.

He became involved with the medical effects of aircraft cabin fume events in 1999 and, ever since, has maintained an active and close interest in this emerging and poorly and, not widely recognised, occupational disease.

PROFESSOR PETER CHILDS - HEAD OF THE SCHOOL OF DESIGN ENGINEERING, IMPERIAL COLLEGE LONDON

Peter Childs is Head of the Dyson School of Design Engineering and the Professorial Lead in Engineering Design at Imperial College London. His general interests include: creativity tools and innovation; design; fluid flow and heat transfer, particularly rotating flow; sustainable design; robotics. Prior to his current post at Imperial he was director of the Rolls-Royce supported University Technology Centre for Aero-Thermal Systems, director of InQbate and professor at the University of Sussex.

He has contributed to over 150 refereed journal and conference papers, and several books including the Handbook of Mechanical Design Engineering (Elsevier), Rotating Flow and Practical Temperature Measurement. He has been principal or co-investigator on contracts totalling over £30 million. His role at Imperial includes joint course director for the Innovation Design Engineering double master degree run jointly by Imperial and the Royal College of Art. He is also Director and Chief Scientific Officer at QBot Ltd.

CAPTAIN RAY COCKERTON - FORMER CAPTAIN

Captain Ray Cockerton cut his aviation teeth on DC3's out of Lydd, but moved on to become chief pilot of a small charter company, EUROAIR, flying Islanders. He later moved on to join British Midland flying on the Viscount and DC9 aircraft, followed by Boeing 737 and MD83 flying with Orion, Monarch and Paramount Airlines. The demise of Paramount opened up the door to contract work in Australia (Ansett), a two-year contract in Germany with Hapaag Lloyd and then with British Airways with GO based at Stansted.

This was followed by Airtours and flying the MD83 and Boeing 757. However, the lure of Worldwide operations resulted in Ray joining Sunways (Boeing 757) based in Crete with exotic destinations such as Mombasa and Thailand, but its demise led Ray to Air Europe on the Boeing 767, again with World-wide routes.

The pending collapse of AirEurope directed Ray to join DHL, but after repeated exposure to contaminated air in the cockpit of the Boeing 757 he flew, and Ray experiencing severe and numerous health problems as a consequence of these exposures, he resigned from DHL in 2006 and retired to France where he continues to fly with his PPL.

MS. DEANNE DEWITT - CURRENT CREW

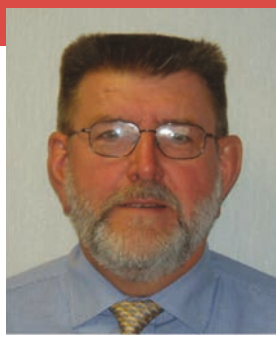
Deanne DeWitt Freise has 27 years of experience as a flight attendant with a major U.S. carrier.

Following a toxic inhalation injury at work in 1992 she challenged herself to improve her health; to investigate the toxic injury; to improve aircraft cabin air quality; and to advocate for crew and passengers exposed to these toxins.

She testified in 1993 at hearings on OSHA Reform before the Congressional Subcommittee on Labor (asking OSHA to take regulatory jurisdiction of airline crew health and safety); testifying in 1994 before the Aviation Subcommittee of the US Senate Committee on Public Works and Transportation (on cabin air quality); participating as a voting member for the ASHRAE Aviation Subcommittee to develop a standard for aircraft cabin air quality; and participating in committees for SAE and AsMA.

In 1999, Deanne was co-presenter to the ASHRAE Aviation Subcommittee of a paper entitled, Cabin Crew Syndrome: A Case Study-Acute and Chronic Symptoms.

In 2015 she took the lead in forming and has been the President and Director of Clean Up Cabin Air, a 501(c)(3) non profit organization.



CLIFF EDWARDS - AVIATION RISK AND HAZARD MANAGEMENT CONSULTANT (RETIRED), FORMER SENIOR ADVISOR AT SHELL AIRCRAFT LTD

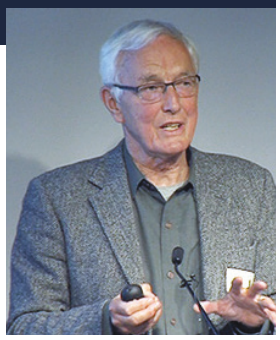
Cliff Edwards has worked in the aviation industry for 55 years and retired in 2015. His career spans working as a maintenance engineer, and holding various managerial posts. For the last 30 years Cliff has worked as an aviation safety consultant, initially for Shell Aviation and subsequently through his own consultancy.

Amongst other initiatives, Cliff has been involved in the development of Safety Management Systems since 1991 and significantly this included developing the first aviation generic hazard model for the operation and maintenance of aircraft. He has participated in the development of the Safety Management Systems of numerous aircraft operators and airlines and has worked with Transport Canada, UK CAA and EASA in developing the regulatory requirements for SMS.

His achievements include being the 2004 recipient of the "Sir Frank Whittle Medal", the International Federation of Airworthiness award, the citation reads: "Individual's efforts in improving aviation safety".

CLEMENT E. FURLONG - RESEARCH PROFESSOR OF MEDICINE AND GENOME SCIENCES - UNIVERSITY OF WASHINGTON

Dr. Furlong received a B.A. in Chemistry from San Jose State College in 1963. He received a Ph.D. in Biochemistry from the University of California, Davis in 1968 where he studied the allosteric regulation of glycogen synthesis in bacteria. He then spent two postdoctoral years at Cornell University, Ithaca, N.Y. with Dr. Leon Heppel working on bacterial ABC nutrient transport proteins. He continued this research as a faculty member in the Biochemistry Department at the University of California, Riverside. In 1976 he spent a sabbatical at Stanford University working with Drs. Harden McConnell and Hugh McDevitt studying immunology. In 1977, Dr. Furlong joined the Departments of Medicine (Division of Medical Genetics) and Genetics (now Genome Sciences) at the University of Washington. Recent research has focused on identifying and characterizing biomarkers of exposure to organophosphates including insecticides and tricresyl phosphate, a component of jet engine lubricants.



DAVID GEE - VISITING FELLOW, INSTITUTE OF ENVIRONMENT, HEALTH AND SOCIETIES, BRUNEL UNIVERSITY

David Gee has worked at the interface of science and policy-making in the fields of occupational health and the environment, with trade unions and NGOs in the UK, and between 1995 and 2012, as Senior Adviser on Science, Policy and Emerging Issues at the European Environment Agency in Copenhagen.

His projects have included eco-tax reform and eco-efficiency; scientific uncertainty and the precautionary principle; children's risks from environmental hazards; methods for evaluating evidence of potential harm; and regulatory reform on hazardous substances; the 50th anniversary celebration of "Environment and Disease: Association or Causation?, the 1965 paper by Bradford Hill (Oct 2016 at the Royal Society of Medicine, London).

David initiated and co-edited both volumes of the influential "Late lessons from early warnings" reports (EEA, 2001, 2013).

David is retired and Visiting Fellow at the Institute of Environment, Health, and Societies, Brunel University, London.

He is married with four daughters and lives in London and Bexhill on Sea.

CAPTAIN NIELS GOMER - FORMER CAPTAIN

Captain Niels Gomer started to fly when he was 22 and flew the American T6 and FH-227 Fairchild in Africa before returning to Sweden and flying the British Aerospace BAe 146-200.

He was the Captain onboard a BAe 146-200 aircraft flying for Malmö Aviation that experienced a serious contaminated air event. The aircraft was operating an internal flight in Sweden between Stockholm and Malmö, on 12 November 1999. In the descent of their third flight of the day, both crew members became incapacitated due to exposure to oil fumes. After using emergency oxygen the crew recovered sufficiently to land the aircraft safely. The ground crew had to help wake the passengers up because of the effects of the toxic fumes they were exposed to.

He retired from flying in May 2006 with over 8000 hours flying experience and set up a business working with heavy machinery.

He also worked as a commercial diver in early 1980s.

DR. ASTRID HEUTELBECK - OCCUPATIONAL PHYSICIAN, GERMANY

Privatdozentin Dr. med. Astrid Heutelbeck is a medical specialist for occupational medicine, environmental medicine, social medicine, and allergology as well as the senior physician of the Outpatient Unit of Occupational and Environmental Medicine of the University Medical Centre (UMG) at the Georg August University of Göttingen, Germany, where she also obtained the post-doctoral habilitation (venia legendi).

She trained for five years in pneumology and allergology, she later moved to occupational and environmental medicine where she focuses her research work, amongst others, on diagnosing and preventing occupational and environmental diseases caused by allergic and toxic agents.

In recent years, she has attended to patients suffering from pulmonary, neurological, or cerebral symptoms primarily after flights with suspected cabin air contamination. In this context, she also works on the development of diagnostic pathways and human biomonitoring strategies in an interdisciplinary cooperation with internal and external specialists.

PROFESSOR VYVYAN HOWARD - PROFESSOR OF PATHOLOGY (TOXICOLOGY) - UNIVERSITY OF ULSTER

Professor C. Vyvyan Howard MB. ChB. PhD. FRCPath.is a medically qualified toxico-pathologist specialising in the problems associated with the action of toxic substances on the fetus during development. In particular, and of relevance to cabin air quality, he has investigated the toxic properties of mixtures of organo-phosphates and the effects of chronic low dose exposure. He is Emeritus Professor of Bioimaging at the University of Ulster.

Professor Howard's work has emphasized the research reporting very low dose effects from endocrine disrupting chemicals on the fetus, their potential to lead to subtle functional deficits and cancer in adult life and the inadequacy of current regulatory risk assessment to address these hazards.

He is a Fellow of the Royal College of Pathologists, Fellow of the Collegium Ramazzini, Past President of the Royal Microscopical Society, Member of the British Society of Toxicogical-Pathologists and Past President of the International Society of Doctors for the Environment. He was a toxicologist on the UK Government DEFRA Advisory Committee on Pesticides from 2002-2008

CAPTAIN DAVID HOY

David Hoy started his aviation life flying gliders out of Compton Abbas and then went on to be sponsored by BEA/BOAC at the College of Air Training, Hamble in the early 70s. He has established a reputation in training having written many text books, some still in use today.

David has almost 20,000 hours flying experience in over fifty different aircraft types; has worked as Head of Training for several organisations including BAe Systems at Woodford where he worked on the RJ 146, ATP and Jetstream aircraft. David now runs his own company, Air Safety Matters Ltd offering advice on safety management and training systems. He continues to instruct examine for the UK CAA for the Instrument Rating and Flight Instructor and Examiner qualifications.

DR. DAVID W. JOHNSON - PH.D CHAIRPERSON, DEPT OF CHEMISTRY, UNIVERSITY OF DAYTON

David W. Johnson is an associate professor and the Chair of the Chemistry Department at the University of Dayton. He received a Ph.D in chemistry at Illinois Institute of Technology in 1983, completing his research in inorganic chemistry. He has been on the faculty at the University of Dayton teaching primarily analytical chemistry since 1984. He has led an active research program focused on the chemistry of lubricants, lubricant additives and lubricated surfaces in aerospace and refrigeration applications. Much of his work has focused on possible breakdown mechanisms of phosphate esters at high temperature that mimic temperatures that lubricants may experience while in contact with bearing surfaces. He is an author of more than 25 papers in refereed journals, numerous technical reports and book chapters.

MS. PETRA VAN KESTEREN - NATIONAL INSTITUTE FOR PUBLIC HEALTH AND THE ENVIRONMENT (RIVM), MSC, THE NETHERLANDS

Petra van Kesteren MSc. studied Biomedical Sciences at the Radboud University of Nijmegen and obtained her Bachelor and Master degree with a major in Toxicology. She started her toxicological research for the Maastricht University on the possibilities of developing a high-throughput assay to improve the current testing strategy for carcinogenic potential of substances. From January 2011 on, she works as a risk assessor in human toxicology at the Centre for Safety of Substances and Products (VSP) at the National Institute for Public Health and the Environment (RIVM) in Bilthoven, the Netherlands. She is mainly involved in Substance Evaluations of chemicals, performed under the European chemicals legislation REACH. She works in national and European projects and processes on the quality of cabin air in relation to chemicals, and is involved in risk assessment of nanomaterials, including silicon dioxide in food and air and the development of a new risk assessment strategy.

CAPTAIN MICHAEL KRAMER - P-COC

Captain Michael Kramer was born in 1965, married, is a stepfather of 3 and has 4 grandchildren. His career started as a German Navy aircraft mechanic on the Lockheed F-104 and Pa-200 Tornado. He was a Civil Aviation aircraft mechanic and engineer and certifying staff member on Beech King Air -200, -300, -350, Lear Jet 25,35,55. He still holds a Cat B1 Part 66 aircraft maintenance licence on King Air 200, 300,350 and Jetstream 32.

From June 1995 to May 1996 he went to Air Transport Pilot School before flying for Executive Aviation as a Co-Pilot on Cessna 421, Metroliner and the BAe Jetstream 32 aircraft. He joined Eurowings in April 1999 initially as a Co-Pilot, flying 2 years on the BAe146 and 10 Years on the CRJ 100, -200, -700, -900. He obtained his command in October 2009. He transferred to the Airbus A300-600R with a German Logistic Company in October 2011. Following repeated confirmed fume events over a three-year period, on the September 3rd, 2015 his health degraded to the point he could no longer fly and was no longer able to continue his dream job as a pilot.

In January 2017 he became the Co-Founder and Representative of a non-profit organization named: "Patientinitiative - Contaminated Cabin Air", in short "P-CoC". Since Aug 2017, P-CoC has been a lawfully registered organization and supports victims and increases public awareness of contaminated cabin air issue.

CAPTAIN TRISTAN LORAINE - BCAi GCAQE SPOKESPERSON

Captain Tristan Loraine BCAi is a former British Airways Captain and was ill health retired in 2006, due to the health effects of repeated exposure to contaminated air in the cockpits of the aircraft he flew.

He was Co-Chairman of the Global Cabin Air Quality Executive (GCAQE) from its inception in 2006 until 2016 when he became the GCAQE Spokesperson.

Previously a Health and Safety representative and National Executive Council member of the UK pilot union BALPA, he was also a founding member of the UK pilot union, the PPU, one of the conference sponsors.

A former Ironman triathlon finisher, Captain Loraine has completed two stages of the legendary Etape Du Tour. He is also author of the novel 'Toxic Airlines' and has produced 3 documentaries and one feature film on the contaminated air issue.

In 2015 he was a recipient of the British Citizen Award for services to Industry (BCAi) for his work on the contaminated air issue since 2001.

COUNTESS OF MAR - CO-PATRON GCAQE

Margaret of Mar, 31st Countess of Mar (born 19 September 1940), is a crossbench member of the House of Lords, an elected hereditary peer, and Deputy Speaker/Deputy Chairman in the House of Lords. She is the holder of the original Earldom of Mar, the oldest peerage title in the United Kingdom, and a farmer and former specialist goats cheesemaker in Great Witley, Worcestershire. She is the only suo jure countess in the House of Lords.

She has lived with the chronic effects of organophosphate poisoning since coming into contact with sheep dip in 1989 on her farm. Lady Mar founded Forward-ME to promote effective joint working by ME and CFS organizations to maximize impact on behalf of all people with ME and CFS in the UK.

Lady Mar has also served on a number of parliamentary select committees and is an officer in several All Party Parliamentary Groups.

The Countess of Mar has been a joint co-patron of the Global Cabin Air Quality Executive (GCAQE) since its creation in 2006 and has raised the issue of contaminated air within the British political arena for over a decade.

DR. SUSAN MICHAELIS - CONSULTANT AND HEAD OF RESEARCH FOR THE GCAQE

Dr. Susan Michaelis, a former Australian ATPL airline pilot holds a PhD in Safety Science, specifically addressing the health and flight safety implications of exposure to aircraft contaminated air. She holds an MSc in Air Safety and Accident Investigation and is a qualified air accident investigator. In 1987 she was awarded the Australian Civil Aviation Authority's award for academic merit, while in 2017 she was awarded the Cranfield University MSc Course Director's best overall student for her MSc, which included a thesis reviewing how oil leaks in turbine engines. For over 20 years she has led much of the global research on the aircraft contaminated air issue and has widely published on this topic. She is also qualified in hazardous substances and general occupational health and safety. She is now a visiting Researcher at the University of Stirling.

DR. MARK MONTGOMERY - TOXICOLOGIST

Dr. Mark Montgomery received his undergraduate degree from Purdue University in Chemistry and his graduate degree from Johns Hopkins Medical Center in Biochemical Toxicology. He attained the academic ranks of Assistant Professor, Associate Professor and ultimately Full Professor of Toxicology at the University of Minnesota Medical Center and later at the University of South Florida Medical Center in Tampa, Florida. In addition to his academic positions he had clinical duties in pharmacology and toxicology at hospitals in Minneapolis and Tampa. As an instrument-rated pilot his interest in aircraft environments was heightened when, in 1977, he was asked to investigate a case of severe incapacitation of a military aircraft crew member. Examination of the flight deck crew and the maintenance logs for the aircraft confirmed a diagnosis of incapacitation due to inhalation of aerosolized lubricating oil from one of the aircraft's turbine engines. He has maintained an interest in this question ever since.

MR. JOHN MORTON - CONSULTANT / CHAIRMAN EUROPEAN SEALS ASSOCIATION

John Morton has 35 years' experience in the mechanical seal industry, he is a qualified engineer and works for John Crane, the world's leading mechanical seal supplier to the process industries. Having held various posts throughout the global organisation, John has had major involvement with all the leading mechanical seal developments from John Crane in that time; either through engineering and product development or latterly marketing based functions. During this time he has also spent an extended period working in the Nordic region and has worked extensively on government affairs projects. A recognised SME on mechanical seal technology he has spoken at both commercial and government conferences on sealing technology. He is the current chairman of the European Sealing Association and member of the executive committee. John is based in Slough, UK, and obtained his MBA from University of Reading in 1998.

DR. VINCENT PEYNET - DIRECTEUR, INSTITUT DE RECHERCHE ET D'EXPERTISE SCIENTIFIQUE - IRES

Vincent Peynet, Ph.D. is a Director at IRES (France), an engineering office and analytical laboratory dedicated to environmental health based in Strasbourg.

He holds a Ph.D. in analytical chemistry and has had successful professional experiences in deep nuclear waste disposal research at CEA (France), in chemical weapon detection at DGA (France), in removal of legionella bacteria from water using irradiation and degradation of pharmaceutical active principles in waste water using irradiation with UCL in Belgium and in life science services for pharmaceutical companies at SGS Life Science Services (Belgium). He joined the Institut de Recherche et d'Expertise Scientifique (France) to build an analytical laboratory dedicated to health and environmental analysis. Since 2010, IRES has developed a wide range of user-friendly testing kits to investigate indoor environment quality, drinking water quality and to assess human exposure to environmental pollution using hair analysis.

MR. MICHAEL RAWLINSON QC - BARRISTER - 12KBW/KINGS CHAMBERS

Michael Rawlinson was called to the Bar in 1991, took Silk in 2009 and now practices from Kings Chambers in Manchester and 12 KBW in London. For the majority of his working life, Michael Rawlinson has been involved in either bringing or defending claims in which it has been alleged that exposure to 'X' has led subsequent to the development of 'Y'.

This has covered both immediate and long term effects; cancers and non-cancers, and across every tier of Court. In the 'Aerotoxicity' litigation, his Claimants have instructed Rawlinson in what is a serious but fascinating area of developing litigation.

The questions to determine are: what level of exposure to the products of pyrolysed aircraft engine oil and what identifiable illnesses will be held both actionable and recoverable?

MR. CHRIS SAVAGE - VICE PRESIDENT TECHNOLOGY, PALL AEROSPACE

Mr. Savage joined Pall in 2003 after spending 22 years in various Manufacturing, Technical Engineering and Programme Management roles within Vickers Ltd, Rolls-Royce Engines plc and GKN Aerospace plc. He is a time served Apprentice, Chartered Engineer and holds a Bachelor of Engineering (BEng) degree in Engineering and Engineering Systems from Portsmouth University in the United Kingdom.
At Pall, he has held roles in the Technical, New Technology, Programme Management and Operations Engineering functions within the Aerospace and Machines & Equipment Business Units focusing on Innovation, Technical Strategy, New Product Introduction and Production/Airworthiness Support.

PROFESSOR DR.-ING. DIETER SCHOLZ, - MSME AIRCRAFT DESIGN AND SYSTEMS GROUP (AERO) - HAMBURG UNIVERSITY OF APPLIED SCIENCES

Prof. Dr.-Ing. Dieter Scholz, MSME is a Professor for Aircraft Design, Flight Mechanics, Aircraft Systems, and Educational Flight Testing. Head of Aircraft Design and Systems Group (AERO), Department of Automotive and Aeronautical Engineering, Hamburg University of Applied Sciences (HAW Hamburg), Germany.

He studied Mechanical Engineering at Universität Hannover, Germany (Dipl.-Ing.) and at Purdue University, USA (MSME). Systems engineer at Airbus in Hamburg, Germany. Topics: Flight Control and Hydraulic Systems. Temporary lecturer at Queens University Belfast (QUB), UK for Aircraft Stability and Control. Researcher at Technische Universität Hamburg-Harburg (TUHH), Dr.-Ing. (PhD).

He has his own engineering office (research and development projects for Airbus and subcontractors) and is a freelance lecturer at Airbus Technical School, Hamburg, Germany.

Since 1999 he has been a Professor at HAW Hamburg.

MR. GRANT M. SLUSHER - MS RESEARCH SCIENTIST, 711TH HUMAN PERFORMANCE WING (HPW) OF THE USAF: (WPAFB)

Grant Slusher received his B.Sci. in Physiology from Northern Michigan University. He then re-enrolled for his M.Sci. where he completed his thesis focusing on population genetics of wild ungulates. Grant taught at a community college before beginning work as a contractor with the United States Air Force 711th Human Performance Wing. Initially the research was specific to characterizing bio recognition elements specific physiologic indicators of fatigue, but in 2012 his focus was shifted to the collection of volatile contaminants in pilot breathing air. He collected samples to thermal desorption (TD) tubes, quantified compounds using EPA methods, and finally identified unknown compounds contributing to hazardous exposures. This research segued into sensor development specific to mitigating risk to the human element. In collaboration with NASA, and Makel Engineering the 711th developed and employed a sensor suite to identify exposures to pilots. He is currently working with multidisciplinary groups to implement said suite.

DR. DAVID STEIN - VICE PRESIDENT, AEROSPACE GLOBAL STRATEGIC MARKETING, PALL AEROSPACE

David's prior experience at Pall was as Vice President of R&D. David joined Pall from Boeing where he managed the Boeing Research and Technology Advanced Research Teams focusing on developing new materials and chemistries using state of the art laboratory and simulation capabilities. Prior to Boeing, he held various management and process engineering positions in the Microelectronics FAB at Sandia National Laboratories.

David earned his BS in Chemical Engineering from Rensselaer Polytechnic Institute. He earned his MS and Ph.D. in Chemical Engineering and his MBA with a specialty in Management of Technology from the University of New Mexico. David has held PMP and Lean Six Sigma Green Belt certifications.

PROFESSOR COLIN SOSKOLNE - (KEYNOTE SPEAKER)
DEPT OF PUBLIC HEALTH SCIENCES - COLLEGIUM RAMAZZINI AND UNIVERSITY OF ALBERTA

Colin L. Soskolne, PhD, was born, raised and educated in Johannesburg, South Africa. He obtained his PhD (Epidemiology) from the University of Pennsylvania, USA, in 1982. For his doctoral dissertation he was awarded the 1983 student prize by the Society for Epidemiologic Research. This work led to the designation by IARC of occupational exposure to mixtures of strong inorganic acid mists containing sulphuric acid as a definitive human carcinogen. After 28 years at the University of Alberta, Canada, he retired as Professor emeritus in 2013. He currently holds an Adjunct Professorship in the Health Research Institute at the University of Canberra, Australia. Colin serves as immediate past-Chair of the International Joint Policy Committee of the Societies of Epidemiology (www.ijpc-se.org). In addition to innovative career teaching and research focusing on occupational, environmental and global health, and also HIV/AIDS, he initiated the integration of ethics into professional discourse in the mid-1980s (www.colinsoskolne.com) and the development of ethics guidelines for the profession.

DANIEL TANDOI - GCAQE CHAIRMAN

Dipl.-Ing. (FH) Daniel Tandoi was appointed Chairman of the Global Cabin Air Quality Executive (GCAQE) in 2016. He is also active in the working groups Aircraft Design & Operation and Flight Health Environment of the German Airline Pilot´s Association Vereinigung Cockpit and was a flight safety officer for a German regional airline for five years.

Flying as a First Officer for German airlines for over 11 years, Daniel Tandoi has a total of more than 5000 flight hours on the aircraft types ATR 42, ATR 72, F100, Boeing 757 and Boeing 767.

Holding a diploma degree in Aviation Systems Engineering and Management at Bremen University of Applied Sciences, Daniel Tandoi has been working as a design engineer for the aviation industry for two years.

MR. KEITH TAYLOR - GREEN MEP FOR SE ENGLAND

Keith Taylor is the Green MEP for the South East of England.

He was a Green Party councillor in Brighton and Hove for 11 years, having been first elected in 1999. He served as leader of Brighton and Hove council's Green group from 2001, and on the council's planning committee for two years.

Keith took Caroline Lucas's place in the European Parliament, following her election to the House of Commons as the UK's first Green MP in 2010. He was successfully re-elected in May 2014 to serve another five years as Green MEP for South East England.

In his role as an MEP, Keith sits on the European Parliament's Transport and Tourism and Environment, Public Health and Food Safety committees. He is also the European Chair of the Climate Parliament, Vice-President of the UK's Local Government Association Group and Vice-Chair of the animal welfare intergroup as well as a member of the delegation for relations with the Palestinian Authority and the intergroup on LGBTI Rights.

DR. ALVIN V. TERRY JR. - PH.D CHAIRMAN, DEPT OF PHARMACOLOGY & TOXICOLOGY - AUGUSTA

Dr. Alvin V. Terry Jr. Ph.D. is Regents Professor and the Chair of the Department of Pharmacology and Toxicology, Medical College of Georgia, Augusta University, Augusta, Georgia, USA. He is also Associate Vice President for Basic Science Research and holds joint appointments as Professor of Neurology and Graduate Studies. Dr. Terry received a B.S. in Pharmacy from the Medical University of South Carolina in 1982 and a Ph.D. in Pharmacology from the University of South Carolina in 1991. To date he has published 158 research articles, 9 book chapters, and holds 1 US patent. His research interests focus on the role of central acetylcholine (i.e., cholinergic) pathways in cognition; specifically how these neuronal pathways are involved in the memory dysfunction associated with neuropsychiatric illnesses and exposures to environmental toxins, especially organophosphates. His laboratories are supported by the National Institutes of Health, the Department of Defense, private foundations, and pharmaceutical companies.

CAPTAIN MAX THOMSON - GCAQE BOARD MEMBER

Captain Max Thomson is a pilot with extensive practical experience in the international aviation industry that covers more than 40 years. The majority of this time has been spent at the controls of heavy passenger jets. Some of his duties in this role encompassed communicating with many department including operations, maintenance, engineering, safety, security, medical and catering to assure the safety and well being every passenger and crew member in his care as well as trying to avoid hard landings.
He also has extensive experience in aviation security by participating in working groups at both national to international levels as a representative of national and international pilot associations.
Having colleagues who have suffered and experienced life-changing events as a result of exposure to toxic fumes while on duty as aircrew, led him to become a board member of the GCAQE in 2017. He is driven to find a solution, mitigate the occurrences and deliver medical protocols to minimise the adverse effects of being exposed to oil and hydraulic fumes.

MS JOANNE TURNER - FORMER CREW

Joanne Turner was a flight attendant travelling between Sydney and Brisbane on a British Aerospace BAe 146 aircraft during the course of her employment on 4 March 1992. During the descent into Brisbane a thick cloud of white grey smoke poured through the vents into the cabin for about 20 minutes.

Ms Turner immediately suffered from the effects of the smoke including coughing, a burning sensation in her throat, sore eyes and a headache. She has suffered with a persistent cough ever since.

Turner Freeman commenced proceedings in the Dust Diseases Tribunal of New South Wales in 2001 against her employer East West Airlines Limited claiming damages caused by East Wests' negligence in relation to the operation of its aircraft.

She succeeded in an action for damages for injuries suffered whilst flying in the BAe 146 aircraft in 2010.

DR. ANTTI TUORI - IFALPA - HUPER VICE CHAIR, A320 CDR, M.D, PHD

Antti Tuori graduated from University of Helsinki Medical Faculty in 1996 and defended his thesis in 1998. He has been working as a General Practitioner from 1996 and Aeromedical Examiner from 2013. He completed CPL and ATPL from Finnair Flight Academy in 2001 and started flying with Finnair in 2002 and has been flying A320, A330 and A340 and now flies as a Captain on the A320. Tuori has been member of IFALPA (International Federation of Airline Pilots' Association) since 2003 and Vice-chair of the Human Performance Committee since 2009. He has also worked actively within ECA (European Cockpit Association). He has been member of different EASA medical Rulemaking Groups as well as ICAO Medical Provision Study Group. Tuori was the IFALPA representative in the ICAO working group for the ICAO Circular 344 Guidelines on Education, Training and Reporting of Fume Events.

PROFESSOR CHRIS VAN NETTEN - ENVIRONMENTAL TOXICOLOGY (EMERITUS) - UNIVERSITY OF BRITISH COLUMBIA

Chris van Netten is a Professor Emeritus of Environmental Toxicology with the Faculty of Medicine at the School of Population and Public Health, UBC, Vancouver B.C. Canada.

His educational and research background covers: Mathematics, Chemistry, Engineering, Nuclear Chemistry, Biochemistry, Clinical Chemistry, Electrophysiology, Epidemiology, Cancer research, Indoor air quality, Radon exposure, Exposure Assessment and Monitoring, Environmental and Occupational Health, Environmental Toxicology. He has 130 publications and reports, 20 specific to aircraft air quality.

Member of 24 national and international committees, including:
- The NRC Committee on Aircraft Air Quality, Washington DC 2001-2002.
- US Federal Aviation Administration, Incident Monitoring and Reporting, 2005-2008.
- European Commission, 2017. Scientific Committee. Aircraft air quality 2017.

PROFESSOR ANDREW WATTERSON - DIRECTOR OF CENTRE FOR PUBLIC HEALTH AND POPULATION HEALTH RESEARCH - UNIVERSITY OF STIRLING

Andrew Watterson PhD, Chartered Fellow of the Institute of Occupational Safety and Health, Fellow Collegium Ramazzini is Professor of Health, Head of the Occupational and Environmental Health Research Group & Director of the Centre for Public Health and Population Health Research at the University of Stirling. He has also been a Visiting Professor at University of New South Wales, Sydney, Australia and the University of British Columbia, Canada.

His research interests range from risk assessment and management of hazardous substances including organophosphates through to health impact assessments, science- policy-civil society interfaces, and regulating risks. He has published widely in such journals as BMJ, Lancet, occupational and environmental health and toxicology journals. He has in the past published a Financial Times guide to occupational health and safety management.

SENATOR JOHN WOODLEY - CO-PATRON GCAQE

John Woodley (born Brisbane, Queensland, 9 February 1938) is a Christian Minister of religion and was a Senator representing the state of Queensland, Australia, in the Australian Senate.

Prior to entering politics, Woodley was a Christian minister with the Methodist Church (ordained in October 1962) and its successor, the Uniting Church in Australia after Church union in June 1977.

He chaired inquiries into aspects of the development and management of the Brisbane and Kingsford Smith airports, and chaired the Senate Rural and Regional Affairs and Transport References Committee enquiry into the Air Safety and Cabin Air Quality in the BAe 146 Aircraft from 1999 and 2000.

He has been a joint co-patron of the Global Cabin Air Quality Executive (GCAQE) since its creation in 2006.

He has two daughters and a son.

KIND THANKS TO ALL OF OUR SPEAKERS
and thank you all for coming to this year's conference.

CONFERENCE SPONSORS

GLOBAL CABIN AIR QUALITY EXECUTIVE (GCAQE)

The Global Cabin Air Quality Executive (GCAQE), established in 2006, is the leading organisation representing air crew that deals specifically with contaminated air issues and cabin air quality.
www.gcaqe.org

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Unite is dedicated to serving the best interests of its members, protecting workers' rights and improving the quality of life by negotiating with employers and government. As a primarily industry-based union, Unite's structure means they can effectively represent workers' interests in the workplace, no matter where the worker works or what sector they're from.
www.unitetheunion.org

PPU

The British professional pilots' union run by pilots for pilots. The PPU works to fully represent and robustly support members of the PPU and to actively promote and augment professional pilots' terms & conditions, pay, working environment and professional status.
www.theppu.co.uk

ACPA

The Air Canada Pilots Association represents the largest group of professional airline pilots in Canada. ACPA strives to be a leader in advancing our profession and aviation safety and aims to serve and support their member pilots' professional interests.
www.acpa.ca

APFA

Founded in 1977, the Association of Professional Flight Attendants (APFA) is the largest independent flight attendant union in the USA. It represents the nearly 25,000 flight attendants at American Airlines.
www.apfa.org

THE AFAP

The Australian Federation of Air Pilots (AFAP) is an industrial organisation and professional association for commercial pilots in Australia. As an industrial organisation the AFAP protect and improve employment conditions for their pilot members. The AFAP's mission is to represent and promote the interests of Australian professional flight crew and to champion the highest possible standards of aviation safety.
www.afap.org.au

AUSTRALIAN AIRLINE PILOTS ASSOCIATION

The Australian Airline Pilots Association (AusALPA) comprises of the Australian and International Pilots Association (AIPA) and the Australian Federation of Air Pilots (AFAP) and represents over 5,000 professional pilots within Australia on safety and technical matters.
www.ausalpa.org.au

ITF

The International Transport Workers' Federation (ITF) is an international federation of transport workers' trade unions. Around 700 unions representing over 16 million transport workers from some 150 countries are members of the ITF. The ITF represents the interests of transport workers' unions in bodies such as the International Labour Organization (ILO), the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO).
www.itfglobal.org/en/global

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