ASSOCIATION OF FLIGHT ATTENDANTS AFL-CIO
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February 4, 2004

Mr. Robert D. Kulick, Director
OSHA
Avenel Area Office
1030 St. Georges Avenue
Plaza 35, Suite 205
Avenel, New Jersey 07001

RE: Violations of the OSHA Hazard Communication Standard

Dear Mr. Kulick:

The Association of Flight Attendants – Communications Workers of America, AFL-CIO (AFA) represents 40,000 U.S. flight attendants at 26 airlines. As Director of the Department of Air Safety, Health, and Security, I am writing to report multiple violations of the OSHA Hazard Communication Standard (29CFR1910.1200) by ExxonMobil at airlines that use one or more of the following products: Mobil Jet Oil ("Mobil") 254, Mobil 291, and Mobil II, including Alaska Airlines[1]. I am writing to request that OSHA launch an immediate investigation into this matter.

The 1975 Federal Aviation Administration (FAA) claim of exclusive jurisdiction over the occupational safety and health of flight attendants[2] is applicable to only *aircraft in operation.* In addition, the Hazard Communication Standard, like the OSHA Record Keeping Standard that is adhered to by airlines, is purely administrative in nature, and does not duplicate any FAA standards. The FAA-OSHA Aviation Safety and Health Team recently confirmed, "Compliance with OSHA's Hazard Communication Standard would not compromise aviation safety"[3]. In addition, OSHA standards provide legal protections to airline ground staff and they are exposed to the hazardous products in question when they inspect and clean contaminated air supply systems. As such, AFA trusts and fully expects OSHA to act on this complaint.

At issue is the *recent* removal of the health hazard warning language citing the potential for *neurological damage* associated with exposure to tricresylphosphates (TCPs) from both the label and the Material Safety Data Bulletin (MSDB) of Mobil 254. AFA also requests that OSHA investigate the removal of this language on the MSDB for Mobil 291, and the *anticipated* removal of this language on the MSDB for Mobil II. The reported TCP content of all three of these products is the same.

[1] According to Dec. 4, 2002 letter from Alaska Airlines' Holly Geiger-Zimmerman, Mobil 254 is now used fleet-wide. In the past, it has also used Mobil II and Mobil 291.
[2] 40 Fed. Reg. at 29114, 1975.
[3] FAA/OSHA Aviation Safety & Health Team. "First Report: Application of OSHA's requirements to employees on aircraft in operation." Washington, DC. December 2000.

The MSDB for Mobil 254 that ExxonMobil approved on January 9, 2003 includes warnings of neurological symptoms in Sections 3, 4, 11, and 16 (Attachment 1). All of these warnings are removed from the most current version, approved by ExxonMobil on August 21, 2003 (Attachment 2). No justification is provided for this change; moreover, the reported TCP content did not change.

Health hazard warnings are also *absent* from the latest available version[*] of the MSDB for Mobil 291, except for a bland mention of weak acetylcholinesterase inhibition in experimental animals (Attachment 3). In contrast, all four warnings are *included* on the latest available[*] version of the MSDB for Mobil II (Attachment 4), although ExxonMobil has announced its intention to remove them. Again, the reported TCP content of all of these products has remained the same.

AFA fails to understand the justification for removing the references to the potential for neurological damage on the MSDBs for Mobil 254, Mobil 291, and Mobil II. Because the ExxonMobil office in NJ oversaw the recent change to the MSDB for Mobil 254, and because the changes affect airline workers in multiple states, AFA considers the Federal OSHA regional office in NJ to be the appropriate venue to file this complaint.

Published laboratory studies demonstrate that when these three engine oils are heated to temperatures typical of an operating aircraft engine, tricresylphosphates (TCPs) are volatilized and carbon monoxide is generated[4-5]. Other engine oils in the aviation industry also have these characteristics. The health hazard warning on the product labels and MSDBs must reflect these exposure hazards.

What follow is a detailed description of: (1) ExxonMobil's proposed and published changes to its MSDBs; (2) How heated engine oils can contaminate the aircraft air supply systems; (3) The exposure hazard for ground staff and airline crews; (4) The relevant requirements of OSHA's Hazard Communication standard; and (5) AFA's specific request for OSHA to act.

1. ExxonMobil's proposed and published changes to its Material Safety Data Bulletins

An AFA safety representative was invited to a June 3, 2003 meeting hosted by Alaska Airlines during which ExxonMobil representatives announced their intention to **remove** health hazard warnings related to TCP exposure on the MSDBs for Mobil 254 and Mobil II (Attachment 5). The warnings have already been removed from the MSDB for Mobil 291.

Shortly thereafter, one of AFA's staff industrial hygienists contacted the two ExxonMobil representatives present at the meeting and asked for documentation to support these proposed changes. The AFA staff member was told that the paper "was no secret" and that Mr. Wayne Daughtrey at ExxonMobil's NJ office could provide a copy. Mr. Daughtrey had been present on

[*] Provided by ExxonMobil's fax-on-demand document system on December 9, 2003. MSDB approved by ExxonMobil January 9, 2003.

[4] van Netten, C. and Leung, V. "Hydraulic fluid and jet engine oil: pyrolysis and aircraft air quality." Archives of Environmental Health, Vol 56(2): 181-186 (March/April 2001).

[5] van Netten, C. "Analysis of two jet engine lubricating oils and a hydraulic fluid: their pyrolytic breakdown products and their implication on aircraft air quality." Air Quality and Comfort in Airliner Cabins, ASTM STP 1393, NL Nagda, Ed. American Society for Testing and Materials, West Conshohocken, PA (2000).

the phone during the June 2003 meeting at Alaska Airlines. He did not provide a copy of the paper because it had not been completed. On August 21, 2003, AFA contacted the researcher that ExxonMobil cited as the director of the study that apparently justified the change to the MSDBs[**]. This researcher told AFA that she had not yet finished writing her report. AFA also began to monitor the status of the latest MSDBs using ExxonMobil's fax-on-demand document service.

After leaving many phone messages, an AFA staff member finally made telephone contact with Mr. Daughtrey at his NJ office on August 25, 2003 and described AFA's specific concerns. Mr. Daughtrey confirmed that ExxonMobil intended to remove the following warnings from the MSDBs of Mobil 254 and Mobil II:

> *"Overexposure to TCP by…prolonged or repeated breathing of oil mist…may produce nervous system disorders including gastrointestinal disturbances, numbness, muscular cramps, weakness, and paralysis. Paralysis may be delayed."* (Section 3, Hazards Identification)
>
> *"This product contains TCP which can cause symptoms associated with cholinesterase inhibition. TCP may also produce neurotoxicity associated with inhibition of neuropathy target esterase (NTE). Effects of cholinesterase inhibition are expected to occur within hours of exposure, but neurotoxicity related to NTE inhibition may not become evident for several days. Treat appropriately."* (Section 4, First Aid Measures)
>
> *"Prolonged or repeated breathing of oils mist, or prolonged or repeated skin contact, can cause nervous system effects."* (Section 16, Other Information)

These health hazard warnings are echoed in the NJ Department of Health and Senior Services Hazardous Substance Fact Sheet for TCPs (Attachment 6).

Mr. Daughtrey also confirmed ExxonMobil's intention to **add** the following language:

> *"May generate irritating vapors/fumes when burning."* (Sections 3, Hazards Identification; Section 5, Firefighting Measures) The company has also announced its intention to add a list of combustion products that may be generated upon heating, including carbon monoxide, under Section 5.
>
> *"Vapors and aerosols which may be formed under elevated temperatures may be irritating to the eyes or upper respiratory tract."* (Section 11, Toxicological Data)

It is highly inappropriate to remove the warnings that describe the neurological hazards associated with exposure to the TCP content of these products. The reported TCP content has not changed, and a steady stream of airline workers, as well as passengers, has reported neurological damage consistent with exposure to TCPs, as a result of these specific ExxonMobil products being ingested into the air supply systems on commercial aircraft at Alaska Airlines, among others. AFA can provide you with additional information upon request.

[**] Hens were dosed orally with these ExxonMobil products and then given a "clinical neurological evaluation."

Further, while AFA agrees wholeheartedly that it is necessary to list carbon monoxide as an exposure hazard associated with the use of these products on aircraft, eye and upper respiratory tract irritation is an insufficient description of the hazard. The NJ Department of Health and Senior Services reports that "exposure to carbon monoxide can cause headache, dizziness, lightheadedness and passing out," and that "lower levels can affect concentration, memory and vision, and loss of muscle coordination" (Attachment 7). On aircraft, this health issue becomes a safety issue if the pilots' ability to safely fly the plane is impaired. As well, affected flight attendants have reported that they would have been unable to conduct an emergency evacuation had it been necessary, nor would they have been able to react to a security breach.

Carbon monoxide is especially toxic during a flight because the ambient oxygen level is reduced[6-7]. The levels of ambient carbon monoxide generated by heating a 0.5 ml sample of these products in a lab to temperatures typical of an operating aircraft engine ranged from 56 ppm (Mobil 291) to 58 ppm (Mobil II) to 102.5 ppm (Mobil 254) [8-9]. Although it is not possible to extend these results directly to the aircraft cabin, airline maintenance records indicate losses on the order of two to three quarts of engine oil[*] that coincide with a "smoke in the cabin event", suggesting that crewmembers may be exposed to clinically significant levels of carbon monoxide. Pilots are especially at risk because they are supplied with 100% outside air at flow rates on the order of 20 times that supplied to the cabin.

Mr. Daughtrey and his colleagues at Exxon-Mobil are well aware of the hundreds of neurological complaints filed by flight attendants at Alaska Airlines regarding exposure to these specific products. Twenty-six of these flight attendants were plaintiffs in a high-profile lawsuit in May 2002, and Mr. Daughtrey's former boss was retained as an expert witness by the defendants to testify on the work he did at Mobil. Mr. Daughtrey was also copied on an October 2002 letter that AFA sent to Alaska Airlines on this very subject (Attachment 8).

During that August 25, 2003 telephone conversation, Mr. Daughtrey conceded that high-level exposure to carbon monoxide could explain the flight attendants' symptoms and agreed to take our comments regarding TCP toxicity "under consideration" (Attachment 9).

In fact, unbeknownst to AFA during that call, ExxonMobil had already approved the revised MSDB for Mobil 254 four days earlier (August 21, 2003). The references to potential neurological symptoms have been removed and the reference to carbon monoxide is weak and understated (see Attachment 2).

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[6] United States Air Force MIL-E-87145 (USAF) "Appendix B. Respiratory Environmental Thresholds and Physiologic Limitations." (1992).

[7] McFarland, RA. "Human factors in relation to the development of pressurized cabins." Aerospace Med. 12: 1303-1318 (1971).

[8] van Netten, C. and Leung, V. “Hydraulic fluid and jet engine oil: pyrolysis and aircraft air quality.” Archives of Environmental Health, Vol 56(2): 181-186 (March/April 2001).

[9] van Netten, C. "Analysis of two jet engine lubricating oils and a hydraulic fluid: their pyrolytic breakdown products and their implication on aircraft air quality." Air Quality and Comfort in Airliner Cabins, ASTM STP 1393, NL Nagda, Ed. American Society for Testing and Materials, West Conshohocken, PA (2000).

[*] Personal communication with Mr. O. Anthony, recently retired Senior Mechanic at a major US airline. The location of the hydraulic fluid line leak will dictate the extent of the air supply contamination. For example, a leak in the nose wheel will enter the engines, while a leak in the landing gear will not.

2. BACKGROUND - How engine oils can contaminate the aircraft air supply systems

AFA does not dispute that generally, one should not anticipate exposure to engine oils in the passenger cabin and cockpit; these products are designed to lubricate systems and are not intended for human consumption. However, the Society of Automotive Engineers has described the exposure potential on aircraft as follows[10]:

> *"Engine compressor bearings upstream of the bleed ports are the most likely sources of lube oil entry into the engine air system, and thence into the bleed system, contaminating the cabin/cockpit air conditioning systems…At temperatures above 320°C this oil breaks down into irritating and toxic compounds."*

In fact, the potential for heated oils to enter the air supply system has been recognized in the aviation industry for well over 35 years[11]. Briefly, with the exception of operations at the gate, the two major sources of supply air to the aircraft cabin are air compressors made up of moving parts that are lubricated with oils and are subject to temperatures greater than 350°C during operation. Usually these hot oils are kept separate from the compressors, but sometimes (whether it is because of a leaky seal, a cracked joint, or overfilling by maintenance workers), the heated oils (or the gases that are generated) can leak into the air supply systems. In addition to maintenance and operating deficiencies, the design of particular aircraft systems have proven more prone to air supply contamination than others (e.g., MD80, DC10, B737, B747, B757, B767, BAe146, A320)[12-13]. Airborne contaminants are distributed to the cabin via the ventilation ducts, thereby presenting an inhalation hazard to passengers and crew. Depending on the temperature, some of these contaminants can accumulate on the lining of the air supply ducts that are rarely cleaned, providing an additional source of contaminants.

The impact of air supply contamination on health and aviation safety has also been recognized in the scientific community. For example, a recent National Research Council committee report recommended that the Federal Aviation Administration require continuous carbon monoxide monitoring on all flights and publish requisite standard operating procedures for pilots to respond to elevated levels[14]. The report also highlighted the need to evaluate TCP exposure in the aircraft cabin.

3. BACKGROUND - The exposure hazard for ground staff and airline crews

For ground staff, the potential for exposure to heated oils and hydraulic fluids is easier to define because trouble-shooting contaminated air supply systems is part of these workers' job

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[10] Society of Automotive Engineers Aerospace Information Report 1539: "Environmental Control System Contamination." Rev. A. SAE International. Issued Jan. 1981. Revised Oct. 1997.
[11] Robbins, CS. Boeing Company. "737 Engine Bleed Air Contamination," Nov. 1968.
[12] National Research Council. "The Airliner Cabin Environment and the Health of Passengers and Crew" Committee on Air Quality in Passenger Cabins of Commercial Aircraft. Board of Environmental Studies and Toxicology, Division of Earth and Life Sciences. National Academy Press, Washington DC (2002).
[13] Michaelis, S. "A survey of health symptoms in BALPA Boeing 757 pilots." J Occup Health Safety – Aust NZ, 19(3): 253-261 (2003).
[14] See NRC 2002.

description. All US airlines have FAA-approved maintenance manuals, and those that AFA has reviewed include procedures to clean oil-contaminated air supply systems.

AFA has spoken to a maintenance worker who described symptoms consistent with exposure to TCPs (e.g., "chills" and a bad headache, followed by sores in the mouth and severe muscle weakness) after working on an aircraft removed from service because of air supply contamination. This worker, and reportedly his colleagues as well, said that their supervisors tell them in no uncertain terms to keep their symptoms under wraps, specifically because the last thing the airlines need is any news that will discourage passengers from flying.

Depending on the airline, *crewmembers* may also be exposed to these toxins *during aircraft maintenance*, almost by definition. At Alaska Airlines, for example, a checklist of maintenance tasks for cleaning oil in the air supply system instructed the mechanics to clean the system, run the air conditioning packs, and find a "fresh nose" to confirm that there is no residual contamination. Alaska policy explicitly stated: "We have a policy that after any such instance of smoke or mist in the cabin, we utilize a non-maintenance person (customer service agent, flight attendant, pilot, etc.) to accomplish a sniff test with [the] APU and [air conditioning] packs running after our action and prior to releasing the aircraft."[15] This policy was only changed recently, and only as the result of the involvement of a professional mediator.

Although Alaska has a particularly egregious record, partly by virtue of the design of the aircraft types it operates, and partly by virtue of inadequate maintenance procedures, cabin crew at other airlines throughout the US and in Australia, Canada, and Europe have also reported the effects of such contamination incidents[16].

There is ample evidence that *crewmembers* can also be exposed to contaminated air during any phase of *flight* when either the engines or Auxiliary Power Unit (APU) are operating. Because the airlines are not required to monitor the air quality during any phase of flight on any aircraft, there are no in-flight sampling data from routine operations to refer to. However, the symptoms described by flight attendants at Alaska Airlines - and others that use these specific jet engine oils manufactured by ExxonMobil or chemically similar products - following "smoke in the cabin" incidents in the passenger cabin are consistent with exposure to organophosphates (e.g., chills, stomach cramping, muscle aches, delayed peripheral neuropathy, tremors, seizures, abnormal gait, and balance problems) and/or asphyxiants (e.g., dizziness, severe headaches, tunnel vision, and metallic taste). Maintenance records can confirm that the source of the smoke, mist, or fumes in the cabin is partly-combusted and aerosolized engine oil and/or hydraulic fluids.

Some crewmembers have reported neurological symptoms that resemble multiple sclerosis (MS) following one of these "smoke in the cabin" incidents. The temporal association (exposure – symptoms – diagnosis) suggests a possible occupational connection in some cases. Pilots in Australia have reported similar anecdotal observations. Interestingly, occupation-specific clusters of symptoms that resemble MS have been described in the literature with specific references to

[15] Alaska Airlines internal memo from John Fowler to Engineering and Maintenance departments. Dec. 21, 1997.
[16] Minutes of biannual ITF International Task Group on Aircraft Air Quality, International Transport Workers' Federation, London, England (1999-2003).

exposure to hydraulic and machining fluids that contain the same or similar organophosphates[17-18]. Three case studies of TCP-associated neurological deficits have also been published for workers in a plant that manufacturers tri-aryl phosphates[19]. As well, significant excess in *mortality* from motor neuron disease has been reported among pilots and machinists[20-21]. Pilots have also been found to have significant excess *morbidity* from motor neuron disease[22], although such associations have never been formally investigated among flight attendants.

4. Relevant requirements of the OSHA Hazard Communication Standard

The OSHA Hazard Communication Standard applies to "any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency" [emphasis added] (1910.1200(b)(2)). OSHA's definition of "exposure or exposed" includes "potential (e.g., accidental or possible) exposure" (1910.1200(c)).

In fact, OSHA has explicitly interpreted anticipated or known use during which exposure to hazardous chemicals might occur to downstream employees to include equipment failure. Further, OSHA has said that "[i]f the chemical manufacturer [has] information that overheating via equipment failure or maladjustment, etc., can be expected to occur a percentage of time…then employees have a right to know the hazard information associated with the resultant potential exposure…[23]"

AFA's analysis of Alaska's mechanical and maintenance records over a nine-year period indicates that either oil or hydraulic fluid contaminates the air supply system in concentrations sufficient to result in a mist, smoke, and/or odor in the cabin approximately seven times per month[24]. AFA data clearly show that these all of these incidents are accompanied by occupant-reported symptoms ranging from discomfort to disability, including symptoms consistent with exposure to asphyxiants and/or neurotoxins. At this time, AFA has no data on how many maintenance workers have also developed these symptoms but because of their job duties, that exposure potential exists. The persistence of these events satisfies the OSHA definition of "potential exposure", and is supported further by the recognition of these hazards, both within and beyond the aviation industry, as described above.

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[17] Krebs, JM; Park, RM; Boal, WL. "A neurological disease cluster at a manufacturing plant." Arch Environ Health, 50(3): 190-5 (May-June 1995).
[18] Park, RM. Letter to the Editor. Arch Environ Health, 4(4): 383 (July-Aug 2002).
[19] Morgan, AA. "Neurological problems arising in a plant manufacturing tri-aryl phosphates." J Soc. Occup. Med., 31: 139-143 (1981).
[20] Nicholas, JS; Lackland, DT; Dosemeci, M et al. "Mortality among US commercial pilots and navigators." J Occup Environ Med, 40(11): 980-5 (1998).
[21] Schulte, PA; Burnett, CA; Boeniger, MF; and Johnson, J. "Neurodegenerative diseases: occupational occurrence and potential risk factors, 1982 through 1991." Am J Public Health, 86(9): 1281-8 (1996).
[22] Nicholas, JS; Butler, GC; Lackland, DT; et al. "Health among commercial airline pilots." Aviat Space Environ Med: 72(9): 821-6 (2001).
[23] OSHA Hazard Communication Standard Interpretation: "Potential release of hazardous substances from heat shrink products." Dec 21, 1990.
[24] Witkowski, C. "1997 Review of Air Quality Incidents at Airline B." Appendix B to AFA Submission to National Research Council Committee on Aircraft Air Quality, January 2001.

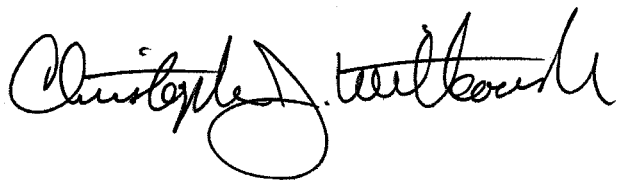
Section 1910.1200(d)(5)(i) of the OSHA Hazard Communication Standard states, "If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous." In this case, ExxonMobil does claim that it has tested the ingestion toxicity of its engine oils, as mixtures, on hens. However, to AFA's knowledge, the *inhalation hazard of exposure to heated, aerosolized oils and their byproducts* has not been assessed, either in a reduced oxygen environment or at sea level. As such, the toxicity of the individual components must be assessed, including those for which an OSHA PEL and/or ACGIH TLV® have been published (i.e., oil mist, carbon monoxide, and TOCP) as per 1910.1200(d)(3)(i) and (ii)). The toxicity of the TCP isomers must also be assessed because they are present in an amount of 1% or greater by volume, as per 1910.1200(d)(5)(ii).

5. AFA request for OSHA to act

AFA respectfully requests that OSHA investigate this matter and: (1) Require that the product labels and MSDBs for Mobil 254, Mobil II, Mobil 291, and chemically similar engine oils and hydraulic fluids include a health hazard warning that describe the inhalation hazard and attendant neurotoxic effects of exposure to these heated oils and hydraulic fluids, including both the potential for exposure to carbon monoxide and tricresylphosphates in a reduced oxygen environment; and (2) In light of the demonstrated toxicity of the mono- and di-ortho isomers of TCP – five to ten times greater than even TOCP[25] - AFA requests that ExxonMobil be required to report the content of these TCP isomers on the MSDBs.

Flight attendants, pilots, and airline ground workers are potentially exposed to these hazards daily. They need OSHA's support. If you have questions about this complaint, please contact me directly at 202-712-9743, or call Judith Murawski, an Industrial Hygienist on my staff, at 206-709-2743.

Sincerely,



Christopher J. Witkowski
Director
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CC: Mr. Rick Engler, Director, New Jersey Work Environment Council
Mr. Richard E. Fairfax, Director, Directorate of Enforcement Programs, OSHA
Ms. Marion C. Blakey, Administrator, FAA
Mr. Nicholas A. Sabatini, Associate Administrator for Regulation & Certification, FAA

[25] Henschler, D. "Tricresyl phosphate poisoning." Experimental clarification of problems of etiology and pathogenesis. Klinische Wochenschrift, Vol. 36(14): 663-674 (1958).