Occupational Health and Safety Tribunal Canada

Date: 2015-08-27
Case No.: 2011-62 and 2012-06

Between:

Air Canada, Appellant

and

Canadian Union of Public Employees, Respondent

Indexed as: *Air Canada* v. *Canadian Union of Public Employees*

Matter:	Appeals under subsection 146(1) of the *Canada Labour Code* of directions issued by a health and safety officer.
Decision:	- The direction under subsection 125.2(1) of the Code is rescinded. - The direction under paragraph 125(1)(*s*) is confirmed. - The direction under paragraph 125.1(*f*) of the Code and section 5.4 of the *Aviation Occupational Health and Safety Regulations* is confirmed.
Decision rendered by:	Mr. Jean-Pierre Aubre, Appeals Officer
Language of decision:	English
For the appellant:	Ms. Rhonda R. Shirreff, Heenan Blaikie LLP
For the respondent:	Mr. James Robbins, Cavalluzzo Shilton McIntyre & Cornish LLP
Citation:	2015 OHSTC 14

REASONS

[1] These cases concern appeals brought under subsection 146(1) of the *Canada Labour Code* (the Code) of directions issued by Health and Safety Officer (HSO) Mary Pollock on November 4, 2011 and December 23, 2011.

[2] In both cases, the issuance of these directions was preceded by a finding of "danger" by said HSO at the conclusion of her investigation into the work refusals registered by the two refusing employees. In both instances, the appellant formulated its appeal by stating that it was appealing "the finding of danger" in the directions issued by HSO Pollock. For the purpose of hearing and determination on the merits and given the great facts and circumstances similarity as well as the commonality of documentary evidence and testimony, these two appeals were heard simultaneously with two other appeal cases, those having been brought under subsection 129(7) by employees of the present appellant against the decisions that a danger does not exist rendered pursuant to subsection 129(4) of the Code respectively by Health and Safety Officers Mary Pollock and Rochelle Blain on March 26, 2012 and July 18, 2011. A separate decision will deal with those appeals.

Background

[3] The parties had initially indicated intending to call a considerable number of witnesses in addition to the three expert witnesses. However, at the outset of the hearing and following discussion with the undersigned appeals officer, the parties opted instead to present statements of agreed facts in all cases, thus avoiding having to call those witnesses to testify. The said statements have been filed as exhibits and as they provide a detailed description of the circumstances of each case and refer abundantly to the HSO reports, they are extensively cited below for those reasons.

Claudia Martinez

[4] At all material times, Ms. Martinez was employed by Air Canada as a flight attendant and a member of the flight attendant bargaining unit represented by the Canadian Union of Public Employees (CUPE). On November 29, 2011, she operated flight AC 460 from Toronto to Ottawa aboard an Airbus A319 identified as Fin 277. According to HSO Pollock, during that flight Ms. Martinez noticed an odour in the cabin which she described as "dirty wet sock smell" to which she attributed nausea and headache. She thus refused to operate the return flight to Toronto (AC 465) on the basis that the odour constituted a danger. A joint report from the flight deck crew (G. Mongrain and M. Lefebvre) indicates that Captain Mongrain advised the Service Director prior to departure of flight AC 460 of a defect log entry concerning an inoperative Auxiliary Power Unit (APU) valve which would result in no air conditioning from the APU, require the first engine to be started at the gate prior to pushback and a second engine cross bleed start after pushback. The HSO report indicates that during the pre-flight safety briefing for AC 460, the Service Director advised the cabin crew, including Ms. Martinez, that Fin 277 had a history of a "dirty, wet sock" odour in the cabin.

[5] According to a synopsis of the fume events and subsequent maintenance activity regarding Fin 277 prior to flight AC 460, Air Canada Maintenance in Toronto had inspected that aircraft for reported odours in the cabin on previous flights as follows:

- November 11, 2011 - Maintenance followed up on a reported "gym bag smell" in the cabin and flight deck that somewhat dissipated during cruise. Oil was found leaking from the attach point of the oil pump to the accessory gear box. Decontamination of the ECS (Environment Control System) was carried out;
- November 13, 2011 - Maintenance followed up on a reported "dirty socks" smell throughout the cabin and flight deck. The odour occurred after engine start and subsided after takeoff but remained noticeable. The elbow ducts from both engines were removed to check for oil contamination. No fault was found, a ground run carried out with minimal smell at engine start and none thereafter;
- November 19, 2011—Maintenance follow up on report of "very strong wet sock smell" during descent into Calgary and Vancouver. Suspicion of filter oil contamination. A visual inspection of the fan areas on the engines showed no sign of any oil leakage. Maintenance suspected an unauthorized use of APU and scheduled a replacement that was carried out on November 21, 2011;
- November 24, 2011—Report of "dirty sock smell" on APU start. Maintenance deferred this snag;
- November 28, 2011—Maintenance followed up on a reported "terrible odour 'stinky feet' smell" in the cabin. Maintenance determined that the APU had been over-serviced and the oil cap was not secure. The APU was drained to correct the oil level and the cap was secured. Maintenance found no evidence of an external oil leak, ran the APU and engines and no smell was noted. The recirculation filters were replaced and the aircraft (Fin 277) found to be serviceable. Next day, Maintenance checked the outcome of said repair, ran the APU for approximately one hour to burn off the residual smell. After approximately one hour, the smell got progressively worse in the cabin, particularly in the aft cabin. The APU bleed valve was inoperative and secured closed.

[6] The joint report of the flight deck crew (Mongrain and Lefebvre) as well as that of the HSO indicate that on AC 460 from Toronto, bridge air conditioning units were in heating mode due to the season and thus no air conditioning was available prior to first engine start. Once the main cabin door had been closed for departure, cabin temperature had reached 25 C and upon this being reported to the flight deck by the Service Director, Captain Mongrain indicated that air conditioning would become available with the first engine start. During the cross bleed start of flight 460 to Ottawa, the flight crew report notes that the Service Director advised the flight deck of an "old socks" odour throughout the cabin. Captain Mongrain explained to the

Service Director that strong winds sometimes carry exhaust fumes from towing equipment into the cabin air system and that the odour would dissipate with the second engine starting. Air Canada Maintenance reported on November 30, 2011, that the odour during taxiing was most likely from external sources (i.e. ground equipment, vehicles or aircraft exhaust). The Service Director replied to a query from the flight deck that there was no perceptible smoke and that there had been no adverse passenger reactions. According to the pilots, this odour never reached the flight deck area. Prior to top of descent, the Service Director informed the flight deck that the odour had been on and off for some time but had finally gotten down to a barely noticeable level. However, during descent into Ottawa, the Service Director informed the pilots that flight attendant Martinez would refuse to operate the return flight to Toronto (AC 465) on Fin 277, invoking health reasons due to cabin air quality.

[7] HSO Pollock accepted as fact in her investigation report and Decision of December 23, 2011, that aviation environment is subject to smells from a variety of sources such as ground power units, other aircraft exhaust from engine start, ground vehicles that produce smells and that would account for the ambient air around an aircraft.

[8] The notes of flight attendant Martinez indicate that during AC 460 to Ottawa take-off roll, the odour was "so bad [she] wanted to gag" and remained just as strong throughout the flight. Upon landing in Ottawa, she reported "suffering from nausea and a strong headache" and light-headedness which she attributed to a "strong odour of dirty wet socks" that "took over the cabin". Air Canada notes that Ms. Martinez reported having been involved in two other "odour events in the previous three weeks". Cabin Crew Manager P. Campacci informed Manager Safety and Product Support J. Donato of the refusal and he was advised by Captain Mongrain that the aircraft had taken air from the ramp in Toronto, that the odour had dissipated shortly after takeoff, that both air packs were functional and that the aircraft was safe. Mr. Donato and Ms. Martinez were advised by G. Antonopoulos of Maintenance Control that the odour in the cabin during taxi in Toronto was outside air from the ramp (external sources) and would have dissipated once the aircraft was on its way.

[9] Maintenance thus likened this odour occurrence on AC 460 to a smell that would linger if one was in a traffic jam in a car surrounded by diesel trucks. Maintenance confirmed that the APU on Fin 277 was deactivated, filters were replaced and the aircraft was serviceable. Ms. Martinez nonetheless continued to exercise her refusal right vis-à-vis operating return flight AC 465 to Toronto on Fin 277. She maintained said refusal after the employer's investigation in the presence of a work place committee employee representative that saw Captain Mongrain and Maintenance reiterate that the aircraft was safe and serviceable and the odour would not repeat on the Toronto return flight. The flight was dispatched with a minimum crew. Upon being met on arrival in Toronto by Manager Safety and product Support Donato and Cabin Crew Manager Campacci, the three AC 465 flight attendants confirmed that there was no odour present in the cabin of Fin 277 during that flight. Furthermore,

Mr. Donato and Ms. Campacci failed to notice any odour when walking through the cabin.

[10] Ms. Martinez was advised to seek medical attention by Mr. Donato. The HSO report notes that she attended Ottawa General Hospital by bus and asked to be tested for exposure to carbon monoxide. She later informed the HSO that the attending physician's report indicated that the carbon monoxide tests were negative and that her symptoms were "indicative of exposure to nauseous fumes".

[11] HSO Pollock's investigation proceeded on December 1, 2011. As part of that, the HSO asked whether Air Canada could confirm what product Ms. Martinez would have been exposed to. Air Canada's response was provided by Mr. Donato as follows:

- Maintenance and the Captain reported the source of the odour as exhaust from either other aircraft or ground equipment;
- Maintenance confirmed that there was no inherent mechanical problem with Fin 277;
- Mr. Chris Koroneos (Industrial Hygienist) stated that Air Canada could not confirm what the product was as the source of the odour was never established, and he expressed the opinion that there had been no exposure to primary bleed air contaminants such as oil and hydraulic fluid.

[12] HSO Pollock's investigation report and decision on December 23, 2011 has the HSO stating *inter alia* under Facts:

- The odour present in the cabin on Fin 277 during flight AC 465 was a result of Mobil Jet Oil II;
- Air Canada Maintenance could not say that there would not be a residual mist or particles inside the aircraft or systems after a burn off of the APU for approximately one hour;
- It was reasonable to conclude "that the probability of residual particles of the gaseous phase of a chemical substance existed from this burn off of the APU which contaminated systems on board the aircraft and there is an increased probability that you will still experience the smells …;"
- Although Air Canada's Industrial Hygienist stated that the TLV [Threshold Limit Value] would be below the threshold limit for trace amounts and that the odour would dissipate during flight, in the absence of scientific data or measurements, it could not be confirmed that TLV exposure would be below the threshold for trace amounts or that the smell would dissipate during the flight.

[13] The conclusion of HSO Pollock was that a danger existed in regards to operating Fin 277 for flight AC 465 on November 29, 2011. However, the HSO did

not issue a corrective direction under subsection 145(2) of the Code, choosing instead to issue a contravention direction pursuant to subsection 145(1) of the Code to the effect that Air Canada had contravened subsection 125.2(1) and paragraph 125(1)(*s*). The directions read as follows:

> IN THE MATTER OF THE CANADA LABOUR CODE,
> PART II OCCUPATIONAL HEALTH AND SAFETY
>
> DIRECTION TO AIR CANADA UNDER SUBSECTION 145. (1)
>
> On December 1, 2011, the undersigned health and safety officer conducted an investigation following a refusal to work onboard Flight 465/460 Airbus A319 Fin#277 at Terminal 1 Lester B Pearson Airport and during a meeting on December 1, 2011 at Air Canada's Crew Boardroom, the undersigned health and safety officer is of the opinion that the following provisions of the *Canada Labour Code*, Part II has been contravened:
>
> *Canada Labour Code*, Part II, paragraph 125.2(1):
>
> **125.2(1)** An employer shall, in respect of every workplace controlled by the employers, and in respect of every work activity carried out by an employee in a workplace that is not controlled by the employer, to the extent that the employer controls that activity, provide, in respect of any controlled product to which an employee may be exposed, as soon as is practicable in the circumstances, any information referred to in paragraph 125.1 (*e*) that is in the employer's possession to any physician or other prescribed medical professional who request that information for the purpose of making a medical diagnosis of, or rendering medical treatment to, an employee in an emergency.
>
> …
>
> Therefore, you are HEREBY DIRECTED, pursuant to paragraph 145(1)(a) of the *Canada Labour Code*, Part II to terminate the above contravention by December 31, 2011
> Issued at Toronto this 23, day of December 2011.
>
> Mary Pollock
> Health and Safety Officer
> […]
>
> IN THE MATTER OF THE CANADA LABOUR CODE,
> PART II OCCUPATIONAL HEALTH AND SAFETY
>
> DIRECTION TO AIR CANADA UNDER SUBSECTION 145.(1)

> On December 1, 2011, the undersigned health and safety officer conducted an investigation following a refusal to work onboard Flight 465/460 Airbus A319 Fin #277 at Terminal 1 Lester B Pearson Airport and during a meeting on December 1, 2011 at Air Canada's Crew Boardroom, the undersigned health and safety officer is of the opinion that the following provisions of the *Canada Labour Code*, Part II has been contravened:
>
> *Canada Labour Code*, Part II, paragraph 125.(1)(s):
>
> **125.(1)** Without restricting the generality of section 124 or limiting the duties of an employer under section 125 but subject to any exceptions that may be prescribed, every employer shall, in respect of every work place controlled by the employer and, in respect of every work activity carried out by an employee in a work place that is not controlled by the employer, to the extent that the employer controls the activity,
>
> …
>
> (s) ensure that each employee is made aware of every known or foreseeable health and safety hazard in the area where the employee works.
>
> Therefore, you are HEREBY DIRECTED, pursuant to paragraph 145.(1)(a) of the *Canada Labour Code*, Part II, to terminate the above contravention by December 31, 2011
> Issued at Toronto this 23, day of December 2011.
>
> Mary Pollock
> Health and Safety Officer
> […]

Jerome LaPorte

[14] At all material times, Mr. LaPorte was a flight attendant employed by Air Canada and a member of the flight attendant bargaining unit represented by CUPE. The HSO report indicates that on October 17, 2011, Mr. LaPorte was scheduled to operate flight AC 597 using an Airbus 319 bearing number Fin 283. This flight was to be from Toronto to Las Vegas and Mr. LaPorte was to act as Service Director. Air Canada's Flight Crew Statement indicates that during boarding of the flight, there was a noticeable odour in the cabin when the APU bleed was started by Captain Mark Hellman who contacted maintenance and kept the APU running pending their arrival. It appears however that the odour seemed to be dissipating while the situation was being assessed by the flight crew and maintenance.

[15] The Fin 283 log book indicated that on the previous day, flight attendants operating flight AC 979 on the same aircraft had reported an "old socks" or "wet

dog" odour in the latter part of that flight, an odour that became worse during descent. Following that report and pursuant to standard practice for identifying the source of any odour, an engine idle run and APU isolated bleeds (aircraft two air packs checked separately with the APU bleed air and the bleed air source for each engine) were carried out by maintenance with no noticeable smells in the cabin. The APU bleed duct was also checked for oil and none was found. Maintenance noted that there was no history of high oil consumption and that the engine and the APU checked out as serviceable. HSO Pollock's report notes that Captain Hellman informed Service Director LaPorte about those entries in the aircraft log book. Mr. LaPorte described the cabin odour on FIN 283 as either "toxic" or "toxic/dirty laundry smell" in his Refusal to Work Registration form, although the HSO report notes that Service Director LaPorte did not report having developed any health symptoms after exposure to the odour on Fin 283. When advised of Mr. LaPorte's work refusal, Cabin Crew Health and Safety Manager K. Mackenzie initially phoned the gate and spoke to Mr. LaPorte who then described the cabin odour as smelling like "dirty socks". When she subsequently arrived at the aircraft, Mr. LaPorte told her that he believed the smell from the APU to be "toxic" and that it constituted a danger. On the other hand, Captain Hellman told Ms. Mackenzie that he felt that the aircraft was safe and good to go, that the odour had been present briefly on APU start-up but had dissipated quickly and had not reappeared even though the APU had been running for an hour. He further stated that there was only one report of a similar odour in the aircraft log book, that being for the previous day, and that the odour could have been caused by improper APU shutdown. In a subsequent written statement, Captain Hellman indicated that:

- Maintenance had arrived at the aircraft about five minutes after the odour had appeared, at which time it was already starting to dissipate;

- Maintenance felt there was some residue in the lines that was purging out;

- After about twenty minutes there was no odour.

[16] HSO Pollock's report notes that in the employer's description of events, Ms. Mackenzie had spoken to maintenance (S. Francis) and been told:

- There had been only one other odour occurrence reported in the aircraft log book (October 16), and that Fin 283 had been in the hangar overnight where all Airbus Standard Operating Procedures (SOPs) for troubleshooting had been followed on that occasion;

- Maintenance had checked for oil consumption and found no problem, and checked bleed ducts with black light and found no contamination.

[17] Furthermore, Ms. Mackenzie had spoken with maintenance at the time of the LaPorte refusal and been told that all Airbus SOPs had been followed on that day and that they were unable to replicate the odour although they had run both air packs. Another maintenance member (G. Kerem) was called by Mr. Francis. He spoke to

the Captain who advised that he did not have an issue with the aircraft, and no abnormal odour was noted by Mr. Kerem when he boarded the aircraft. When informed of Air Canada's conclusion that there was no danger, Mr. LaPorte expressed his disagreement and maintained his refusal to work.

[18] A replacement Service Director was requested by the Captain and upon the latter's arrival and acceptance to operate the flight as well as the acceptance of the two flight attendants initially designated to also operate the flight, AC 957 flight departed for Las Vegas, albeit with the Captain's assurance that if the odour reappeared, he would return the aircraft to the gate. The on-site HSO investigation commenced after the flight had departed.

[19] An Air Canada Flight Incident Notification Message indicates that shortly after HSO Pollock had left the site, the AC 957 flight crew had reported that on takeoff roll and during climb, passengers and crew had experienced a strong odour in the aft cabin, with the flight attendants informing that the odour in the back burned their eyes and caused coughing. However, the odour dissipated during cruise and the Captain, in consultation with Maintenance Operations Control (MOC) and dispatch, decided to carry on with the flight. Prior to top of descent, Captain Hellman elected to shut off one of the air packs on descent and the odour did not recur. That air pack was kept off for the return flight to Toronto and the flight was uneventful.

[20] HSO Pollock's report indicates that Air Canada informed her that:

- Maintenance had replaced both heat exchangers on air pack #1 and replaced the air cycle machine twice on the same air pack, having been informed that when the odour had occurred on AC 957 during take-off, the said odour had dissipated after the flight crew had turned off air pack #1;

- Maintenance had found no trace of oil contamination in the bleed system and as a precautionary measure; it had replaced the APU cooling fan and found no evidence of a leak. Air Canada subsequently advised HSO Pollock that after maintenance had performed those actions, Fin 283 had flown more than seven legs without a recurrence of the odour.

[21] In concluding that a danger existed in regards to operating Fin 283 on October 17, 2011, HSO Pollock stated, *inter alia*, that maintenance had not identified any source of the smell and that Air Canada could not confirm to Transport Canada what the cause of the smell was on flight AC 597, but could confirm that there was no trace of oil contamination. While not issuing a direction pursuant to subsection 145(2) of the Code following her "danger" finding, HSO Pollock concluded that Air Canada had contravened paragraph 125.1(*f*) of the Code and section 5.4 of the *Aviation Occupational Health and Safety Regulations* (AOHSR).

[22] The direction reads as follows:

IN THE MATTER OF THE CANADA LABOUR CODE,
PART II OCCUPATIONAL HEALTH AND SAFETY

DIRECTION TO AIR CANADA UNDER SUBSECTION 145.(1)

On October 17, 2011, the undersigned health and safety officer conducted an investigation following a refusal to work onboard Flight 597 Airbus A320 Fin# 283 at Terminal 1 Lester B Pearson Airport and during a meeting on October 17, 2011 at Air Canada's Crew Boardroom, the undersigned health and safety officer is of the opinion that the following provisions of the *Canada Labour Code*, Part II, and the *Aviation Occupational Safety and Health Regulations* have been contravened:

***Canada Labour Code*, Part II, paragraph 125.1(f):**

125.1 Without restricting the generality of section 124 or limiting the duties of an employer under section 125 but subject to any exceptions that may be prescribed, every employer shall, in respect of every work place controlled by the employer and, in respect of every work activity carried out by an employee in a work place that is not controlled by the employer, to the extent that the employer controls the activity,

…

(*f*) where employees may be exposed to hazardous substances, investigate and assess the exposure in the manner prescribed, with the assistance of the work place committee or the health and safety representative; and

***Aviation Occupational Health and Safety Regulation* (AOHSR), section 5.4:**

(1) If there is a likelihood that the health or safety of an employee is or may be endangered by exposure to a hazardous substance, the employer shall, without delay,

(a) appoint a qualified person to carry out an investigation in that regard; and
(b) notify the work place committee or the health and safety representative of the proposed investigation, and of the name of the qualified person appointed to investigate, so that they may participate in the investigation.

(2) In an investigation, the following criteria shall be taken into consideration:

(a) the chemical, biological and physical properties of the hazardous substance;
(b) the routes of exposure to the hazardous substance;
(c) the acute and chronic effects on health of exposure to the hazardous substance;

> *(d)* the quantity of the hazardous substance to be handled;
> *(e)* the manner in which the hazardous substance is stored, used handled and disposed of;
> *(f)* the control methods used to eliminate or reduce exposure of the employees to the hazardous substance;
> *(g)* the concentration or level of the hazardous substance to which an employee is likely to be exposed; and
> *(h)* whether the concentration of an airborne chemical agent or level of ionizing or non-ionizing radiation is likely to exceed 50% of the values referred to in section 5.16 or the limits referred to in subsection 5.19(2).
>
> Therefore, you are HEREBY DIRECTED, pursuant to paragraph 145.(1)(a) of the *Canada Labour Code*, Part II, to terminate the above contravention by November 14, 2011 Issued at Toronto this 4, day of November 2011.
>
> [signed]
> Mary Pollock
> Health and Safety Officer
> […]

Issues

[23] The present appeals concern the directions issued by HSO Pollock relative to contraventions of the Code by the appellant that the HSO found to have occurred when she investigated the refusals to work by cabin crew members LaPorte and Martinez. The appellant employer has nonetheless premised its challenge of the directions by claiming to actually appeal the finding of "danger" by HSO Pollock although it has brought its appeals pursuant to subsection 146(1) of the Code which provides a right of appeal to a party "who feels aggrieved by a direction issued by a health and safety officer […]".

[24] Upon these appeals being brought, the undersigned informed all parties by letter decision dated April 18, 2012, that the issue that would be entertained in these appeals would only relate to the said directions:

> The Code is very specific as to the matters that may give rise to appeals. As such, subsections 129(7) and 146(1) clearly state that only decisions of no danger and directions may be appealed. It makes no mention in this regard of decisions or findings of danger. While this Appeals Officer has no intention of dictating to parties the manner in which they formulate their appeal, or interfere in the manner in which they structure or formulate their arguments and submissions in support of their individual positions, in my opinion it needs to be made very clear to the parties to the present appeals that the essence of the issues at appeal in these cases should be whether contraventions to the legislation and its supporting regulations have occurred and

> consequently that it is expected by this Appeals Officer that it is to this that the parties will direct their submissions.
>
> While one cannot ignore that the Health and Safety Officer did indeed conclude his (sic) investigation into both refusals to work by finding that a danger did exist, this is not reflected in the wording of both directions and consequently, while this Appeals Officer would not object to evidence and submissions relative to danger being presented, it needs to be clearly understood that this would solely be within the process of establishing and determining whether the contraventions identified in the directions have occurred or not.

[25] Paragraph [2] of the present decision indicates that the undersigned has made a parallel decision (2015 OHSTC 15) regarding HSO Mary Pollock and Rochelle Blain's decisions of "no danger" following work refusals by employees of Air Canada arising from facts identical to those dealt with in the present decision, and where the existence or not of "danger" has been determined in that decision.

[26] Therefore, while the matter of "danger" may be broached in these appeals, the decision by the undersigned will be incorporated by reference in the present cases with respect to whether or not the odours indicate a "danger" thereby leaving the present decision to deal exclusively with the validity of the directions by the health and safety officer citing contraventions. Subsection 145(2) of the Code stipulates that where a health and safety officer arrives at a conclusion that a "danger" exists, there is a statutory obligation for that officer to issue a direction pursuant to that provision. The words of the provision however clearly indicate that this mandatory direction must be for the purpose of correcting the hazard or condition in the work place that constituted a "danger" for a refusing employee, thereby making it possible, in cases where there would no longer be the necessity to take "corrective" action, not to issue such a direction. HSO Pollock has not indicated in her reports why she chose not to issue directions pursuant to subsection 145(2) following her findings of danger and attempting to decipher her reasons would only be speculation.

Submissions of the parties

A) Appellant's submissions

[27] In the course of preparatory pre-hearing conferences, the parties to these cases had indicated intending to resort to considerable documentary evidence as well as calling a large number of witnesses in the presentation of their respective positions. While much documentary evidence was indeed filed at the outset and in the course of the common hearing, the parties finally opted to call just four witnesses, three of those being called, tendered and recognized by the undersigned appeals officer as experts in the following fields.

[28] The appellant Air Canada tendered Dr. Richard Carl Pleus, Ph.D., as its expert. The latter is a toxicologist and pharmacologist who has considerable project

experience with air and exposure to chemicals by humans as well as health risks to workers resulting from acute exposures. He holds a Ph.D. in environmental toxicology from the University of Minnesota, Department of Public Health and has conducted toxicological assessments for human exposure to chemicals in the work place and other environments. He has written or co-authored numerous peer-reviewed articles on toxicology issues and contributed chapters to books on the subject. Dr. Pleus is founder and managing director of Intertox Inc., a Seattle-based company that provides toxicology research and consulting services to a plethora of clients, including U.S., state and government agencies, foreign governments, non-profit organizations and private companies. Dr. Pleus was tendered and recognized as expert in toxicology.

[29] Dr. Pleus describes toxicology as the scientific study of the adverse effects that human made, natural and endogenous compounds have on living organisms. As part of the toxicological assessment, he reviewed technical reports, medical records, sampling results and other documents describing the nature and timing of the so-called fume event(s) involved in these cases and he has formed the opinion that the objective information relative to the said cases does not support a conclusion of danger due to acute exposures to the chemicals in engine oil (Mobil Jet Oil II) or hydraulic fluid (Skydrol 4).

[30] Dr. Pleus explains that an exposure threshold for toxicological effects exists for most chemical agents. Before harm can result from an exposure to an agent, exposure must be of sufficient concentration and duration to produce the necessary internal dose that exceeds that threshold. Furthermore, the potential for adverse health effects is highly dependent on the exposure scenario, what happens to the chemical in the body and whether the individual is more sensitive than average. Dr. Pleus asserts that in order to fully characterize the potential hazard of an agent, one must not only know what type of effect it produces and the dose required to produce that effect but also be informed about the agent, the exposure and the disposition by the subjects. The major factors that influence toxicity as it relates to the exposure situation for a specific chemical are the route of administration and the duration or frequency of exposure.

[31] Dr. Pleus posits that the mere presence of a chemical in the environment or the route of exposure does not mean that adverse toxicological effects will occur. According to Dr. Pleus, it is scientifically invalid to classify chemical agents as either toxic or non-toxic. Whether a toxic effect occurs is dependent on the chemical and physical properties of the agent, the exposure situation, how the agent is metabolized by the system, and the overall susceptibility of the biological system or subject. Stated differently, in order for harm to result from an exposure, that exposure must be of sufficient concentration and duration to exceed the chemical's dose-response threshold for some adverse effect, and this is true for the chemicals assessed in Dr. Pleus' report. Thus, even for chemicals labelled as toxic, exposures must be above this threshold level for the possibility of any adverse effect to exist, and for exposure(s) to a chemical agent to occur, there must be a pathway of exposure from the source of the chemical to the exposed individual.

[32] As for the aircraft concerned in these cases, for exposure to hydraulic fluid to occur, there must be a leak or spill from one of these systems at or near locations where the fluid could reach the cabin. Some examples include leaks that occur near air conditioning units or near APU intakes. If hydraulic fluid is drawn into the air conditioning units or APUs, then the eventual concentration is dependent upon many parameters that include temperature changes, the design of the ventilation systems and filter efficiency.

[33] The aircraft ventilation system operates throughout the flight to control cabin temperature and pressure and air is distributed through the cabin. Thus, if chemicals enter the ventilation system of the aircraft, they will distribute throughout the passenger cabin, and all cabin attendants, pilots and passengers would be exposed. High efficiency particulate air filters (HEPA) are used in Airbus A319s or A320s (the aircraft involved in these cases) to remove concentrations of chemicals. The filtration process is done by interception, impaction and diffusion and can remove particles, bacteria, viruses, mist, dust and aerosols. Cabin air is also vented constantly from the cabin back into the environment and replaced by incoming air. According to the literature, the most common exposure pathway to engine oil in cabin air occurs when air from the engine compressor is diverted or bled to the cabin through a closed system. Bleed air is used to pressurize and ventilate the cabin air. Once in the cabin, air consists of approximately 28-57% filtered bleed air with the remainder consisting of outdoor air.

[34] Skydrol LD4 and Mobil Jet Oil II were used by Air Canada on the planes at the center of the present cases. In short, hydraulic fluid is used to lubricate and conduct power in the hydraulic system, which is used to drive essential components of the aircraft and jet engine oil is used to lubricate, protect and cool engine use. Of all the chemical constituents in these products, the chemicals often alleged to be the cause of adverse health effects are members of a class of chemicals called organophosphates and representing a large class of chemical compounds with great diversity in their toxicological potency due, in part, to different mechanisms of action. Some organophosphates inhibit acetylcholinesterase (AChE) and others do not. Of these, the most frequently recorded organophosphate is an additive to jet engine oil called tricresyl phosphate (TCP), including an isomer of TCP called triorthocresyl phosphate (TOCP). TCP is listed as a component of Mobil Jet Oil II but not of Skydrol LD4 as per its material safety data sheets (MSDS).

[35] The primary toxicological (neurotoxic) effect of exposure to TCP is known as organophosphate-induced delayed neuropathy (OPIDN). According to the literature, it is a rare neurodegenerative disorder in humans that is characterized by loss of function and ataxia of distal parts (in the far end) of sensory and motor axons in peripheral nerves and ascending and descending tracts of the spinal cord. The early neurological symptoms are usually sharp, cramp-like pains in the calves, tingling in the feet followed by distal numbness and paresthesia. Pain and weakness in muscles becomes progressive and spreads to flaccid paralysis, motor signs such as weakness

and muscular atrophy, ataxia (lack of muscle coordination) and gait abnormalities and sensory deficits.

[36] According to Dr. Pleus, it has been reported that in some cases, ingestion of preparations contaminated by TOCP may be followed by gastro-intestinal symptoms (nausea, vomiting and diarrhea). In contrast to those organophosphates that cause OPIDN, organophosphates that affect AChE can cause other syndromes like acute cholinergic syndrome, intermediate syndrome and chronic organophosphate induced neuropsychiatric disorder (COPIND). Plasma and red blood cell AChE activity is used to monitor exposure to these organophosphates. COPIND is reported in some farm workers with chronic low-level exposure to organophosphate pesticides, not TCP. Common symptoms are impairment in memory, concentration and learning, anxiety, depression, psychotic symptoms, chronic fatigue, peripheral neuropathy, autonomic dysfunction and others.

[37] On the toxicity of Skydrol LD4 and its components, Dr. Pleus notes that its main constituents are TBP (Tributyl Phosphate) and DBPP (Dibutyl Phenyl Phosphate). He reports that toxicity data from Skydrol suggests low acute toxicity via the oral, dermal and inhalation routes. The lethal concentration or dose (lethality) on test animals was used as end point to compare the relative potency of chemical agents following acute exposure and the data has shown that the acute toxicity of Skydrol LD4 on humans would be classified as "slightly toxic" for acute exposure via ingestion and "practically non-toxic" for acute exposure via the dermal route.

[38] Testing on rabbits resulted in rabbit eyes being slightly irritated by Skydrol LD4 and skin moderately irritated following direct application to tissue for a 24hour exposure. Where human volunteers were involved in testing via patch application, no dermal sensitization was reported. Similar testing conducted in rats over a period of 28 days caused respiratory irritation as well as reduced body weight and increased organ weights were also observed at higher doses exposure. Of the constituents of Skydrol LD4, TBP is a non-flammable, non-explosive, colorless and odourless liquid used as a solvent, a primary plasticizer, metal extractant and as an antifoaming agent. In animals, it is irritating to both skin and eyes with no dermal sensitization, and on humans, it has an irritant effect on the skin and mucous membranes as well as on the human eye and respiratory tract.

[39] According to Dr. Pleus, based on data obtained through research on rats, TBP would be classified as moderately to lightly toxic for acute exposure via ingestion, moderately toxic for acute exposure via inhalation and practically non-toxic for acute exposure via the dermal route. He notes that no case of OPIDN caused by TBP has been reported in humans, and studies conducted on hens has shown that TBP does not cause OPIDN at less than lethal doses. Similar studies of TBP conducted on rats have also revealed that the potential for any type of neurological effects is very low, even when very high levels of the chemical are administered daily for prolonged periods. Very large doses are required to produce cholinergic symptoms and when the dosages applied to rats are proportionately calculated for humans, humans would

need to ingest 1/10 of a liter. Workers exposed to 15mg/m3 in air have complained of nausea and headaches.

[40] A comprehensive study of the toxicity of TPP, which is another chemical found in some hydraulic fluids, including Skydrol LD4, has shown that workers regularly exposed to airborne TPP vapour, mist or dust for an average of 7.4 years suffered no increase in any type of symptoms including neurological, neuropsychiatric, dermatitis and respiratory irritation, even though they were under particularly close medical observation. It is noted that the TPP TLV was set at 0.2 ppm, with the same being assigned to TBP, representing concentrations "considerably less than the concentrations reportedly associated with worker complaints of nausea and headache.

[41] According to the American Conference of Governmental Industrial Hygienists (ACGIH), "this value is intended to minimize the potential for headache, nausea and irritation of the eyes, skin, mucous membranes and upper respiratory tract[1]. It should also provide a wide margin of protection from narcosis and cholinergic effects". Another component of Skydrol LD4, DBPP is a clear, slightly yellow liquid with an odour similar to butanol. Based on the data obtained from research on rats and rabbits, DBPP would be classified as "slightly toxic" for acute exposure via ingestion, and "practically non-toxic" for acute exposure via the dermal route.

[42] The MSDS for Skydrol LD4 indicates that DBPP is practically non-irritating to the eyes and skin of rabbits but ACGIH states that it can injure the eyes and is irritating to the skin and upper respiratory tract in humans and contact with the eyes has caused marked pain. Repeated dermal contact has caused drying and cracking of exposed skin and exposure to aerosolized or vaporized DBPP has caused nose and throat irritation accompanied by coughing and wheezing. However, based on the results of patch tests on human volunteers, it is not considered a primary irritant or a sensitizing agent in humans. Dr. Pleus reports also concerning BDPP (Butyl Diphenyl Phosphate) that the MSDS for Skydrol LD4 lists no toxicity information and that he has found no toxicological data in separate literature review.

[43] On the toxicity of Mobil Jet Oil II, Dr. Pleus notes that it contains between 1-3% TCP. Research on hens at a repeated dose exposure of 1000mg/kg for five days per week for 13 weeks has shown no alterations indicative of OPIDN. Such a dose in hens would be equivalent to a 70kg adult ingesting a dose of 70,000mg of jet engine oil per day for 13 weeks.

[44] The MSDS for Mobil Jet Oil II reports that decomposition products can be harmful. Those are listed as carbon monoxide, phosphorous oxides, aldehydes, smoke, fume and incomplete combustion products. At elevated temperature and under fire conditions, the oil may decompose and give off irritating and/or harmful

[1] ACGIH, 1986. *Documentation of the Threshold Limit Values and Biological Exposure Indices*, American Conference of governmental Industrial Hygienists, Cincinnati, OH.

gases, vapours or fumes. The possible symptoms from acute exposure to these decomposition products in a confined space may include headache, nausea, eye, nose and throat irritation. TCP, or Tricresyl Phosphate, is a synthetic heterogeneous oily mixture historically added to some jet engine oils and hydraulic fluids to provide high temperature, anti-wear properties. Since the anti-wear properties of TCP are unique to this class of compounds, complete replacement in jet engine oils by other additives is not presently possible for many applications.

[45] TCP is found in many products that people have used and been exposed to for over 50 years. It is used as a plasticizer, flame retardant, waterproofer, lead scavenger in leaded gasoline, and solvent. Given its common uses, it is reasonable to assume that a large population has been exposed to TCP at one time or another, albeit at very low levels.

[46] Dr. Pleus notes that toxicity data for TCP suggests low acute toxicity (lethality) via the oral and dermal routes. It is classified as "slightly toxic" for acute exposure via ingestion and practically "non-toxic" for acute exposure via the dermal route. There is no data on skin or eye irritation. In the absence of human data, data from research using mature hens and cats are considered the most useful in determining the OPIDN-producing potential of organophosphates. Both types of research express OPIDN by signs very similar to those of humans. In general, the dose required to cause OPIDN is lower for ortho-containing isomers of TCP than other isomers. Various studies of ingestion of jet engine oil by hens with varying concentrations of TCP and TOCP have led Dr. Pleus to conclude that substantial ingestion of oil containing TCP are required to cause OPIDN. Dr. Pleus further notes that toxicity of TCP mixtures is much lower in the present day because manufacturers have made an effort to reduce the concentrations of orho-cresyl phosphate constituents in TCP, which are considered to be primarily responsible for the ability of TCP to induce OPIDN. Potencies of TCP formulations in terms of ability of the product to induce OPIDN are up to 100 times lower than earlier formulations.

[47] Regarding the regulatory aspects of occupational exposures, Dr. Pleus notes that governmental agencies or non –government entities develop occupational exposure levels (OEL) to protect workers. Such exposure limits are recommended by governmental bodies or legislated by federal, provincial and territorial agencies responsible for occupational safety and health. While the exact definition of an OEL may vary depending on the developing agency, Dr. Pleus notes that an OEL is typically based on repeated exposures to a particular chemical for 8 hours a day, 5 days per week for many years of employment, and that OELs applied in Canada include ACGIH TLVs. In the case of a single exposure, other OELs have been developed, such as NIOSH's IDLH values. These single episode values reflect exposure levels that can cause significant adverse effects after a short duration exposure, such as 15 or 20 minutes. In the case of exposure for a shorter duration, reaching a short term exposure limit or IDLH would require exposure to a much higher concentration of the chemical.

[48] Regarding chemical exposure assessment, Dr. Pleus states that exposure evaluation consists of assessing the pathways and the possible magnitudes of exposure to a chemical agent. The reports from the employees as well as from Air Canada provided information that was used to characterize the possible exposures to Skydrol LD4 or Mobil Jet oil II, including information on the source, magnitude and duration of possible exposure. For the purpose of his assessment, Dr. Pleus made the assumption that the employees could be exposed to the chemical constituent in hydraulic fluid and jet engine oil for eight hours. He then determined if the chemical exposure is sufficient such that it will meet or exceed the threshold for adverse effects. For a chemical agent to cause long-term adverse health effects following an exposure of short duration, the agent would generally need to be highly potent and found at sufficient concentrations for sufficient time, i.e. at concentrations much higher than the TLV.

[49] Dr. Pleus also considered the aircraft cabin air ventilation system. In the Airbus A319 and A320, air is brought into the air conditioning unit which is located underneath the passenger cabin near the wings, as per a schematic of the ventilation system of the Airbus A319/320 obtained from a training manual on the A319 air conditioning system. Because the ventilation system runs the length of the passenger cabin, the assumption is that if one person were to be exposed to sufficient quantities of a chemical to cause adverse effects, others would be expected to have been as well. Further, there are great quantities of air that are circulated in the cabin of the aircraft. In the Airbus A319, approximately 28% to 49% of the air is recirculated depending on how many air conditioning packs are used and the conditions of their use. In the case of the Airbus A320, approximately 37% to 57% of the air is recirculated, again depending on the number and conditions of use of the air packs.

[50] Using diagrams of the Airbus A319/320 bleed air and air conditioning systems, of the APU and of the fuselage showing the position of the distribution air ducts and recirculation filters, Dr. Pleus states that once a chemical has entered the cabin air, it is further diluted compared to its concentration in bleed air, something akin to adding a drop of food colouring into a pool of water. Thus, anytime dilution occurs, this decreases the concentration of any particular chemical in the air to which a passenger or flight crew could be exposed.

[51] Regarding the assessment of exposure and duration of exposure to chemicals, the report states that from a scientific approach, for there to be a reasonable expectation of injury or illness due to a chemical exposure, there must be exposure to a sufficient dose of that chemical. Since no air concentrations were measured during any of the reported odour events, detection of odour or a visible smoke/mist can be used to estimate what doses might have occurred. Noting that a visible mist of jet engine oil or hydraulic fluid would signify a higher concentration of dispersed aerosol compared to an odour, the report indicates that the documents do not indicate that any vapours or mists actually entered the cabin air. Dr. Pleus' calculations indicate that exposure levels of oil in air sufficient to bring about OPIDN, which constitutes the endpoint of TCP, would produce a visible haze that would have been noticeable by passengers and cabin crew.

[52] Dr. Pleus further notes that reports of air concentrations of TCP measured in commercial aircraft are very low and that TCP is found in many consumer products in low concentrations, thus making the determination of the source potentially challenging. The expected concentrations of TCP and its isomers, based on concentrations measured at different times of aircraft operations, are expected to be exceedingly small. Several studies have measured contaminant levels of hydraulic fluid and its associated constituents in commercial aircraft, TBP and engine oil and TCP in cabin air. In one study (*Muir*)[2], concentrations of airborne contaminants were measured in a medium-sized aircraft manufactured in the UK (BAE 146). Four different scenarios were used: hangar background, aircraft background, APU on and one scenario with a chemical release. In all scenarios, levels of hydraulic fluid and TBP were consistent within the aircraft at 0.002 to 0.003 mg/m3 and 0.023 to 0.042 mg/m3. TBP is also found in plastics and the components of hydraulic fluid have different volatilities, which may explain the higher concentration of TBP compared to hydraulic fluid.

[53] Regarding TCP and engine oil, the same study (*Muir*) reports that when the APU was running, engine oil was found at consistent concentrations of 0.011 to 0.014 mg/m3 and TCP concentrations were 0.0006 to 0.0013 mg/m3. In a different aircraft (Boeing 757), an unplanned bleed air contamination event during ascent when testing to measure cabin air contaminants showed the highest levels of TCP contamination at concentrations of 0.005 to 0.00004mg/m3. The instantaneous values might have been ten-fold higher as the sampling was taken over a short period of time. In another report (Waters), trace levels of TBP were found in cabin air, but no quantitative levels were given and the number of flights and the type of aircraft were not reported. Some studies where analysis for TCP in cabin air and bleed air involving different types of commercial aircraft was conducted yielded no detections. Another study (*Crump*) where cabin air was measured on 100 flights involving 5 different makes of aircraft yielded maximum measured levels of TOCP at 0.0228mg/m3, TCP at 0.0377 mg/m3 and TBP at 0.0218mg/m3 with arithmetic means levels being considerably lower.

[54] Dr. Pleus thus notes that from a toxicological perspective, the lowest OELs for TCP and TBP being 0.1 mg/m3 and 2.2 mg/m3, these represent permissible work place exposure levels that would be unlikely to cause harm if a worker were exposed for an 8 hour day, 5 days per week for many years of employment. In addition, the exposure to chemical agents that enter the cabin will be diluted, distributed throughout and of short durations. A considerable amount of air is introduced into the cabin compartment during flight and thus, there will be constant dilution and short duration of any chemical agent exposure. Dr. Pleus adds that air enters the cabin environment along the length of the aircraft which not only causes dilution but also no particular area where increased concentrations are expected. He finally points out that even if the HSO has determined that a danger existed in two other cases, a finding he opines unlikely based on the definition of "danger" in the Code and his

[2] Muir, H., C. Walton, et al., 2008 *Cabin Air Sampling Study Functionality Test.*

own assessment; odours are not uncommon in the aviation industry and could be classified as normal conditions of employment.

[55] This being said, regarding the potential for chronic health effects from chemicals in jet engine oil and hydraulic fluid, Dr. Pleus bases his evaluation on a number of assumptions to wit, that an odour was present in these instances, that some fumes that may be detected on an aircraft can contain, for example, chemicals such as aldehydes or carboxylic acids that are capable of causing short-term and temporary effects, including irritation of the throat, nose and eyes, changes in breathing rate and pattern, as well as nausea to the point of vomiting, for some. He further assumes that if an exposure occurred, each employee's potential exposure was short-term (acute) in duration and, given the lack of reported vapour or mist, that any exposures, if they occurred, were of low concentration, with the triggering events, for nearly all employees, being foul odours.

[56] Given this, Dr. Pleus further notes that the employees who have reported an odour have not reported any health effects that would be consistent with the known mechanism of action of the chemicals assessed, and also that exposures would not be of sufficient air concentrations and durations to cause adverse effects due to the said chemicals. Given the possible duration of exposure, which he assumes at eight hours although actual exposures would have likely been much shorter, Dr. Pleus expresses the opinion that the potential dose would be insufficient to be considered, using the words of the Code, "exposure to a hazardous substance that is likely to result in chronic illness, in disease or in damage to the reproductive system".

[57] Regarding the foul odours per se, two alternative explanations for the employee reactions to the incidents are formulated. The first is physiological response to foul odours. According to Dr. Pleus, odours are sensations that occur when a chemical interacts with receptors in the nasal cavity, the mouth, the pharynx and other locations. The degree of negative perception of foul odours is characterized individually by the perceived intensity and acceptability of the odour. In addition, foul odours can directly stimulate sensory neurons, producing an irritation, but not a pathological effect. Further, detection of odour is not necessarily a reliable indicator of toxicity potential. For a number of chemicals, odours can be detected at concentrations that are lower than levels associated with toxicity. There can be an array of symptoms in response to the detection of foul odours. However, these responses are not adverse effects per se. The more unpleasant an odour, the stronger the negative reaction and the greater the likely perception of adverse health effects associated with the odour.

[58] The second explanation is the phenomenon of psychogenic illness which affects people with real symptoms that are often triggered by misunderstood or false information. These responses are not the result of toxicological effect, but rather as a result of anxiety provoked by a triggering event, such as noxious odour. The predominant symptoms of mass psychogenic illness include headache, dizziness, nausea, cough, fatigue, drowsiness or weakness, watery or irritated eyes, inability to concentrate/trouble thinking, vomiting, tingling, numbness and others. In incidences

where mass psychogenic illness has been reported, a plausible pathogenic agent or source is not identified.

[59] Given all of the above, Dr. Pleus concludes that there was no unacceptable level of health risk to the Air Canada employees due to exposures to jet engine oil (Mobil Jet Oil II) or hydraulic fluid (Skydrol LD4). Foul odours are not good indicators of health risk as odours do not correlate with toxicity. Thus, odours are not reliable indicators of danger in many cases of chemical exposures. While it is possible that some symptoms occur with short term exposure, as indicated by the MSDS of these products, the doses and exposure duration that produced these symptoms in the animal studies that are the basis for these assertions are much greater than the employees would have received. Further, available evidence provides no indications that exposures would be sufficient to cause long term adverse effects. Dr. Pleus' conclusions are based on a reasonable degree of scientific certainty.

[60] The other witness who testified at the hearing was Mr. David Supplee, who presently is a Financial Officer for district 142 of the International Association of Machinists representing aircraft mechanics for numerous airlines, including U.S. Airways, Hawaiian Airlines and Alaska Airlines, but not Air Canada mechanics who are instead represented or part of district 140 of the same union. Mr. Supplee was in the employ of U.S. Airways starting in 1980 and over the years worked for the said airline as an aircraft mechanic, lead mechanic, including certified and lead Airbus mechanic at U.S. Airways and as such was part of the airline's service entry team when it introduced Airbus aircraft to its fleet, and designated quality control inspector for U.S. Air fleet comprising Boeing 737 and 757 as well as Airbus 319, 320 and 321.

[61] Mr. Supplee was called to testify in response to a request from the undersigned to provide insight into the workings of an Airbus 319, 320 and 321 ventilation and air conditioning system, be it from the perspective of the functioning of the main aircraft ventilation system and air packs or that of the auxiliary power unit (APU), although his testimony did extend to other equipment of the aircraft that has a function in the ventilation system. While his testimony was initially sought to provide information as to the workings of those systems and equipment, it did also broach rather extensively on what would be the various sources of air contamination on the Airbus A 319, 320 and 321 which are essentially the same narrow bodied aircraft.

[62] Mr. Supplee's testimony on air management and ventilation systems on the airbus aircrafts was essentially unchallenged and uncontested. He also testified that there are primary and residual sources of air contamination on the Airbus. Specifically, cabin air on an Airbus is an amalgamation of outside air brought into the aircraft through the engines of the aircraft by way of a technique that calls for the outside air to be bled off the engines, and recirculated air, the last being essentially the same air as the first but recycled and recirculated after being sanitized by going through HEPA filters that collect particles of various origins that may have found

themselves in, contaminated, the cabin air. It is important to note that contaminants from external sources may also be ingested from the front of engines, enter the engine air and thus subsequently the bleed air.

[63] There are two engines on an Airbus; it is through those engines that the outside air is normally bled off into the ventilation system to the cabin. Under certain circumstances, the outside air may also be bled off the APU, this being mostly when the aircraft is stationary on the tarmac and the main engines are not in operation. The engines and the APU, according to Mr. Supplee, represent the main sources of cabin air contamination via the bleed air system, as jet engine oil and outside contaminants can enter the bleed air system at these points.

[64] The outside air entering the engines (or the APU) is compressed by fans and thus reaches high temperatures and then is bled out of each engine through two bleed valves ("taps") and into ventilation ducts that lead the bleed air through a "pre-cooling" system into the two air packs of the aircraft that cool the hot bleed air. This air then goes into a mixing unit to be mixed with recirculated air and then released into the cabin. While the recirculated air may have gone through HEPA filters before being mixed with bleed air, the mixture is not filtered when being released into the cabin. The fans that compress the outside air as it goes through to the back of the engines are on a common shaft supported by bearings that need to be kept lubricated. Jet engine oil is the lubricant used and it is prevented from mixing with air by seals (carbon and labyrinth or air seals). Those seals are subject to wear and thus may leak, with the result that oil will mix with the extremely hot compressed air in the engines (210-225ºC), thereby vaporizing the oil. The bleed valves through which air is circulated are located behind or "downwind" of a number of the bearings and consequently, if a bearing "upwind" of a bleed valve leaks, vaporized oil will enter the ducting leading to the cabin and contaminate that air potentially with pyrolysis products.

[65] The auxiliary power unit or APU functions essentially as an aircraft engine. It has the same basic design as the main aircraft engines, albeit on a smaller scale, including a bleed air valve which feeds air into the same ducting system that serves to release air into the cabin. It is used to start aircraft engines by supplying them with compressed air and supplies air to the cabin as well as powers aircraft systems when the engines are not running. While the APU compressed air may be slightly cooler than that of the main engines, it nonetheless operates at sufficient temperatures to vaporize oil.

[66] Like the main engines, the APU may be subject to oil leaking through worn bearing seals resulting in vaporized oil and pyrolysis material being carried by the compressed air being bled off into the air circulation system and entering the aircraft cabin. There are also other circumstances where the APU may serve as conduit for contamination. One such circumstance is when fluids on the outside of the aircraft, such as de-icing fluid, may run down the belly of the aircraft and be ingested through the intake of a running APU. Another would be when a cooled down APU is "over-

serviced", i.e. where too much engine oil is added, with the excess oil leaking and being ingested into the hot running APU.

[67] In addition to the main engines and the APU, oil contamination in the cabin air may originate with the air cycle machine (ACM) or "turbine compressor" located in the air packs. The turbine is supported by bearings whose carbon seals are subject to wear and leak, although the temperatures in the ACM are much cooler than in the engines or APU. The same Mobil Jet engine oil II is used in the engines, the APU and the ACM.

[68] Mr. Supplee's testimony also dealt with residual sources of air contamination. Vaporized oil or other contaminants that find their way into the ventilation system ducting can also condense under certain conditions and thus leave residues in the system. Mr. Supplee noted that because of the design of the system (air flowing through 3" ducting to various valves then distributed in the cabin through flat ducting at top of fuselage), it is difficult to find and correct the source of contamination when it is caused by the presence of residues in the ventilation system. In normal operations, bleed air from engine 1 follows ducting to air pack 1, both on the left side of the aircraft, and similarly engine 2 and air pack 2 operate on the right side of the aircraft. Under normal circumstances, air pack 1 will feed the cockpit and air pack 2 will do the same for the cabin, although both are usable for both with the possibility of cross-bleed from the system feeding one air pack to the other using cross-bleed valves. Three inch round ducting leads from the engines on the forward edge of the wing to the air conditioning bay where the air packs are situated, just forward of the wheel well. From there, air is distributed in the aircraft through the distribution flat ducting.

[69] The APU generates bleed air that is ducted to the aircraft engines to start them. This bleed air uses ducting (65-75 feet in length) under the cargo floor to reach the starter valves on the engines, and then flows through the same ducting to air packs used by engine bleed air to provide ventilation when the aircraft is on the ground. As stated above, a cross-bleed valve allows air from engine 1 to supply air to air pack 2 and vice versa. The cross-bleed valve may be opened for two main reasons. First, if there is a problem with an engine, the other engine can be used to supply air to both air packs. Second, if the APU cannot be used, a ground source of air will be used to start engine 1 which will then provide hot compressed air to start engine 2. As a result of this design, oil leaks or external contamination from either engine or the APU can result in residue being formed in any part of the ducting system, potentially resulting in contamination of cabin air when such residue is either disseminated or pyrolyzed. Where there are leaks or suspected leaks, or problems with the APU, opening of the cross-bleed valve will increase the chances of residual contamination throughout the ventilation system.

[70] The hot bleed airs is cooled by means of heat exchangers in the air packs, and are designed to maximize the surface outside of which "ram air" (cold air) flows and cools the hot air that is inside. Temperatures in the ventilation system vary, which

causes vaporized oil to condense to form residue. This can happen on the heat exchangers as the ram air cools the hot ventilation air.

[71] When the aircraft stops operating, temperatures lower and vaporized oil condenses. Oil can condense on ducts, valves and heat exchangers after various degrees of transformation through heating and cooling. Mr. Supplee testified to seeing pack valves coated with oil and baked on carbonized oil and heat exchangers with a black tar-like substance up to oil sheen that could be smeared. Furthermore, if particulates enter the cabin, they will be deposited on the HEPA filters when the cabin air is recirculated. Since residues from any source can form on either air pack or ducting on either side of the aircraft, shutting down one air pack or bleed air valves from one engine or APU will not prevent contaminated air from entering the cabin. Once hot bleed air from the remaining engine comes into contact with the residue, it can vaporize and contaminate cabin air. Mr. Supplee agrees that very small quantities, a few drops, of oil can produce a fume event. A sign of an oil leak would be increased oil consumption by an engine. As such, under normal conditions of operation, an aircraft engine will use one to two quarts of oil per day. A leaking bearing will bring up oil consumption to three to four quarts per day.

[72] Air Canada submits that the Occupational Health and Safety Tribunal Canada (Tribunal) should allow the appeals, rescind the directions citing contraventions of subsection 125.2(1), paragraphs 125(1)(*s*) and 125.1(*f*) and section 5.4 of the AOHSR, and overturn HSO Pollock's findings of danger in the LaPorte decision and the Martinez decision.

[73] With respect to the Martinez directions citing contraventions of subsection 125.2(1) and paragraph 125(1)(*s*), Air Canada submits that they could not have violated paragraph 125(1)(*s*) of the Code because there was no known or foreseeable hazard to employee health and safety present or, in the alternative, the company had fulfilled its obligations under paragraph 125(1)(*s*). Air Canada also submit that they could not have violated subsection 125.2(1) of the Code because there was no request for information from a medical professional for the purposes of rendering medical treatment in an emergency. Furthermore the appellant believes that there is no objective evidence to support issuing the Martinez directions, including no evidence of danger in connection with Ms. Martinez's work refusal.

[74] With respect to the LaPorte direction citing a contravention of paragraph 125.1(*f*) of the Code and section 5.4 of the AOHSR, the appellant submits that in the absence of any evidence establishing a reasonable expectation that an exposure to a hazardous substance might have occurred in this case, the obligations in paragraph 125.1(*f*) of the Code were not triggered and could not have been violated by Air Canada. Furthermore, the appellant believes it could not have violated section 5.4 of the AOHSR because there was not any likelihood that exposure to a hazardous substance endangered employee health and safety. According to the appellant there is no objective evidence to support issuing the LaPorte direction, including no evidence of danger in connection with Mr. LaPorte's work refusal and the direction ignores practical issues related to investigating or measuring cabin air events.

[75] The appellant relies on the testimony of Mr. Supplee, a licenced aircraft mechanic who provided an explanation as to the workings of the ECS, the various sources of air in the aircraft cabin, and the potential origins of an oil leak. Namely the appellant accepts the following points:

- outside air to the aircraft is supplied via the engines, or the auxiliary power unit (APU);
- as little as a few small drops of oil can produce a smell in the cabin and any oil found in the ducting generally appears as a smear or a stain;
- bleed air may also contain substances drawn into the plane from outside sources, such as exhaust fumes from other planes. Oil that enters bleed air in the ECS will vapourize somewhere between 210 and 220 degrees Celsius and when the plane is shut down, the oil vapours may condense and leave a tar-like or oil-like sheen in ductwork, or on air pack valves and the heat exchanger;
- locating the source of a leak may be difficult and Airbus has published an Aircraft Maintenance Manual (AMM) for the Airbus A320 to assist with locating and removing possible sources of contamination from the ECS;
- with the plane not in flight, the normal maintenance procedure attempts to replicate any reported air quality issues *(e.g.*, odours, vapour, etc.) by running the ECS. If this is unsuccessful, maintenance technicians review maintenance logs to determine whether there is evidence of excess consumption of oil or hydraulic fluids, which may be evidence of a leak. If there is no evidence of such, maintenance technicians generally provide the next flight crew with a survey to complete in the event of reported odours.
- the survey gathers information about when and where the odour occurs, the description of the smell, which air packs are being used, and current temperature settings. This allows maintenance to identify which components should be inspected for leaks.
- with repeated air quality complaints, maintenance will generally proceed with a two stage air pack burn in an attempt to burn off any contaminants in the ductwork which requires two or three mechanics and lasts all night. This will entail inspection and cleaning, replacement of contaminated filters and flow control valves as well as removal, cleaning and replacement of water extractors, injectors and ozone filters.

[76] The appellant discredits the respondent's expert evidence and the report of Dr. Weisel on a number of points and thus concludes that his evidence should be given little weight. First, with respect to the HEPA Filter Study mentioned in his reports and his testimony, the appellant submits that it is scientifically flawed and may not have been entirely blind. The appellant points out that Dr. Weisel himself conceded that the study's findings were limited as it showed only that TCP was deposited on filters, not when and how this occurred and acknowledged that there are

sources of TCP other than contaminated bleed air that could have deposited TCP on filters, thereby giving credence to Dr. Pleus' expert report statement that TCP is found in many consumer products, albeit in low concentrations thus rendering determination of the source challenging.

[77] The appellant also points out that Dr. Weisel admitted that he made no attempt to estimate the dose of TCP that would be required to result in the amount of TCP measured on the filters examined in his study, causing the appellant to claim that in the absence of this information, the said study cannot be used to estimate possible exposure to or dosage of TCP that may have occurred during any flight.

[78] The appellant submits that Dr. Weisel's report conceded that he was unable to find any literature that would allow him to prepare a quantitative evaluation of the oil that could get into the air in a fume event. In fact, in cross-examination, Dr. Weisel admitted that he assumed that an oil leak occurred, but that he did not attempt to measure or calculate the possible exposure in each case, or the dose to which the flight attendants could reasonably have been expected to be exposed. It is the appellant's opinion that Dr. Weisel's conclusion that the smells were toxic is problematic because it does not take into account the principle that odours may not be a reliable indicator of toxicity, nor the fact that a number of chemicals produce odours at concentrations lower than levels associated with toxicity or harm or that foul odours may have a psychogenic effect that foul odours may have.

[79] Regarding the Guide entitled *Exposure to Aircraft Bleed Air Contaminants Among Airline Workers* produced by the respondent's second expert, Dr. Harrison, the appellant notes that the said 50 crew members case series cannot be considered a controlled peer-reviewed scientific study since, among other reasons, given the extensive aircraft crew members population, a case series population of 50 represents a small sample size and one where the individuals in the population were not randomly selected, but in many cases sought out by Dr. Harrison. The appellant notes that Dr. Weisel consulted literature in which there were reports of symptoms associated with exposure to oil and pyrolysis products and then made the assumption that the levels of oil and pyrolysis products that may have leaked into the cabin air in all these appeals were the same, something that the appellant qualifies as wholly speculative.

[80] Additionally, the appellant argues that Dr. Weisel disregarded relevant scientific authorities without reasonable basis such as the "UK Science and Technology Report" on cabin air quality issues, the *Muir* study and the Golder Associates report using different odour descriptors than the ones used in the present cases, and the *Crump* study, all of which were discussed by Dr. Pleus in his report. The appellant asserts that Dr. Weisel also discounted the *Cranfield* study[3] on the same basis of different odour descriptors even though that study measured cabin air on 100 different flights using five different makes of commercial aircraft and where

[3] Institute of Environment and Health (*Cranfield* Ref No YE29016V), 2011, Aircraft Cabin Air Sampling Study; Part 1 of the Final Report, Cranfield University, Great Britain.

in all five cases, the very low concentrations of TCP that were reported would be insufficient to cause either acute or chronic health effects. The appellant submits that Dr. Weisel agreed when cross-examined that descriptions of odours are very subjective and may vary from person to person. The appellant further notes that Dr. Weisel's views in this regard are also at odds with the evidence of Mr. Supplee who testified that in his experience, a variety of descriptors, including "wet dog", "smelly socks", "old socks" and "oil smell" are commonly used to identify the smell of cabin air in a fume event.

[81] Furthermore, the appellant submits that Dr. Weisel also saw as irrelevant to his analysis and of no effect on his opinion the *Schindler* study[4]published after all three experts had submitted their reports in these four appeals and after Dr. Pleus had concluded his testimony. In that study, 332 urine samples were obtained from pilots and cabin crew within 12 hours of exposure to a reported smoke/odour/fume event on a flight for evidence of three isomers of TCP metabolites and which reported that "occupational exposure of air crews to TCP isomers and particularly neurotoxic o-TCP after fume events was not evident". The appellant thus maintains that there was no reasonable or rational basis for Dr. Weisel to summarily disregard the results of that study, noting that the air crews in the said study had identified fume events by the smell of stinky socks, oil smell or others.

[82] The appellant further argues that even though Dr. Weisel testified that as an exposure scientist, he routinely consults with a team of other scientists, including a toxicologist and a behavioural scientist, he failed in the present cases to consult a behavioural scientist about psychogenic issues relative to such foul odour exposure. The appellant relies on the testimony of Dr. Pleus to the effect that psychogenic symptoms suggesting organic illness but with no clinical evidence of disease may be the result of anxiety provoked by a triggering event such as a foul odour with symptoms similar to those described. The appellant notes that Dr. Harrison's health care provider guide makes mention of similar symptoms and that in the case of refusing employee Martinez, she reported nausea and headache when refusing to work. The appellant describes the failure by Dr. Weisel to consider the possibility of psychogenic illness and to consult with a behavioural scientist in the present cases as particularly troubling since there is no objective evidence of exposure or dose and since he recognized at cross-examination that "people can perceive themselves as sick and display symptoms for psychological reasons."

[83] The appellant asserts that preference should go to the evidence of Dr. Pleus in the field of toxicology because Dr. Harrison is not a member of the Society of Toxicologists, and his testimony has demonstrated that his experience in the field is limited to understanding how chemicals circulate, interpreting toxicological studies, and teaching a course on liver toxicology, as part of the certification process for a specialization in occupational medicine.

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[4]Schindler et al., 2011. *Occupational Exposure of air to Tricresyl Phosphate isomers and organophosphate flame retardants after fume events*,

[84] The appellant submits that while Dr. Harrison opined that there are many substances where even a small dose will result in very serious health effects, notably carcinogens, this only serves to reinforce the principle since it is a very small dose of carcinogens that "makes the poison". The appellant also questions the notion put forth by Dr. Harrison on individual sensitivity or subjective response to the presence of toxicological hazards, since there is a wider variability of responses to odours at lower doses. It is the position of the appellant that such variability in individual sensitivity and reported subjective responses (headache, nasal irritation, etc.) to odours at different levels does not establish that the substance that they were exposed to was toxic, nor does it establish that there was a reasonable expectation of harm at the dose of the substance to which the individual was exposed. It is thus the submission of appellant Air Canada that basic toxicology principles are not properly considered and therefore the undersigned should give preference to the evidence of Dr. Pleus in the field of toxicology.

[85] Air Canada also submits that there is a reasonable apprehension that Dr. Harrison may be biased towards employees and unions and states the following as reason for such a suggestion. First, Dr. Harrison has testified having frequently acted as an expert in civil litigation matters alleging adverse health effects from chemical exposures and that in every instance did so on behalf of plaintiffs and provided medical opinion on causation, suggesting that he may not always be solely guided by scientific or medical expertise to reach a conclusion independent from and uninfluenced by the parties' interests. It is the submission of the appellant that Dr. Harrison's extensive professional involvement with trade unions on cabin air quality issues, and the fact that he has only testified on behalf of employees, or the Union, gives rise to an apprehension that he may be biased towards unions and workers, and that the undersigned should consider the possibility that the evidence and expert opinion by Dr. Harrison may not be truly objective, impartial and uninfluenced.

[86] Furthermore, the appellant submits that Dr. Harrison's opinion is based on limited, scientifically flawed, and anecdotal evidence. In this regard, Air Canada notes that his testimony and expert report were primarily based on the limited experience of evaluating and treating 50 pilots and flight attendants over a period of 15 years, reporting symptoms like headache, dizziness, nausea and memory and concentration problems that Dr. Harrison recognizes, as not forming a recognized medical illness.

[87] The appellant points out that Dr. Harrison recognized that in order to establish a cause-and-effect relationship between exposure to contaminated bleed air and outcome (symptoms), one needs to obtain and consider an individual's complete history, evidence of exposure and toxicological information about the substance to which the individual was exposed and yet, Dr. Harrison admitted that he neither reviewed nor asked to review such information in all these cases. Furthermore, the 50 members of what Dr. Harrison refers to as a "case series" that served as the basis for the health care provider guide, were not randomly selected and thus cannot be viewed as a controlled peer-reviewed scientific study.

[88] While the said guide itself prescribes a 6 step methodology for evaluating the potential or actual health effects, from exposure to contaminated bleed air, Dr. Harrison recognized not having followed his own methodology in formulating his expert medical opinion in the cases under appeal, in that he failed to consider occupational history or past medical history as well as non-occupational factors and failed to interview or conduct a physical examination of any of the employees. Instead he relied wholly on the information provided to him by CUPE to form a medical opinion about possible adverse health effects and likely causation.

[89] Finally, the appellant points out that Dr. Harrison testified that he disregarded the Threshold Limit Value (TLV) of chemicals set by the ACGIH when preparing his expert opinion as, in his opinion, TLVs do not define when a hazard exists because they are not set to prevent adverse health effects but to prevent symptoms and because many chemicals do not have TLVs. According to the appellant, this is inconsistent with the purpose of TLVs which represent the opinion of the scientific community of industrial hygienists that exposure at or below the TLV level does not create an unreasonable risk of disease or injury. The appellant further notes that Dr. Harrison, like Dr. Weisel, gave no consideration to the *Cranfield* and U.*K.* studies although he had reviewed them in preparing his opinion. Furthermore, while admitting that blood and urine tests are the only way to determine exposure to TCP, Dr. Harrison chose with no reasonable or rational basis to ignore the *Schindler* study mentioned previously and of which he was aware, where 332 pilots and attendants were urine tested following fume events, a fact that the appellant believes should be considered by the undersigned in assessing the Harrison opinion.

[90] The appellant believes that Dr. Pleus formulated an expert opinion that concludes with a reasonable degree of certainty that the dose and exposure duration that the employees in all these appeals could have experienced were insufficient to endanger their health or safety. According to the report, in arriving at such conclusion, Dr. Pleus had to assume that these employees had been exposed to hydraulic fluid and jet engine oil in the air of the aircraft while they were working, that such exposure was for eight hours, although in reality it would have been much shorter given the duration of the various flights involved, and that said exposures were of low dose concentrations because no vapour or mist were reported on those flights. Such assumptions were necessary due to the fact that there was no objective data to support the presence of any exposure or dose of any kind. In formulating his opinion, Dr. Pleus followed the standard toxicological risk assessment steps established by the U.S. Academy of Science: hazard assessment, exposure assessment, dose-response assessment and risk characterization. The two compounds reviewed by Dr. Pleus through his toxicological risk assessment were Skydrol LD4 and Mobil Jet Oil II. Dr. Pleus testified and explained in his expert report that Skydrol LD4 had been tested for a number of toxicity endpoints. The data on acute toxicity endpoints suggest that there is low acute toxicity via the oral, dermal, and inhalation exposure routes.

[91] The appellant also submits that Dr. Pleus defended his reliance on and reference to scientific studies involving animal exposure to the chemicals of interest

in the present cases on the ethical research principles that preclude human testing except in extremely limited circumstances and added that the animals selected are as sensitive if not more sensitive than humans to the chemicals being tested. He also reviewed the toxicity data for each of its main components TBP, DBPP, BDPP, and BHT.

[92] On Mobil Jet Oil II, Dr. Pleus has indicated that it is practically non-toxic orally, only slightly toxic dermally, and only slightly toxic when inhaled. The possible symptoms from acute exposure to the decomposition products in a confined or non-ventilated space may include headache, nausea, eye, nose, and throat irritation. Dr. Pleus noted that the MSDS for Mobil Jet Oil II does not list all of the proprietary ingredients, however it does contain TCP, which he testified is present in a number of other applications (e.g., plastics and windshields), and a large percentage of the public has likely been exposed to TCP at low levels at one time or another.

[93] The appellant also submits that because there were no air samples, data or other objective evidence collected from the flights at issue, Dr. Pleus assumed that exposure was for eight hours, and he assumed that exposures were of low dose concentrations because there were no reports of vapour or mist on any of the flights. Notably, he did not discount exposure or dose to account for the recirculation of air while the plane was attached to the ground ventilation system or once the APU was in operation because all of the studies on which he relied were conducted in circumstances where there was no way of reducing concentration although on a plane, the recirculation of air would have reduced concentration of any chemicals, and of any resulting exposure or dose.

[94] On the basis of these assumptions, the appellant maintains that the conclusion reached by Dr. Pleus was that the concentrations were below the occupational exposure limits (TLV) as well as the published lowest observable adverse effect levels and thus would be unlikely to cause human health effects. Furthermore, he concluded that there was no reasonable possibility of chronic health effects from the hypothetical exposures and dose levels. He also noted that the employees who experienced odours in all the cases under appeal had not reported any health effects that would be consistent with the known mechanisms of any of the actions for the chemicals assessed, pointing out however that many of the alleged symptoms (headache, nausea, coughing) were common in psychogenic illness which amounts to a psychological response to a perceived harm rather than a pathological response to an actual harm.

[95] Contrary to the HSO's findings, the appellant submits that there is no objective evidence that would support issuing the LaPorte and Martinez directions, nor is there evidence of a danger being present and they request that the directions be rescinded. Additionally, it is the appellant's submission that in light of the absence of evidence to support the HSO's findings of danger in either case, the undersigned should also overturn those findings. In support of such position, the appellant invokes the *de novo* authority of an appeals officer formulated in *Martin* v. *Canada*

(Attorney General), 2005 FCA 156 and in the Tribunal's decision *Correctional Service Canada (CSC) Millhaven Institution and Union of Canadian Correctional Officers* Decision No.: 06-026 (August 10th, 2006), and the latter's underlying authority at subsection 146.1(1) of the Code to vary, rescind or confirm a direction which is being appealed.

[96] In reviewing the case law relative to the definition of "danger" in the Code, and in particular the Tribunal's decisions in *Darren Welbourne and Canadian Pacific Railway Company* Decision No. 01-008 (March 22, 2001), *Parks Canada Agency and Doug Martin and Public Service Alliance of Canada* Decision No. 02-009 (May 23, 2002), *Rehab Rivers* v. *Air Canada,* 2010 OHSTC 11 and the Federal Court decision in *Verville* v. *Canada (Service correctionnel),* 2004 FC 767, the appellant reasserts that "danger" in the Code is a more demanding concept than "risk". It also entails not only exposure to injury or illness, but also a reasonable expectation that an injury or illness will occur before the hazard or condition can be corrected or the activity altered. Such a finding cannot be based on speculation or hypothesis, and that one does not need to be able to ascertain exactly when the potential hazard or condition will happen, one must be able to ascertain as a reasonable possibility, as opposed to a mere possibility or high probability, in what circumstances in the future it could be expected to cause injury.

[97] With respect to both refusals. the appellant submits that the danger test is not met because the facts do not establish that any hazardous substance was present in the odour reported during boarding, nor on the subsequent flight 597 on Fin 281 much less that Mr. LaPorte was exposed to any such substance in sufficient concentration and duration for it to reasonably be expected to cause injury or illness. The HSO did not identify any hazardous substance that was released or likely to be released on that aircraft. HSO Pollock accepted that Air Canada found no trace of oil contamination on the aircrafts, thereby ruling out the potentially hazardous substances associated with that cause, nor did they identify any hazardous substance that would be likely to be released on Fin 281 that could be associated with the "dirty laundry" smell described by LaPorte that could be expected to recur and be likely to result in injury or illness. Furthermore, HSO Pollock had no evidence that Mr. LaPorte had suffered any ill effects from the reported smell or had any medical condition or history of exposure to hazardous substances that would have made him susceptible to illness or injury during another exposure.

[98] Regarding the Martinez refusal, the appellant submits that the facts do not support the HSO's conclusion that the smell present of flight 460 from Toronto to Ottawa was from Mobil Jet Oil II. According to the appellant, the HSO accepted that Air Canada Maintenance personnel checked the engines and detected no evidence of an oil spill. She also accepted that the APU was locked out, secured closed and inoperative on that aircraft for flight 460 to Ottawa and the return 465 flight to Toronto. The appellant also maintains that there is no evidence that the ambient external air taken in from the ramp in Toronto smelled of or contained any significant amount of Mobil Jet Oil II. The appellant thus asserts that there were no facts establishing that (1) there was presence of a substance constituting an existing

or potential hazard or condition that could reasonably be expected to cause illness or injury on either flight and (2), that the substance that caused the smell on flight 460 actually caused Ms. Martinez's reported symptoms.

[99] The appellant also notes that the respondent's own expert witnesses could offer nothing more than speculation about the adverse health effects that they thought might occur in the event of an exposure of unspecified dose. Dr. Pleus explained, on the basis of a number of scientific studies, that it is the dose to which a person is exposed that determines whether a chemical agent is hazardous. The appellant submits that after reviewing the circumstances, Dr. Pleus concluded that any doses that the flight attendants who exercised their right to refuse to work could possibly have been exposed to were insufficient to endanger their health or safety.

[100] Given this absence of evidence, the appellant believes that the conclusion arrived at by HSO Pollock in both refusals amount to a mere presumption drawn from the occurrence of a smell that could not be definitively explained. In short, it is the appellant's position that there exists no objective or convincing evidence on which to base a conclusion that Mr. LaPorte or Ms. Martinez could have been exposed to any substance at a dose sufficient to cause a reasonable expectation of illness or injury. The appellant's opinion as to the respondent's expert witnesses evidence is that they could offer nothing more than speculation about the adverse health effects that they thought may occur in the event of an exposure of unspecified dose. In the absence of such evidence, the appellant is of the view that the HSO's own finding of danger can only be viewed as speculative or, at best, a mere possibility or risk, which is not the standard required under the Code for a finding of danger.

<u>LaPorte Direction (re 125.1 (f) of the Code and 5.4 of the AOHSR)</u>

[101] Air Canada submits that it did not contravene paragraph 125.1(*f*) of the Code and section 5.4 of the AOHSR. The obligations under paragraph 125.1(*f*) of the Code are triggered "where employees may be exposed to hazardous substances". According to the appellant the use of the words *may be exposed* requires more than mere speculation but rather requires that there be a reasonable expectation that an exposure to a hazardous substance will occur at some point in the future. The appellant maintains that it is not reasonable to expect that there is or has been exposure to a hazardous substance simply because there is a smell in the cabin, or a report of a prior but dissipated smell noted in the aircraft log. It is the appellant's position that a smell is not *per se* a hazardous substance nor does it establish that a hazardous substance is present. In support of their position the appellant relies on Dr. Pleus' expertise, which states that odours may be detected at concentrations that are lower than the levels associated with any toxicity, and foul odours are not reliable indicators of chemical exposure in many cases.

[102] The appellant notes that subsection 122(1) of the Code defines "hazardous substance" as including "a controlled product and a chemical, biological or physical agent that, by reason of a property that the agent possesses, is hazardous to the safety

or health of a person exposed to it" and 122(2) defines "controlled product" as "any product, material or substance specified by the *Regulations* made pursuant to paragraph 15(1)(*a*) to be included in any of the six classes listed in the Schedule adopted pursuant to the provision of the *Regulations*" as per the *Hazardous Products Act*, R.S.C., 1985, c.-I-I-3.

[103] Noting that Mobil Jet Oil II is not part of those six classes of "controlled" or "hazardous" products, the appellant points out that in *Canadian Pacific Railway Canada Company* v. *Allan Woollard,* 2010 OHSTC 10, the Tribunal has stated that "any controlled product comes within the definition of hazardous substance without having to establish that such a product is hazardous to the safety and health of a person exposed to it by reason of a property that it possesses". Moreover the appellant maintains that the MSDS for Mobil Jet Oil II states that it contains no reportable hazardous substances, and thus it is not considered to be hazardous according to regulatory guidelines, nor is it controlled product and that it is not expected to produce adverse health effects. The appellant also points out that HRSDC's (now Employment and Social Development Canada (ESDC)) own industrial hygienist confirmed that Mobil Jet Oil II is not a controlled product or hazardous substance.

[104] As for section 5.4 of the AOHSR paired with paragraph 125.1(*f*) of the Code, the appellant points out that while that paragraph of the legislation makes it an obligation to inquire where employees "may be exposed" to hazardous substances, the AOHSR at section 5.4 are triggered only if there is "a likelihood that the health or safety of an employee is or may be endangered" by exposure to a hazardous substance. It is thus the appellant's position that section 5.4 of the AOHSR is not triggered just because section 125.1(*f*) of the Code has been triggered. There needs to be a "likelihood" that the employee's health or safety is or may be endangered by exposure to a hazardous substance.

[105] According to Air Canada, it is not reasonable to expect that there is or has been exposure to a hazardous substance simply because there is a smell in the cabin air, or a report of a prior but dissipated smell noted in the aircraft log. The appellant relies on the evidence by Dr. Pleus that odour is not a reliable indicator of toxicity potential because, among other things, odours may be "detected at concentrations that are lower than levels associated with toxicity". Rather, it is the dose to which a person is exposed that determines whether a chemical agent represents a hazard. The appellant maintains that in all the cases at hand, the conclusion by Dr. Pleus was that any doses that could possibly have been received were insufficient to endanger employee health and safety.

[106] The appellant recognizes that an aircraft environment offers particular circumstances or practical issues and that as the evidence indicates, after a cabin air event has occurred, it is not reasonably possible to determine potential exposure because by the time the investigation can proceed, the air has dissipated through the normal operation of the aircraft ECS. In such circumstances, the aircraft operator is left to take the only practical approach open to it, as per the testimony of Mr.

Supplee, which calls for maintenance personnel to troubleshoot for specific concerns and rule out any potential engine oil or hydraulic fluid contamination. Furthermore, as indicated by the evidence, the appellant points out that there are currently no known detection devices that can be effectively used in the aftermath of a cabin air quality event to determine potential exposure.

Martinez Directions (subsection 125.2(1) and paragraph 125(1)(*s*))

[107] Appellant Air Canada notes that although it challenges the directions citing contraventions of subsection 125.2(1) and paragraph 125(1)(*s*), it has taken steps to comply. Its position regarding paragraph 125(1)(*s*) is that the obligation under that provision is triggered only if there is a known or foreseeable hazard to employee health or safety and in these circumstances there was no such known or foreseeable hazard since the cabin air issue was only a smell in the cabin, or a report of a prior or dissipated smell in the aircraft log. The appellant submits that a smell is not *per se* a hazardous substance. In this respect, the appellant reiterates the evidence of Dr. Pleus to the effect that odour is not a reliable indicator of toxicity potential and that the dose determines whether a chemical agent represents a hazard. The appellant also noted that in a separate but related case, HSO Pollock did observe that "individuals react to odour, which is not uncommon […]. A low threshold does not mean that it is harmful. Because something smells does not mean that it is hazardous to your health."

[108] Counsel for the appellant further maintains that, even if one were to assume that a smell in the cabin or a report of a smell represents a known or foreseeable hazard to employee health or safety, which it denies, Air Canada has met its obligation to ensure that employees are made aware of the health and safety hazards. It submits specifically that in February 2009, and then again in 2011, it sent to all cabin crew an article titled "*To Breathe or not to Breathe*" which discussed cabin air quality issues and the various contaminants which may be present. Additionally, according to the appellant one day before the Martinez work refusal (November 28, 2011), Air Canada issued a bulletin to Maintenance employees to reinforce that complaints of odours in the cabin are to be taken seriously and that immediate action must be taken.

[109] The appellant submits that contraventions of paragraph 125(1)(*s*) of the Code are typically found to have occurred where employees are not aware of the known or foreseeable hazards of the work they are about to perform before being called to actually perform it. In support, Air Canada cites *Securicor Canada Ltd.* and *Fédération des employees et emplyés de services publics inc. (CSN)* Decision no. 06-006 (March 10, 2006) where such a violation was found to have occurred where an employee was not informed prior to arrival at the work site that he would be working on a front-loading ATM, kneeling with his head down and back to the entrance, and thus was not equipped to address health, safety and security concerns as he had no advance notice of the hazard or of the actions to be taken to ensure his health and safety. Air Canada contends that that scenario is quite unlike the situation prevailing in these cases where Air Canada had repeatedly informed flight attendants of the

possible hazards associated with cabin air smells and fumes, and informed of the specific actions to take in the circumstances to ensure their health and safety.

[110] As for the contravention to subsection 125.2(1) of the Code, the appellant argues that the language of this provision is clear and unambiguous and provides that the said obligation to provide information to any physician or medical professional is triggered only upon the three statutory preconditions stated therein being met, namely: (1) that a physician or medical professional request the information in the MSDS, (2) that the request be made for the purpose of making a medical diagnosis or rendering medical treatment to an employee, and (3) that this be in an emergency. The appellant's position is that all three conditions must apply in order to trigger the obligation and that in the case of Martinez, no evidence was adduced nor any allegation made that a physician or medical professional requested the said information. The appellant adds that the said obligation cannot be grounded merely on the request formulated by an employee.

[111] For all of the foregoing reasons, the appellant is of the opinion that the appeals should be allowed and the directions rescinded and, that despite the undersigned's letter decision of April 18, 2012, that the findings of danger by HSO Pollock in the LaPorte and Martinez work refusals be overturned as unsupported.

B) Respondent's Submissions

Dr. Robert Harrison

[112] The respondent tendered two experts, Dr. Robert Harrison and Dr. Clifford P. Weisel. Dr. Harrison, is licensed to practice medicine in California, is a clinical professor of medicine at the University of California at San Francisco as well as visiting professor at the School of Public Health at the University of California at Berkley and serves as Chief of the Occupational Health, Surveillance and Evaluation Program of the California Department of Public Health. He is attending physician for the occupational health services at the blood born pathogen Program at the University of California at San Francisco and director of the Occupational Health Internship Program of the Association of Occupational and Environmental Clinics.

[113] Dr. Harrison was recognized as expert in occupational and internal medicine as well as toxicology and epidemiology, albeit with objection from Air Canada as regards the fields of toxicology and epidemiology on the basis of limited experience. He authored a guide entitled *Exposure to Aircraft Bleed Air Contaminants Among Airline Workers*, in which is discussed the potential for toxic chemical compounds such as pyrolyzed engine oils and hydraulic fluids that may leak into the aircraft cabin and flight deck air supply systems and may be associated with health effects. Dr. Harrison notes that in his work as physician and internal medicine specialist, he has consulted with over 50 aircraft cabin crew members who had experienced exposure to bleed air contamination and as an occupational medicine physician and Qualified Medical Examiner for the State of California, he has evaluated the cause of patients' occupational diseases. In this respect, he has prepared reports concluding

that patients with exposure to bleed air (presumably contaminated) suffered neurological, respiratory and systemic health effects. In considering whether it is reasonable to expect that the exposure(s) aboard the aircrafts involved in the present cases would lead to injury or illness, he notes that there is considerable scientific and medical literature indicating that for many decades, both the airline industry and aircraft manufacturers have acknowledged the potential for toxic air contamination from multiple sources aboard aircraft.

[114] According to Dr. Harrison, when employees smell an odour (and here one would assume that Dr. Harrison means odours that would be out of the ordinary and different from usual odours in their work place), it is reasonable for them to suspect that a condition exists that constitutes a danger to their health. After exposure to bleed air and other contaminants aboard aircraft, cabin crew members may experience acute symptoms including cough, shortness of breath, nausea, chest pain, headache, dizziness and confusion. These symptoms indicate toxic effects to the respiratory and central nervous systems. Physical examination may show wheezing or crackles in the lungs, and neurological testing may show impairment in balance, gait and coordination. If symptoms persist, objective testing may show abnormal pulmonary function and impaired concentration, memory and other cognitive abnormalities. It is thus the conclusion of Dr. Harrison that the Air Canada flight attendants who refused to work had reasonable cause to expect that they may develop either acute and/or chronic health problems as a result of exposure to toxic air contaminants aboard the aircraft.

[115] Dr. Harrison makes particular reference to an Airbus service information letter dated May 13, 2004, part of the arguably relevant documents filed by Air Canada and titled “Cabin Air Quality Troubleshooting Advice”. He notes in particular that the letter states that “there are many potential causes of cabin odour or smoke and it can sometimes prove difficult to isolate the cause of an odour quickly”. He notes that the list includes engine or APU ingestion of de-icing fluid, exhaust fumes from other aircraft, pollution, hydraulic fluid leaks, birds and compressor wash procedure residues. Added to this, engine oil leaks can occur into the bleed air system.

[116] Though odours can be very useful in determining the presence of a particular gas or vapour in the environment, the variable relationship of odour threshold and the minimum concentration which would reduce toxic effects renders odour an unreliable indicator of toxicity”. Mr. Koroneos, Manager, Industrial Hygiene, recommended medical evaluations only if experiencing significant health effects regarding an exposure to confirmed primary bleed air fume event. Referring to the same document, Dr. Harrison notes that Mr. Koroneos’ document summarizes the potential biological effect and toxicity index for bleed air contaminants, including upper respiratory tract or central nervous system irritants of slight to moderate toxicity and concludes, in a revision dated January 9, 2012, that “significant health effects would include symptoms such as chronic, severe headaches, disorientation and vomiting”. He also notes that a study (*Cranfield*) cited by Mr. Koroneos shows

that there are detectible levels of triorthocresyl phosphate (TOCP) in the flight deck of aircraft during routine flight operations.

[117] Dr. Harrison makes the suggestion that any flight attendant reading those documents from Air Canada would conclude that exposure to toxic air contaminants could reasonably be expected to cause injury or illness. He further points out that in each of the instances where employees refused to work, there was evidence of a mechanical problem aboard the aircraft and that since air measurements were not obtained during the incidents involved in these cases, something that in fact would have been impossible, and consequently opines that the mechanical investigations alone (presumably the results of such) were sufficient evidence to reasonably expect that toxic air contaminants were released into the cabin air and could result in health problems, as confirmed by the Material Safety Data Sheets for (Mobil) jet engine oil and Skydrol stating that these chemicals are toxic to the respiratory system.

[118] Regarding the one test flight conducted by Air Canada on May 3, 2012, mentioned above, Dr. Harrison formulates the opinion that the absence of TOCP detected aboard that flight does not provide any salient evidence regarding the potential for toxic air contaminants to cause illness to the employees who refused to work in the present cases. In jet engine oil, TCP are contained as multiple isomers, of which the TOCP isomer is present in a relatively small concentration. In that test flight, the testing was not adequate to assess the potential hazard to TCPs as only the TOCP isomer was measured.

[119] By way of conclusion, Dr. Harrison states that he followed the accepted methodology in the field of occupational medicine in finding that the employees in these cases had a reasonable expectation that they were exposed to toxic air contaminants that cause illness, both acute and potentially chronic. In each case, the perception of an odour by the flight attendants was a warning sign that a toxic air contaminant was present in the aircraft cabin. This toxic contaminant likely was the result of engine oil and/or other volatile hydrocarbons that entered the ventilation system of the aircraft. When these chemicals are breathed into the lungs, they are rapidly absorbed and can cause damage to the respiratory tract and nervous system. Flight attendants have been documented to suffer both acute and chronic health problems as a result of bleed air exposure and it is reasonable to conclude that the Air Canada flight attendants had reasonable expectation that the exposures would lead to illness.

Dr. Clifford P. Weisel

[120] Dr. Clifford P. Weisel, Ph.D., is a professor in the Department of Environmental and Occupational Medicine at the Robert Wood Johnson Medical School, University of New Jersey, and Deputy Director of the Exposure Science Division of the Environmental and Occupational Health Sciences Institute. He has conducted research and taught in the field of exposure sciences for more than 20 years and also directs laboratory analysis of various compounds related to releases of jet fuel oil into aircraft bleed air.

[121] Dr. Weisel was recognized as expert in exposure science. In his report, he evaluates the likelihood that hazardous chemicals would have been released into the air of an aircraft cabin when several cabin crew members reported an air quality problem relative to an odour present in the cabin that was described as dirty socks or vomit. Dr. Weisel evaluated the initially encountered air quality problems, whether the same air quality problems would potentially be encountered in subsequent flight legs on the same aircraft and finally what is known about the air quality associated with the odours that were reported by the refusing employees. Regarding the source of air in an aircraft, the witness noted that fresh air to the aircraft comes from the high temperature compressed air that is bled off the engines or the APU which, after being cooled, is mixed with re-circulated air to provide the necessary ventilation to the aircraft cabin. The APU is used when engine bleed air is needed for optimum aircraft performance or when the aircraft is on the ground and the engines are turned off. He noted that in the present cases, the odours in question were detected when the APU was in operation on each aircraft.

[122] According to Dr. Weisel, oil leakage into the bleed air which then finds its way into the aircraft cabin through the ventilation system is often associated with an odour that is characterized as a smelly sock or vomit odour. Oil can contaminate the aircraft bleed air if there is a mechanical failure with the oil seal that separates the section of the air compressor that is filled with oil from the section that supplies the ventilation air. Contamination can also occur if the oil reservoir is over serviced (overfilled), if oil is spilled during the filling process or if the oil seal has a failure while operating at transient high-temperature/power engine conditions. Where bleed air is contaminated by oil, the high air temperature may cause the oil to be pyrolyzed and the oil constituents as well as the pyrolysis products can mix into the air being circulated into the cabin, thereby exposing the crew and passengers to the hazardous chemicals that emanate from either the oil or its pyrolysis.

[123] Oil leaking into bleed air results in many potentially hazardous compounds being released into the aircraft cabin, including isomers of TCP, dibutyl phenyl phosphate (DPP), various hydrocarbons which are components of jet oil and/or hydraulic oil, and several pyrolysis products such as carbon monoxide, trimetholpropane, formaldehyde and octanoic and decanoic acids. These acids have a rancid odour and likely contribute to the dirty sock odour, although only some of the compounds in the hazardous mixture cause the smell. However, Dr. Weisel noted from consulted research publications that little data has been collected on the contaminants that might be present in engine bleed air under normal operating or upset conditions, such as when odour episodes occur due to engine oil entering the bleed air during commercial flights, given that such odour events occur at a relatively low frequency, a very large number of flights with incidents would have to be evaluated to collect sufficient air samples and health data from the crew and passengers to evaluate if health effects are related to such episodes.

[124] Research publications consulted by Dr. Weisel lead to the conclusion that there would need to be a certain concentration of pyrolyzed oil in the bleed air to

present hazardous air conditions to crew members. Based on calculations and a set of assumptions used in the research publication[5]it was determined that pyrolysis of 1gram of oil would produce formaldehyde concentrations at the TLV-C level. Set against this, Dr. Weisel noted that while based on some of the assumptions in the said research, 1 gram of oil may be an underestimation of the amount required to reach a formaldehyde air concentration above the TLV, typical oil consumption rates of commercial aircraft are on the order of 0.5 quarts per hour, which would represent ± 470 grams, and thus, he considered from these estimations that losses of oil to the bleed air during flight so as to produce a hazardous concentration are consistent with what might happen during an oil leak that would not be readily identified by routine maintenance.

[125] Comparatively, Dr. Weisel referred to studies that measure TCP concentration measurements in the cockpit of military aircrafts in flight and on the ground, prompting the opinion that higher concentrations would have been expected had the canopy been closed. He noted however that no similar concentration measurements have been reported in the open literature for commercial aircraft. Dr. Weisel also pointed to 94 air samples collected by Honeywell Corporation to establish a summary of concentrations of organic compounds in bleed air in a dissertation[6]. He noted however that the document presented no indication as to whether those samples had been collected during an oil leak or when an odour was present in the aircraft. Furthermore oil leak events/incidents occur at an average frequency rate of 1% of flight cycles.

[126] Dr. Weisel thus concluded that the mean concentrations provided for aldehydes, aromatic and aliphatic hydrocarbons, TCP, carbon monoxide (CO) and other compounds would reflect normal operating conditions of the aircraft rather than an upset condition. While, as previously stated, the frequency of such incidents (oil entering the bleed air) may vary from one type of aircraft to another, with BAE 146 being the most likely[7]. Dr. Weisel pointed out that based on the Van Netten (2005) study, the Airbus A320 had the second highest air quality at 1.29 reported incidents per 1000 flight cycles. He also formulated the opinion that when an aircraft has an odour that is associated with oil leakage into the bleed air that is likely due to a degrading oil seal or other malfunction of the mechanism that separates the oil from the bleed air, it is likely that air quality problems will persist on that aircraft until the source of the oil leak is found and properly repaired.

[127] In his report, Dr. Weisel reviews the results of a test flight conducted on May 3, 2012, for Air Canada by an independent firm (Golder Associates) for the purpose

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[5] Winder, C., Air monitoring studies for aircraft cabin contamination, Current Topics in Toxicology Vol 3, 33-48, 2006, National Research council *The Airliner Cabin Environmental and the Health of Passengers and Crew*, National Press, Washington, DC 2002.

[6] Richard B. Fox, Assessing Aircraft Supply Air to Recommend Compounds for Timely Warning of Contamination.

[7] Van Netten Aircraft "Air Quality Incidents, Symptoms, Exposures and Possible Solutions", in Air Quality in Airplane Cabins and Similar Enclosed Spaces Martin B. Hocking Ed. The Hanbook of Environmental chemistry Volume 4 Air Pollution Part H, Springer-Verlag Berlin 2005.

of evaluating compounds present in the cabin of an aircraft when an APU with a known oil leakage was operated during said simulated flight. Provided by the said report are measurements of TOCP, total organic compound (screening) and carbon monoxide in three locations on the aircraft during the flight. The APU was turned on for various increments of time while the aircraft was on the ground, during the climb and during descent and return to the hangar.

[128] According to Dr. Weisel, there were problems with the procedures used for the said evaluation, particularly if the objective was to determine if hazardous chemicals were emitted from the leaking APU. First, the compound that was measured (TOCP) is not the only hazardous chemical released into the cabin air in the tested circumstances as there are eight other compounds (tricresyl phosphates (TCP) isomers) that could be present in engine oil. Second, the air samples that were collected exceeded the maximum volume allowed for such test by triple the amount. Third, during the majority of the time that air samples were collected, it was not expected that compounds from the APU would be generated because the samples were collected over the entire time of the flight instead of over the shorter periods when the APU was being operated and during which the actual emissions would be likely to occur. Consequently, according to Dr. Weisel, while the results reported to Air Canada by Golder Associates may in the end have found no evidence that either CO or TOCP were above regulatory standards through the flight, the measurement of carbon monoxide while the APU was being operated suggested that the said APU was emitting compounds that would cause cabin air quality to decline.

[129] The opinions arrived at by Dr. Weisel were to the effect that each of the aircrafts involved in the incidents central to the refusal action by the appellants have been documented to have had air quality problems that were associated with oil leakage into the bleed air of the aircraft, with such leakage resulting in a mixture of chemicals being released into the aircraft cabin that include a mixture of hazardous and toxic chemicals. Said mixture would have been composed of engine oil and unknown pyrolysis products of the oil. Dr. Weisel formulated the opinion that there was a reasonable expectation of the cabin crew that working a subsequent flight on the same aircraft in which they smelled the odour without that aircraft receiving proper maintenance to identify and repair the source of the oil leakage in the APU would result in them, other crew members and passengers being exposed to a mixture of hazardous chemicals associated with further oil leakage into the bleed air of the aircraft.

[130] Counsel for the respondent interprets the issues under appeal as being a question whether there may have been an exposure to a hazardous substance (in the case of LaPorte) and whether there was a known or foreseeable health and safety hazard (in the case of Martinez). Both cases concern fume events similar to those addressed in the appeals in OHSTC file nos. 2011-38 (Delgado and Liang) and 2012-22 (Haiden Blaize) dealt with in a parallel decision previously mentioned. The contamination of the cabin air in those cases was corroborated by evidence of mechanical failures also associated with the leakage of jet oil into the ventilation

system. The respondent submits that exposures are associated with acute and chronic health effects.

[131] The respondent also contends that in the cases underlying these appeals by Air Canada, the HSO (Pollock) did not need to first find that there was "danger" within the meaning of the Code in order to issue the directions. In the LaPorte case, she merely needed to find that employees “may be exposed to a hazardous substance” such that the potential exposure to such potential hazardous substance ought to be investigated. In the Martinez case, the HSO merely needed to find that there was a “known or foreseeable health and safety hazard” to trigger the employer’s obligation to inform employees of the hazard.

[132] With respect to the LaPorte direction, the respondent submits that Air Canada maintenance had not determined the source of contamination by the time of the work refusal and that smells and symptoms were reported on the flight where the refusal took place. Moreover, according to the respondent, it is unequivocal that fume events and exposures to pyrolyzed oil products in the aircraft cabin have not been sufficiently studied; and that it is virtually impossible for third parties to study such exposures without consent and cooperation of airlines.

[133] With respect to the Martinez directions, the respondent submits that the evidence is to the effect that Air Canada Flight Operations and Maintenance knew that there was contamination of cabin air from oil, and had taken (unsuccessful) steps to trace and eliminate the source of contamination. Ms. Martinez was not informed of that and was instead told that the smell that made her sick was jet exhaust or some other external source. The respondent maintains that Air Canada management did nothing to correct the situation.

[134] It is the respondent’s general view that both directions concern the fundamental right of employees to know about health and safety issues in their workplace and that the question of whether the said directions are founded does not relate to the issue of whether the circumstances of the LaPorte and Martinez work refusals involved danger. The respondent finds support in this respect in the previously mentioned ruling of April 18, 2012, by the undersigned in which the parties were notified that the danger findings were not under review in the present cases.

[135] The respondent identifies 3 common issues to be determined in all four appeals: (a) what was the likely cause of the fume events? (b) what was the likely composition of the fumes? (c) what were the likely (or actual) medical effects of exposure? The respondent further claims that in its appeals, Air Canada does not address the evidence on any of the said issues.

[136] It is the respondent’s position that the manner in which Air Canada approaches the evidence in the present files undermines the credibility of the respondent’s expert witnesses. In particular, the respondent points to the fact that Air Canada has asked the undersigned to accept non-expert opinion evidence, e.g., Dr.

Pleus opining on medical matters, and putting medical questions about psychogenic illness to the respondent's non-medical expert witness while refraining from putting the same questions to the respondent's medical expert witness. The respondent also asserts that Air Canada attacks the methodology of exposure science and occupational and environmental medicine without any evidence, challenging a ruling on the qualification of an expert witness as well as a preliminary ruling made by the undersigned regarding the relevance of the danger issue relative to the issuance of contravention directions in the LaPorte and Martinez cases. In response to these issues, counsel for the respondent submits that parties are not entitled to re-litigate final decisions, that non-expert opinion evidence is not admissible, and that Air Canada has failed to answer the three issues that the respondent sees as central.

[137] The respondent submits that the facts of these cases are similar to the facts of the cases in the parallel appeals by refusing employees: fume events happened, they were associated with known mechanical failures, oil got into the ventilation system which, in addition to pyrolyzed compounds contaminated the cabin air on multiple occasions before and after the work refusals. The respondent submits that the exposures were hazardous, the smells are associated with contaminants and the exposures contained dangerous chemicals which cause illness.

[138] The respondent notes that Air Canada does not dispute the evidence of Mr. Supplee. It accepts that jet oil can and does get into the aircrafts ventilation systems. It accepts that smell is recommended by the manufacturer, Airbus and by Air Canada's own maintenance documents as a diagnostic tool for determining oil leaks. Mr. Supplee testified that Air Canada mechanics followed standard operating procedures, but did not necessarily determine the source of contamination. For example, regarding the LaPorte direction, Mr. Supplee testified that looking at bleed ducts can eliminate them as a current source of leaking oil, but does not give a mechanic any information as to whether there is residue on the heat exchanger. Accordingly, the respondent believes that Air Canada could only conclude that there was no contamination in the part of the system that was examined, not in the ventilation system as a whole. Regarding the maintenance history in the Martinez refusal, Mr. Supplee testified that the statement that the "APU may have had an unauthorized use" suggests that the bleed valve would have been opened, probably to start the engines, which would result in the APU bleed air making its way through the system. It is the contention of the respondent that the likely source of the fume events is not in dispute; it was likely due to jet oil leaked or ingested through the engines and/or APU into the ventilation system and which formed residues.

[139] According to the respondent, Air Canada's entire case rests on the theory advanced by Dr. Pleus that the exposures did not present any hazard or danger. However, the respondent maintains that Dr. Pleus did not address the most significant factors in this case: pyrolysis products and illness without irreversible health effects. Additionally, the respondent asserts that Dr. Pleus' opinion evidence on medical issues is outside his field of expertise and cannot be relied on and that he crossed the line between being an expert and being an advocate. In support of this

position the respondent relies on Keefer Laundry Ltd. v. Pellerin Milnor Corp. [2007] 12 W.W.R. 346 at paras 15-16 where it was held that:

> [...] There is a difference between an expert who advocates for a party and one who advocates for his or her opinion. By that I mean that an expert opinion should be confined to the expert's field of expertise and to the question within that field that is at issue. It should be the result of careful and objective consideration of all relevant facts and scientific principles and not based on extraneous considerations. "In short, the Court should be able to approach the opinion with some confidence that the expert would have rendered the same opinion if he or she had been consulted by the opposite party. However, once an expert has formed an opinion through that process, he or she may be firm, emphatic or even strident in the way he or she expresses the opinion or defends it against contrary opinions.

[140] The respondent submits Air Canada's attack of Dr. Weisel's evidence is without foundation because it is based on Air Canada's theory that there is only one kind of science, toxicology. Air Canada does not actually address Dr. Weisel's description of methodology in exposure science and the consistency of his approach with that methodology and simply asserts that exposure science is not science, since it is not toxicology. However, the respondent points out that Air Canada did not object to the tendering of Dr. Weisel as an expert in exposure science, did not call evidence to suggest that exposure science is "less scientific" than toxicology, nor did it challenge the appropriateness of Dr. Weisel's methodology to the circumstances of the refusals. Therefore the respondent maintains that there is no basis for Air Canada's current claim that Dr. Weisel's opinion is invalid.

[141] The respondent also submits that Dr. Weisel, unlike Dr. Pleus, did address the question of what was the likely composition of the fumes, and his opinion on the composition of jet oil and the compounds produced through pyrolysis remains unchallenged. Specifically, the respondent relies on Dr. Weisel's explanation that jet oil consists of both additives and a base and that pyrolysis affect both additives and base. Thus while the base is mostly non-hazardous, pyrolyzation of the base produces new compounds which can be irritant and carcinogenic.

[142] The respondent further asserts that Dr. Weisel's explanation of the HEPA filter study was clear and straightforward contrary to the submission of the appellant that it was scientifically flawed. The respondent explains that the study was designed to determine if bleed air is contaminated. The respondent points out that Dr. Weisel testified in chief that the purpose of the study was to see if they could use analysis of HEPA filter contaminants to indicate leakage of oil into bleed air that would affect air quality. The study demonstrated that there was such leakage. The respondent submits that Air Canada has no factual basis on which to claim that there are "apparent and significant design shortcomings" in the study.

[143] The respondent notes that Air Canada claims that Dr. Weisel's methodology is flawed because he did not provide a quantitative evaluation of the oil that could get into the air in a fume event nor did he evaluate exposure. On this, the respondent submits that while quantitative calculation of dose is part of toxicological methodology, it is not necessarily part of every scientific methodology. The respondent thus submits that Dr. Weisel approached the present matter as a case study, evaluated the information available from this case, and then reviewed scientific literature to see if the circumstances of the case matched circumstances he could find in the literature. Unlike toxicology, exposure scientists have to deal with exposures to a mixture of compounds.

[144] The respondent points out that Dr. Weisel testified in re-examination that psychogenic effects are a matter of medical expertise. According to the respondent, Air Canada did not put any questions concerning psychogenic effects to Dr. Harrison, who was the only expert qualified to discuss them.

[145] The respondent also submits that Air Canada ignores Dr. Weisel's actual evidence when it claims that he "disregarded relevant scientific authorities". He observed that TLVs are not protective of everyone on an aircraft that they do not take into account mixtures. He also noted that most existing studies dealt with cabin air quality under normal conditions, not during fume events. The excerpts of the UK Science and Technology Report indicate that the study pertains in large part to "normal operating conditions". The "worst case scenario" described in the report pertains to TOCP only. Dr. Weisel repeatedly stated that the compounds of concern were other than TOCP as they were products of pyrolysis of the engine oil base as well as additives.

[146] The respondent believes that Air Canada's contention that Dr. Weisel ignored measurements during an "unplanned bleed air event" "because the researchers used different descriptors to describe the odours that occurred on flight" is unsupported by the evidence. In fact, the respondent submits that Dr. Weisel commented on the "oily" odours present in that study and on that basis found that the release was unlike the releases in the present cases. Likewise, Air Canada claims that Dr. Weisel "dismissed" the *Golder* report. The respondent submits on the contrary that Dr. Weisel's testimony was that the report was a step in the right direction, but limited as it did not measure the exposures that were significant in the present cases.

[147] The respondent further submits that Dr. Weisel did not discount the *Cranfield* study but rather referred to "oily" and "fuel smell" odours rather than the odours characteristic of pyrolysis products. He was not disputing "descriptors", but was making an observation that the smells in the *Cranfield* study differed from the smells in these work refusals. All witnesses in this case, Dr. Pleus included, testified to the specific and unusual nature of the "smelly socks" smell in fume events however Dr. Weisel found the *Cranfield* study to be of limited value because it studied concentrations "under normal operating conditions" and not during fume events.

[148] Air Canada claims that "Dr. Weisel's views with respect to descriptors of odours is also at odds with the evidence of Mr. Supplee, who testified that in his experience a variety of descriptors, including 'wet dog', 'smelly socks', 'old socks' and 'oil smell' are commonly used to identify the smell of cabin air in a fume event." In fact, Mr. Supplee testified that the smell of "old socks" and "wet dog" were jet oil smells, i.e. the "smell oil puts out." The only cross-examination of Mr. Supplee on that point was the question, "If you get a report from cabin crew about a dirty socks smell, you suspect an oil-related problem", to which Mr. Supplee said, "Generally, yes". There is no contradiction between Dr. Weisel and Mr. Supplee on the characterization of jet oil and fume event odours. The respondent submits that this case is not about TOCP, which forms a small fraction of jet oil. It is about pyrolysis products of the base, which forms over 90 percent of the oil, as well as additives.

[149] The respondent argues that if Air Canada's theory of psychogenic illness is correct, a theory advanced by Dr. Pleus who is not a medical expert, that theory being that fume events lead to psychogenic illness, including "headache, dizziness, nausea, cough, fatigue, drowsiness or weakness, watery or irritated eyes, inability to concentrate/trouble thinking, vomiting and tingling or numbness", then it has lost all four cases. Simply put, the respondent believes that psychogenic illness is illness. Employees have a right to refuse work if it is going to result in the symptoms described. However, the respondent submits that the evidence in this case is that the symptoms associated with fume events are not psychogenic. It is the respondent's submission that Air Canada's decision to avoid hearing expert evidence and then advance pseudo-scientific theories without evidence of psychogenic illness is troubling, not the fact that behavioural scientists who are not medical doctors were not consulted on such matter.

[150] The respondent also points out that Air Canada submits that Dr. Harrison gave uncontradicted expert evidence on the issue of the likely (or actual) medical effects of exposure. Conversely, Air Canada did not call any medical evidence. There was only one person qualified to give medical evidence in this case and that was Dr. Harrison who testified for the respondent.

[151] The respondent asserts that in challenging the undersigned's ruling accepting Dr. Harrison as being qualified to give opinion evidence in toxicology, Air Canada acted belatedly and without foundation and ignores the evidence of Dr. Harrison's teaching and writing on toxicology. The respondent argues that Air Canada's claim that Dr. Harrison "initially denied the very existence of the standard risk assessment" in toxicological evaluation is false. Dr. Harrison answered the first question put to him in cross examination about a "four step process for a toxicological risk assessment" by stating "There is an established process for risk assessment." Likewise, where Air Canada claims that Dr. Harrison "misapprehended" the "dose makes the poison" central toxicology principle when commenting on carcinogens, those comments were that the medical community, World Health Organization and U.S. Environmental Protection Agency accept that there is no safe level of exposure to carcinogens i.e., regardless of the principle that "dose makes the poison", there are

classes of toxins for which no measurable dose is acceptable. Dr. Pleus was not questioned on that point and did not contradict it in any way.

[152] Contrarily to what is claimed by Air Canada, the respondent maintains that Dr. Harrison's evidence was that there is greater variability in individual health responses to lower doses than at high doses, where everyone will have the same response. He was not referring to odours in particular, but to exposures to any potentially toxic substance. His evidence is consistent with the studies relied on by Dr. Pleus, who testified to the common use of the "LD 50" standard, i.e., the dose at which 50 percent of the population will die. It is submitted that this Tribunal can take judicial notice that the difference between life and death is medically significant. At LD 50, half the population is dead and half alive. Increase the dose sufficiently, and the response will be less variable. The entire population will die. Dr. Pleus was not asked whether there was greater variability in dose-response effects at lower doses than higher ones, but nothing in Dr. Pleus' evidence suggests that he would have disagreed with Dr. Harrison on that point.

[153] According to the respondent, the claim by Air Canada that Dr. Harrison's evidence may be biased is without foundation as evidenced by his credentials as an unbiased expert, his high ranking positions in public institutions, his state and federally funded work as well as the various positions he occupies in public institutions.

[154] The respondent clarifies that Dr. Harrison testified that "aerotoxic syndrome" is not a diagnosis and that there is no symptom that is only caused by bleed air. The respondent maintains that, contrary to the appellant's submission, at no point did Dr. Harrison say that the symptoms suffered by flight attendants as the result of exposure to contaminated bleed air did not form a recognized medical illness.

[155] The respondent submits that Dr. Harrison testified that controlled testing for chemical exposure is never done in occupational and environmental medicine because it would involve exposing a group to the chemicals. His uncontradicted evidence is that the data he used was commonly used and appropriate in his fields of expertise. Furthermore, the respondent believes that Dr. Harrison's "Guide for Health Care Providers" was peer-reviewed, by five or six toxicologists and specialists in occupational and environmental medicine. He further testified that he would likely be updating and publishing the results of his work with flight attendants. According to the respondent, peer-review is not part of the process of adducing expert opinion evidence before tribunals.

[156] The respondent believes that the issue in the present case is whether there was a reasonable expectation that they would suffer symptoms if they did not refuse to fly. According to the respondent, medical histories are taken when a patient has suffered symptoms as the result of an exposure, not when an individual has avoided the exposure and avoided suffering symptoms.

[157] The respondent submits that Dr. Harrison's evidence on TLVs was essentially the same as that of Dr. Pleus' evidence on TLVs on the following points:

- Researchers dealing with air quality e.g. "Sick Building Syndrome" deal with concentrations well below TLVs and Occupational Exposure Limits ("OELs");
- TLVs have been changed and in some cases lowered;
- TLVs generally refer to a particular chemical and do not account for combined exposures to different chemicals;
- TLVs pertain to particular routes of exposure;
- TLVs are designed to address specific endpoints, i.e., specific adverse health effects.
- Different health endpoints could result in TLV levels for a single chemical being set several orders of magnitude apart.

[158] The respondent further maintains that TLVs, as Dr. Pleus, Dr. Weisel and Dr. Harrison testified, have specific purposes, primarily to deal with repeated exposures of workers to individual chemicals normally present in their work places. There would thus be no foundation to the claim that TLVs represent the opinion of the scientific community of industrial hygienists that exposure at or below the TLV level does not create an unreasonable risk of disease or injury. The respondent also points out that according to both Dr. Harrison and Dr. Weisel, TOCP is present in relatively small concentrations in jet oil compared to other compounds including those produced by pyrolyzation.

[159] The respondent maintains that Dr. Pleus ignored the main exposure in this case: pyrolyzed jet oil products, and the illnesses associated with those exposures, including non-irreversible health effects. The respondent finds this problematic given that Dr. Pleus acknowledged that the Mobil Jet Oil II MSDS "does report that decomposition products may be harmful". The products listed, including carbon monoxide, phosphorus oxides, and aldehydes, overlap with the pyrolyzation products identified by Dr. Weisel. Acute exposure to these products, as noted by Air Canada, "may include headache, nausea, eye, nose, and throat irritation".

[160] The respondent maintains that Dr. Pleus' opinion does not address any of the issues in this case. He ignores the contents of the actual exposure, despite the MSDS and the Airbus and Air Canada instructions to mechanics to use a "dirty socks smell" as a diagnostic tool for oil leaks in the ventilation system. He ignores relevant reported symptoms associated with the smell - including those on the MSDS. He discounts any illness that is not chronic or irreversible.

[161] Ultimately, the respondent submits that while Dr. Pleus' evidence may have established that hens exposed to fume events on aircraft are unlikely to suffer from TOCP-induced long-nerve damage, it does not speak to the actual exposures of workers to aircraft cabin air contaminated by jet oil and pyrolysis products. The

respondent submits that the relevant expert evidence in this case is that of Dr. Weisel and Dr. Harrison.

[162] The respondent submits that the issue in Air Canada's appeal of the LaPorte direction is whether employees "may be exposed to hazardous substances" so that an investigation is required according to paragraph 125.1(*f*) of the Code. The LaPorte direction cited a contravention of paragraph 125.1(*f*), which according to the respondent simply stands for a requirement that Air Canada investigate what may be an exposure to a hazardous substance, with the assistance of the Work Place Committee. The substance which workers may be exposed to includes, but is not limited to, exposure to controlled products and to agents which are hazardous to the health of the person exposed. The respondent asserts that, as a matter of statutory interpretation, the term "hazardous substance" in paragraph 125.1(*f*) of the Code is broader than a controlled product because a hazardous substance "includes" a controlled product. Furthermore, the respondent relies on *Canadian Pacific Railway Company* v. *Woollard* (supra), where it was held that it was not necessary that the substances in question be controlled products for them to be found hazardous. The respondent notes that the evidence is similar to this case:

> [114] Furthermore, the uncontested evidence also shows that lubricating grease, hydraulic oils and lubricating oil, by reason of a property that they possess, are hazardous to the safety or health of a person exposed to them. Indeed the MSDSs for those chemical agents indicate that prolonged or repeated contact with these substances "may cause skin irritation characterized by dermatitis or oil acne". Under the heading "first aid measures", "Skin contact", it is stipulated that contaminated clothing should be removed and laundered before reuse.

[163] The respondent points out in this case that the MSDS for Mobil Jet Oil II is replete with reference to hazards and protective measures, particularly if the exposure to the oil is not under normal conditions. It reads in part:

> This product is not expected to produce adverse health effects under normal conditions of use…Product may decompose at elevated temperature or under fire conditions and give off irritating and/or harmful (carbon monoxide) gases/vapours/fumes. Symptoms from acute exposure to these decomposition products in confined spaces may include headache, nausea, eye, nose, throat irritation. (…)Note:(…) Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person. Hazardous Combustion Products: Carbon monoxide, Phosphorous Oxides, Aldehydes, Smoke, Fume, Incomplete combustion products.

[164] It is the respondent's position that pyrolyzation of jet oil creates more chemical compounds with adverse health effects. The exposure in issue is not merely

to jet oil, but to the pyrolysis products that result from the extreme heating of jet oil in the engines, APU and/or ventilation system. In *Boone* v. *Air Canada*, 2010 OHSTC 005, the appeals officer found that the potential of a substance to cause harm was sufficient to bring it within the statutory definition of hazardous substance. In both the LaPorte and Martinez cases, there were reports of adverse health effects as a result of exposure to the fumes. The evidence in general concerning all four appeals is that exposure to air contaminated by jet oil and pyrolyzed oil products causes adverse health effects. Dr. Pleus' evidence on the other hand does not pertain to those exposures as it pertains only to TCP and TOCP exposure.

[165] The respondent also makes reference to the Federal Court, which has held that "the Federal Court of Appeal endorsed the notion that a "danger" finding under Part II of the Code requires assessment of the likelihood of an injury occurring as a reasonable possibility." *Martin-Ivie* v. *Canada (Attorney General)*, 2013 FC 772 at para. 52. The respondent submits that the findings of danger are findings that there is more than a mere likelihood of injury or illness but rather that there is a "reasonable possibility". Accordingly, the respondent maintains that the HSO's findings of danger in the LaPorte and Martinez cases mean that there is a "likelihood that the health or safety of an employee is or may be endangered by exposure" to the hazardous substance.

[166] The respondent maintains that Air Canada has not investigated and assessed the exposure with the assistance of the Work Place Committee and that Mr. Supplee testified to other investigative possibilities such as providing checklists to maintenance, and surveys to flight deck and cabin crew, which have not been done. The respondent also believes that there are other techniques that Air Canada can use to investigate. Dr. Harrison suggested standard public health surveillance techniques used in occupational and environmental medicine, and development of a consistent and uniform investigation protocol whose results would be put into a data base. Dr. Weisel discussed the lack of measurements during fume events and testified to the importance of taking measurements of peak exposures. The *Golder* Report attests to such measurements being possible.

[167] Regarding the LaPorte direction, the respondent asserts that Air Canada's position is circular in that it relies on incomplete knowledge of the contaminants and health effects in fume events to argue that the hazard is speculative, and therefore do not need to be investigated. The respondent submits that by that reasoning there would never be any investigations under the Code. Investigations by nature are inquiries into matters which are to some extent unknown.

[168] Regarding the Martinez directions, the respondent disagrees with Air Canada's submission that there was no known or foreseeable hazard in Ms. Martinez's case because "a smell is not a hazardous substance". The respondent clarifies that the hazardous substance is not the smell; it is the substance that produces the smell. In the case of Ms. Martinez, Air Canada maintenance thought there was oil leaking into the ventilation system and had taken actions in an attempt to rectify the problem. Those actions included the hour-long incomplete pack burn

immediately before Ms. Martinez's scheduled Toronto-Ottawa return flight. The pack burn did not solve the problem but rather, according to Air Canada maintenance reports, resulted in worsening contamination of the cabin air.

[169] The respondent notes again that in the Martinez case, as in the LaPorte case, the “danger” finding is not the issue. In the case of Ms. Martinez, the HSO found that "the probability of residual particles of the gaseous phase of a chemical substance existed from this burn off of the APU which contaminated air systems on board the aircraft". The "danger" finding was a finding of a hazard, i.e., residual chemical substance contaminating the air system. Furthermore, while Air Canada has claimed that it has met its obligation to ensure that employees are aware of health and safety hazards, factually it has not since the direction arose in a context where Air Canada personnel were advising Ms. Martinez that the smell experienced was produced by exhaust fumes while at the same time being aware or taking steps to rectify oil leaks, thus leading to the conclusion that it did not inform her of her exposure or potential exposure to cabin air contaminated by jet oil or pyrolyzed oil products.

[170] The respondent maintains that there is no evidence that Air Canada took steps after the work refusal or direction to inform flight attendants of the potential exposures. Air Canada refers to its communication to employees including, the "To Breathe or Not to Breathe" article. The article makes no reference to the possibility of cabin air contamination by oil leaking into the bleed air system. The only reference to bleed air contaminants states that “a sign of potential contamination is usually smoke or vapour”. There is no reference to contamination associated with "smelly sock" smells. There is no description of what the contaminants are nor of pyrolyzation of jet oil. Furthermore, the respondent notes that Air Canada does not explain what specific actions flight attendants are to take when exposed to air contaminated by jet oil or pyrolyzation products. Furthermore, while Air Canada relies on a bulletin issued to its maintenance employees the day before the Martinez refusal in which it indicated that mentions of foul odours by crew members were to be taken seriously, the respondent views the document as ineffective as a means of ensuring that the maintenance personnel who told Ms. Martinez that she smelled “exhaust” would tell her what they suspected the problem to be, i.e. leaking jet oil.

[171] The respondent objects to the appellant’s request to overturn the findings of danger for the following reasons:

- The matter has been finally determined by the appeals officer;
- There is no statutory authority for an appeals officer to reconsider appeals officer’s decisions;
- Air Canada did not give any notice that it intended to assert that the undersigned had jurisdiction to hear these cases as appeals of danger findings and, to the contrary, specifically stated that the issue of my jurisdiction to hear appeals of danger findings was not before the undersigned;

- The respondent has been prejudiced by the lack of notice in that they would have called evidence to support the findings of danger had they known Air Canada sought to challenge them; and
- Air Canada's argument that the undersigned has jurisdiction is illogical and contrary to principles of statutory interpretation.

[172] The respondent submits Air Canada did not seek judicial review of the undersigned's April 18, 2012, decision concerning the scope of the appeal and it is thus too late for Air Canada to seek reconsideration. The respondent further asserts that it is not because an appeals officer has the power to hear an appeal *de novo* of a direction that the appeals officer has jurisdiction to hear other appeals. The respondent distinguishes the reasoning in the *CSC Millhaven Institution* case cited by the appellant as irrelevant since it concerned an appeal of a direction made pursuant to paragraph 145(2)(*a*) and points out that paragraph 145(2)(*a*) grants an HSO the power to issue a direction if the officer "considers that the use or operation of a machine or thing, a condition in a place or the performance of an activity constitutes a danger to an employee while at work". Thus, the appeals officer standing in the shoes of the HSO "must take into consideration the definition of 'danger'". Conversely, the respondent submits that section 145(1), however, grants the power to issue a direction to a "health and safety officer who is of the opinion that a provision of this Part is being contravened or has recently been contravened." There is no mention of "danger" and there is no need for the HSO to make any finding of danger to exercise powers under section 145(1). The *de novo* process of the appeal only permits the appeals officer to consider the grounds for issuing a direction under section 145(1), i.e., whether there is or has been a contravention of Part II of the Code.

[173] Moreover, the *CSC Millhaven Institution* decision does not constitute authority for the expansion of appeals officer jurisdiction claimed by Air Canada. The appeals officer in that case rescinded the direction issued by the health and safety officer and opined that no danger existed but did not actually rescind the health and safety officer's danger finding. On comparison of the wording of subsections 129(6) and (7) of the Code, the respondent submits that if Parliament had intended to include an appeal process for a finding of "danger" made under subsection 129(6), it would have done so, as evidenced by the actual wording in subsection 129(7) where a finding of no danger is made appealable. Applying the principle of statutory interpretation that words should be given their plain meaning and be read in context the respondents thus submits that the Code allows employees to appeal danger findings and employers to appeal directions. Accordingly, the respondent submits that Air Canada is precluded from seeking to appeal the findings of "danger" in the LaPorte and Martinez cases. However, the respondent reserves the right to make submissions on the issue of "danger" in these appeals, including a submission that it be allowed to lead further evidence, should the undersigned be persuaded to reconsider its ruling of April 18, 2012.

[174] Without prejudice to this position, the respondent submits that the danger findings should be upheld on their merits. It is noted that Air Canada's submissions in support of its purported appeal of the "danger" decisions rely entirely on Dr. Pleus' evidence and the theory that there is no hazard other than TCP. Air Canada repeatedly and wrongly has claimed that the MSDS for Mobil Jet Oil II “states that it is not a health hazard.”

[175] Furthermore, the respondent submits that the circumstances of these refusals were not "normal conditions" of jet oil use. Normally, jet oil stays in the engine bearings, sealed off from the extremely hot air that is compressed in the turbine and bled into the ventilation system of the aircrafts. According to the maintenance histories, the circumstances of these refusals were abnormal and involved oil contamination of the aircraft's ventilation system.

[176] The respondent relies on the MSDS which states that there are health hazards associated with the product, particularly under abnormal conditions of elevated temperatures. These work refusals concerned what in all probability was the exposure of flight attendants to jet oil that had been subjected to abnormal conditions of elevated temperatures in the engines, APU and/or ventilation system. The HSO findings of danger were correct. For the foregoing reasons, the respondent submits that Air Canada's appeals should be dismissed and the directions upheld.

C) Reply

[177] Air Canada reiterates its submissions that, in the present appeals of the directions issued by HSO Pollock, it is within the appeals officer's jurisdiction to overturn the findings of danger if they are unsupported by the evidence and maintains that the appeals officer is empowered to review all the evidence he finds to be relevant for the purpose of determining if the LaPorte and Martinez directions are appropriate.

[178] Air Canada maintains it has taken measures to comply with the LaPorte direction, despite its right and intention to file an appeal. It submits that there is no evidence whatsoever that HSO Pollock ever disputed Air Canada's compliance. At all times, Air Canada Flight Operations and Maintenance staff took Ms. Martinez's and Mr. LaPorte's concerns about cabin air quality seriously. Air Canada's maintenance staff took appropriate action to investigate and fix any mechanical problems that were identified. Indeed, the Agreed Statements of Facts and related documents demonstrate this and the respondent’s acknowledgement.

[179] The appellant submits that in order to determine whether the alleged contraventions of paragraph 125.1(*f*) of the Code and section 5.4 of the AOHSR occurred in Mr. LaPorte's case and, consequently, whether to vary, rescind or confirm the LaPorte direction, it is necessary to determine whether the evidence supports a reasonable expectation that exposure to a hazardous substance occurred and whether it establishes a likelihood that exposure to a hazardous substance endangered employee health and safety. Similarly, determining whether the alleged

contraventions of paragraph 125(1)(*s*) and subsection 125.2(1) of the Code occurred in Ms. Martinez's case, and whether it would be appropriate to vary, rescind or confirm the Martinez Directions, it is necessary to determine whether the evidence establishes that a known or foreseeable hazard to employee health and safety was present. The appellant reiterates that the determination requires that Dr. Pleus' evidence be followed and preferred over CUPE"s expertise, as these determinations require that the science be followed with its central toxicological long accepted principle that "the dose makes the poison".

[180] The appellant maintains that Dr. Pleus' opinion is supported by two pre-eminent enquiries into cabin air quality, and that his methodology and analysis follows the science which stands for the principle that adverse health effects are not produced by a chemical agent unless that agent or its metabolic breakdown reach appropriate sites in the body at a concentration and for a duration sufficient to produce a toxic effect. In this respect, he has concluded, on the basis of necessary assumptions due to the fact that no air samples, data or other objective evidence was collected in any of the flights at issue, that hypothetical exposures and dose levels in these cases were below the published lowest observable adverse effect levels (LOAEL) and the occupational exposure limits and, consequently, would be unlikely to cause human health effects. His opinion is consistent with numerous scientific studies that have found TCP and TOCP on aircraft at levels that are, at their highest, many times lower than the most conservative occupational exposure limits. It is submitted that neither Dr. Weisel nor Dr. Harrison have provided any scientifically objective evidence that the flight attendants were exposed to components of jet oil or its pyrolysis products, or any other hazardous or dangerous substance, at a dose and exposure duration sufficient to present a health risk.

[181] Air Canada relies on its submissions with respect to other significant problems with Dr. Weisel's and Dr. Harrison's evidence and conclusions, including the fact that neither is a toxicologist. In brief, Air Canada has submitted that both have based their opinions on limited evidence that is scientifically flawed and largely anecdotal, both have disregarded, without reasonable basis, relevant scientific authorities that are inconsistent with their personal views, there is a reasonable apprehension that Dr. Harrison may be biased towards workers in general and unions in particular on the cabin air quality issue in these appeals and both deviate from the methodology they claim normally to follow in coming to their opinions.

[182] With respect to methodology, Dr. Weisel testified that he followed the general methodology of exposure science, however, he provided no quantitative evaluation of the oil or pyrolysis products that could reasonably be expected to get into the cabin air in support of his conclusion that there was a reasonable expectation that the flight attendants would have been dangerously exposed to oil or pyrolysis products on the flights they refused. In cross-examination, he admitted that although he assumed an oil leak occurred in each case, he made no attempt to measure or calculates the possible exposure, or the dose to which the flight attendants could reasonably have been expected to be exposed.

[183] According to the appellant, the only calculation Dr. Weisel includes in his expert report is the presentation of the NRC (2002) calculation that estimates the amount of oil that would have to be pyrolyzed to yield an air concentration of formaldehyde in cabin air that exceeds the TLV. The appellant notes however in this regard that Dr. Weisel fails to fully present the caveats the report describes notably that 1g of oil must be completely pyrolyzed and all of it must enter the cabin air, neither of which is realistic, as noted in the NRC report. Rather, when there is a leaky seal, most leaked oil goes out the main engine exhaust and does not enter the cabin air. Likewise, Dr. Harrison did not provide any scientifically objective evidence that the flight attendants in these appeals were exposed to oil or its pyrolysis products (or, indeed, any hazardous or dangerous substance) at a dose and exposure duration sufficient to present a health risk.

[184] Additionally, as regards Dr. Harrison’s case series which he refers to on adverse health effects after exposure to contaminated bleed air, the appellant maintains that there is no reasonable evidentiary basis for assuming that oil and/or pyrolysis products leaked into the cabin air in the LaPorte and Martinez cases in the same concentrations and for the same durations as in any of the cases in Dr. Harrison’s case series. Dr. Harrison testified that occupational medicine methodology is designed to deal with incomplete data. It follows that an important step in occupational medicine methodology involves performing a differential diagnosis; i.e., ruling out other possibilities. Nonetheless, Dr. Harrison did not perform any differential diagnoses in these cases.

[185] With respect to evidence about psychogenic illness, the appellant submits that the respondent has failed to acknowledge that, in direct examination Dr. Weisel testified that as an exposure scientist he works in a team with and normally draws on the expertise of colleagues who specialize in other areas, including a "behavioural scientist". This clearly invites the question of whether Dr. Weisel followed his normal procedure in these cases, particularly given that Dr. Pleus' report contains a reference to the possibility of "psychogenic illness". Dr. Weisel admitted that in coming to his opinion about the present appeals, he did not consult with a behavioural scientist at all.

[186] The appellant also asserts that there is no evidence in either Dr. Harrison's report or his testimony that he gave any consideration to the issue of psychogenic illness, although Dr. Pleus raises this issue in his report. Air Canada notes that the respondent chose not to ask Dr. Harrison to comment on this issue despite the fact that this subject matter falls within his medical expertise.

[187] On the matter of peer review, the appellant contends that contrary to the respondent’s submission, it has not suggested that Dr. Harrison's expert report should have been "peer reviewed". Rather, Air Canada has asked the Tribunal to take note of the fact that the opinions and assertions Dr. Harrison makes in his health care provider guide, including with respect to the case series on which he relies, have never been subject to independent peer review. In other words, and as Dr. Harrison agreed in response to a question put to him directly by the appeals officer, although

he and his co-authors asked some of their peers to review the health care provider guide prior to its publication, it was not and never has been peer reviewed.

[188] For the foregoing reasons and the reasons stated in its submissions, Air Canada reiterates its requests.

Analysis

[189] These appeals by Air Canada constitute a dual challenge. Air Canada indicated that it was challenging, in both the cases of Ms. Martinez and Mr. LaPorte, the finding of danger made by HSO Pollock prior to issuing three directions, ("contravention" directions) pursuant to subsection 145(1) of the Code, instead of the corrective or protective directions required by subsection 145(2) of the legislation. In the second part of its challenge, appellant Air Canada is seeking to have the three "contravention" directions rescinded on the basis that it has not violated the obligations stated in the provisions of the Code that base the directions issued by HSO Pollock pursuant to subsection 145(1).

[190] In a preliminary decision made on June 18, 2012, in the present appeals, I stated that a stand-alone finding of danger could not, in and of itself, be appealed pursuant to subsection 146(1) of the Code unless it had given rise to a corrective or protective direction or directions issued by a health and safety officer pursuant to subsection 145(2) of the Code and that in such a situation, it would be those directions resulting from the underlying conclusion of danger that would be the actual object of the challenge, not the actual finding of danger itself. The wording of the Code, particularly subsection 146(1) which sets out the right of appeal, is specific in that it states that appeals are made against directions. A finding of danger is not, in and of itself, a direction, although the Code does state that where there is a finding of danger, there is the statutory obligation put on the health and safety officer to issue a direction pursuant to subsection 145(2) of the legislation where, as a result of such finding, there is a requirement that corrective or protective action be taken where required. I have previously dealt with the possibility of deviating from that statutory obligation to issue a corrective or protective direction in certain circumstances, for instance where there may no longer be a situation requiring corrective action when the health and safety officer completes his or her investigation and makes the finding of danger, something that may occur after some considerable time has elapsed since the cause of investigation has been raised through refusal to work action.

[191] In the present cases, HSO Pollock elected not to issue directions under subsection 145(2) of the Code for reasons that are not stated in the investigation reports, opting instead to issue "contravention" directions pursuant to subsection 145(1) of the Code, such directions not requiring finding of danger and being independent of such a finding. The language of the statute must be given its plain meaning and read in context. Subsection 129(4) of the Code grants authority to a health and safety officer to make decisions on "danger" and accordingly statutorily obliges the officer to issue proper directions pursuant to subsection 145(2) of the Act

where the officer has decided that a danger exists that requires correction or protection.

[192] At subsection 129(7), the legislation provides a specific right of appeal where the health and safety officer has decided that a danger does not exist while at subsection 146(1), the right of appeal being provided is specific to directions that a HSO may have issued, regardless of whether such were issued on the basis of the HSO having concluded to the existence of a danger (subsection 145(2)) or to the commission of a contravention (subsection 145(1)). There is no mention of "danger" at subsection 146(1) of the Code, which establishes the right to appeal directions, nor at subsection 145(1), which establishes the authority of a health and safety officer to issue directions relative to contraventions, and I would add that in the case of such directions, a contravention of the Code and its regulations does not need to be grounded in a finding of danger. In this respect, I share the view expressed by the respondent that given the specificity of the language used by Parliament at subsection 129(7) of the Code in granting the right to appeal a finding of no danger, if it had wanted to grant a similar right of appeal regarding findings of danger, it would have explicitly so stated. This being the case, it is my opinion that in the appeals of the directions issued to the appellant for contraventions to the legislation, there is neither legal basis nor requirement for the undersigned, when making a determination on the validity of the contravention directions issued to the appellant by HSO Pollock, to examine the finding of danger made by the said HSO.

[193] Notwithstanding this prior decision on the particular matter of appealing a finding of danger, the appellant Air Canada has renewed its request to have this matter looked at again by the undersigned, arguing in this regard that I have the authority to reconsider my earlier determination on this issue as I am proceeding *de novo*. I do not share that opinion. While it is true that as an appeals officer, I sit in review of decisions made or rendered by a health and safety officer, I am vested with statutory authority to investigate, make certain findings and render appropriate directions, that authority or jurisdiction does not extend to my reviewing my own initial decisions, something that would be the equivalent of my sitting in appeal of my own decisions. As I have already made a decision on this matter, the end result is that the following decision will solely address the appeal of the three contravention directions issued in the cases of Ms. Martinez and Mr. LaPorte. I have however alluded repeatedly to parallel appeals by Air Canada employees regarding whether a danger was present in essentially identical circumstances as the present appeals by Air Canada; and the evidence presented in both sets of cases are identical; a fact that should not be ignored by the appellant.

Martinez Directions

Subsection 125.2(1)

[194] Two contravention directions were issued by HSO Pollock in the case of the refusal by Ms. Martinez. In the first case, it was the conclusion of the health and safety officer that the employer had contravened subsection 125.2(1) of the Code by

failing to provide the refusing employee information regarding any controlled product to which she may have been exposed. This statutory obligation however involves a number of elements that need to be satisfied when one considers the wording of the Code provisions that ground the obligation directly or through incorporation by reference, as well as the regulations made pursuant to the said statutory provisions. Basically, the obligation is one that requires information in the possession of the employer to be transmitted to a specific party, namely a physician or a prescribed medical professional for the purpose of allowing the latter to make a medical diagnosis or rendering a medical treatment. Subsection 125.2(1) which states the obligation is only complete when read together with paragraph 125.1(*e*) of the Code and, because of incorporation by reference, relevant provisions of the *Hazardous Materials Information Review Act* (R.S.C. 1985, c. 24) as well as the *Hazardous Products Act* (R.S.C. 1985, c. H3) and the regulations made pursuant to both these statutes. The appellant has argued that the clear and unambiguous language of the grounding legislation shows that the employer's obligation is only triggered if three pre-conditions are met, those being that there be a request made by the treating physician or medical professional, that the request be for the purpose of making a medical diagnosis or for rendering treatment to an employee, in this case Ms. Martinez, and finally that there be an emergency requiring the diagnosis or the treatment. I find myself in agreement with the appellant in this regard.

[195] An attentive reading of the provisions mentioned above however demonstrates that there is an additional pre-condition that needs to be satisfied, one that has not been mentioned by the appellant. As I mentioned previously, the obligation which is identified by HSO Pollock is one of transmission of information in the hands of the employer. The Code however, is more specific in that it specifies and, in so doing, restricts that information to a controlled product to which the employee may have been exposed. The evidence shows that the information that was provided to the refusing employee by the appellant employer regarding the source of the unpleasant odour prompting their refusal right was external ambient air: HSO Pollock, on the one hand recognized as fact that the aviation environment is subject to smells from a variety of sources such as Ground Power Units, other aircraft starting their engines or ground vehicles, on the other hand she unequivocally stated that "the smell is a result of Mobil Jet Oil which is a high performance aircraft type gas turbine lubricant formulated with a combination of highly stable synthetic base fluid and a unique chemical additive package" and thus rejected the odour explanation favoured by the appellant's maintenance personnel and the aircraft Captain. However, the Material Safety Data sheet or MSDS for Mobil Jet Oil does not designate this product as being a controlled product within the meaning of the statutes mentioned above. In fact, under the title of hazard classification, it is described as a non-hazardous substance and a non-dangerous good.

[196] The *Hazardous Materials Information Review Act* previously mentioned sets out the definition of Controlled Product to the *Hazardous Products Act* stating at its section 2 that a controlled product or hazardous product: "means any product, material or substance specified" by the regulations made under that Act to be included in any of the classes listed in Schedule II of the said statute. Those six

classes, list controlled products as ranging from (1) compressed gas, (2) flammable and combustible, (3) oxidizing, (4) poisonous and infectious, (5) corrosive and (6) dangerously reactive materials. That same statute also describes an MSDS as being a document expressing through words information that is essentially the same as what is stated at paragraphs 125.1(*e*) (*i* to *v*) of the Code. While it is true, as has been argued, that even though the MSDS for Mobil Jet Oil states that the product is not expected to produce adverse health effect under normal conditions of use, the conditions under which the complaint of odour may have been perceived may not have been normal conditions of use in that it may have resulted from leakage of oil in the ECS and pyrolyzation of such, with various substances being released in the cabin air giving off irritating and/or harmful gases/vapours/fumes, with acute exposure to such in confined spaces resulting in symptoms such as headache, nausea, eye, nose and throat irritation, this, in my opinion, does not make the product a controlled product, even with the MSDS listing a number of reportable hazardous composing substances, including TCP. I further retain the evidence on record, concerning one of the parallel cases often alluded to throughout this decision, but based on the exact same information/evidence as the present, to the effect that E. Karpinsky, Industrial Hygienist for ESDC/Labour Program which enforces conformity with the Code confirmed that Mobil Jet Oil is not a controlled product nor a hazardous substance. Therefore, this pre-condition under subsection 125.2(1) is not satisfied.

[197] As to the three other pre-conditions argued by the appellant as needing to be satisfied in order to ground the obligation to provide information under subsection 125.2(1) of the Code, I share the view expressed by the latter that the Code is clear that all conditions need to be satisfied in order for the obligation to be triggered. In this respect, although Ms. Martinez followed up on the employer's recommendation to seek medical examination for the symptoms she complained of, and went on her own to consult a medical professional to be tested for exposure to carbon monoxide, there is absolutely no evidence, or even allegation, that a request of any kind by said medical professional was addressed to the employer to provide any information in its possession to allow the said physician to render a diagnosis, including the diagnosis of exposure to nauseous fumes. Finally, regarding the requirement that there be an emergency, no evidence was adduced and none can be derived from the HSO report that such emergency was the case. Furthermore, although the employee did follow up on the employer's recommendation to be medically tested for exposure to carbon monoxide, the manner in which events developed, as described in the HSO report, to the effect that following the employer's recommendation, Ms. Martinez went by bus to the Ottawa General Hospital, certainly does not illustrate a sense of emergency from either the employer or the refusing employee. Given all of the above, I have formed the opinion that the contravention retained against the appellant by HSO Pollock is not founded and as such the direction has no basis and must be rescinded.

Paragraph 125(1)(*s*)

[198] The second direction issued to the appellant in the case of Ms. Martinez had to do with a contravention to paragraph 125(1)(*s*) of the Code, which requires the

employer, for every work place controlled by the latter, to "ensure that each employee is made aware of every known or foreseeable health and safety hazard in the area where the employee works". Words such as "each employee is made aware" and "the area where the employee works" in the English text of the provision, or the words "à l'attention de chaque employé" and "l'endroit où il travaille" in the French text, convey a sense of specificity to the obligation to make aware, one that in my opinion signifies that what must be brought to the attention of an employee must be specific to that employee's situation and not merely generalities. That is even more so in my opinion where the contravention has occurred as a result of the exercise of the individual right that is the right to refuse to work. Furthermore, in considering whether there has been a contravention of the obligation, every word of the provision must be considered. In this respect, one needs to point out that Parliament has not only couched the obligation in terms of certainty ("known"), but also alternatively in terms of what is "foreseeable" meaning an awareness beforehand. Furthermore, the wording used in the provision is inclusive in that it covers "every […] health or safety hazard", thus in my opinion covers more than just the health and safety hazards that can reasonably be expected to cause injury or illness.

[199] In the case at hand, the refusal to work by Ms. Martinez related to an odour perceived in the aircraft that she had worked on and would work on, thus a work place controlled by the appellant Air Canada. This leaves only one triggering element left to fulfill in order for paragraph 125(1)(*s*) to find application: the presence or existence of a known or foreseeable safety hazard in the employee's work place or, to actually use the wording of the Code, "in the area where the employee works". While the testimony from the three expert witnesses that were heard evidence a disagreement as to the presence of "danger" in the aircraft and even as to the various substances that may or could be released into the cabin air in the case of fume events, there is nonetheless a point of agreement, supported also by the testimony of Mr. Supplee, that such an odour can be associated with oil either being present, leaking or pyrolyzed into the ECS.

[200] In a nutshell, the appellant employer's position is that there is no known or foreseeable hazard to an employee's health or safety when all that is raised is a smell or odour, or the report of such, as smell is neither a hazardous substance nor a reliable indicator of toxicity. Furthermore, given the accepted link between the reported odour and Mobil Jet oil, even if one were to accept that exposure to a chemical agent had indeed occurred, this would not translate into a hazard to the employee's health and safety as the MSDS for Mobil Jet Oil, states that it is not a hazardous substance. The appellant complements its position by advancing that even if one were to assume that a smell in the cabin or the report of such a smell in the aircraft log could be taken as a known or foreseeable hazard, it had satisfied its obligation to inform under the provision through its repeated issuance of the article "To Breathe or Not To Breathe" in 2009 and 2011 discussing the cabin air quality issues and various contaminants that could become present in the cabin air, as well as a bulletin to maintenance employees stressing the importance of taking action on odour complaints.

[201] The circumstances of the present case require that one distinguish between odour and what causes the odour, or more precisely, what substance causes the smelly sock odour, since the hazard or potential hazard lies in the substance that may be dispersed in the cabin through the ventilation or ECS system rather than in the indicator of the substance, namely the odour. In this respect, the evidence is to the effect that the aircraft had a history of oil related fume events between November 11 and November 29, 2011, up to and including the time of the flight that gave rise to Ms. Martinez's refusal on that day. The closest incident of this nature had occurred on November 28th, where, as stated in the statement of agreed facts:

> Maintenance followed up on a "terrible odour 'stinky feet' smell in the cabin. Maintenance determined that the APU had been over-serviced and the oil cap was not secure. The APU was drained to correct the oil level and the cap was secured. Maintenance found no evidence of an external oil leak. Maintenance ran the APU and engines and noted that there was no smell. Maintenance replaced the recirculation filters and considered Fin 277 to be serviceable.

[202] On the following day, November 29th, still as per the statement of agreed facts, it appears that prior to flight AC 460 that in an effort to verify the fix previously noted, "Maintenance ran the APU for approximately one hour to burn off the residual smell. Approximately one hour into the run, the smell in the cabin got progressively worse, particularly in the aft cabin. The APU bleed valve was inoperative and secured closed". There is no evidence to conclude that at the end of the so-called one hour pack burn, the smell had disappeared. Rather, the evidence shows that Air Canada maintenance took various actions in the days that preceded flight 460 on November 29, 2011, that showed it believed that there was in fact or had been oil leaking into the ventilation system of Fin 277 and was attempting to rectify the problem. The final attempt to burn off the residual smell occurred on the actual day of said flight. However while this eventually led maintenance to close the APU bleed valve as it suspected that the problem could be attributed to the APU, and no trace of oil had been found in the ventilation system, it is clear from the evidence that it had not managed to identify the cause or source of the "wet dog"/"stinky feet" smell being dispersed through the cabin ventilation system. The cross-bleed start of the aircraft engines for flight 460 to Ottawa which was required by the inoperative APU bleed valve brought back the same odour, evidencing in my opinion that the problem had not been rectified.

[203] What precedes is significant in respect of the present contravention, when one considers the conclusion of HSO Pollock, a conclusion that has not been contested or invalidated by the evidence adduced in this case. That conclusion was, firstly, that a second decontamination run or pack burn should have been, but was not, conducted after the initial one hour burn had only worsened the fumes and smell. Secondly, and most important as regards the present issue, the HSO concluded that it was "reasonable to conclude that residual particles or film or mist from this burn off of the APU contaminated air systems on board the aircraft and during flight, (one) would still experience the smells currently being explained as dirty sock smell at

different times of the flight based on what systems the pilots activated to cool or heat the cabin". Having reviewed the evidence, I see no reason to disagree with those conclusions. It is also my opinion that given the knowledge by maintenance that the initial pack burn had only resulted in the smell getting progressively worse instead of disappearing, an indication of an incomplete corrective action, it could not have ignored the fact that residual particles would remain in the air systems and thus would be or could be dispersed through the cabin.

[204] Air Canada personnel explained to Ms. Martinez that the source of the smells were likely external sources such as exhaust fumes from equipment in the vicinity of the aircraft. HSO Pollock also recognized that the aviation environment is "subject to smells from a variety of sources such as Ground Power Units, other aircraft starting their engines, ground vehicles that produce smells which could account for the ambient air around an aircraft", but still concluded that the source of the distinctive odour was Mobil Jet oil. Furthermore, beyond the general agreement emanating from the evidence that an odour such as that which was described as "wet dog or gym bag" or "stinky feet" is associated with the presence of oil leaking, overheating and/or being pyrolyzed in the ventilation system of the aircraft, Ms. Martinez had stated that in preceding days, she had experienced similar smells or fume events and could identify that the odour or smell in question was not from exhaust fumes.

[205] While I do not disagree with the statement made by G. Antonopoulos from Air Canada maintenance that certain odours may likely emanate from external sources during taxi, a situation over which the appellant may not have control, in my opinion, the evidence is compelling that the odour, as well as all the surrounding circumstances was caused by oil leakage in the ventilation system of the aircraft. The explanation offered to Ms. Martinez that the odour was "likely" from external sources appears to the undersigned to have been a means to an end to facilitate the departure of the aircraft as, again according to the statement by Mr. Antonopoulos: the "Captain […] wasn't very pleased with the whole situation (and) was eager to depart but IFS mgr explained that TC (Transport Canada) needs to be advised prior to a/c departing."

[206] The MSDS for the product, as argued by the appellant, does specify under "hazard classification" that it is a "Non-Hazardous Substance" and a "Non-Dangerous Good". However, one must look beyond this general characterization to the *Health Hazards* subtitle of the document. It states first that "This product is not expected to produce adverse health effects under normal conditions of use". In this regard, I have no difficulty in finding that oil leaking and being pyrolyzed in the aircraft ECS does not represent a normal condition of use. Second, under the same title, it is stated that the "Product may decompose at elevated temperatures or under fire conditions and give off irritating and/or harmful (carbon monoxide) gases/vapours/fumes. Symptoms from acute exposure to these decomposition products in confined spaces may include headache, nausea, eye, nose, and throat irritation."

[207] Making a determination as to whether there has been a contravention of paragraph 125(1)(*s*) of the Code does not require establishing a premise of "danger" and thus, having already come to the conclusion that the odour/smell experienced by Ms. Martinez could be linked to the presence of oil and/or particles of such being or remaining in the aircraft ventilation system, it is my opinion that what is described in the MSDS under *Health Hazards* satisfies the requirement of "foreseeable health hazard" stated in the provision.

[208] The Code requires that the employer ensure that every employee is made aware of such a foreseeable health hazard. I have concluded that there is specificity requirement of that obligation and thus that what needs to be brought to the attention of the employee must be specific to the employee's circumstances, not generalities. The appellant submits that it has met its information obligation first, by sending an article titled "To Breathe or Not To Breathe" to all cabin crew in February 2009 and again in 2011, which discussed the cabin air quality issues and the various contaminants that may be present, including Volatile Organic Compounds (VOCs), and additionally, on the day prior to Ms. Martinez's refusal, by issuing a bulletin to maintenance employees to reinforce that complaints of odours in the cabin were to be taken seriously and immediate action must be taken. The appellant argues that it has repeatedly informed flight attendants of the possible hazards associated with cabin air smells and fumes, and informed of the specific actions to take in the circumstances to ensure their health and safety.

[209] Apart from the article and the bulletin to maintenance mentioned above, Air Canada has not provided any other evidence of this so-called repeated information to the flight attendants. As for the article "To Breathe or Not to Breathe", an attentive reading of the two-page document leaves me with the impression that the text is an attempt at minimizing the importance or impact of air quality problems in the cabin ("*based on the propaganda material and videos available on the web about cabin air quality, one would think it is best not to breathe while on an aircraft-ever*"), and due to its general language, essentially lumps contaminants, including bleed air contaminants, together with a plethora of other factors that cause symptoms such as sickness, dizziness, nausea, headaches, eye and nose irritation and respiratory problems, with the result that "air quality is usually blamed even though there is no visible mechanical failure present or any medical substantiation". The factors that are suggested to interact are presented as including cabin altitude, flight duration, jet lag, turbulence, noise, work levels, cabin humidity, temperature, contaminants, dehydration and an individual's personal health and stress level. On "contaminants", the article first notes that the aircraft ventilation system is designed to eliminate contaminants with low particulate levels due to the high efficiency of the filtration system and the quantity of outside air flow being supplied into the cabin which maintains acceptable gaseous levels of VOCs, carbon dioxide (CO2), CO and odours.

[210] As for VOCs, the article notes that only on rare occasions are bleed air contaminants the source of VOCs, since those usually originate in aircraft as a result of off-gassing from food or beverages, cleaning products, perfumes, cabin

environment furnishings and bio-effluents from people. The article also states that "on rare occasions, sources of contaminants can potentially be introduced in the cabin and cockpit by the Environmental Control System (ECS) or by other routes" with a sign of potential contamination usually being smoke or vapour. As regards CO, the article notes that since cigarette is no longer the typical source of CO on aircrafts, emissions from internal combustion engines have become the typical source, and are often encountered on the ground and contribute to contaminants in the local air, which is then distributed throughout the cabin by the ventilation system.

[211] It is clear that the article makes no reference to the possibility of cabin air contamination being caused by oil leaking into the bleed air system, nor does it make any reference to contamination that would be associated to a particular smell or specifically to a "smelly socks" odour. Furthermore, while there is general mention of contaminants and that those would rarely be of bleed air origin, none are actually described in any fashion nor is there any mention of oil, hydraulic fluid or pyrolyzation. There is no evidence that the bulletin to maintenance had been sent to flight attendants nor did that document ensure that maintenance personnel who told Ms. Martinez that she smelled "exhaust" would also inform her that the suspected problem was leaking jet oil. Having regard to what precedes, it is my opinion that while there may have been some information dealing generally with cabin air quality passed on to flight attendants, this falls far short of the required specific information required to satisfy the obligation at paragraph 125(1)(*s*). As a whole therefore, I am of the opinion that Ms. Martinez was not made aware, particularly at the time of her refusal, as to a foreseeable health hazard as a result of the odour she encountered on flight 460, and consequently the direction issued by HSO Pollock in this regard should stand.

LaPorte Direction

[212] In the case of Mr. LaPorte, HSO Pollock's direction concerns a contravention to paragraph 125.1(*f*) of the Code combined with section 5.4 of the AOHSR made pursuant to the Code. The full meaning of the obligation requires that both provisions that make up the obligation be read together. Paragraph 125.1(*f*) of the Code makes it mandatory for an employer: "where employees may be exposed to hazardous substances, to investigate and assess such exposure in the manner prescribed". Section 5.4 of the AOHSR sets out the prescribed manner, which states that such an investigation is to be conducted "if there is a likelihood that the health or safety of an employee is or may be endangered by such exposure to a hazardous substance".

[213] The specific terminology used in the legislation is important and thus must be given its full meaning. In considering both the Code and the AOHSR provision that make up the obligation, the fact that the Code uses the words "may be exposed to hazardous substances" whereas the AOHSR speak in terms of "likelihood" makes it clear that there are dual triggering points to the obligation. In short, elements that may serve to trigger the application of paragraph 125.1(*f*) will not necessarily trigger the application of section 5.4 of the AOHSR. However, both triggering points must be satisfied for the obligation to apply.

[214] At this juncture, it is important to note that the application of this obligation, as any other obligation under the Code, is independent from an employee's work refusal right, although such action may serve to bring a potential violation of the Code to the attention of a health and safety officer. In this regard, while Mr. LaPorte elected to notify the appellant of his claim of potential endangerment due to exposure to dirty sock odours by refusing to work on flight AC597 on October 17th, 2011, the statement of agreed facts filed in evidence by the parties demonstrates that a similar situation had been reported to the employer, by flight attendants working the day before (October 16, 2011), as per the Fin 283 log book. On that day maintenance followed Airbus standard operating procedures for troubleshooting, and unsuccessfully conducted a number of operations to identify and isolate the source of said smell or replicate the actual odour and clearly suspected, that said smell was related to oil contamination. Also noted in the statement of agreed facts in evidence, albeit after Mr. LaPorte's refusal, but relative to a flight he would have worked on, was the fact that a similar fume event was reported by the flight crew on AC597 where, on the takeoff roll and in climb, (i.e. maximum engine use) passengers and cabin crew had experienced a strong odour in the cabin with the flight attendants reporting that the odour had burned their eyes and caused coughing.

[215] The appellant submits that "where employees may be exposed", requires more than mere speculation and must be interpreted as needing a reasonable expectation that an exposure to a hazardous substance may occur at some point in the future, thus not requiring a precise point in time at which such exposure may occur but excluding hypothetical and speculative exposures. According to the appellant, any other interpretation of the word "may", defined in dictionaries as meaning or entailing "possibility", would mean that the obligation would be triggered in nearly every employment situation where possible exposures could be imagined.

[216] While, in principle, there may be some merit to this interpretation by the appellant, I must still determine this matter as per the evidence that has been adduced. In this regard, regardless of the meaning one considers to be put on the words "may" or "likelihood", the inescapable conclusion to be reached is that one is not looking for a "certainty", but rather a "possibility", however strong it would need to be to satisfy the level of "likelihood". This being said, there is also an inescapable element which I retain from all of the evidence, namely that the odours or smells reported by Mr. LaPorte are associated with oil and oil contamination, regardless of whether they were actually confirmed by maintenance.

[217] The appellant's position on this particular contravention appears to turn on a claim that there was no exposure to a hazardous substance because Mobil Jet Oil is not a controlled product. In my opinion, this would not avoid application of the obligation to investigate since it is the exposure to a hazardous substance that triggers its application. In this respect, the MSDS for Mobil Oil, states that it is not a hazardous substance or dangerous good, but does indicate that it is susceptible to cause adverse health effects where its conditions of use are not normal, and that it can decompose at elevated temperatures and give off irritating and/or harmful

(carbon monoxide) gases/vapours/fumes, with symptoms resulting from acute exposure in confined spaces ranging from headache to nausea, eye irritation, nose and throat irritation. I have already stated the opinion that normal conditions of use do not include oil leakage, contamination and pyrolyzation.

[218] The appellant has further argued that even if there was exposure to a hazardous substance, its obligation to investigate would have been triggered solely in the case of likelihood of endangerment to the health of the employee concerned, something it claims was not present. In support, the appellant refers to the evidence from its expert to the effect that odours may be detected at non-toxic levels and that the dose that could possibly have been present in these cases was insufficient to endanger employee health and safety. The fact that Mr. LaPorte developed none of the health symptoms associated with these brief exposures in which he was involved, lends some credence to that conclusion. However, I point out that the obligation does not require that health effects be effectively suffered.

[219] Furthermore, while it is true that the evidence shows that at the time of the LaPorte refusal, no substance that could explain the odour was definitively identified, such a definitive identification is not required given the "may" criteria established by paragraph 125.1(*f*) of the Code. In this case, the evidence does show that the odours that brought about the refusals are commonly associated with oil contamination of the ECS. In this regard, I share the view expressed by the respondent to the effect that by relying on the incomplete knowledge of the contaminants and health effects in fume events to argue that the hazard is speculative and therefore does not need to be investigated, the appellant is making a circular argument and that should such a reasoning be accepted, there would never be investigations under the Code as, by their very nature, investigations are inquiries into matters which are to some extent unknown.

[220] The appellant has also claimed that in issuing the said direction, the HSO ignored practical issues related to the investigation of cabin quality air complaints, arguing that the evidence indicates that it is not reasonably possible, after a cabin air quality event has occurred, to determine potential exposure because at the time the investigation can proceed, the air has been dissipated through the normal operation of the aircraft ECS. The appellant further contends that there are currently no known detection devices that can be effectively used in the aftermath of a cabin air quality event to determine potential exposure. Apart from the fact that this is vigorously contested by the respondent, my opinion is that the matter of how an investigation should be conducted and what means or techniques may or may not be available or accessible to conduct such investigation required by paragraph 125.1(*f*) and/or even section 5.4 of the AOHSR is not a matter that needs to be addressed nor is it relevant in considering whether the appellant has contravened the obligation to conduct the investigation.

[221] Having regard to all of the above, I find that the obligation that is the object of the contravention is one of investigation, not necessarily of specific identification. The conduct of the investigation under section 5.4 of the AOHSR is dependent on the

likelihood of health endangerment, which, in the circumstances of a work refusal, applies to the health of the refusing employee or employees. In light of all of the evidence, my conclusion in the case of Mr. LaPorte is to the effect that the elements were sufficient to trigger the application of the obligation to investigate pursuant to paragraph 125.1(*f*) of the Code. Consequently, the direction is confirmed.

Decision

[222] Having regard to all that precedes,

- the direction issued on December 23rd, 2011, by HSO Pollock pursuant to subsection 125.2(1) of the Code (Martinez) is rescinded;
- the direction issued on December 23rd, 2011, by HSO Pollock pursuant to paragraph 125(1)(*s*) of the Code (Martinez) is confirmed; and
- the direction issued on November 4th, 2011, by HSO Pollock pursuant to paragraph 125.1(*f*) of the Code and section 5.4 of the AOHSR (LaPorte) is confirmed.

Jean-Pierre Aubre
Appeals Officer