IN THE MATTER OF the Commission of Inquiry into matters respecting Helicopter Passenger Safety for Workers in the Newfoundland and Labrador Offshore Area established pursuant to s. 165 of the Federal Accord Act (s. 161 of the Provincial Act) by order dated May 25, 2009

WRITTEN SUBMISSION
ON BEHALF OF THE ESTATES AND FAMILIES OF THE FLIGHT CREW OF COUGAR HELICOPTER SIKORSKY S92-A FLIGHT 491

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1.0 Introduction

The Commissioner's general mandate for this Inquiry is as follows:

> *[T]o inquire into, report on and make recommendations in respect of matters relating to the safety of offshore workers in the context of Operators' accountability for escape, evacuation and rescue procedures while traveling by helicopter over water to installations in the Newfoundland and Labrador Offshore Area, in compliance with occupational health and safety principles and best industry practices.*

It is important that "offshore worker" be defined to include the flight crews who fly the helicopters to and from the installations. Although these captains and first officers are a small group compared to the approximately 1600 men and women who work on the installations, two seats on every helicopter flight are occupied by flight crew and so they represent, at the very least, over 10% of each flight. No consideration of helicopter safety could be complete without giving their interests due attention. Moreover, the safety of flight crew and the safety of passengers are connected. In an emergency, pilots are trained to assist and lead their passengers and obviously injury or loss of motor control due to cold exposure will compromise a pilot's ability to do this.

Newfoundland and Labrador offshore workers fly in one of the harshest environments in the world. Industry practices, rules and, even, regulations that adequately protect workers in other geographic locations may not be enough in the cold waters, gale-force winds and low visibility conditions that are regularly found off this coast. The C-NLOPB, as regulator of the Newfoundland and Labrador offshore, has the ability to set the standard that oil operators, and by extension helicopter operators, must meet to best ensure the safety of their workers. The standards they set for issuing authorizations can be higher than regulatory standards. In an environment such as this, to ensure that risks are as low as reasonably practicable more than the legislated minimums must be required.

Guided by these principles, what follows are our submissions with respect to the follow two specific issues defined by the Commissioner for consideration:

Issue 13. What personal protective equipment and clothing is necessary for helicopter passengers and pilots; what are the standards, and should the C-NLOPB require guidelines to ensure such equipment and clothing is properly fitted?

Issue 14. Are changes needed to maximize worker and pilot participation in the development, implementation and monitoring of helicopter safety initiatives and activities?

2.0 Issue 13: Protective equipment and clothing for pilots

2.1 General

During the course of hearings, representatives of all of the companies who testified spoke of their strong commitment to safety, their safety management systems, and their commitment to risk assessment processes. Yet in the area of protective equipment and clothing for pilots, closer examination reveals that very little has been done to ensure that in the case of a crash or a ditching into the North Atlantic that the pilots will be adequately protected.

There is no doubt that the outfitting of flight crew must be considered distinctly from that of helicopter passengers. As we have heard, the cockpit environment and the tasks that flight crew must perform there make considerations such as heat stress, the "Christmas tree effect", and reflection in the cockpit, paramount. But these unique considerations should not relieve the oil and air operators from undertaking full and proper risk evaluations. In response to questioning on why current equipment and clothing was chosen, responses from the witnesses were heavily weighted with opinion and testaments of personal feeling and experience. No empirical evidence was presented to support the status quo. In some instances, it was admitted that formal risk assessments or testing on equipment was not done. Surely, in an industry as well established as this one, important decisions about safety should not be undertaken based on "gut feelings" or personal opinion. From our understanding of Ms. Kimberly Turner's testimony, one of the essential features of good risk management is systemizing and objectivising assessment.

We should be very cautious of accepting the word of pilots and their managers that the current protection is adequate. Reluctance of end users to accept changes to mandatory protective wear or voluntarily adopt new equipment is well known. A recent example from this province is the mandatory booster seat legislation for children between the ages of four and eight. Many parents and children accustomed to the freedom and ease of strapping these kids into regular seatbelts find the new law inconvenient and question its necessity. Yet studies show a properly installed and appropriately used booster seat can reduce the risk of injury to a child by 70 per cent and reduce the risk of death by 90 per cent. If the risk had never been studied, if there was no empirical data to support the law, it is unlikely the law would have been passed.

2.2 Helmets

According to Colonel Drover, Director of Air Force Readiness, Chief of Air Staff, pilots with the Department of National Defence wear helmets. According to Rick Burt, General Manager of Cougar Helicopters Inc., helmet use is currently left to the individual discretion of Cougar's pilots. When asked if it is safer to wear a helmet than not to wear a helmet, Mr. Burt responded as follows:

MS. O'BRIEN:
Q. From a safety point of view, is it safer to wear a helmet than to not wear a helmet?
MR. BURT:
A. I think a helmet would protect, you know, your head and your face more than a headset would, yes.
MS. O'BRIEN:
Q. Okay. So you know, if it's safer to wear a helmet than to not wear a helmet, if the issue is comfort, isn't safety more important?
MR. BURT:
A. Well, again, it has to do with levels of risk. What is an acceptable level of risk? **I would not necessarily say that the other crew members had to wear a helmet, because I believe that that is an acceptable level of risk** and I say that for myself. But again, ask -- we have to ask the question about the entire aircraft. I'm not fighting against helmets because I'm the one who made the decision to bring them in. So I don't know if I really adequately answered your question. It was a tough one for me. [emphasis added]

Despite the fact that Mr. Burt was aware that helmets are safer, and understood that an assessment of risk is key to making such a safety decision, he conceded that Cougar had never undertaken a full risk assessment of helmet use. Cougar's decision to make helmets optional safety equipment seems to have been based on the personal opinions or feelings of its employees. We were surprised by this. So, too, was Howard Pike, Chief Safety Officer for the C-NLOPB:

MS. O'BRIEN
[...] [W]ere you surprised that Cougar had, to this date, not done a risk assessment on sort of a fundamental piece of safety equipment?
MR. PIKE:
A. That's, again, I think if you go back through some of these audits, you'll notice that that safety management and culture has been evolving at Cougar. In one of the audits, we actually identify that they didn't have a fully developed safety management system. They were essentially relying on the regulatory structure within which they were. So it is in some regards somewhat surprising, yes, because they seem to be an innovative company. When people were raising some of these things that would increase the safety of how they operated, they seemed to be embracing

them. So it was somewhat surprising that they
hadn't taken the initiative to take a look at
helmets. So in some respects, it seemed a
little bit out of the character that I
understood Cougar to be operating under. They
seem to be a very innovative company,
embracing some of the initiatives to improve
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safety. So the fact that they hadn't done
that, yeah, that was somewhat surprising..

Encouragingly, once the issue of a risk assessment on helmets was raised at the Inquiry, Mr. Burt was quick to embrace it as a very good idea. He went further and committed on the Inquiry record that Cougar would do such an assessment, because "it's just pure goodness to do so". We do not know if Cougar has undertaken this assessment to date.

On March 12, 2009, when flight 491 crashed neither of the flight crew were wearing a helmet. Although their investigation of the crash is not yet complete, the Transportation Safety Board was concerned enough by the lack of helmet use to issue an Aviation Safety Advisory. The complete text of the Aviation Safety Advisory is attached as a schedule to this report. In part, it reads:

> On March 12, 2009, a Sikorsky S-92A helicopter with 16 passengers and 2 flight crew on board was en route from St. John's, N.L., to the Hibernia oil production platform when, 20 min after departure from St. John's, the flight crew noticed an indication of low oil pressure to the main gearbox. The crew declared an emergency and diverted the flight back to St. John's. Approximately 30 NM from St. John's, the helicopter impacted the water and sank in 178 m of water. There was one survivor and 17 fatalities. **Although not fatally injured during the impact sequence, both pilots received severe injuries due in part to striking their heads/faces against the instrument panel.** Neither pilot on the occurrence flight was wearing head protection.[1] The TSB investigation into this occurrence (A09A0016) is ongoing.
>
> While the *Canadian Aviation Regulations* (CARs) do not require that helicopter pilots wear head protection, **approximately 10 percent of the operator's pilots were routinely wearing head protection at the time of the occurrence.** Whether or not this percentage represents an industry-wide norm for head protection usage is unknown. **However, the majority of pilots surveyed during the A09A0016 investigation cited discomfort as the reason they did not wear head protection. In addition, very few pilots had fully considered that partial incapacitation due to a head or face injury could compromise their ability to help their passengers after an accident. On May 8, 2009, the operator implemented a cost-sharing program aimed at increasing the use of head protection. Management agreed to cover a portion of the cost for any pilot wishing to purchase a prescribed make and model of head protection.** The operator stated that approximately 50 percent of its pilots have participated thus far, and it anticipates 75 percent participation. [Emphasis added]

We are pleased that Cougar has committed to doing more on the issue of helmets. But why are they only covering a portion of the cost? Even if they do not become mandatory equipment, we submit that Cougar should be required to cover the full costs of helmets for pilots who want them. In his extremely informative article entitled "*Helicopter Safety Helmets – a Hard S(h)ell*"[1], Rob Freeman, Program Manger, Rotorcraft Standards, Operational Standards, Standards, Civilian Aviation, Transport Canada, cites cost as one of the reasons pilots do not wear helmets. A well-equipped helmet can cost more than $3000. Other reasons cited by Mr. Freemen include: peer pressure, company pressure, and comfort.

We do not know what the Cougar helmet assessment will conclude, but Mr. Freemen's conclusion is this:

> The fact is, all helicopter pilots should be wearing helmets—with visors installed and selected down, whenever possible. The numbers speak for themselves.

2.2 Flight Suits

Despite the fact that the Canadian General Standards Board (CGSB) has published detailed and comprehensive standards for Immersion Suits (CAN/CGSB 65.16- 2005) and Helicopter Passenger Transportation Suits (CAN/CGSB 65.17-99), there is no standard in Canada for suits worn by flight crew. This is surprising. According to Rick Burt of Cougar, the only mandate for flight suits is Transport Canada's requirement that the suits provide "suitable protection against hypothermia".

Passenger suits seem to get all the attention. The Helicopter Passenger Transportation Suit standard is currently under review by an industry-funded, CGSB-lead initiative. From comments made by Mr. Mark Collins, Operations Manager with Helly Hansen Canada, who is involved in the process, the review will likely result in changes to the standard, particularly to the testing requirements so that they will better mimic the real world environment.

In addition to the CGSB standards testing that has been done on the suits currently worn by helicopter passengers in the Newfoundland Labrador Offshore, the Canadian Association of Petroleum Producers (CAPP) recently funded the CORD Group to do further, more stringent testing on the suits. The CORD Group test conditions were for longer periods of time than the CGSB testing and in more realistic, wave water conditions. The results of the passenger suit tests were very positive and no doubt have brought a large measure of comfort to those wearing them.

Compare this to the current situation for the flight crew suits. The Inquiry has not been presented with any evidence of testing done on these suits. Do they protect against hypothermia in the North Atlantic? We don't know. We have no data before us to help predict how these suits will work once immersed in frigid, rough water conditions.

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[1] http://www.tc.gc.ca/eng/civilaviation/publications/tp185-2-10-flightops-3719.htm#helmets

During questioning at the Inquiry, Cougar undertook to provide to the Commissioner the specifications for the flight suits worn by its pilots. They ultimately did provide information but it was largely a qualitative description of the suits without any quantification of thermal rating (measured in Clo), water ingress rate, or buoyancy specifications. This data is critical for any risk assessment of the flight suits.

In his report for the Inquiry, Micheal Taber cited research by Brooks (Transport Canada, 2003), that air crew should be thermally protected by a suit ranging from 0.25 to 0.75 Clo. One would reasonably infer that in the frigid waters off our coast, a Clo rating to the high end of this range would be best. We know from the information provided by DND that their SAR helicopter pilots working in the Newfoundland Offshore area wear a dry suit with an immersed Clo of 0.847 *plus* a liner made of Nomex *and* closed cell PVC foam. It would be interesting to know how this suit rates in comparison to the suit used by Cougar. Unfortunately, we don't know because no testing has been done and no specs have been provided.

This information is critical for pilots to make informed decisions:

24 MS. O'BRIEN:
25 Q. So wouldn't you think that when you have a
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1 range when a standard, you know, albeit a
2 European standard because we don't have a
3 Canadian one -
4 MR. GERBER:
5 A. No, we don't.
6 MS. O'BRIEN:
7 Q. - is giving an appropriate range, wouldn't
8 you, as a pilot, take some comfort in knowing
9 that you're wearing a suit within the
10 recommended range?
11 MR. GERBER:
12 A. Yes, I would.
13 MS. O'BRIEN:
14 Q. Wouldn't you want to know what that range was?
15 MR. GERBER:
16 A. Yeah, I would, yeah.
17 MS. O'BRIEN:
18 Q. To make that decision. And to make that
19 decision wouldn't you have to know what the
20 Clo rating of the equipment that you've been
21 provided is?
22 MR. GERBER:
23 A. And to make the comparison, yes, but we don't
24 have that information now.

From the research that was presented to the Commissioner by Michael Taber, we know that water ingress to a suit has a drastic effect on a body's ability to stave off hypothermia in cold water conditions. Again, no water ingress testing has been done on the flight crew suits so we do not know how the will perform when exposed to rough water.

There may also be an issue with the colour of the flight suits, which for Cougar is navy blue. At page 42 of his expert report to the Commissioner, Michael Taber wrote:

> For example, in a safety recommendation from the Australian Aviation Investigation Bureau (AAIB) (2008), **it is recommended "that the European Aviation Safety Agency (EASA) investigate methods to increase the conspicuity of immersion suits worn by the flight crew, in order to improve the location of incapacitated survivors of a helicopter ditching.** The yellow immersion suits worn by the passengers were noticeably more conspicuous in the dark than the blue immersion suits worn by the pilots when illuminated by a helicopter's searchlight" (Safety Recommendation 2008-036 AAIB). And the CAA suggests, "the choice of suit colour may vary to minimise the risk of the suit reflecting on surfaces within the flight deck" (p. 4). [emphasis added]

In her testimony, Dr. Coleshaw commented on a recent report from the Accident Investigation Branch in the United Kingdom on a crash in the Irish Sea where it was noted that it was much easier to spot the passengers in the yellow suits than the pilots in their dark suits. She considered suit visibility to be a "major issue".

Captain Jakobus Johannes Gerber, Director of Flight Operations with Cougar, gave us more information. He confirmed that the navy suits were used to reduce reflection in the cockpit. He felt that the loss of visibility from the suits was adequately compensated for by other measures: safety systems to prevent ditching and crashing into water, reflector tape on the life vests, reflector tape on the suits and personal locator beacons.

Are the mitigating measures described by Captain Gerber enough to make the risk of not being seen in the water as low as practicably possible? Could more measures be taken? A personal locator will help if the searcher has the necessary receiver equipment on board, but what if the first responders are fishing boats or fellow passengers in a life raft? Clearly, some experts in the area feel that conspicuousness of flight suits is an issue. Has Cougar adequately addressed the problem? We do not know but we submit that this issue should be considered in a full risk assessment of the suit.

There is a European Standard for flight crew suits: EASA (2006) European Technical Standard Order, ETSO-2C503, for helicopter crew and passenger immersion suits for operations to or from helidecks located in an hostile sea area. An assessment of the Cougar flight suit against this standard would be informative. In any event, a lack of a Canadian flight crew suit standard is not justification for no assessment of the suits at all.

2.3 Spray Hoods

In her testimony, Dr. Susan Coleshaw, identified spray hoods as an important peice of safety equipment to prevent drowning in rough water:

> DR. COLESHAW:
> A. All right. Well, in terms of protection from
> drowning, there are two sort of issues. Yeah,
> one is obviously if the head is underwater,
> you're highly -- at high risk from drowning.

16 So that's where you're looking for buoyancy to
17 support the head, but once you're floating on
18 your back with the head well supported, then
19 you're still at high risk, particularly from
20 breaking waves. So any water splashing over
21 the face puts your airways at risk of
22 ingesting water. Now if you're conscious, you
23 can look for wave, particularly if you're
24 facing the waves, you can see a wave coming
25 towards you and in that case, you'd make sure
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1 your mouth was closed and take a breath as
2 that's washed over. Of course, that becomes a
3 problem if you're losing consciousness and
4 you're no longer able to protect yourself in
5 that way. So spray hoods then become a very
6 important part of protecting yourself from
7 this water splash over the face.
8 MS. O'BRIEN:
9 Q. Would spray hoods be more important in higher
10 sea states?
11 DR. COLESHAW:
12 A. Yes.

Dr. Coleshaw testified that's she was 99% sure that flight crew in the United Kingdom have spray hoods as part of their kit. She later confirmed to the writer that spray hoods were required by the EASA standard. When advised that the pilots in this area do not have spray hoods, she responded:

4 DR. COLESHAW:
5 A. I wasn't aware of that.
6 MS. O'BRIEN:
7 Q. Does that surprise you?
8 DR. COLESHAW:
9 A. Yes.

The conclusion of Dr. Coleshaw's testimony on this topic was as follows:

MS. O'BRIEN:
6 Q. Okay, it's of interest to me because knowing
7 that you're either [sic] telling us that the pilots
8 on the other side have spray hoods as part of
9 their equipment, but hearing that it's an
10 important piece of safety equipment or hearing
11 it's particularly important in higher sea
12 states which we know in this jurisdiction we
13 get high sea states and we also know that our
14 pilots don't have those spray hoods, so it
15 seems to me an issue that might be begging for
16 a little further research.

17 DR. COLESHAW:
18 A. Uh-hm.
19 MS. O'BRIEN:
20 Q. To find out if we do have the best practice
21 here.
22 DR. COLESHAW:
23 A. Yes, I mean, I'll certainly recommend that
24 spray hoods would be of great benefit.

We agree with this recommendation.

2.4 Emergency Breathing Systems

At the time Cougar employees gave testimony at the inquiry, Cougar pilots were scheduled to begin using an Emergency Breathing System, similar to the helicopter underwater escape breathing apparatus (HUEBA) devices used by passengers but referred to as Helicopter Emergency Egress Devices (HEEDs), within a few days.

Notwithstanding that these devices are presumably now in use and there to assist pilots when needed, we believe it is worth mentioning the time that was taken to implement the devise by Cougar as we believe it was too long. We do not intend to belabour the point but we hope that it will be recognized by Cougar and others that the company's implementation of this equipment was not "proactive".

Similar devises have been used by military pilots for some 15 years. The C-NLOPB requested that the devices be investigated for passengers in 2000. We already know that the nine year delay in implementing the system for passengers was unacceptable. We have also been advised that it was largely caused by concern over the risk associated with training personnel of various ages and fitness levels. Certainly, the health profile of pilots is not the same as that for passengers. Pilots are, almost by definition, healthy and fit. The training concern simply could not be anywhere near as problematic for this group. Yet Cougar, it seems, did not start looking at Emergency Breathing Systems for its pilots until after the passengers' systems were introduced, according to Richard Banks, the Director of Safety Management for Cougar:

MR. BANKS:
3 A. Okay, yes, originally I was on the HUEBA Task
4 Force, myself from Cougar, and another member
5 from CHC in Halifax, their safety officer, and
6 as we progressed and assisted in that program,
7 we fundamentally agreed that our air crew
8 needed such a bottle, such air supply, and
9 from past history of our company with our
10 rescue specialists wearing the same type of
11 HEEDS in the back for a number of years, it
12 was decided in our eyes that that could be an
13 opportunity for us. After exploring and doing
14 risk assessments, after the introduction to
15 passengers, we started looking into the HEEDS

16 versus HUEBA, that when that came to light
17 that it was more desirable for us for the
18 HEEDS bottle, ... [emphasis added]

If military pilots had been using these systems for 15 years, if Cougar's own rescue specialists had been using the systems for a "number of years", if the C-NLOPB had identified these systems worthy of investigating for passengers 10 years before, we believe a 2010 introduction of emergency breathing systems for the pilots is best described, at best, as reactive, not proactive.

3.0 Maximizing pilot participation in safety initiatives

As stated above, we believe that pilots are, and must be considered as, "offshore workers" in the context of helicopter transportation. Helicopter safety can only be maximized if pilots have full ability to participate in safety initiatives and activities. A good example is the safety survey by Aerosafe Risk Management. The original survey was only distributed to helicopter passengers. When questioned about this decision Kimberly Turner readily conceded that there would be great value in surveying the pilots and staff at Cougar. We understand that the work is currently underway to provide the survey to this group. We are pleased with this development. If flight crew and passengers, or air operators and oil operators, are always placed in separate boxes and treated as completely distinct groups, we will never bring the risk of helicopter transportation as low as reasonably practicable.

During the course of hearings, we have seen a few ideas surface that may improve pilot participation and communication. One would be communication between the occupational health and safety committees of the oil operators and air operators. Currently there is none. While many of the issues facing these different committees would be unrelated, there would be overlap on helicopter transportation issues. A regular joint meeting may help both groups deal with common issues more effectively.

Another idea raised by Kimberley Turner is Crew Resource Management or Team Resource Management training. From what we understood from Ms. Turner's testimony, this type of training focuses on training passengers around the risks and hazards of helicopter travel. Presumably, flight crew and other air operator employees would be heavily involved in this training. The goal, as we understood it, was to give passengers more information and confidence so that they can be effectively involved in early reporting of possible hazards or risks. Increased communication between flight crew and passengers of this kind can both mitigate risk and add to the passengers' sense of security.

There will be lots of opportunity for participation and communication, if the parties involved keep their eyes open for it. The greatest challenge will be to shift mindsets away from the "separate box" type of thinking that we submit currently exists, to some extent, between: air and oil regulators, air and oil operators, and flight crew and passengers.

4.0 Conclusion

No doubt the first objection to many of the suggestions made in this brief will be that the C-NLOPB does not regulate air operators and has no jurisdiction over the regulation of that industry. This is true, but does it make this road a dead end? We believe not.

Rob Freeman[2] addresses this problem in the context of pilot helmets:

> Should TC introduce regulations for mandatory helmet usage? Under the current government's Cabinet Directive on Streamlining Regulations, TC may consider regulatory action only when absolutely necessary. **Other alternatives must be considered first.**

In our case, there are other alternatives. Through their contract with the air operator, the oil operators have a great deal of control over that company. In turn, the C-NLOPB has a great deal of control over the operators. These bodies could, and should, require assurance from Cougar, or whatever air operators they use in the future, that:

(a) All safety equipment and clothing, including helmets, suits, and spray hoods, undergo a full risk assessment. This should require that the air operator be able to demonstrate the ability of the clothing and equipment chosen to adequately protect flight crew in the conditions of the Newfoundland and Labrador Offshore. It should also include a comparison with equipment and clothing used by DND pilots operating in the North Atlantic.
(b) These risk assessments or evaluations are updated or repeated regularly as new technologies and safety equipment emerge.
(c) All approved safety equipment for flight crew, whether mandatory or not, is fully funded by the air operator.
(d) The air operator has a continuing education program in place for flight crew that includes information on safety equipment and clothing and the risks associated with not using it.

Regulatory requirements must be viewed as minimums. In the weather and water conditions faced by the men and women flying to the offshore installations of Newfoundland and Labrador, it is just common sense that more will frequently be required to keep our workers safe. Moreover, a "that's not my responsibility" approach can only serve to hurt the interests of all involved. Communication, collaboration and secondary controls are the best ways to ensure that this industry is as safe as it can be.

All of which is respectfully submitted this 31st day of July, 2010.

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[2] Ibid.

APPENDIX A

Low Usage of Head Protection by Helicopter Pilots

The following is an Aviation Safety Advisory from the Transportation Safety Board of Canada (TSB).

On March 12, 2009, a Sikorsky S-92A helicopter with 16 passengers and 2 flight crew on board was en route from St. John's, N.L., to the Hibernia oil production platform when, 20 min after departure from St. John's, the flight crew noticed an indication of low oil pressure to the main gearbox. The crew declared an emergency and diverted the flight back to St. John's. Approximately 30 NM from St. John's, the helicopter impacted the water and sank in 178 m of water. There was one survivor and 17 fatalities. Although not fatally injured during the impact sequence, both pilots received severe injuries due in part to striking their heads/faces against the instrument panel. Neither pilot on the occurrence flight was wearing head protection.[1] The TSB investigation into this occurrence (A09A0016) is ongoing.

While the *Canadian Aviation Regulations* (CARs) do not require that helicopter pilots wear head protection, approximately 10 percent of the operator's pilots were routinely wearing head protection at the time of the occurrence. Whether or not this percentage represents an industry-wide norm for head protection usage is unknown. However, the majority of pilots surveyed during the A09A0016 investigation cited discomfort as the reason they did not wear head protection. In addition, very few pilots had fully considered that partial incapacitation due to a head or face injury could compromise their ability to help their passengers after an accident. On May 8, 2009, the operator implemented a cost-sharing program aimed at increasing the use of head protection. Management agreed to cover a portion of the cost for any pilot wishing to purchase a prescribed make and model of head protection. The operator stated that approximately 50 percent of its pilots have participated thus far, and it anticipates 75 percent participation.

According to U.S. military research[2], the risk of fatal head injuries can be as high as six times greater for helicopter occupants not wearing head protection. In addition, the second most frequently injured body region in survivable crashes is the head.[3] The effects of non-fatal head injuries range from momentary confusion and inability to concentrate, to a full loss of consciousness[4]; these outcomes can effectively incapacitate pilots. Incapacitation can compromise a pilot's ability to quickly escape from a helicopter and assist passengers in an emergency evacuation.

The U.S. National Transportation Safety Board (NTSB) has acknowledged that the use of head protection can reduce the risk of injury and death. A review of 59 emergency medical services accidents that occurred between May 11, 1978, and December 3, 1986, was completed in 1988. This review resulted in recommendations to the Federal Aviation Administration (FAA) (# A-88-009) and to the American Society of Hospital-Based Emergency Aeromedical Services (# A-88-014) to require and encourage, respectively, that crew members and medical personnel wear protective helmets to reduce the risk of injury and death.

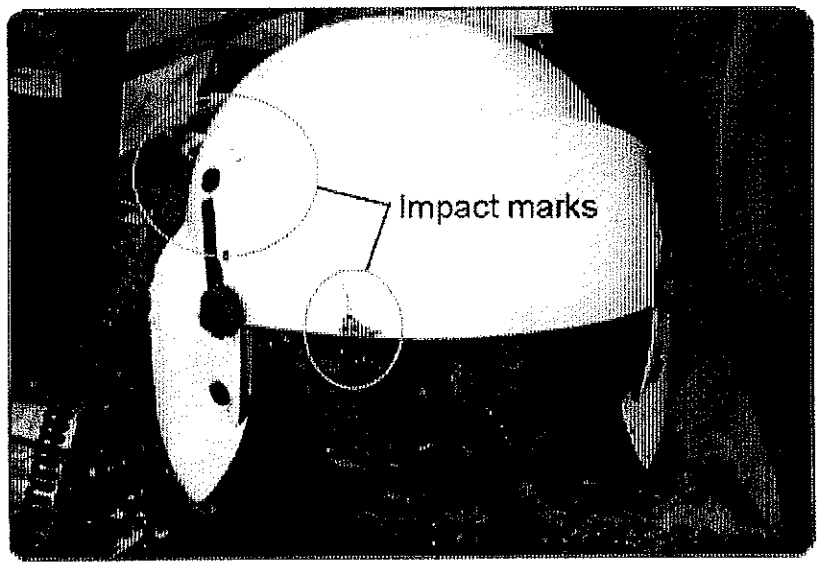
Transport Canada (TC) also acknowledged the safety benefits of head protection use in its 1998 Safety of Air Taxi Operations Task Force (SATOPS) report[5], in which it committed to implementing the following recommendation:

- That TC continue to promote in the *Aviation Safety Vortex* newsletter the safety benefits of helicopter pilots wearing helmets, especially in aerial work operations,

and promote flight training units (FTU) to encourage student pilots to wear helmets.

In addition, SATOPS directed the following recommendation to air operators:

- That helicopter air operators, especially aerial work operators, encourage their pilots to wear helmets, that commercial helicopter pilots wear helmets, and that FTU encourage student helicopter pilots to wear helmets.



This helmet was retrieved from an AS350 accident in Atlantic Region (TSB File A07A0007). The other pilot was not wearing his helmet and suffered serious head injuries.

The TSB has documented a number of occurrences where the use of head protection likely would have reduced or prevented the injuries sustained by the pilot. Similarly, the TSB has documented occurrences in which the use of head protection reduced or prevented injuries sustained by the pilot. Despite the well-documented safety benefits of head protection, the majority of helicopter pilots continue to fly without it. Likewise, most Canadian helicopter operators do not actively promote head protection use amongst their pilots. The low frequency of head protection use within the helicopter industry is perplexing, given the nature of helicopter flying and the known benefits of head protection.

As shown in this occurrence, without ongoing and accurate communication of the benefits of head protection usage, helicopter pilots will continue to operate without head protection, thereby increasing the risk of head injury to the pilot and consequent inability to provide necessary assistance to crew or passengers. Therefore, TC and the Helicopter Association of Canada (HAC) may wish to consider creating an advocacy program designed to substantially increase head protection use amongst helicopter pilots. Such a program could include, but is not limited to, initiatives that: ensure that helicopterpilot training curricula highlight head protection use, promote the advantages of cost-sharing programs between operators and pilots, and encourage informed debate by publishing articles that promote head protection use in publications such as the TC *Aviation Safety Letter* (ASL) and HAC newsletters.

[1] TSB defines head protection as the use of an approved helmet, complete with visor.

[2] Crowley, J.S. (1991) "Should Helicopter Frequent Flyers Wear Head Protection? A Study

of Helmet Effectiveness." *Journal of Occupational and Environmental Medicine*, 33(7), 766-769.

[3] Shanahan, D., Shanahan, M. (1989) "Injury in U.S. Army Helicopter Crashes October 1979–September 1985." *The Journal of Trauma*, 29(4), 415-423.

[4] Retrieved on 31 August 2009 from www.braininjury.com/injured.html.

[5] Transport Canada publication, TP 13158.