

CANADA-NEWFOUNDLAND AND LABRADOR

OFFSHORE HELICOPTER SAFETY INQUIRY

**Report and Recommendations arising from
the Transportation Safety Board's Report**



**The Honourable Robert Wells
Commissioner**



Newfoundland and Labrador • Canada

Canada-Newfoundland and Labrador
Public Inquiry into Offshore Helicopter Safety

Mr. Max Ruelokke, P. Eng.
Chair and CEO
Canada-Newfoundland and Labrador Offshore Petroleum Board
Fifth Floor, TD Place
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St. John's, NL
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Dear Mr. Ruelokke:

I, the Commissioner appointed on April 16, 2009, to inquire into offshore helicopter safety, under the Terms of Reference dated May 25, 2009, and the Public Inquiries Acts of Canada and Newfoundland and Labrador, submit my Report under the terms and requirements of Phase II of the Inquiry.

The Honourable Robert Wells, QC
St. John's, NL

July 2011

Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

Phase II

Report and Recommendations arising from the Transportation Safety Board's Report

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Phase II
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the Transportation Safety Board’s Report

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Preface and Acknowledgements

The Phase II Report of the Offshore Helicopter Safety Inquiry is the final Report of this Inquiry. The Phase I Report was published in November 2010.

This Report follows from the Report of the Transportation Safety Board of Canada (TSB), which had the task of determining how and why the crash of an S-92A helicopter occurred in the Canada-Newfoundland and Labrador offshore on March 12, 2009. In addition, the TSB made Recommendations and drew conclusions relating to the many circumstances surrounding the crash.

The observations and Recommendations in this Report have their genesis in the TSB Report, which was published on February 9, 2011. My position that there must be a strengthened offshore safety regulator with a new and broader mandate should be considered in conjunction with Chapter Eight of my Phase I Report.

My Terms of Reference required that I should maintain regular and frequent communication with the Transportation Safety Board of Canada. That communication has taken place and our relationship has been cooperative and helpful throughout.

I will simply say in closing that the core group of the Inquiry has again provided me with invaluable assistance. They are Ms. Angela Williams; Ms. Patricia Tinkham; John Roil, QC; Anne Fagan, QC; and, at the end of the process, my editor, Dr. Claire Wilkshire. To them I express my heartfelt thanks.

I again express my thanks to the Canada-Newfoundland and Labrador Offshore Petroleum Board for its support, to the participants with standing, and to members of the public who provided submissions.

All of the work of this Inquiry is dedicated to those who lost their lives on March 12, 2009, and to the sole survivor.

St. John's, NL
Canada
July 2011

The Honourable Robert Wells, QC

Chapter One

Background and Safety Improvements

Background and Safety Improvements

Background and Preliminary Discussion

The Offshore Helicopter Safety Inquiry was set up by the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB). The Atlantic Accord Implementation Acts require a public inquiry to be held should a serious accident or incident occur in the Canada-Newfoundland and Labrador (C-NL) offshore oil-producing area.

On March 12, 2009, a Sikorsky S-92A helicopter carrying two pilots and sixteen passengers crashed on its way from St. John's, Newfoundland and Labrador, to the offshore oilfields. Seventeen persons died and one survived.

As a result of that tragedy, this Inquiry was set up on April 16, 2009. The Inquiry has two Phases. Phase I, which was completed in November 2010, was an examination of offshore helicopter safety and survival issues; it resulted in 29 Recommendations, which were presented in my Report to the C-NLOPB.

The Inquiry has two limitations, which are contained in clause 6 of its mandate:

The Commissioner's mandate does not include an examination of any issues related to the airworthiness of aircraft, training of flight crew, or flight procedures or any other matters which are included in the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92-A Crash except to the extent specifically described in paragraph 5 hereof.

The Commissioner's mandate does not include an examination of the provision by the Government of Canada (Department of National Defence) of Search and Rescue facilities for all marine incidents and the location of such facilities within the Province of Newfoundland and Labrador.

In Canada, all aircraft accidents are required to be investigated by the Transportation Safety Board of Canada (TSB), which has the exclusive

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jurisdiction to do so. The TSB has the resources and expertise to investigate and make findings on the causes of aviation accidents and related matters. In this case it completed its investigation and issued its Report on February 9, 2011. Phase II of the Inquiry began with a study of the TSB Report and a call for submissions from participants in Phase I of the Inquiry and the general public.

The entire thrust of the Inquiry is that it should, where possible, make recommendations to improve safety in helicopter operations in the C-NL offshore. Recommendations must be made directly to the C-NLOPB on matters within its jurisdiction, and recommendations to legislators and other regulatory agencies will be channelled through the C-NLOPB.

A primary safety consideration in the C-NL offshore involves the transportation of workers to and from the operations base in St. John's, Newfoundland and Labrador, and the offshore oil installations. The majority of helicopter offshore passengers are oil workers and other persons who have business on offshore installations. The primary mode of transportation is by helicopter, which in the C-NL offshore is the Sikorsky S-92A, a twin-engine heavy-lift helicopter which requires two pilots and has a capacity of up to 19 passengers, depending on its seating configuration.

The S-92A, when it was introduced in November 2007, was considered to be a state-of-the-art machine. Unfortunately, it had two serious flaws, as found by the TSB investigation:

- (1) A known shortcoming was that it did not have a 30-minute run-dry capability, i.e., the ability of the gearbox to operate without oil for up to 30 minutes. That failure was known by the Federal Aviation Administration (FAA) in the US and Transport Canada in this country, and no doubt by aircraft regulators elsewhere, at the time of its certification. Its run-dry time was 11 minutes.
- (2) A flaw that had not been identified at the time of certification was present in the three titanium studs (relatively small bolts) that secured the filter bowl of the gearbox oil reservoir of the S-92A. It

was discovered in 2008 that these titanium studs could fracture and cause a total loss of main gearbox oil, which they did on July 2, 2008, off the coast of Australia. In that incident, the S-92A was only seven minutes from the coast and so was able to land safely before the gearbox failed. The landing was thus accomplished within the S-92A's run-dry capability of 11 minutes.

As of the autumn of 2008, the S-92A should have been known, by regulators and at least some operators, to pose two potential dangers, both of which affected operational safety: the 11-minute run-dry capability of the main gearbox, instead of the 30 minutes that is more common in the industry; and the propensity for fracture in the three titanium studs securing the oil filter bowl, which meant that the studs could fracture, and they did fracture off Australia with a total loss of main gearbox oil. It should be noted that Sikorsky perceived the stud fracture as a maintenance problem and not a design problem. It seems that the foregoing opinion was accepted by the FAA in the United States and in turn by Transport Canada.

The Federal Aviation Administration certified the S-92A without the usual 30-minute run-dry capability, because it accepted Sikorsky's assertion that a total oil loss was a remote possibility. The S-92A was in turn certified by Transport Canada under a bilateral legislative protocol which allows certifying regulators in participating countries to accept, act upon, and endorse one another's certifications.

As a result of a fracturing of two of the three titanium studs, followed by a total loss of gearbox oil, an S-92A operating in the C-NL offshore fleet as Flight 491 crashed into the ocean about 35 nautical miles east of St. John's, Newfoundland, on March 12, 2009. There were 18 people on board. One passenger survived; the remaining 17 persons suffered varying degrees of injury from the crash, and then died by drowning. If the S-92A had had the usual 30-minute main gearbox run-dry time for helicopters of that type, it might have been able to reach land within 30 minutes. Even if it could not have reached land, the pilots would in all probability have ditched in a controlled manner. The TSB Report describes in detail the confusion which occurred in the cockpit of Flight 491 when the pilots were first uncertain of the run-dry capability

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and were later unsure, because of a lack of noises and vibration, whether the warning light was accurate when it showed a loss of the main gearbox oil.

Phase II of the Offshore Helicopter Safety Inquiry, then, has as its purpose to respond to and make recommendations arising from the Transportation Safety Board's Report.

Terms of Reference

The Terms of Reference of this Inquiry require an examination of the Transportation Safety Board Report and require the Commissioner to make a further report in Phase II of the Inquiry. For the benefit of the reader, I will reproduce the full Terms of Reference, with the requirements of Phase II in bold.

As Amended October 7, 2010

**COMMISSIONER'S TERMS OF REFERENCE
FOR THE INQUIRY INTO MATTERS RESPECTING
HELICOPTER PASSENGER SAFETY FOR WORKERS
IN THE NEWFOUNDLAND AND LABRADOR
OFFSHORE AREA**

WHEREAS the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) was established by the Government of Newfoundland and Labrador and the Government of Canada as a joint, independent, arms-length regulator of exploration, development, and production of oil and gas resources in the Newfoundland and Labrador Offshore Area;

AND WHEREAS the C-NLOPB has a mandate to interpret and apply the provisions of the Atlantic Accord and the Atlantic Accord Implementation Acts to all activities of Operators in the Newfoundland and Labrador Offshore Area and to oversee Operator compliance with those statutory provisions;

AND WHEREAS the C-NLOPB is required by legislation, before issuing an authorization for work or activity, to consider the safety of the work or activity by reviewing the system as a whole and its components, including its structures, facilities, equipment, operating procedures and personnel;

AND WHEREAS the C-NLOPB oversees the safety of Offshore Activities by review and approval of an Operator's plans and implementation to determine that risks have been reduced to a level that is as low as reasonably practicable;

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AND WHEREAS the crash of Cougar Helicopter Sikorsky S92-A flight 491 was a serious accident in the Newfoundland and Labrador Offshore Area;

AND WHEREAS pursuant to the Accord Implementation Acts an inquiry into a serious accident is mandatory, and the C-NLOPB has determined that an inquiry into safety matters respecting transport by helicopter to the Newfoundland and Labrador Offshore Area is essential for the C-NLOPB in carrying out its mandate as it relates to overseeing safety in the Newfoundland and Labrador Offshore Area;

NOW THEREFORE the C-NLOPB, pursuant to s. 165 of the Federal Accord Act (s. 161 of the Provincial Act), directs that an inquiry be made into safety matters respecting transport by helicopter to the Newfoundland and Labrador Offshore Area the terms of reference of which are set out herein;

1. Establishment of the Inquiry

There is established a commission of inquiry on matters respecting worker safety associated with helicopter transportation in the Newfoundland and Labrador Offshore Area that are within the jurisdiction of the C-NLOPB. The Commissioner shall be the Honourable Robert Wells, Q.C.

2. Definitions

In these Terms of Reference,

“*Accord Acts*” means the *Canada-Newfoundland Atlantic Accord Implementation Act* and the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*;

“*Board*” means The Canada-Newfoundland and Labrador Offshore Petroleum Board;

“*Commissioner*” means the individual appointed pursuant to para. 165 of the *Canada-Newfoundland Atlantic Accord Implementation Act* and section 161 of the *Canada-Newfoundland*

and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act;

“Newfoundland and Labrador Offshore Area” means the offshore area as defined in the *Accord Acts*.

“Operator” means a company which has been issued an authorization pursuant to the *Accord Acts* to conduct work or activity within the Newfoundland and Labrador Offshore Area.

“Participant” means a person who makes an oral presentation or files a written submission to the Commissioner pursuant to the Rules of Procedure and Practice;

“Rules of Procedure and Practice” means the procedures as may be implemented by the Commissioner;

“Secretariat” means the Commissioner’s support staff.

3. Purpose

The purpose of this Inquiry is to determine what improvements can be made so that the Board can determine that the risks of helicopter transportation of offshore workers are as low as is reasonably practicable in the Newfoundland and Labrador Offshore Area.

4. General Mandate

The Commissioner’s mandate will be to 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.

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5. Specific Mandate

Specifically the Commissioner shall inquire into, report on, and make recommendations in respect of:

- (a) safety plan requirements for Operators and the role that Operators play in ensuring that their safety plans, as represented to and approved by the Board are maintained by helicopter operators,
- (b) search and rescue obligations of helicopter operators by way of contractual undertakings or legislative or regulatory requirements,
- (c) the role of the C-NLOPB and other regulators in ensuring compliance with legislative requirements in respect of worker safety.

6. Limitation

The Commissioner's mandate does not include an examination of any issues related to the airworthiness of aircraft, training of flight crew, or flight procedures or any other matters which are included in the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92-A Crash except to the extent specifically described in paragraph 5 hereof.

The Commissioner's mandate does not include an examination of the provision by the Government of Canada (Department of National Defence) of Search and Rescue facilities for all marine incidents and the location of such facilities within the Province of Newfoundland and Labrador.

7. Powers of the Commissioner

Consistent with s. 165(2) of the Federal Accord Act and s. 161 (2) of Provincial Accord Act, the Commissioner shall be vested with the powers conferred by the Inquiries Act, R.S., 1985, c. I-11 and the Public Inquiries Act, 2006, SNL2006 c. P-38.1.

8. Inquiry Methodology

The Commissioner shall design, make known and enforce rules, practices and procedures for the proper conduct of the Inquiry and where necessary may amend such rules, practices and procedure from time to time.

Phase I – (Parts A and B to be undertaken concurrently)

A. The Commissioner shall solicit the views of the public in respect of practices which will reduce the risks of helicopter transportation in the offshore area. Mechanisms by which this phase of the inquiry is to be conducted may include:

- (i) interviews and surveys,
- (ii) calling for written submission, and
- (iii) formal or informal hearings

as the Commissioner deems appropriate.

B. The Commissioner shall gather information in respect of the specifically identified mandate issues described in paragraph 5 hereof. Mechanisms by which this phase of the inquiry is to be conducted may include:

- (i) research studies,
- (ii) consultation with other offshore safety regulators in other jurisdictions in respect of best practices,
- (iii) inspections and investigations,
- (iv) calling for written submissions, and
- (v) informal or formal hearings

as the Commissioner deems appropriate.

- Any information gathered by the Commissioner during Phase I of the Inquiry which in his view should be addressed by the C-NLOPB or any other regulatory agency with urgency shall be brought to the attention of the C-NLOPB at a time and in a format the Commissioner deems appropriate.

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- To the extent that it reduces duplication of efforts and facilitates expeditious consideration of issues raised, the Commissioner shall maintain regular and frequent communication with the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92-A Crash.

The Commissioner may retain and as needed request the services of independent specialists whose function would be to provide information on and interpret information and issues relevant to the Inquiry. Independent specialists retained by the Commissioner may be requested by the Commissioner to appear before the Commissioner as experts.

The Commissioner shall provide a Report to the Board on completion of Phase I, which Report shall be provided by September 30, 2010 unless an extension should become necessary.

Phase II

Upon completion of the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92-A Crash, the Commissioner shall undertake a review of the sections of the Report therefrom that deal with matters which are specifically within the mandate of the C-NLOPB and particularly the findings in respect thereof and shall advise the C-NLOPB:

- (a) which findings should result in actions being recommended to be undertaken by C-NLOPB and how they should be implemented,**
- (b) which findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.**

The Commissioner may retain and as needed request the services of independent specialists whose function would be to provide information on and interpret information and issues relevant to the Inquiry. Independent specialists retained by

the Commissioner may be requested by the Commissioner to appear before the Commissioner as experts.

Participation by Parties with Professional and Commercial Interests

The Commissioner shall provide criteria for Standing for those with professional and commercial interest in helicopter transport to the Newfoundland and Labrador Offshore Area. The Commissioner shall also provide procedures by which Standing will be granted.

Parties with Standing shall provide the Commissioner with written submissions outlining the issues within the Inquiry Mandate upon which such parties have an interest. The Commissioner may request from such parties further submissions either by way of written reports or oral presentations.

The Commissioner may provide for sessions in which evidence is presented to the Commissioner and where appropriate may allow for cross-examination of such evidence.

Scheduling

The Commissioner will provide notice of the detailed schedule and announce specific dates, locations and topics respecting the public sessions, if any, of the Inquiry. This notice will be issued a minimum of thirty (30) days prior to the start of the sessions and shall identify the specific issues on which information is being sought.

The Commissioner will hold sessions at such locations, within the province of Newfoundland and Labrador, and at such times as the Commissioner deems appropriate.

9. Consultation by Commissioner with the C-NLOPB

The Commissioner, the Secretariat, or both may consult the Board for the purposes of clarifying any matters respecting the Terms of Reference, the Inquiry process and any matters relating to support of the Inquiry.

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The Commissioner may consult the Board to provide information in relation to matters within the Inquiry Mandate.

The Commissioner or Secretariat shall not consult the Board for the purpose of discussing any substantive matters respecting purpose of the Inquiry and the recommendations to be made.

Notwithstanding the above provision the Commissioner shall bring to the attention of the Board matters that come to the Commissioner's attention during the Inquiry that are of an immediate nature relating to any safety issues within the jurisdiction of the Board.

10. Support for Commissioner

The Board shall provide funding to the Commissioner so as to fulfill the mandate and effectively achieve the objectives of the Inquiry.

The Commissioner shall occupy such space for offices and hearing rooms and employ staff as may be necessary in consultation with the Board and in accordance with Board policy and practices.

The Commissioner may engage professional services (public relations, technology, website) so as to fulfill the mandate and effectively achieve the objectives of the Inquiry.

The Commissioner shall not express any finding or recommendations regarding criminal or civil responsibility of any person, body or organization.

Readers who have had an opportunity to read the Phase I Report will remember that I began by describing the legislative and regulatory framework of the C-NL offshore, from its inception in 1985 to the present day.

After that introduction, I described the federal/provincial agreement called the Atlantic Accord and its matching implementation legislation enacted by the Parliament of Canada and the Legislature of the Province of

Newfoundland and Labrador. The Accord and the legislation set the framework for the regulation of Canada's first offshore oil field and established the Regulator, which is the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB). The foregoing legislation mandated this Inquiry as a result of the crash.

Phase I of the Inquiry concluded in November 2011 with the presentation of my Report and 29 Recommendations. I was then required to wait for the publication of the Report of the Transportation Safety Board of Canada (TSB) before beginning Phase II. The TSB Report was made public on February 9, 2011.

After the crash of March 12, 2009, it was realized that offshore helicopter safety needed improvement in a number of ways. Improvements were begun in 2009 and continued in 2010, after an interim recommendation which I made in February of that year. Following Phase I, improvements continued, many of which were reinforced by the TSB conclusions in February 2011.

I think it is important for offshore workers, the general public, the federal and provincial Governments, and the offshore community generally to be made aware of these improvements and the degree of progress made to date.

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Submissions

At the start of Phase II, I granted standing to 15 corporate and other entities and asked them to make written submissions to the Inquiry. Evidence was not presented by way of a public forum as was done in Phase I, because the TSB Report is the evidence upon which I must rely. The factual Findings and conclusions of the TSB set the parameters and provide the basis for all recommendations which follow. As required by the first limitation, I have not made an examination of airworthiness or training or flight procedures, but have accepted in full the Transportation Safety Board's examination and assessments. I should nevertheless make it clear that when issues are based on the TSB's Findings, I may make recommendations under both clauses (a) and (b) of the Phase II mandate.

I asked the participants who are parties with standing at the Inquiry to provide me with submissions as to ongoing safety improvements in which they are involved and as to issues which I should consider for the future. I also asked the public for input.

The issues for the future were referred to in clauses (a) and (b) of the first paragraph of the Phase II mandate, which say as follows:

- (a) which findings should result in actions being recommended to be undertaken by C-NLOPB and how they should be implemented,
- (b) which findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.

I will begin by discussing the submissions of the participants on current and ongoing improvements. It is not required by my Terms of Reference that I give such an overview but I am doing so in order that interested readers will be made aware of safety improvements and initiatives to date. To accomplish this, I will give an overview of the submissions from the participants. These submissions were placed on the Inquiry's website in mid-April, 2011, and for the convenience of the reader they also appear as appendices attached to this Report.

C-NLOPB

(submission attached as Appendix A)

In its submission of April 15, 2011, attached as Appendix A, under the heading “Changes since March 2009,” C-NLOPB identifies SAR Response/Night flying. As a result of an interim recommendation from this Inquiry, dated February 8, 2010, C-NLOPB issued a directive to the operators which said:

The Commissioner noted and the Board has confirmed that a “one hour wheels up” response for First Response SAR provided by industry should be improved; effective SAR skills must be available in a response situation as quickly as possible. We believe this can only be achieved by having a fully equipped SAR helicopter on standby at St. John’s at any time when flights for workers are being undertaken. The effective “wheels up” time for such a SAR helicopter must be 15 – 20 minutes, consistent with practices in other offshore oil and gas jurisdictions. At times when worker transportation is not being undertaken a “wheels up” time of 45 minutes is acceptable. We agree with the Commissioner that the full-time dedicated and fully equipped response helicopter must be equipped with technology to locate and retrieve personnel from the water in all low visibility circumstances (auto-hover and forward-looking infrared radar) as soon as practicable. We expect you collectively or individually to advise as soon as possible how you will effect this service, certainly advising us not later than February 19, 2010, of your plans for earliest implementation.

In revisiting the acceptability of night flying, the Board recognizes that effective first response SAR cannot be delivered in conditions of impaired visibility until the dedicated and fully equipped SAR helicopter described above is available. That being the case, effective February 14, 2010, except for emergency circumstances, helicopter transportation to the offshore facilities will not be permitted to start or finish between dusk and dawn (or in any low visibility conditions where rescue cannot be effected without auto-hover) until such time as the First Response SAR provided by industry is properly equipped to effect personnel retrieval from water in these conditions.

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Following the Phase I Report and Recommendations, C-NLOPB further responded as follows:

The Commissioner's recommendation on banning night flights is made on the basis that successful search and rescue during the night is hampered by the unavailability of a properly equipped dedicated SAR helicopter. The Board accepts this rationale, and therefore is continuing the ban on night flying, except for medical emergencies. However, the Board has also directed operators to improve their first response capability, and they have acquired a dedicated SAR helicopter equipped with forward-looking infrared (FLIR) and night vision. The required auto-hover is still in the certification process with the US Federal Aviation Authority and Transport Canada. When the auto-hover is certified, the Board will revisit the decision to ban all night flights.

Personal Protective Equipment

Since the return to flight in May 2009, all operators in the Newfoundland and Labrador offshore have been using new suit fitting criteria to ensure proper fit of the Passenger Transportation Suit Systems.

Helly Hansen has developed and had approved the new HTS-1 PTSS for use in the Newfoundland and Labrador offshore to address sizing issues.

Since May 2009, all persons traveling to and from offshore installations in the Newfoundland and Labrador offshore are required to be trained on and equipped with underwater breathing apparatus.

The C-NLOPB is actively engaged, along with other stakeholders, in the review of the certification of the Passenger Transportation Suit Systems through the CGSB. A staff member from the C-NLOPB participates in this process and the Board has provided the necessary funding for research, testing and development.

Emergency Floatation

S-92 helicopters currently in use in the Newfoundland and Labrador offshore are now equipped with a 5-bag floatation system designed to increase the likelihood of a ditched helicopter remaining upright.

Descent Profile

Cougar, in conjunction with Transport Canada, has developed a descent profile which allows for an S-92 to ditch within 11 minutes in the event of a main gear box malfunction.

SUMMARY

Phase I of the Canada-Newfoundland and Labrador Offshore Helicopter Safety Inquiry resulted in 29 recommendations to the Board. The Board has established a dedicated team led by two highly qualified safety and aviation experts and comprising Board staff, worker representatives, operator representatives, and a representative from Cougar, to review the Inquiry Recommendations and provide analysis and implementation recommendations to the Board.

The Inquiry Recommendations are comprehensive. The report of the TSB into the crash of Cougar flight 491 did not identify any new issue within the mandate of the C-NLOPB not already covered by the Inquiry Recommendations.

One of the most important actions taken by C-NLOPB since the Inquiry began was the establishment of two teams to address safety and aviation. These teams have since been merged into the one referred to above, which is described in greater detail on pages 1 and 2 of its submission (see Appendix A).

The leaders of this safety team are highly qualified and experienced in both aviation and safety, and their team comprises representatives from a broad spectrum of offshore operations. C-NLOPB is to be commended for its prompt action in pushing forward with these safety initiatives.

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It is also to be commended on its swift and decisive action in response to my interim Recommendation of February 2010, which has resulted in the wheels-up time for search and rescue being reduced from 60 to 30 minutes, which will be further reduced to 15-20 minutes with the completion of a new and specialized search-and-rescue hangar for the dedicated first-response helicopter which has been acquired by the oil operators.

It is now recognized that in our hostile waters, if a crash or ditching occurs, the speed of rescue efforts is crucial to saving lives.

C-NLOPB has divided the TSB Recommendations and conclusions into two categories. The first group includes those which mirror the Recommendations of this Inquiry in Phase I and are already being worked upon by C-NLOPB and the oil operators. The second category are TSB Findings 1 to 13, which C-NLOPB says are outside its mandate and can be addressed only by Transport Canada, the manufacturer, and other aviation regulators through the helicopter operator. As a result, C-NLOPB says that the TSB Report does not identify any new issue within the mandate of the C-NLOPB that is not already covered by the Inquiry Recommendations.

Offshore Safety and Survival Centre

a division of the Fisheries and Marine Institute of Memorial University
(submission attached as Appendix B)

The Centre trains offshore helicopter passengers in survival techniques which would be called upon in the case of a helicopter crash or ditching. Its work is absolutely vital. In the hostile ocean environment of the C-NL offshore, no passenger should be allowed to fly without such training. It must be recognized that training does not and cannot guarantee survival in a crash or ditching, but without it the chances of survival are drastically reduced.

In response to Inquiry Recommendation 13, the Centre is doing as follows:

The Marine Institute, through its Offshore Safety and Survival Centre (OSSC), has been actively involved with the Canadian Association of Petroleum Producers (CAPP) training and qualifications committee, other training providers and the regulator with respect to the development of a definitive and rigorous suite of optimal survival competencies which should be attained during Basic Survival Training (BST), Basic Survival Training Recurrent (BST-R) and Offshore Survival Introduction (OSI) training.

At this time, the OSSC meets or exceeds the standards, but the improvements to the optimal competencies identified are not fully achievable with existing facilities and infrastructure. Hibernia Management and Development Company Ltd. (HMD) has, however, provided a significant contribution to the Marine Institute of Memorial University of Newfoundland which will allow the OSSC to retrofit a new integrated helicopter training system incorporating a new configurable Helicopter Underwater Escape Trainer (HUET), up rated crane and environmental theatre. A tender document has been developed and is posted for bid submissions. It is expected that the retrofit work will take place this year. With these modifications in place, the Marine Institute will be outfitted with current *state of the art* training aids for helicopter underwater escape training.

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The modifications will permit the introduction of more complex and challenging training evolutions. As noted in the Commissioner's recommendation, however, training should not be so rigorous as to pose safety risks. When the new equipment is installed, OSSC will assess new exercises in accordance with internal risk management protocols. The participation, during risk assessments, of key stakeholders such as regulators, operator representatives and worker representatives would be welcomed. It may be that initial risk assessments identify a need for structured research and development and associated ethics approval to formally assess risk against benefit to properly inform the implementation decision. The OSSC is well positioned to undertake such research if and as deemed necessary.

And in response to Recommendation 14, it says:

The Marine Institute confirms that it would be pleased to work with the Regulator in assisting in the establishment of appropriate goals for physical fitness in preparation for safety training. It is likely that such goals may have to be established and re-established in conjunction with increasing the level of difficulty of training exercise evolutions. In the short term, we have available resources that can assist within our research unit and other units/ departments of the Marine Institute and Memorial University. For the longer term, we are pleased to advise that an interdisciplinary team at Memorial University led by the Faculty of Medicine and involving the Marine Institute Offshore Safety and Survival Centre (OSSC) has developed a graduate program for occupational physicians entitled *Human Physiology, Performance and Safety in Extreme Environments*. OSSC involvement in the course will be to provide short course safety/cold water/high temperature training as part of the program as well as to provide opportunities for occupational physicians to undertake applied research. The occupational medical expertise of the program participants will be appropriate for developing necessary underpinning research for the establishment of training fitness goals, particularly if more difficult and challenging evolutions are envisaged.

I should note here the donation by Hibernia Management and Development Company of 2.4 million dollars to assist in enhancing the Centre's training facilities. In particular, the funds will provide a new helicopter replica which more closely resembles an actual S-92A and which will be able, as it overturns in the pool, to provide trainees with an experience that more closely approximates that of escaping from an overturned and underwater helicopter. Donations such as this are a direct and tangible contribution to offshore helicopter safety.

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Helly Hansen Canada Limited

survival suit manufacturer

(submission attached as Appendix C)

Helly Hansen has been a participant with standing throughout this Inquiry, but has limited its participation to discussions of the survival suits which it manufactures for the C-NL offshore.

As part of an improvement process, Helly Hansen began in December 2008 to modify the E-452 survival suit which was being used at that time. The modifications resulted in the improved HTS-1 suit, which received the approval of the oil operators and Transport Canada as a suit that met the aviation suit standard only.

The improvements are significant and are described in Helly Hansen's submission. In addition, the suit was examined at Phase I of the Inquiry and all participants thus became familiar with it. It received aviation approval from Transport Canada on November 25, 2009, and, in July 2010, marine suit approval. All passengers now use the HTS-1 suit.

Considerable strides have been made in the suit-fitting process since the oil operators engaged Helly Hansen to conduct fittings. Helly Hansen trained Cougar Helicopters personnel to ensure that passengers do not travel without a properly-fitting suit.

The fitting process consists of:

- 1) instruction in the proper way to don the suit
- 2) verification of the ability to zip up the suit
- 3) verification of suit size
- 4) checking of face and wrist seals
- 5) mobility checks

In addition to fittings by Cougar's personnel, Helly Hansen continues to conduct individual suit fittings five days a week, and at other

times also, should the need arise. In a completely new departure, a 2XS suit has been developed for smaller passengers and custom-made suits are being manufactured for all passengers who fall outside the increased size range of the HTS-1 suit. It takes several months for a custom-made suit to be approved by Transport Canada. Each passenger's suit size has been established and remains on file so that passengers will fly only in a suit of the correct size.

Helly Hansen is also working with the Canadian General Standards Board (CGSB) in a review of helicopter transportation suit standards. Research is being undertaken to show what sort of undergarments should be worn under the suit. The suit will also be tested in realistically-simulated conditions of rain, wind, and waves. Such tests will also involve cold water conditions such as are encountered in the offshore. The water temperature at the time of the crash on March 12, 2009, was 0.02° Celsius, which is very close to freezing. I have observed cold-water testing at the National Research Council test facilities in St. John's, and was told that the colder the water, the greater are the demands on both the suit and the wearer.

Helly Hansen also referred to aviation reports from the TSB relating to suit fittings and sizing. They note that an expert report in Phase I explained that individual suit fittings are not usually done in the industry, but rather a passenger chooses his or her own suit size. That being the case, the suit-fitting procedures in the C-NL offshore now exceed suit-fitting standards elsewhere, which in my view is most appropriate considering the severity of our offshore conditions. Helly Hansen notes also that the combination of aviation and marine capabilities in a single suit results in buoyancy and bulkiness issues which can cause problems for a passenger escaping a ditched and overturned helicopter.

In its recommendations, Helly Hansen says:

Helly Hansen Canada Limited reiterates the recommendations contained in the submissions which it filed in Phase I of the Inquiry. In particular, we submit that the TSB report supports the first two of Helly Hansen Canada Limited's recommendations, which appear in Volume 1 of the Offshore Helicopter Inquiry Report (p. 94):

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- 1) Remove the requirement for dual approval with respect to the helicopter transportation suits. The suits should only be required to meet the Transport Canada aviation suit standards and not be required to also meet the Transport Canada marine abandonment suit standards.
- 2) Confirm that offshore workers have a level of personal accountability for their own safety in helicopter transportation.

We submit that the current CGSB review supports the following recommendation contained in our previous submissions:

- 4) Require that future testing of the helicopter transportation suits recreate as realistically as possible the conditions where the suits will be used in order to obtain an accurate assessment of their performance in real world scenarios.

Conclusion

Since the tragic events of March 12, 2009, there have been significant efforts to improve the safety of helicopter transportation to the Newfoundland and Labrador offshore area. Helly Hansen Canada Limited has continued its efforts to improve the effectiveness and comfort of the helicopter transportation suits as well as being an active participant in the CGSB committee that is reviewing the helicopter transportation suit standards. Helly Hansen Canada Limited is proud to have played a role in the important work of this Inquiry, which has already made substantial recommendations for improved safety in this area.

I support the recommendations of Helly Hansen and the TSB on the foregoing points, as readers of the Phase I Report will be aware.

The issue of the survival suit was very high in the list of concerns raised in Phase I, as shown by the Worker Survey in Phase I, when very often the issue of discomfort was at the forefront. Comfort should be considered when it can be achieved, but in my opinion never when it would interfere with the efficiency of the suit in saving lives in an emergency. It is gratifying to know that progress has been made and is still being made with respect to helicopter survival suits. I have no doubt

that the CGSB Committee will carefully consider Helly Hansen's recommendation that the suit used in the C-NL offshore be certified for aviation use only and not be a dual purpose suit. My reading indicates that Helly Hansen are not alone in their opinion. I recently asked the National Research Council in St. John's to give me an update of the work being done by the CGSB Committee on improving the helicopter transportation suit standard. Because of the importance of this subject, I am reproducing in full their letter, which I received on June 28, 2011.

Dear Commissioner Wells,

We would like to thank you for the opportunity to provide a brief status update to the Offshore Helicopter Safety Inquiry with regard to the work completed to date by the CGSB working group on the implementation of the new helicopter transportation suit standard, and to provide some ideas that may be implemented the next time the standard comes for review.

As testified at the OSHSI last year, NRC-IOT advocates adopting performance-based standards for life-saving appliances used in the marine industry and more specifically in our offshore oil industry. It is the belief of NRC researchers that by using conditions for the actual area of operations, a more accurate measurement of performance can be achieved. This bridges the gap that now exists as a result of testing standards that tend towards benign, or even calm water, conditions.

In November 2009, the Canadian General Standards Board (CGSB) met in Ottawa to discuss submitted comments on the standard "Helicopter Passenger Transportation Suit Systems" (CAN/CGSB-65.17-99). At the November meeting, a number of issues that needed further examination were brought to the attention of the committee. A working group comprising CGSB members was established with the goal of drafting a new version of the standard, and to help address the items of interest identified at the November meeting.

The items identified covered a wide variety of topics within the standard. Questions were raised as to whether certain tests conducted in calm water, as prescribed in the standard,

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provided an accurate assessment of performance in conditions that included wind and waves. Other items of interest included whether measuring the ability of a person to perform critical survival actions (e.g. deploying a HUEBA, releasing harness, etc.) in water temperatures above 20°C was overestimating performance when compared to doing the same tasks in much colder water (~2°C).

The CGSB working group is to be commended on the work they have undertaken to date with simultaneously drafting the new standard, and ensuring that work was completed on the items identified in November 2009. Much of that work has focused on determining if the calm water pool testing conditions outlined in CAN/CGSB-65.17-99 provided an accurate measurement of performance. In many cases, the work undertaken has resulted in the incorporation of significantly more rigorous tests for future helicopter passenger transportation suit design and certification. For example, instead of a doing a jump from 3m and an hour swim in a calm water pool to calculate water ingress into a suit, test subjects must now escape from a high fidelity helicopter underwater escape trainer and spend an hour immersed in wind and waves. This upgraded test is performed in conditions approaching the offshore and will ensure that future HTS designs will be assessed according to a performance-based approach.

In cases in which the new standard prescribes calm water tests, work has been conducted to determine if there is a difference between testing in those conditions, and in environments with waves. NRC-IOT was involved in tests that examined the change in buoyancy in calm water and waves, and the ability of test subjects to move to a vertical position in the same conditions. NRC-IOT found that there were no significant differences in performance when conducting the tests in calm water compared to waves.

The movement of the new version of CAN/CGSB-65.17-99 towards performance-based tests is a step in the right direction. However, it is NRC-IOT's opinion that the standard is not rigorous enough. For example, when testing the thermal protective properties of a suit with humans, the new standard

prescribes the test to be conducted in 0°C water, with 20-25cm waves and 20-25km·hr⁻¹ wind. While these conditions are more challenging than the previous tests, the prescriptive nature of the test may result in an overestimation of performance for areas with larger waves and higher wind speeds since it limits the testing to a very specific condition. While the clothing insulation values calculated in the prescribed testing conditions may be sufficient to prevent hypothermia from occurring in 6 hours, moving to harsher conditions may result in unexpected lower performance. A human who is able to maintain a stable deep body temperature in a 0.75 Clo suit in 0°C water, 20-25cm waves and 20-25 km·hr⁻¹ wind, may be pushed past their ability to do so in conditions with higher waves and wind speeds.

As a result, NRC-IOT voted “No” on adopting the new draft version of the standard in its current form. We suggest that further discussion, and possibly further research, is needed to ensure that the standard continues to improve. It is vital that we address the increasingly inhospitable environments that our offshore industry is exploring in the search for natural resources. We must be certain that the standard will always be sufficient to save lives in Canada’s offshore industries.

In summary, the work done by the CGSB and its working group has been extensive and has resulted in the creation of a standard that is improved compared to its previous version. We look forward to the further refinement of the standard in future versions.

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Cougar Helicopters Inc.

(submission attached as Appendix D)

The company reviewed in general terms the Recommendations of Phase I of the Inquiry and its efforts as the helicopter operator to comply with all Recommendations which refer to it. Some of those have already been implemented; the remainder are in the process of implementation.

The submission points out that prior to the return to service on May 15, 2009, the titanium filter bowl studs had been replaced by steel studs. Since then, Sikorsky has redesigned the filter bowl housing with an adapter that permanently attaches it to the gearbox. Also, a new filter bowl with six fasteners instead of the original three has been designed and installed. These improvements have all been fitted on Cougar's S-92A helicopters as required. Cougar makes no proposals to the Commissioner for further recommendations to either C-NLOPB or other legislative or regulatory agencies arising out of the TSB Report. It is Cougar's position that recommendations which could have been made vis-à-vis the TSB Report have already been addressed by the Inquiry's Phase I Recommendations.

The Government of Newfoundland and Labrador
(submission attached as Appendix E)

Under the heading of Safety Initiatives, the Government says as follows:

The safety of all offshore workers is of paramount importance to the Government of Newfoundland and Labrador. For that reason, on December 13, 2010, the Premier announced that the Government of Newfoundland and Labrador had accepted all twenty-nine recommendations of the Phase I Report from the Offshore Helicopter Safety Inquiry, including the recommendation for a stand-alone safety regulator (Recommendation 29).

To accommodate the implementation of these recommendations, the C-NLOPB has taken interim measures to address each of the first 28 recommendations. The C-NLOPB has concentrated on an internal restructuring solution by establishing two teams – Aviation and Safety Teams – with responsibility to develop implementation plans for these recommendations.

With regard to Recommendation 29, it is the intention of the Government of Newfoundland and Labrador that this recommendation be implemented, and to that end the Province has entered into discussions with the federal government to achieve this goal. The Government of Newfoundland and Labrador is committed to completing this important task in an expeditious manner.

It is important to note that the Atlantic Accord Agreement was implemented by the enactment of mirror (parallel) legislation, the federal *Canada Newfoundland Atlantic Accord Implementation Act* and the provincial *Canada Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*, collectively the Atlantic Accord Acts. Creation of a stand-alone safety regulator will require amendments to these Acts.

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The Government informed the Inquiry that the Province, the federal Government and the Government of Nova Scotia continue to work on the proposed occupational health and safety amendments to the Accord Acts. These amendments were intended to be introduced in the spring of 2011; however, the federal election of May 2011 has in all probability delayed them. Nevertheless the work continues.

The Government refers to the thrust of the proposed legislation and, in the spirit of the separation of certain safety functions, the submission states that there will also be a separation of governmental oversight functions. At the moment, the Minister of Natural Resources has responsibility for offshore safety, but the new legislation will provide that the Minister of Government Services will have responsibility for offshore occupational health and safety oversight, while the Minister of Natural Resources will retain the oversight role for promoting offshore development. The Minister of Government Services will therefore be entitled to any offshore safety helicopter information and documentation under the control of C-NLOPB.

The Government of Newfoundland and Labrador endorses the Report of the TSB and its strong recommendations on how such tragedies in the offshore can be prevented.

The submission also takes the position that Transport Canada has the responsibility to act on the TSB's Recommendations and Findings and that the Province will look to Transport Canada to fulfill its mandate.

I deeply appreciate the Province's acceptance and support of all 29 of the Phase I Recommendations and its continued support for the Inquiry.

Canadian Association of Petroleum Producers (CAPP)
(submission attached as Appendix F)

CAPP has produced an extensive submission which explains its role within the oil and gas industry in Canada and gives an overview of its activities.

The submission makes reference to its role in Phase I of the Inquiry and goes on to say:

In order to improve communications with the C-NLOPB and to ensure CAPP's committee structure and processes support timely achievement of industry consensus and effective interactions with the regulator, CAPP has implemented a number of process improvements over the last year. These include:

- Improving the interface between CAPP and the regulator(s) by ensuring expectations, priorities and timelines are clear and providing formal progress reporting at regular intervals.
- Improving CAPP's internal processes for managing complex projects by identifying a project champion from the Atlantic Canada EPG for complex projects.
- Ensuring CAPP member company engagement and support by developing clear terms of reference for complex projects including expectations and roles of committee members and expectations related to member resources.
- Improving stakeholder engagement by developing stakeholder engagement plans for every complex project and developing communication materials and feedback templates.
- Ensuring the C-NLOPB is aware of CAPP's priority issues and vice versa by holding formal meetings at least twice per year between the C-NLOPB and CAPP member executives/staff.

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CAPP has also had involvement in discussions/initiatives related to other Phase I recommendations, specifically, helicopter safety training and survival, and personal protective equipment. As these issues are also raised in the Transportation Safety Board of Canada (TSB) report on its investigation into the crash of the Cougar Helicopter Sikorsky S92-A, CAPP's involvement in these issues is outlined in the section below entitled "CAPP Initiatives in Relation to TSB Report."

CAPP has responded to the Phase I Recommendations in a commendable manner, which demonstrates that the Association and its membership are taking the matter of ongoing safety initiatives very seriously.

As is the case with a number of other participants, CAPP says as to the overall response to the Phase I Recommendations and the TSB Report as follows:

Following the issuance of that report, the C-NLOPB established teams who will facilitate the implementation of those recommendations. Given the extensive response that is already underway, we respectfully submit that no additional recommendations are required by the Commissioner in response to the TSB report.

There then follows an extensive discussion of industry initiatives flowing from the TSB Report. This includes topics such as:

- (a) basic survival training (BST), including recurrent BST standards and consistency
- (b) training equipment
- (c) frequency of training
- (d) Helicopter Passenger Transportation Suit Systems and related standards
- (e) CAPP's role in the overall review process, including the Canadian General Standards Board's review process and research
- (f) specific items such as suit thermal requirements, cold hand dexterity and escape buoyancy
- (g) the supplemental underwater breathing apparatus (HUEBA)

- (h) the work of the Atlantic Canada Safety Committee
- (i) a modified assessment guideline (for passengers)
- (j) fatigue management

CAPP concludes its submission as follows:

In conclusion, CAPP is providing the information included in this submission to assist in Phase II of the Inquiry. The intent is to provide up-to-date information about what industry is doing related to the TSB recommendations which are broadly applicable to the industry and those in which CAPP has a role. Given the response that is already underway following Phase I of the Inquiry, CAPP respectfully submits that no additional recommendations are required by the Commissioner in response to the TSB report.

I am encouraged by the industry initiatives in which CAPP is engaged. I hope also that through its industry membership, CAPP will encourage worker involvement in these initiatives whenever possible. Workers are the principal group of passengers on offshore helicopters and they, as much as anyone, should have input into a matter which so directly affects them.

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Joint Operator Submission (the operators)

Hibernia Management and Development Company Ltd. (HMDC), Husky Oil Operations Limited, and Suncor Energy Inc.
(submission attached as Appendix G)

In their introductory paragraph, the operators refer to their participation in Phase I of the Inquiry and their work in implementing its Recommendations. That implementation process involves working with C-NLOPB and in particular with its safety team, which was established very shortly after the Phase I Report.

As to Phase II, the operators say as follows in their introduction:

Phase II was initiated with the February 9, 2011 release of the Transportation Safety Board of Canada report on the crash of flight 491 (TSB Report). The TSB Report contained four recommendations as well as findings as to causes and contributing factors and findings as to risk. The mandate of Phase II of the Inquiry is to undertake a review of the TSB Report and its findings that are within the mandate of C-NLOPB and determine which should result in actions being recommended to be undertaken by C-NLOPB and by other legislative or regulatory agencies. The Operators have carefully reviewed the TSB Report. We are of the view that the findings and recommendations that fall within the mandate of C-NLOPB were addressed in the Phase I Report.

The operators have responded to my request for an update on the numerous safety initiatives arising out of the tragic events of March 12, 2009, in some detail. Their introduction says:

Many safety initiatives have been taken since the loss of Cougar Flight 491 and many are still underway. Notable perhaps are the implementation of helicopter underwater escape breathing apparatus (HUEBA) and HUEBA training; enhanced first response search and rescue (SAR), including a dedicated SAR helicopter and reduced 'wheels up' time; the donation by HMDC of \$2.4 million to the Marine Institute's Offshore Safety and Survival Centre to facilitate the installation of state-of-the-art simulation training equipment, including a new helicopter

underwater escape trainer (HUET) and training pool upgrades which can provide a higher level of fidelity for HUET training; greater workplace communication and involvement in helicopter safety matters; the provision of dedicated full-time Operator personnel to C-NLOPB to assist its Safety and Aviation teams; and ongoing research through the Canadian Association of Petroleum Producers (CAPP) to improve offshore training and development of an improved passenger helicopter transportation suit standard. These efforts are demonstrative of the Operators' ongoing commitment to safe offshore helicopter transportation.

In addition, the operators acquired, in conjunction with Cougar, improved helicopter flotation equipment for the helicopter fleet. The parts were ordered in March 2009 but manufacture, fitting, and installation took until March 2011 to complete. They were also instrumental in revising the guidelines for restricted flight operations in high sea states. As well, they have worked on suit and glove enhancements.

Of particular importance, they have responded positively to the Inquiry's interim Recommendation and C-NLOPB's resulting requirement for reduced search-and-rescue response times. They have, in their contractual relationship with Cougar, acquired a fully-equipped, dedicated first-response helicopter and engaged additional pilots and rescue specialists. They have initiated the construction of a new SAR helicopter hangar at St. John's airport. When it is completed in late 2011, it will enable the first-response launch time to be reduced to 15-20 minutes, as recommended in Phase I.

In-flight tracking has been enhanced and a "Blue Sky" system has been introduced at the Canadian Coast Guard which will track, in real time, the locations of all offshore passenger helicopters and support vessels.

The operators are also involved in the protocol between Cougar and the Department of National Defence which was recommended in Phase I. Progress is being reported to C-NLOPB.

I have referred earlier to HMDC's funding commitment of 2.4 million dollars to the Marine Institute's Offshore Safety and Survival

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Centre. This funding is for a new helicopter underwater escape trainer (HUET) with windows which can be reconfigured to S-92A size and other refinements such as high-backed stroking seats with four-point harnesses similar or identical to those in the S-92A. Other enhancements to training also appear in the CAPP submission.

The operators have facilitated worker involvement as recommended by Phase I. Other enhancements involve flight information to passengers and notification of any matter which differs from normal flight operations.

I have already mentioned the work of CAPP and the work of the C-NLOPB safety and aviation teams, now combined into one team, which require and receive industry cooperation and support.

Finally, while the relevant Recommendation from Phase I and from the TSB is being considered by C-NLOPB, a program has been implemented to fund the full cost of pilots' helmets.

In summary, I believe that since March 12, 2009, the industry has done whatever it has been asked to do for safety, and has also of its own volition initiated additional enhancements and funding with a safety focus.

The Estates and Families of the Flight Crew (summary attached as Appendix H)

The flight crew families began with a focus on basic survival training (BST), flight crew suits, helmets, and visors, all of which were matters raised in the TSB Report.

On the matter of TSB Findings and the role of the C-NLOPB generally, the submission quotes a passage from Volume 1, Chapter 8, of my Phase I Report.

The submission then says:

These observations by the Commissioner underpinned a number of his recommendations, particularly those on Regulatory Oversight. We wholeheartedly support these recommendations. We also acknowledge and support the C-NLOPB's response to the recommendations to date, which has included creating an Aviation Team led by an experienced Aviation Safety Advisor.

Throughout the course of the Inquiry, we have urged the importance of the C-NLOPB seeing beyond the boundary of what might at first be perceived as the sphere of Transport Canada. There is no doubt that Transport Canada is the primary regulator but, as recognized by the Commissioner in the passages quoted above, there will be areas of offshore helicopter safety which it does not regulate and there will also be areas where additional requirements exceeding those of Transport Canada will be needed. Through its oversight of the helicopter service provider contracts, the C-NLOPB has the ability to require top-tier training for pilots, frequent review of rotorcraft flight manuals (**RFMs**), standard operating procedures, checklists and the like and a number of other recommendations directly related to the TSB's findings.

To give a specific example, the TSB found that a lack of recent, modern, CRM training likely contributed to communications and decision-making breakdowns with the flight crew of flight 491. As a result, TSB *Findings as to Risk* numbers 12 and 13 directly concern deficiencies in the current Transport Canada regulations

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around CRM. The C-NLOPB could require that helicopter service providers to our offshore installations be contractually required to have latest generation CRM training and frequent recurrent training.

The pilots who fly in the Newfoundland and Labrador offshore fly over one of the harshest marine environments in the world. If something goes wrong, as it did for Matt Davis and Timothy Lanouette, the pressure on the pilots cannot be overstated. These pilots deserve the best training possible; they deserve to have up-to-date, unambiguous RFMs and emergency procedures. The passengers of the helicopters deserve it too. The C-NLOPB has a role to play in ensuring that this happens and we ask the Commissioner to consider that role in his recommendations with respect to the TSB findings generally.

I have quoted the above passages from the submission because they touch on the scope of the offshore regulatory role and what it ought to be. The future role of the offshore safety regulator is important, and I will address that subject later in this report.

The submission then deals with the TSB Findings 14 and 15 as to risk, which relate to my Phase I Recommendation 13. After reproducing the TSB's and my own Recommendations, the submission says:

Our submissions on these survival training recommendations are simply that any consideration of the training requirements should include a distinct consideration of the pilots' survival training. While there may be considerable overlap between the needs of the pilots and the passengers, there may also be instances where the pilots' requirements differ. Fidelity in training is no less important for flight crew and so, whenever possible, the HUET, breathing apparatus training, and other survival training for pilots should mimic their actual equipment and conditions, including suits worn, breathing apparatuses used and cockpit environment.

As to the matter of flight crew suits, the submission quotes TSB Findings 17 and 18, and I would note in particular for the reader Finding 17, which says:

17. There are minimal regulations and standards pertaining to offshore helicopter flight crew suit use and maintenance. This increases the risk that flight crews will be inadequately protected following a ditching or crash at sea.

After identifying further issues vis-à-vis flight suits, three from TSB and one from my Phase I Report, the submission says:

We strongly support the Commissioner's recommendation for further study and work and see it as a critical first step to addressing the concerns raised by the TSB. It is only a first step, though, as ultimately, a standard is needed and the Canadian General Standards Board (CGSB) has to be engaged. Even without a standard in place we see a role for the C-NLOPB to be proactive and require that the helicopter operators have empirical data to support their choice of suit and robust maintenance procedures in place. Our thoughts on these matters will be expanded on below.

After further noting of differences in the requirements for flight crew suits, the submission says:

It does not have to be this way, nor should it. The attention given to passenger suits over that given to flight crew suits is short-sighted given that in terms of flight-hours, pilots face the greatest risk.

The unique circumstances of flight crew have not stopped European regulators from developing standards.

The submission goes on to deal with the issue of visibility and colour of pilots' flight suits, supporting and quoting from the TSB Report. It discusses the Inquiry's Phase I Report and some of the expert reports introduced at the public stage of Phase I.

The submission emphasizes the need for further study and discussion by stakeholders. The submission also endorses both the TSB's and Inquiry's Recommendations on making pilot helmets compulsory.

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I am able to say that the Recommendations from this Inquiry and those from the TSB, which overlap to some degree, are being examined carefully by the safety team of C-NLOPB, the oil operators, and Cougar Helicopters. I have every expectation that all of the Recommendations arising from the Inquiry will receive the most careful consideration from the entities which I have listed above, and also from the Canadian General Standards Board and Transport Canada.

Families of the Deceased Passengers
(submission attached as Appendix I)

After noting the commonality between a considerable number of the TSB Recommendations and the Phase I Recommendations of this Inquiry, counsel's submission goes on to make important points which cause me to reproduce the body of their letter:

At the outset, we should indicate that there is considerable commonality of interest between your Phase I report and that of the TSB, especially in such areas as training, the necessity of having underwater breathing devices and overall the need to improve the level of accountability by industry and the helicopter providers with the end user, the passengers on the helicopter.

In formulating your recommendations on Phase II and in terms of charting a future course of action for the C-NLOPB, we encourage you to provide an expansive view of the C-NLOPB's role as opposed to a narrow, technical or strictly jurisdictional perspective. We believe the role of the C-NLOPB is essentially that of a regulator of last resort insofar as it has a mandate to promote safety. Moreover it has a mandate to respond to industry concerns and directly or indirectly, it has a role to play with the service providers who are employed by industry to facilitate development of the offshore oil field in the Province of Newfoundland and Labrador. The service providers include, in this case, those who provide helicopter transportation to the workers' place of employment.

In the above context, we identify the issue of certification of the Sikorsky S92 helicopter. The concerns of the families of the deceased passengers on this issue were expressed in a letter dated February 18, 2011 to the Honourable Chuck Strahl, Minister responsible for Transport, Infrastructure and Communities, a copy of which is enclosed. This issue was one which the families maintain the TSB failed to provide a suitable analysis of. Our clients maintain and call on the Minister of Transport to investigate the certification of the S92 aircraft and take all necessary steps to ensure that in future, Transport Canada will rigorously enforce the safety standards and certification requirements of the Canadian Aviation Regulations to prevent

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serious senseless tragedies such as what happened on March 12, 2009 from occurring again.

We also attach for your interest the speaking notes of Lori Chynn, Spokesperson for the families, in relation to a press conference she participated in in Ottawa on March 23, 2011, principally on the certification issue.

At first glance, the certification issue would appear to fall outside the mandate of the C-NLOPB and would therefore not merit consideration as part of your Phase II report. For the reasons stated above, we believe that it is an issue on which you may wish to comment as the C-NLOPB is a regulator of last resort. We ask that you take this matter into consideration when you prepare your final report. We look forward to receiving that report in due course.

The points raised in the letter engage the question of what is and what is not within the mandate of C-NLOPB as the Regulator of the entire offshore, including safety. More importantly, they raise the question of what the role of an offshore safety regulator should be in the future.

The foregoing recognizes that these questions fall within the mandate of the Inquiry's Phase II. The Terms of Reference of Phase II say in part as follows, vis-à-vis the TSB Report:

The Commissioner shall undertake a review of the report therefrom and particularly the findings and shall advise the C-NLOPB:

- (a) which findings should result in actions being recommended to be undertaken by C-NLOPB and how they should be implemented,
- (b) which findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.

The only possible legislative bodies to come within clause (b) are the Parliament of Canada and the Legislature of the Province of Newfoundland and Labrador. The term “regulatory agencies” must, I believe, refer to Transport Canada as the principal aviation regulator in Canada.

I am entitled therefore under clause (b) to address recommendations to the Parliament of Canada and the Legislature of Newfoundland and Labrador and Transport Canada on issues which I believe require legislative amendment or regulatory change. Any such recommendations will of course be made through the C-NLOPB.

Of considerable interest is a letter which forms part of the families’ submission. It is dated February 18, 2011, and is from a law firm representing the one survivor of the crash of March 12, 2009, and the family members of those passengers who died in the crash. The letter was written to the then Minister of Transport and says as follows:

Dear Minister:

An Open Letter From Brenda Anwyll, Janet Breen, Cecilia Corbett, Robert Decker, Wanda Drake, Melinda Duggan, Karen Eddy, Janet Escott, Susan March, Richard and Marjorie Maher, Heather Warren, Roxanne Mullooney, Marilyn Nash, Lori Chynn, and Sharon Pike - the Families of the Passengers Killed in, and the Sole Survivor of, the Crash of Cougar Flight 491

As you are undoubtedly aware, on March 12, 2009, a Sikorsky S-92 helicopter, operated by Cougar Helicopters, carrying 2 pilots and 16 passengers crashed into the seas off St. John's, NL, killing the crew and all but one of the passengers. The Transportation Safety Board of Canada ("TSB") released its final report regarding the accident on February 9, 2011.

While the TSB report is extensive and detailed in many respects, it does not satisfactorily address critical questions pertaining to the manner in which the Sikorsky S-92 helicopter was initially certified by Transport Canada and how Transport Canada responded to an S-92 Main Gear Box ("MGB") failure in July, 2008. Transport Canada never should have certified as airworthy

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a helicopter that could not fly for at least 30 minutes after the complete loss of MGB oil. Transport Canada should have responded in 2008 after learning about the "Achilles heel" of the S-92 MGB: titanium studs prone to failure. The cold, harsh reality is that this accident never would have happened had Transport Canada enforced the certification requirements of the Canadian Aviation Regulations ("CARs") and standards, as is required by law.

On behalf of the surviving family members of the passengers of Cougar Flight 491 and on behalf of the passenger who survived the crash, we call on the Minister of Transport to investigate the certification of the S-92 aircraft and take all necessary measures to ensure that in the future Transport Canada will rigorously enforce the safety standards and certification requirements of the CARs so as to prevent senseless tragedy, such as this, from occurring again.

Our call for an investigation is based on the following incontrovertible facts:

1. The TSB determined that Cougar Flight 491 crashed eleven minutes after, and as the direct result of, a complete loss of MGB oil caused by the failure of two of the three titanium studs securing the oil filter (the studs are very small; the exposed threading of each stud is 1/4 inch in exterior diameter and 1/2 inch in length).
2. The Sikorsky S-92 helicopter was certified by the United States Federal Aviation Administration ("FAA") as meeting the requirements of Part 29 of the Federal Aviation Regulations ("FAR"). It was subsequently certified by Transport Canada on February 2, 2005.
3. FAR 29.927(c) and its identical counterpart in the CARs (Airworthiness Manual 529.927) requires that the helicopter's MGB be capable of operating for 30 minutes following a "complete loss of lubricating oil" (quote from Sikorsky's 2002 test criteria), unless it can be demonstrated that the likelihood of such a failure is "extremely remote".

4. This design standard, referred to in the industry as "30 minute run dry" capability, was derived from military requirements and is considered crucial for helicopter safety.
5. While the development of the S-92 helicopter was underway, Sikorsky made numerous announcements to the industry that the helicopter would have 30 minute run dry capability, similar to its primary competitors, the EH-101 and EC Super Puma. For instance, see the enclosed technical information bulletin published by Sikorsky in July of 2000 that unequivocally states that the S-92 helicopter has 30 minute run dry capabilities.
6. On August 6, 2002, Sikorsky carried out its initial certification test to demonstrate to the FAA that the MGB could run dry in accordance with the requirements of FAR 29.927(c). The MGB suffered a catastrophic failure approximately 11 minutes into the test. At that point, it was obvious to Sikorsky and the FAA that the helicopter was incapable of meeting the run dry requirements for certification.
7. Rather than redesign its MGB to ensure safe operation for 30 minutes after the complete loss of oil, Sikorsky asserted that the S-92 should be certified on the basis that the risk of a complete loss of oil from the MGB was "extremely remote", a term that has been defined by the FAA in various publications to mean that a failure would be expected to occur no more than once per 10 million flight hours and in some circumstances, no more than once per 1 billion flight hours.
8. Despite the fact that the S-92 MGB design was unproven and had catastrophically failed during certification testing, the FAA accepted Sikorsky's conjecture that the risk of a complete loss of MGB oil was extremely remote. Transport Canada also accepted this conjecture and certified the aircraft in Canada on that basis.

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9. The S-92 is the only helicopter ever certified by the FAA under Part 29 or by Transport Canada under AWM 529.927 that does not have 30 minute run dry capability.
10. The S-92 is the only helicopter that was designed to use three titanium studs to mount the oil filter bowl assembly; the Sikorsky Black Hawk helicopter, whose airworthiness data was relied upon to certify the S-92, uses steel bolts.
11. Titanium studs, in contrast to those fabricated from steel, are particularly vulnerable to fatigue failure from a process known as galling, a type of adhesive wear.
12. On July 2, 2008, a Canadian owned S-92 helicopter off the coast of Australia suffered a complete loss of MGB oil caused by the failure of the titanium mounting studs, exactly the same problem which would bring down Flight 491. Fortunately for the crew and 14 passengers onboard that aircraft, it was only 7 minutes away from land when the failure occurred. The pilots were able to land the aircraft without incident.
13. In August, 2008, the studs, nuts, washers and oil filter assembly from that helicopter were brought to Vancouver for analysis under the supervision of the TSB. The investigation determined that the titanium mounting studs had failed due to fatigue cracking initiated by galling. It was suspected that the galling damage to the titanium studs occurred as a result of the nuts being removed and reinstalled during servicing of the oil filter.
14. The Australian incident demonstrated that the extremely remote assumption upon which the S-92 helicopter was certified both in the United States and Canada was erroneous. At the time of the incident, the S-92 fleet had accrued approximately 100,000 hours in service.
15. Notwithstanding the fact that the CARs require Transport Canada to take mandatory safety action once it becomes aware of an unsafe condition, Transport Canada did not

take any safety action as a result of the Australian incident.

16. Following the crash of Cougar Flight 491, Transport Canada issued an Airworthiness Directive requiring the mandatory replacement of the titanium mounting studs.
17. To this date, the S-92 Helicopter lacks 30 minute run dry capability, a capability enjoyed by the vast majority if not all of the helicopters that compete with the S-92. Passengers and crew flying on this aircraft offshore remain at risk in the event of another loss of MGB oil.

As a result of the Australian incident, which occurred eight months before Flight 491, it should have been obvious to Transport Canada that the potential for complete loss of oil from the S-92 MGB was anything but extremely remote and that the assumption on which the aircraft was certified was invalid. Notwithstanding this, Transport Canada did not take any steps to properly rectify the situation. Transport Canada's lack of action raises serious issues regarding aviation safety which remain unanswered by TSB report. Did Transport Canada succumb to pressure from the FAA or Sikorsky or did they simply fail to recognize a serious safety/certification issue? Either way, something needs to be done to prevent future accidents of this nature. Safety standards are of little benefit to the flying public if the regulators charged with enforcing them lack the conviction or resources to do their jobs and, instead, grant exemptions to manufacturers.

We can assure that we are seeking answers to these questions in order to advance aviation safety and not for compensation purposes as our legal claims have been resolved.

We call on you as the responsible minister to investigate the failure of Transport Canada to take appropriate steps pertaining to both its initial certification of the S-92 aircraft and its response to the Australian accident.

We look forward to a timely response and we will be pleased to respond to any questions or concerns you may have.

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I will deal with the matters raised in this submission later in my Report, after I examine the relevant TSB Findings on the history of the S-92A.

Jack Harris, QC, Member of Parliament for St. John's East
(submission attached as Appendix J)

Mr. Harris notes at the outset that he is restricting his submission to aspects of the TSB Report that can be considered to affect search-and-rescue capability and response in the Newfoundland and Labrador offshore.

The submission deals first with Emergency Flotation Systems, which are designed to keep a ditched helicopter upright and afloat long enough for the passengers and crew to escape. Though helicopters are equipped with these devices, they are not always able to keep a helicopter upright in the conditions which may be encountered.

Mr. Harris notes the TSB's Findings as to very high sea states in the C-NL offshore and the work which is being done on flotation issues, but observes also that, despite improvements, the risks remain high for occupants of downed helicopters. He notes also the TSB's observation that twin-engine helicopters invariably turn upside down when flotation systems do not operate successfully. These matters are exacerbated in crashes, when the systems are often disabled. The key point is that offshore ditchings and crashes require the swiftest possible rescue efforts if lives are to be saved.

Mr. Harris also discusses the need for improved Emergency Locator Transmitters and Personal Locator Beacons and the need to ensure that these are of high capability and resistant to damage caused by accidents or by immersion in water.

The inability of the C-NL offshore helicopter fleet (S-92As) to run dry for at least 30 minutes causes Mr. Harris to focus on potentially severe problems. He discusses the TSB recommendation that

The Federal Aviation Administration assess the adequacy of the 30 minute main gearbox run-dry requirement for Category A transport helicopters.

and the recommendation that

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The Federal Aviation Administration, Transport Canada and the European Aviation Safety Agency remove the "extremely remote" provision from the rule requiring 30 minutes of safe operation following the loss of main gearbox lubricant for all newly constructed Category A transport helicopters and, after a phase-in period, for all existing ones.

and the TSB's comment at p. 104 of its Report as follows:

With the exception of the S-92A, all other Category A helicopters certified by the FAA, the JAA [Joint Airworthiness Authority], and TC [Transport Canada] to Part 29.927(c)(1) or its equivalent, have met the requirements by draining the MGB then continuing operation using only residual oil for 30 minutes.

Mr. Harris concludes his submission by saying:

It appears then that despite the obscurity of the wording and recommendations, the only aircraft that doesn't meet the requirement of a 30-minute run-dry capability is the one being used for transport in the Newfoundland and Labrador offshore.

Even the S-92A may in the future meet this standard. According to information provided to the Standing Committee on National Defence, the S-92A aircraft being purchased by the Canadian government, modified for military use and named the Cyclone, will be required to meet the 30-minute run-dry capability, and Sikorsky is developing the technology required.

This discussion and the recommendations above raise significant concern with respect to the operation of the S-92A in our offshore conditions. The comments and recommendations of the Transportation Safety Board lead inevitably to the conclusion that the S-92A, without the 30-minute run-dry capability, is not a suitable aircraft for use in the conditions which exist in the Newfoundland and Labrador offshore environment.

This helicopter is unable to successfully land in the event of a MGB failure and may be required to ditch or potentially crash in hostile conditions, providing a great risk to passengers and crew.

If the Transportation Safety Board has concluded that all new helicopters should meet the 30-minute run-dry requirement and all existing ones must also, after a phase-in period, the S-92A should be unacceptable for use in the hostile conditions of the Newfoundland and Labrador offshore during the “phase-in period.”

It therefore calls into question the continued use of the S-92A in the Newfoundland and Labrador offshore and the Commissioner should consider requiring alternative aircraft to the S-92A or placing even further restrictions on operations, to reduce the risk to the lives and safety of helicopter passengers and crews.

It also further exacerbates the crucial need for adequate search and rescue capability and response times for both first and second responders, given the risks, distances from land, and the hostile environment in which this helicopter transport takes place.

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Communications, Energy and Paperworkers Union of Canada, Local 2121

(submission attached as Appendix K)

After outlining the Commissioner's mandate in Phase II, including the limitation respecting airworthiness, etc., the submission quotes paragraph 5 of the mandate, which says in part:

Specifically, the Commissioner shall inquire into, report on and make recommendations in respect of:

- (a) safety plan requirements for Operators and the role that Operators play in ensuring that their safety plans, as represented to and approved by the Board are maintained by helicopter operators.

In regard to the foregoing mandate, the submission says:

CEP, Local 2121 understands that the C-NLOPB has the authority, in respect of operators' safety plans, to require the operators to impose contractual obligations, on helicopter operators providing services to the operators, which are in excess of the requirements of Transport Canada. An example of this sort of obligation imposed by C-NLOPB on the offshore operators is the current requirement that passengers be trained to use and be issued the HUEBA. CEP, Local 2121 takes the limitation imposed in Section 6 of the Terms of Reference to mean, for instance, that it would be inappropriate for the Commissioner to inquire into the standards for flight training for helicopter pilots or the content of simulator training, but it would not be inappropriate for the Commissioner to consider whether helicopter pilots ought to have extra knowledge where that knowledge is relevant to the safety of the passengers who are workers being transported to offshore installations in the Newfoundland and Labrador offshore.

Simply put, CEP, Local 2121 feels it is appropriate for this Inquiry to make recommendations to the Regulator whereby the Regulator will be advised to alter the content of the contractual relationship between helicopter operators and offshore installation operators so as to make the helicopter transportation of workers in

the Newfoundland and Labrador offshore safer than that would be the case given compliance only with the minimum standards set by Transport Canada.

The submission summarizes the gist of and quotes some of the TSB's observations on the incidents preceding the failure of the titanium studs. It refers to Sections 1.18.3.7, 1.18.3.10, 3.15, and 1.18.3.9. The submission's comment is that the TSB detected a general consensus amongst the S-92A community that the requirement identified in Sikorsky's Alert Service Bulletin (ASB) of January 28, 2009, respecting the main gearbox filter bowl assembly, was not urgent, since the ASB allowed one year or 1250 flight hours for completion.

The sections quoted, and the entire section of the TSB Report dealing with regulatory approach to an incident off the coast of Australia on July 2, 2008, are so important to an understanding of what happened on March 12, 2009, and how it happened, that I have reproduced the sections of the TSB Report on the filter bowl stud problems and I will discuss them later in this Report.

On the issue of urgency, CEP says in its submission:

It is quite clear that the issue was in fact entirely urgent. The maintenance procedure was determined by the manufacturer, and with the sanction of the Federal Aviation Administration, to be mandatory. The premise of Recommendation 7, Phase I for the exclusion of Alert Service Bulletins was that they were maintenance-related. It is submitted that the findings of the Transportation Safety Board suggest that this is not a sound basis for exclusion of these items from an obligation to post information on the website.

The posting of these items on the website performs two functions. Firstly, it satisfies the right of passengers to know that matters crucial to their safety are extant. Secondly, the posting of the matter for public disclosure elevates the importance of the issue in the mind of the helicopter operator and its employees. Good management and human nature respond to the principle that it is easier to do something required than to explain why it has not been done. Elevation of the disclosure obligation to include air

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safety advisories and Alert Service Bulletins will reinforce that behaviour.

It is submitted that the Commissioner ought to recommend that Recommendation 7 in Phase I be amended so as to require immediate posting on the helicopter operator's website of all safety advisories and Alert Service Bulletins.

CEP deals with a wide variety of matters which appear in the TSB Report. Many of these are similar to my Recommendations in Phase I. The CEP references are too lengthy to quote but may be accessed in Appendix K of this Report.

I will reproduce here CEP's argument arising out of the TSB's Findings on the S-92A gearbox issues:

The continued use of the S-92A in the Newfoundland and Labrador offshore seems to suggest that the Newfoundland and Labrador offshore should, as it did with search and rescue response time, the helicopter underwater emergency breathing apparatus and the three bag (as opposed to five bag) emergency flotation system, be satisfied with less than the best international practices. As previously stated, the issue is not what is to be done with an existing fleet of S-92As. The issue is what are the appropriate steps to ensure worker safety in helicopter transportation in the Newfoundland and Labrador offshore. There is no logical reason why workers in the Newfoundland and Labrador offshore should have less than the best available safety capacity in the helicopters which they must ride to their work. The Newfoundland and Labrador offshore is arguably an even more hostile environment than the North Sea. Thirty minutes of flying time is invaluable in terms of assessing the problems with a helicopter which has suffered a loss of main gearbox oil. In an emergency, time is everything. Run dry time of a helicopter being extended to the maximum available time is, in essence, no different than the requirement that search and rescue response be reduced to the minimum possible time. It is simply about preserving life in a life-threatening situation. We submit that the Inquiry should recommend to the Regulator that it be a condition of the Oil Operator Safety Plan that the contract for helicopter

operations provide a condition that the helicopter used for transportation of workers to and from installations in the Newfoundland and Labrador offshore have a run dry capability equal to the maximum available in a helicopter at the time such contract is made and that no such contract should be for a period of greater than five years.

The CEP submission also catalogues TSB's observations on the checklists and operating procedures of Cougar and Sikorsky and challenges my observation in the Phase I Report, in which I said, "The oil and helicopter operators are very aware of the consequences of the failure of safety, from whatever source it comes, and strive to keep their operations accident-free. The net result is that all four have good risk-management systems." The submission then goes on to say:

The foregoing statement is frankly challenged by the findings of the Transportation Safety Board. The internal procedures of Cougar Helicopters were, at the time of Phase I of this Inquiry, matters appropriately dealt with by the Transportation Safety Board. As a consequence, while sample audits were presented as exhibits in Phase I, the manner of undertaking such audits and the findings of such audits were left largely unexplored. Indeed, most were redacted. Reviewing the audits and Exhibits 192 and 194 discloses, for instance, that the auditors did not review maintenance records nor did they check the checklists and Standard Operating Procedures against the Rotorcraft Flight Manual. Likewise, no check was done to determine if the Rotorcraft Flight Manual was up to date. It is submitted that one would have expected such an intensive audit process to have identified deficiencies in some of the behaviours and procedures found to be lacking by the Transportation Safety Board. It appears then that there may be an issue with the audit standards or methodology. We submit that Phase II should include an inquiry by the Commissioner which will review the audit standards applied to the operations of Cougar Helicopters by the Regulator and the oil operators with a view to determining whether it is necessary to develop a new and more appropriate audit standard. We further submit that if the Commissioner is not prepared to undertake such further inquiries, that the Commissioner should recommend to the Regulator that it undertake a review of the audit standards applied by the Regulator and the installation

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operators with respect to the operations of Cougar Helicopters so as to develop a new and more effective audit standard.

The submission then deals with Safety Management and Crew Resource Management, Emergency Locator Transmitters, Personal Locator Beacons, and Worker Representation. The Locator Transmitters and Locator Beacons have been dealt with by the TSB Report. The Worker Representation issue was raised at an Inquiry meeting and concerned the process of choosing worker representatives. It should not be an issue in my Phase II Report and I understand that it will be resolved by the oil operators.

CEP's submission is very broad; some of the issues raised in it are also raised by others and I will address those later in this Report. Many of the points raised are already under consideration by the helicopter operator, oil operators, and others. The role of the foregoing entities and the safety team of C-NLOPB is to address the details which the TSB has identified. I agree with and support the Findings of the TSB, but I must be cognizant that my role as a Commissioner is to make recommendations to the C-NLOPB, and to legislators and other regulators through C-NLOPB. My role in Phase II of the Inquiry is not to offer detailed advice to the safety team of the Regulator or to Transport Canada, but rather to make broader recommendations as to what the approach to offshore safety regulation should be, and how it could be organized and mandated by Parliament and the provincial Legislature.

Transport Canada

Transport Canada responded to the TSB Report on June 6, 2011, and provided this Inquiry with a copy of its response on June 7th.

Transport Canada Response to the Aviation Safety Recommendations A11-01, A11-02, A11-03 and A11-04 issued by the Transportation Safety Board of Canada

Transportation Safety Board of Canada Recommendation A11-01

“The Federal Aviation Administration, Transport Canada and the European Aviation Safety Agency remove the “extremely remote” provision from the rule requiring 30 minutes of safe operation following the loss of main gearbox lubricant for all newly constructed Category A transport helicopters and, after a phase-in period, for all existing ones.”

Transportation Safety Board of Canada Recommendation A11-02

“The Federal Aviation Administration assess the adequacy of the 30 minute main gearbox run dry requirement for Category A transport helicopters.”

Transportation Safety Board of Canada Recommendation A11-03

“Transport Canada prohibit commercial operation of Category A transport helicopters over water when the sea state will not permit safe ditching and successful evacuation.”

Transportation Safety Board of Canada Recommendation A11-04

“Transport Canada require that supplemental underwater breathing apparatus be mandatory for all occupants of helicopters involved in overwater flights who are required to wear a PTSS.”

Transport Canada Response to Recommendations A11-01 and A11-02

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Transport Canada (TC) has initiated, through a meeting in June, a coordinated formal review with the Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA) of the rules related to the extremely remote provision and the 30 minute requirements. The objective of the review is to reach an international agreement on what changes may be required to the rules.

While the recommendation to assess the complete loss of lubricant in Category A helicopters is not directed to TC, it deals with the same part of the rules and will form part of the review. Any amendments to the airworthiness rules would follow the regulatory process in each jurisdiction.

TC is accelerating a review of the guidance material relating to the application of standards referred to in these recommendations to identify, by early fall of 2011, additional direction or clarification for the Canadian certification of Category A helicopters.

Transport Canada Response to Recommendations A11-03 and A11-04

Transport Canada is initiating a focus group during the summer of 2011 with industry stakeholders to review the recommendations related to when the sea state will not permit safe ditching, and successful evacuation as well as mandatory supplemental breathing apparatus be made mandatory for all occupants of helicopters involved in overwater flights who are required to wear a Passenger Transportation Suit System (PTSS).

On the basis of these discussions, Transport Canada will develop an advisory bulletin for publication in the fall of 2011. Transport Canada will also present the results from the focus group to the Canadian Aviation Regulation Advisory Council (CARAC) at the next meeting in fall 2011 as the basis for amendments to the rules that would be consulted using the accelerated process.

Transport Canada has further initiated a comprehensive review of other offshore helicopter operations (such as North Sea

operations) and the existing Canadian regulatory framework to determine if other specific regulations are required.

Transport Canada will also continue to work with the Canada Newfoundland and Labrador Offshore Petroleum Board (CNLOPB) Inquiry and the resulting recommendations, expected by the fall of 2011 that may need to be taken account of in changes to the rules.

Transport Canada's response shows a concern for the TSB Recommendations and demonstrates that the actions being taken are appropriate in the circumstances because Transport Canada's aviation regulatory processes are affected by legislation and international agreements. Nevertheless, Transport Canada should work assiduously to rectify the certification procedures which allowed the S-92A to be certified and more particularly to be operated without full rectification of the flaws which became apparent after the Australian incident of July 2, 2008.

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Submissions by the Public

Some members of the public responded to the Inquiry's public notice inviting submissions in Phase II. A number of responses were in writing or by email and more were by way of telephone calls. In most cases, members of the general public were anxious that their names not be published, and for that reason I have not placed their letters or emails on our website.

I have consolidated the public responses by means of the following references to specific points:

- (1) The necessity for properly specified undergarments under suits was mentioned. Light gloves should be worn when flying because in the event of a ditching, gloved hands would be protected for long enough to be able to perform certain essential tasks before the passenger put the larger gloves on. Immersion in bitterly cold water can render the hands useless within minutes.
- (2) Four people now sit in the seat at the rear of the helicopter. Persons sitting in these seats are so tightly packed together that they find movement difficult. For reasons of safety as well as comfort, this seating area is suitable for three persons only.
- (3) All offshore workers should have the right to refuse to fly if weather and/or sea conditions are bad and they are seriously concerned, even though the applicable regulations permit flight.
- (4) Heavy equipment and machines are not supposed to be carried in the rear of passenger helicopters. On one occasion the pilot had to ask rear-seated passengers to move forward out of their seats, in order to restore balance for landing. That should not happen, but I have been told that it did happen on one occasion.
- (5) Some opinions are that if a main gearbox warning light is activated or there is any other serious alarm, the pilots should land or ditch at once and not risk a more serious accident. If in the pilot's discretion a rig or

ship could be reached quickly, he or she should be able also to consider that alternative.

(6) The decision not to fly over certain sea states is not what it appears to be. The launch decision is based on the reported sea state at the destination, not the seas over which the helicopter must fly. The launch decision is made 30 minutes prior to departure. If the sea state is within accepted limits at that time, the helicopter will depart. The writer of the letter believes that the TSB meant that sea states along the entire route should be the deciding factor. Marine sea states are available for offshore flight paths. As an example, Hibernia in one instance recorded a sea state of 6.2 metres and its helicopter did not fly. SeaRose recorded 5.9 metres and its helicopter flew. Passengers are not given information on such matters. The writer says that the oil operators have made their position clear that they wish to resume night flying when auto-hover is installed on the rescue helicopter. Flying at night has been demonstrated elsewhere to be more dangerous for passengers and crews than daylight flying, should a crash or ditching occur, and the fatality rate at night is much higher.

(7) The Inquiry received a detailed engineering analysis of the gearbox and the tensions and stresses which are part of its operation. The material was so technical that I suggested the writer forward the analysis to the Transportation Safety Board, for whom I think it was meant.

(8) The decline of safety caused by night flying was raised by more than one person. As one writer expressed it, "I am opposed to night flying period." The writer continued, "I wonder about the effectiveness of the current sea state guidelines of six meters. I really would not like to have someone looking for me and trying to pull me out of 20 foot waves."

(9) One contributor wrote in part as follows:

Dear Mr. Wells,

I am writing in response to the request of the Offshore Helicopter Safety Inquiry (the "Inquiry") seeking feedback on the report issued by the Transportation Safety Board (the "TSB") on February 9, 2011 regarding the crash of Cougar Flight 491 (TSB report title "Aviation Investigation Report A09A0016,

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Main Gearbox Malfunction/Collision with Water, Cougar Helicopters Inc., Sikorsky S-92A, C-GZCH, St. John's, Newfoundland and Labrador, 35 NM E, 12 March 2009", the "Report").

...

Based on my review of the Report, I believe that several items addressed by the TSB speak directly to opportunities to improve offshore helicopter safety — thus overlapping, I believe, directly with the primary mandate of the Inquiry.

In interest of brevity, I will try not to repeat too much of what is noted in the Report. I am also not addressing several important items raised in the Report that have already been addressed by the work of the Inquiry (such as survival suits, HUET/BST, breathing apparatus, etc.):

1. Aircraft Certification: The Report makes note that the S-92A was certified for operation in Canada by Transport Canada ("TC") based on accepting the U.S. Federal Aviation Administration's (the "FAA") certification for the aircraft: The FAA's certification appears to have been based largely on invoking an "extremely remote" provision relating to likelihood of complete loss of oil.

In this case TC, through its reciprocal certification protocols with the FAA and other regulatory bodies, accepted the FAA's certification of the S-92A even though the certification process did not meet TC's own testing expectation that transmission lubricating oil be drained while the transmission is operating to assess the aircraft's ability to meet a 30-minute "run-dry" requirement (i.e. ability of the aircraft to effectively remain operational for 30 minutes upon loss of lubricant).

Sikorsky's certification testing showed a catastrophic main gearbox ("MGB") failure only 11 minutes after the draining the lubricating oil. In spite of this failure, Sikorsky was able to certify the aircraft with the FAA based on an argument that the likelihood of such a complete loss of oil was "extremely remote".

Additionally, TC was aware of a similar MGB oil-loss occurrence

on an S-92A in Australia in 2008 (discussed further below) and did not subsequently question or challenge the FAA or Sikorsky whether such occurrences were in fact "extremely remote".

Implication(s) for Offshore Helicopter Safety: It would seem at first an obvious assumption that the helicopters themselves being used for offshore transportation are inherently safe and meet the minimum requirements for certification as set out by the appropriate regulatory bodies. It would appear in this case however that this is a flawed assumption.

At a minimum, I believe that TC should be held to its own certification requirements for any future aircraft certifications in Canada — and not be obligated to accept certifications from other jurisdictions at the expense of its own guidelines. TC has certified other helicopters to meet the 30-minute run-dry requirement — and there is no reason why all helicopters that fall under its jurisdiction (ie those operating in Canada) cannot.

This specific item was seen as sufficiently alarming to the surviving family members of the passengers and the lone surviving passenger to warrant direct communication with TC requesting action on this issue.

Though the likelihood of the S-92A fleet being used by Cougar Helicopters Inc. ("Cougar") to service the Newfoundland offshore being grounded is slim, at the very least it would appear as though TC should ensure, and regulators such as the Canada- Newfoundland Offshore Petroleum Board (the "C-NLOPB") should require proof, that any *new* aircraft certified for use in Canada by operators servicing the offshore should be required to show that they have met the "run-dry" requirement without relying on any "extremely remote" qualifications.

2. Aircraft Certification: Training: The Report makes reference to the fact that there may have been some issues regarding cockpit Crew Resource Management ("CRM") and that certain tasks were not optimally managed between pilot/co-pilot, which may have had an impact on decision-

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making and other time-sensitive actions during those stressful minutes. Though it appears as though both the pilot and co-pilot were in compliance with all regulatory requirements re: training, it would also appear as though training requirements re: CRM in Canada are somewhat dated and left heavily to the discretion of aircraft operators.

Implication(s) for Offshore Helicopter Safety: I would hazard to say that most people would agree that, all else equal, more training is usually better than less.

We will never know if any level of enhanced CRM training on the part of the pilot and/or co-pilot would have resulted in a different outcome in this case given both the stress and uncommon nature of what they were experiencing that day.

However, it would appear that a more rigorous, standardized regime re: CRM training, including the required frequency of such training and its contents, could only be seen as an *improvement* over current practices and, if nothing else, provide both passengers and crew members with at least some comfort that crew are as equipped and trained as they can be to deal with these situations should they arise.

I can appreciate that there is a tradeoff between having pilots and co-pilots in the air and operating aircraft versus sitting in a classroom setting and training on situations that we hope they may never have to experience. However, if the upside of that tradeoff is better decision making and/or performance in situations where lives are at risk then I believe that the tradeoff is a fair one.

3. Operator Accountability and Information Availability: One of the more alarming items to me noted in the Report was that Cougar had seemingly attributed the cause of a 2008 crash of an S-92A in Western Australia due to total loss of MGB oil to the maintenance that was being undertaken by that aircraft's

operator.

It appears as though Cougar did not follow the enhanced maintenance directive put forth in a Safety Advisory by Sikorsky re: MOB stud inspection and replacement after that 2008 occurrence, as evidenced by the fact that the helicopter still had its factory MOB studs in use after multiple oil filter bowl assembly changes, and that galling/deterioration of the MOB studs recovered from the wreckage was seemingly visible to the naked eye -- neither of which should have been the case if the Safety Advisory had been followed.

Implication(s) for Offshore Helicopter Safety: One of the Inquiry recommendations was to ensure that airworthiness directives and incident reports be made available to all passengers, etc. However, Alert Service Bulletins were not included in the recommendation as they were deemed to be "maintenance-related". In this case, what we saw was a "maintenance-related" item that was not actioned by Cougar - and which was ultimately identified in the Report as a contributing factor to this accident.

Ultimately, I believe that it is up to the crew and passengers travelling on these aircraft to seek out any such information that is made available to them and form their own opinions on what that information means for their own personal comfort levels and safety. If we generally accept that providing crew and passengers with adequate and pertinent information regarding the aircraft and allowing them to make decisions based on this information is one way to enhance offshore helicopter safety, then this occurrence illustrates that items such as Alert Service Bulletins *should* be considered for inclusion in this disclosure bucket.

For example, would the knowledge and availability of the Sikorsky Safety Advisory regarding the MGB studs have caused a crew member or passenger to challenge Cougar to show that the Advisory had been followed — and what would the implications have been for that aircraft or that flight on that

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day if Cougar was unable to confirm its adherence to the Advisory when questioned (e.g. a required grounding until they can show that it had been adequately followed if concerns are raised by crew and/or passengers, passengers having the ability to choose another flight/aircraft or form of transportation offshore)?

If the concern is the technical nature of some of these bulletins or advisories, I would have to believe that the impacted parties (e.g. operators, regulators, labour, industry) would be able to arrive at a communication strategy or approach to boil these issues down to their basic elements so that they are meaningful and useful for crew and passengers. At the risk of oversimplifying the issue — I believe that the core of what people want to know is:

- (i) Is there an issue with this aircraft?
- (ii) What is being/has been done about it?
- (iii) Does this issue impact safety overall?
- (iv) Am I happy with the actions being taken?
and
- (v) What does this information mean for me and my decision-making about travelling on this aircraft?

Likewise, one would have also likely assumed that all operators are following any such service bulletins or directives issued by manufacturers. This accident shows that this assumption is also potentially a flawed one — and there possibly needs to be a higher level of oversight and/or accountability on the part of operators to prove to regulatory bodies, such as TC and/or the C-NLOPB, that they are adhering to both the spirit and letter of any operational and/or maintenance-related items that are initiated by manufacturers.

I, like many, hope that one of the legacies of this tragic accident is such that offshore helicopter travel is made safer for those that must use it to earn their livelihoods and support their families, and I would like to thank you for all the work that you and the Inquiry have done to this end.

The detail of this letter was such that I decided to reproduce it in full.

(10) A writer suggested that the S-92A's gearbox could be designed with an expansion tank which would have drip lines going to the bearings, so that the gearbox could operate for a longer time.

(11) Suggestions were received that there should be floating stations en route to the offshore, toward which an in-transit helicopter might head if it could continue flight for even a short time. I have heard such suggestions before, though I doubt that it would be practical because of the enormous costs and dangers involved. I do, however, reiterate my observation in the Phase I Report that C-NLOPB and the operators may wish to consider requiring future offshore installations to include additional helicopter landing and hangar facilities which would allow a search and rescue helicopter to be stationed offshore in appropriate circumstances.

(12) A final concern expressed was that the face seal, which prevents water from entering the goggles after a helicopter ditching, may be inadequate.

In general, members of the public and offshore workers recognize that improvements have been made, but nevertheless many people still have significant levels of anxiety over helicopter offshore travel on the S-92A.

There were two submissions which fall into the public response category. These submissions were received from Ms. Lana Payne, President of the Newfoundland and Labrador Federation of Labour, and Ms. Lorraine Michael, Member of the House of Assembly for Signal Hill-Quidi Vidi. Both of these persons also made presentations in Phase I of the Inquiry. Their Phase II submissions I have, with their consent, placed on our website.

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Newfoundland and Labrador Federation of Labour

(submission attached as Appendix L)

This comprehensive submission touches on many of the principal aspects of the TSB Report. After some preliminary paragraphs which outline the role of the Federation of Labour, the submission says in part:

- (1) that the audits of Transport Canada and the oil operators failed to pick up the fact that a mandatory directive from the manufacturer had not been carried out
- (2) that the Australian Civil Aviation Safety Authority called on Canada's TSB to examine and investigate the fracture of the titanium studs of an S-92A in 2008, off the coast of Australia, and the TSB found that the fracture of the titanium studs was a factor in that incident
- (3) that Sikorsky's analysis identified the fracture of the titanium studs as the cause of the main gearbox oil loss

The submission also asks whether Transport Canada was informed of the TSB Findings and whether Cougar's auditors were made aware of them.

The submission goes on to express its opinion that night flights should be prohibited, particularly because the S-92A still has only an 11-minute run-dry capability and because night rescue is much more difficult than day rescue. It refers also to comments on these issues made in the Phase I Report. It notes that after the TSB Report on Emergency Flotation Systems, it was the oil operators who responded, not the Regulator.

Following other criticisms, the submission makes an important point regarding the aftermath of the Australian incident in which two of the titanium bolts fractured:

This enhanced inspection became mandatory in November 2008. In January 2009, Sikorsky followed up with an Alert Service Bulletin. That Bulletin, in addition to the enhanced visual

inspections, required the replacement of all MGB filter bowl titanium mounting studs within 1,250 flight hours or one year.

This, of course, gave the absolute wrong message to operators. It lacked urgency. The message: there is plenty of time to get this done. It also failed to convey the serious consequences of inaction.

The submission goes on to describe flaws in the certification process of the S-92A, which has never had the 30-minute run-dry capability and did not have it when it was certified. No one apparently noticed that the “remote possibility” was, after the Australia incident, no longer remote. That is the area of concern over the S-92A shortcomings. Again, no one saw fit to take action. The submission also raises the matter which concerned the TSB, that in the C-NL offshore, even a 30-minute run-dry capability may not be enough.

The Federation’s submission supports the TSB’s call for the elimination of the “extremely remote” provision which was used to certify the S-92A, despite its having only an 11-minute run-dry capability. It asks whether the S-92A should be grounded until it has at least the 30-minute run-dry capability. It raises the question of what should be C-NLOPB’s role in such matters. It refers to the Third International Regulators’ Conference (2010), which concluded that “wherever possible the best standards should be identified and applied internationally” and says that such a standard should be applied to the C-NL offshore.

The Federation discusses the 10-year delay in the introduction of the EUBA (emergency underwater breathing apparatus). It calls for more stringent basic survival training and the elimination of night flights. The conclusion deserves to be read by every reader of this Report. It says as follows:

Conclusion

The TSB report confirms why it is we need a separate, powerful, independent safety regulator for the C-NL offshore.

It also raised as many questions as it answered.

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It raised real concerns around the role of the regulators and their relationship with industry.

The TSB report raised our anger with respect to how so much could go wrong. This is not a case of one error. This is a case of a stunning 16 factors or causes. This is a shocking statement about a health and safety culture littered with holes that need plugging.

It raised the question of why workers in our offshore do not have the best available safety capacity in the helicopters in which they ride to work.

It raised questions about the relationship between helicopter operators and manufacturers and how directives from the latter are dealt with by the operators. It raised issues about how compliance is enforced and who does that, and about how these directives are incorporated into safety plans and fed to the regulator and the joint workplace occupational health and safety committees.

Surely there must be a role for the regulator, like the kind recommended by Commissioner Wells in Phase I, to ensure compliance with such orders. Manufacturers should be required to inform all regulators governing offshore helicopter transport as well as operators. And regulators must be vigilant about ensuring directives are followed and complied with, and if they are not then steps need to be taken to enforce compliance.

The TSB report also raised the issue of what role Transport Canada actually plays. Has it conceded too much of its decision-making authority to its sister organization, the FAA?

The workers employed in the C-NL offshore deserve the best international practices. They deserve to have the safest and best of helicopter technology available. We should indeed be setting standards, not lagging by a quarter of a century. As we expressed in our Phase I submission, we believe in and support a model of industrial democracy. We believe this concept was embraced by Commissioner Wells in his first report:

In a free and democratic society such as Canada, as much information as possible on all safety matters should be made public at all times. Exceptions ... should be kept to a minimum.

(p. 303)

In free and democratic societies, unions have an important and legitimate role to play. The union representing workers in the offshore must be given every opportunity to play that role – this means electing and choosing their own representatives for bipartite and multi-stakeholder boards as we would expect in any democracy. It means they must be part of the communication stream, but they can only do that if they have the knowledge and information to share.

Finally, we thank you for this opportunity. We hope our comments are helpful to your deliberations.

We firmly believe that every accident is preventable. Our hope is through this Inquiry process, offshore health and safety is transformed. The families of 16 men and one woman who died March 12, 2009 deserve this to be the least of our efforts. The women and men who continue to seek their living offshore deserve the same.

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Canada-Newfoundland and Labrador

Lorraine Michael, Member of the House of Assembly, Signal Hill-Quidi Vidi; Leader, New Democratic Party of Newfoundland and Labrador

(submission attached as Appendix M)

Ms. Michael supports the Recommendations of Phase I and the favourable response of the Government of Newfoundland and Labrador to all the Recommendations. She welcomes also the statement of the former federal Minister of Transport that the Government would “support the intent of the TSB recommendations to improve helicopter safety.”

Ms. Michael is not satisfied with what she describes as the slow progress being made in improving helicopter offshore safety. She refers to the lack of a 30-minute run-dry capability and asks whether even a 30-minute run-dry time is adequate when helicopters are operating in extreme environments. She is not satisfied by the responses thus far to the tragic failure of the S-92A and the causes of that failure. Ms. Michael is concerned by the anxieties being communicated to her by offshore workers, and by their fears about speaking openly. She reiterates her desire to see that an independent offshore safety authority is created. She believes that C-NLOPB shows no sense of urgency.

Ms. Michael calls also for the S-92A to be removed from offshore service until it has the 30-minute run-dry capability. She is aware of the implications of suspending the S-92A from service but says the costs pale in comparison to the risks which passengers are being asked to take. She gives an example of another helicopter which she believes to be superior for offshore transportation. Ms. Michael concludes by urging this Commissioner to act on her submissions.

I wish to thank all those who made submissions to the Inquiry. Their efforts and input will improve safety in the C-NL offshore.

Observations as to the Submissions

The reader will notice that those entities which have a responsibility for safety in the offshore, in which group I include the C-NLOPB, the oil operators, the helicopter operator, the suit manufacturer, and the trainers, have taken the Recommendations made in Phase I of this Inquiry and in the TSB Report very seriously and have moved forward on a wide variety of fronts. For that they deserve commendation and support in their efforts. It is also apparent that the foregoing organizations as a group recognize the overlap between the Inquiry Report and many sections of the TSB Report, all of which are now being worked on. They have also taken the position that this Inquiry should not make further recommendations in Phase II.

The remaining entities, a group which comprises the union, the families, the pilots' families, the public, and the other presenters, express a variety of serious concerns, not only with day-to-day safety issues but also with the problems of the S-92A helicopter, as detailed in the TSB Report. Their references are to the certification process and the history of the aircraft's main gearbox problems, including the lack of the expected gearbox run-dry capability and the inadequacy of the titanium studs which secured the filter bowl of the gearbox oil reservoir. I will deal with these issues and what I consider to be the role of the Inquiry, in respect of the matters raised in the TSB Report.

Chapter Two

Overview of the Transportation Safety Board Report

Overview of the Transportation Safety Board Report

The Transportation Safety Board's Recommendations

The TSB began its Report with a description of the initial event and the safety issues arising from it.

EVENT

On 12 March 2009 a Cougar Helicopters' Sikorsky S-92A on a flight to the Hibernia oil production platform had a total loss of oil in the transmission's main gear box. The flight crew descended to 800 feet and headed towards St. John's. Approximately 35 nautical miles from St. John's, during an attempted ditching, the helicopter struck the water in a high rate of descent. One passenger survived with serious injuries and the other seventeen occupants of the helicopter died of drowning.

SAFETY ISSUES

- Category A rotorcraft certified under the "extremely remote" criteria may not be capable of continued operation for 30 minutes with only residual main gear box lubrication.
- Given today's operating environments, it may now be technically feasible and economically justifiable to produce a helicopter that can operate in excess of 30 minutes following a massive loss of main gear box lubricant.
- Helicopter crews and passengers in Canada remain at risk where helicopters are operated over sea states exceeding the capability of their Emergency Flotation Systems.
- Without a supplemental breathing system, occupants have very little time to egress from a submerged or capsized helicopter before breaking their breath-holds in cold water.

The descriptions of the event and the safety issues in the Occurrence Summary speak for themselves. I accept them and, in fact, the TSB Report becomes the evidence which, by my Terms of Reference, I must examine in order to move forward into Phase II of this Inquiry.

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As a first step, I will examine the four TSB Recommendations.

Recommendation 1

- The Federal Aviation Administration, Transport Canada and the European Aviation Safety Agency remove the "extremely remote" provision from the rule requiring 30 minutes of safe operation following the loss of main gearbox lubricant for all newly constructed Category A transport helicopters and, after a phase-in period, for all existing ones.

Recommendation 1 is to the FAA, Transport Canada, and the European Aviation Safety Agency. This Inquiry has no jurisdiction to recommend to the FAA or EASA but it has jurisdiction under clause (b) of its Phase II Terms of Reference to make recommendations to Transport Canada, through the C-NLOPB. This Inquiry totally supports Recommendation 1. I believe the "extremely remote" provision under which the S-92A was certified was itself flawed in that it allows a regulator to excuse a design requirement that is a legitimate industry expectation and has been so for some time. The information given to the FAA and subsequently accepted by Transport Canada, that the total loss of gearbox oil in the S-92A was an "extremely remote" possibility, was an opinion only. Though accepted at the time, the opinion was proven wrong on July 2, 2008, off the Australian coast, when all gearbox oil was lost after two of the three titanium studs fractured.

Following the Australian incident and the subsequent investigations, it is difficult to understand why the "extremely remote" provision continued to be used for new helicopters and why a phase-in period for the 30-minute run-dry capability was not required of Sikorsky. This Inquiry supports and endorses Recommendation 1.

Recommendation 2

- The Federal Aviation Administration assess the adequacy of the 30 minute main gearbox run dry requirement for Category A transport helicopters.

It is well known that the 30-minute main gearbox run-dry requirement came about because of military needs. It has now become an international standard for Category A transport helicopters, civilian as well as military. Offshore oil exploration and production take place as much as 500 kilometres from onshore bases, i.e., up to 500 kilometres over hostile and dangerous waters, as is the case in the C-NL offshore. In this offshore, the nearest installation (Hibernia) is 315 kilometres from land. At midpoint and for some kilometres around midpoint, a 30-minute run-dry capability would still require a ditching if all gearbox oil were to be lost, but pilots would have a better opportunity to be closer to St. John's, a ship, or an offshore installation.

I do not know to what extent the run-dry capability can be enhanced to exceed 30 minutes, but I am certain that at midpoint between land and the nearest offshore installation in the C-NL offshore, an oil loss would necessitate at a bare minimum a 45-minute run-dry capability or more, in order to provide a safe margin for landing either on shore or at an offshore installation.

This Inquiry therefore supports and endorses TSB Recommendation 2.

Recommendation 3

- Transport Canada prohibit commercial operation of Category A transport helicopters over water when the sea state will not permit safe ditching and successful evacuation.

In the C-NL offshore, gale force winds, high seas, frigid waters, and fog are commonplace, especially in late autumn and winter. For these reasons, the TSB Recommendation 3 is essential and deserves endorsement and support from regulators and the industry. That is the position of this Inquiry. The difficulty posed by this Recommendation is that there will likely be differing opinions as to when a sea state will not permit safe ditching and successful evacuation. The subject deserves careful study and wide input.

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Recommendation 4

- Transport Canada require that supplemental underwater breathing apparatus be mandatory for all occupants of helicopters involved in overwater flights who are required to wear a Passenger Transportation Suit System.

The issue of supplemental breathing apparatus has been thoroughly canvassed by the TSB and by this Inquiry in Phase I. The Helicopter Underwater Emergency Breathing Apparatus (HUEBA) (also known as EUBA) can mean the difference between life and death for a passenger or crewmember of a downed helicopter. This Inquiry therefore supports and endorses Recommendation 4.

The Transportation Safety Board's Findings

I now move to the TSB's conclusions. I will reproduce each Finding because some readers may not have had an opportunity to read the TSB Report. Findings which do not require comment from me are quoted without comment. Others I will comment on, not to disagree, because I have no disagreement with any of the TSB's conclusions, but rather to identify those which I may consider under either clauses (a) or (b) of my Phase II Terms of Reference.

3.1.1 Findings as to Causes and Contributing Factors

1. Galling on a titanium attachment stud holding the filter bowl assembly to the main gearbox (MGB) prevented the correct preload from being applied during installation. This condition was exacerbated by the number of oil filter replacements and the re-use of the original nuts.
2. Titanium alloy oil filter bowl mounting studs had been used successfully in previous Sikorsky helicopter designs; in the S-92A, however, the number of unexpected oil filter changes resulted in excessive galling.
3. Reduced preload led to an increase of the cyclic load experienced by one of the titanium MGB oil filter bowl assembly attachment studs during operation of CHI91, and to fatigue cracking of the stud, which then developed in a second stud due to increased loading resulting from the initial stud failure. The two studs broke in cruise flight resulting in a sudden loss of oil in the MGB.
4. Following the Australian occurrence, Sikorsky and the Federal Aviation Administration (FAA) relied on new maintenance procedures to mitigate the risk of failure of damaged mounting studs on the MGB filter bowl assembly and did not require their immediate replacement.

I have difficulty in understanding why, after it was known that titanium studs could fracture as they did, Sikorsky and the FAA did not treat the matter as urgent and require that the titanium studs be replaced by

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steel studs forthwith. This is especially so because both Sikorsky and the FAA knew:

- (a) that the fracture of the studs could cause a total loss of main gearbox oil, as happened off Australia on July 2, 2008
- (b) that with a complete loss of main gearbox oil, the run-dry capability was only 11 minutes
- (c) that after July 2, 2008, the complete loss of main gearbox oil was not nearly as “remote” a possibility as originally thought.

The TSB Findings continue as follows:

- 5. Cougar Helicopters did not effectively implement the mandatory maintenance procedures in Aircraft Maintenance Manual (AMM) Revision 13 and, therefore, damaged studs on the filter bowl assembly were not detected or replaced.

That fact calls into question the credibility of the audit process. In the Phase I Report, I wrote:

Depth and level of expertise are necessary to avoid what I would describe as a cursory audit by a person who knows little about aviation/helicopter operations and safety. A cursory audit, I believe, adds little value and may only serve to distract the helicopter operator from other tasks, but an informed audit by an auditor having aviation expertise would be a valuable safety asset and I will recommend this be done. (p. 243)

- 6. Ten minutes after the red MGB OIL PRES warning, the loss of lubricant caused a catastrophic failure of the tail take-off pinion, which resulted in the loss of drive to the tail rotor shafts.
- 7. The S-92A rotorcraft flight manual (RFM) MGB oil system failure procedure was ambiguous and lacked clearly defined symptoms of either a massive loss of MGB

oil or a single MGB oil pump failure. This ambiguity contributed to the flight crew's misdiagnosis that a faulty oil pump or sensor was the source of the problem.

That conclusion raises the question of the degree to which aviation regulators examine rotorcraft flight manuals to ensure that their wording and layouts are as clear, concise, and unambiguous as possible.

8. The pilots misdiagnosed the emergency due to a lack of understanding of the MGB oil system and an over-reliance on prevalent expectations that a loss of oil would result in an increase in oil temperature. This led the pilots to incorrectly rely on MGB oil temperature as a secondary indication of an impending MGB failure.
9. By the time that the crew of CHI91 had established that MGB oil pressure of less than 5 psi warranted a "land immediately" condition, the captain had dismissed ditching in the absence of other compelling indications such as unusual noises or vibrations.
10. The captain's decision to carry out pilot flying (PF) duties, as well as several pilot not flying (PNF) duties, resulted in excessive workload levels that delayed checklist completion and prevented the captain from recognizing critical cues available to him.
11. The pilots had been taught during initial and recurrent S-92A simulator training that a gearbox failure would be gradual and always preceded by noise and vibration. This likely contributed to the captain's decision to continue towards CYYT [St. John's Airport].
12. Rather than continuing with the descent and ditching as per the RFM, the helicopter was levelled off at 800 feet asl, using a higher power setting and airspeed than required. This likely accelerated the loss of drive to the tail rotor and significantly reduced the probability of a successful, controlled ditching.

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13. The captain's fixation on reaching shore combined with the first officer's non-assertiveness prevented concerns about CHI91's flight profile from being incorporated into the captain's decision-making process. The lack of recent, modern, crew resource management (CRM) training likely contributed to the communication and decision-making breakdowns which led to the selection of an unsafe flight profile.
14. The throttles were shut off prior to lowering the collective, in response to the loss of tail rotor thrust. This caused significant main rotor rpm droop.
15. The pilots experienced difficulties controlling the helicopter following the engine shut-down, placing the helicopter in a downwind autorotative descent with main rotor rpm and airspeed well below prescribed RFM limits. This led to an excessive rate of descent from which the pilots could not recover prior to impact.
16. The severity of the impact likely rendered some passengers unconscious. The other occupants seated in the helicopter likely remained conscious for a short period of time, but became incapacitated due to the impact and cold water shock, and lost their breath hold ability before they could escape the rapidly sinking helicopter.

3.2 Findings as to Risk

1. Certification standards for Category A rotorcraft do not require a capability of continued safe operation for 30 minutes following a failure that leads to loss of MGB lubricant if such failures are considered to be extremely remote, placing passengers and crew at risk.

I support the TSB's Recommendation that a 30-minute run-dry capability should become a certification standard. While the matter may not be so urgent in certain usages of the S-92A, its use as an offshore transportation helicopter makes a run-dry capability of 30 minutes or better an absolute imperative.

2. In distant offshore operations, including the East Coast of Canada, a 30-minute run dry MGB capability may not be sufficient to optimize eventual landing opportunities.

I fully endorse the foregoing conclusion. At the very least, the 30-minute run-dry main gearbox capability should become a requirement until a longer run-dry capability can be developed.

3. Inadequate systems knowledge related to abnormal and emergency conditions increases the risk of pilots relying on previously learned knowledge. This could lead to unintentional errors in interpreting symptoms of a system malfunction.
4. The decision not to identify time critical actions as memory items in the S-92A MGB malfunction procedure could lead to delays in carrying out actions that are vital to the safe continuation of flight.
5. The decision not to automate an emergency system activation, such as the MGB oil bypass system in the S-92A, increases the risk that critical actions will be omitted or delayed unnecessarily.
6. The lack of established standards for landing guidance definitions used in abnormal and emergency procedures leaves the definitions open to misinterpretation.
7. The lack of specific guidance and/or recommendations in the RFM pertaining to optimum airspeed and torque setting could result in the selection of a flight profile that accelerates the catastrophic failure of a gearbox that has lost oil pressure.
8. The combination of abnormal and emergency procedures into a single procedure, which focuses first on the abnormal condition, increases the risk that critical emergency actions will be delayed or omitted.
9. If manufacturers do not clearly identify critical aircraft performance capabilities in flight manuals, such as run dry

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time, there is increased risk that pilots will make decisions based on incomplete or inaccurate information during abnormal and emergency situations.

Finding 9 is important and should be emphasized, because it is essential to ensure that the identification of critical performance capabilities is clearly and concisely expressed in flight manuals.

10. The omission of caution or warning messages from a quick reference legend could result in delays in locating the appropriate abnormal or emergency response in a pilot checklist.
11. The use of non-current publications such as RFM, standard operating procedures (SOPs) and checklists, increases the risk that critical steps of an approved procedure will be omitted or delayed.
12. Under the current regulations, CAR 703 and 704 operators are not required to provide CRM. As a result, there is an increased risk that crews operating under CAR 703 or 704 will experience breakdowns in CRM.
13. The current CRM regulation and standard for CAR 705 operators have not been updated to reflect the latest generation of CRM training or to include CRM instructor accreditation. As a result, there is a risk that flight crews may not be trained in the latest threat and error management techniques.
14. The current basic survival training (BST) standards in Canada lack clearly defined, realistic training standards and equipment requirements. This could lead to differences in the quality of training and affect occupant survivability.

Finding 14 overlaps my Recommendation 13 of Phase I and is now part of the ongoing work in the C-NL offshore; that work involves C-NLOPB, the oil operators, the trainers, and the workers/passengers. I should note that my Recommendation 13 was directed only toward the

C-NL offshore jurisdiction because it is to that jurisdiction that my Terms of Reference apply. I need make no further recommendations on this issue.

15. An interval of 3 years between recurrent BST may result in an unacceptable amount of skill decay between recurrent training sessions. This skill decay could reduce the probability of successful egress from a submerged helicopter.

I dealt with the above issue in my Recommendation 13 of Phase I. Knowing that the C-NL offshore has a three-year recurrent BST while other jurisdictions, such as Norway and the United Kingdom, have a four-year recurrent BST, I did not recommend that there be a lower recurrent BST than three years. I agree that more frequent training could be beneficial, but I believe that such detail is better left to the safety Regulator, the oil operators, the trainers, and the workers, all of whom are able to consult with experts who can bring a greater understanding to the matter. I do, however, commend the issue again to them, with the suggestion that the frequency of training should be given careful consideration for the future.

The Findings which follow concern matters dealt with in my Recommendation 16 of Phase I.

16. Passenger Transportation Suit Systems (PTSS) designed to meet the standard for marine abandonment have high buoyancy and flotation capabilities. While useful in a marine abandonment situation, these features may interfere with a successful egress from a submerged helicopter.
17. There are minimal regulations and standards pertaining to offshore helicopter flight crew suit use and maintenance. This increases the risk that flight crews will be inadequately protected following a ditching or crash at sea.
18. Offshore helicopter flight crew suits that are not a high visibility colour reduce the probability of detection by

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search and rescue crews following a ditching or crash at sea. This could significantly delay rescue at night or in bad visibility.

19. Without regulations and standards pertaining to personal locator beacons (PLB) for helicopter occupants, inappropriate PLB types may be selected for helicopter transportation, resulting in delays locating a person floating in the ocean.

My comment again is one of support and I would suggest to the aviation and safety committee which has been set up by C-NLOPB that it incorporate the above conclusions into its ongoing work.

20. The use of improper passenger transportation suit system (PTSS) fitting techniques may result in unacceptable levels of water ingress and a subsequent rapid loss of body temperature, following a ditching or crash at sea.

The matter of passenger transportation suit systems (PTSS) and fitting techniques has already been addressed in the C-NL offshore and I believe our present systems to be equal to or better than systems used elsewhere. I do note, however, that Helly Hansen, which supplies suits for the C-NL offshore, recommended in Phase I and again in Phase II of this Inquiry that the combination of aviation and marine requirements in a single suit is not the best approach. They recommend for helicopter passengers an aviation survival suit only. In my reading I have seen the same opinion expressed elsewhere. Helly Hansen's recommendation should be carefully considered when the Canadian General Standards Board is examining the issue of suit appropriateness.

21. There is no requirement for occupants of a helicopter to be equipped with EUBAs for prolonged over water flight. As a result, occupants are exposed to an increased risk of drowning following a ditching or crash at sea.

The EUBA, or HUEBA, is now a requirement of C-NLOPB and is in use in the C-NL offshore.

22. The lack of regulation requiring pilots to wear helmets and visors places them at greater risk of incapacitation due to head injuries following a ditching or crash. This type of injury jeopardizes a pilot's ability to assist in the safe evacuation and survival of the passengers.

The foregoing was addressed in my Recommendation 15 of Phase I. Regulations regarding pilot helmets are now being studied by C-NLOPB, the oil operators, and the helicopter operator. Funding for these helmets is dealt with by the oil operators in their submission.

23. Ditching in adverse weather conditions, and sea states in excess of the capability of the emergency flotation system (EFS), places passengers and crew at risk.

These issues were addressed in my Recommendation 9 of Phase I, and are now being examined by the C-NLOPB safety committee.

24. If offshore helicopter EFS systems are only designed to withstand the force associated with a ditching, there is a continued risk that these systems will be disabled in survivable impacts contributing to occupant deaths from drowning.

These issues were addressed in my Recommendations 9 and 27 of Phase I, and are now being examined by the safety committee.

25. Without an immediate signal being transmitted from an emergency locator transmitter (ELT), water attenuation of a useable ELT signal from a submerged aircraft may continue. This increases the risk of an ELT signal not being received and SAR resources not being launched in a timely manner.
26. The use of g-switches for the purpose of stopping a cockpit voice recorder (CVR) or combined CVR/FDR (flight data recorder) will likely continue to result in the loss of potentially valuable CVR or CVR/FDR data. As a result, there is an increased risk that future accident investigations will be impeded.

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The foregoing Findings number 25 and 26 are outside the role of C-NLOPB and the scope of this Inquiry, and they concern matters for Transport Canada to consider.

3.3 *Other Findings*

1. The survivor likely lived through the accident due to his age, fitness, mental preparation, recent helicopter underwater escape training (HUET), previous cold water acclimatization, and a strong will to survive.

I agree with the above conclusion. The concept underlines fitness, mental preparation, and training. All of the above measures will aid in survival, as will mental control, the determination not to succumb to panic, and the resolve to survive.

It may be that passengers can be assisted in their mental preparation by courses designed to be incorporated into the training process. Advice should be sought from psychologists or other professionals as to whether the foregoing is a practical suggestion.

2. It could not be determined why the survivor's body temperature dropped 7.2°C so quickly in the time he was exposed to water temperatures in the 0.2°C range.

The evidence which I heard in the Phase I public hearings led me to conclude that the survivor's body temperature dropped so quickly because of his injuries and the fact that his suit leaked. The water temperature at the time of the crash was 0.02° Celsius, and we know from the research being carried out by the National Research Council in St. John's, NL, that the entry of even half a litre of very cold water into a survival suit, especially in severe wind and wave conditions, can cause a precipitous decline in body temperature. It underlines what I have often said in this process, that our offshore conditions are so extreme that the highest levels of survival suit protection are necessary if persons are to survive after a crash or ditching.

3. Both organizations providing BST training in Canada met or exceeded the current BST training standards.

4. The E-452 PTSS met the Canadian General Standards Board (CGSB) standards and was considered adequate for the risks of the operational environment at the time of the occurrence.

I agree that the E-452 PTSS was considered adequate at the time of the occurrence. Nevertheless, the newer HTS-1 suit is an improved version and I believe that ongoing research and development will result in even better suits in the future.

I should re-emphasize at this point that my not commenting on some TSB Findings which are technical does not mean a lack of either interest in or support for them. The discussion and analysis sections of the TSB Report make it quite clear that many matters are in need of improvement.

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Discussion and Synopsis of the Transportation Safety Board Report

Taken as a whole, the Transportation Safety Board Report was informative, detailed, and comprehensive. It provided information about the March 12, 2009, accident that could not have come from any other single source.

The portions of the Report which overlapped with my Phase I observations and Recommendations were particularly reassuring to me as Commissioner, because in so many of the topics, such as safe ditching and survival procedures, our respective Recommendations complemented and reinforced each other. I should also note that I have not heard of any disagreement with the TSB Report. Work arising from the Inquiry's Phase I Recommendations is ongoing and the necessity for that work is emphasized by a considerable number of the TSB's Findings and Recommendations.

As to the more technical subjects addressed by the TSB, its conclusions are, and will continue to be, of value not only to Transport Canada but, I hope, to other aviation regulators as well. They will also be helpful for manufacturers, helicopter operators, offshore oil operators, workers, and the offshore safety Regulator.

The reader will remember that at the time of certification it was officially known that the S-92A did not have the expected 30-minute run-dry capability which is normal in similar helicopters. Its run-dry capability was and still is about 11 minutes.

I believe that the Australian incident of July 2, 2008, should have been interpreted as a clear warning that in addition to the lack of the usual run-dry capability, there was another threat to the integrity of S-92A operations. It was the possibility, no longer "extremely remote," that the titanium filter bowl studs could fracture and cause a complete loss of main gearbox oil. I think it was very unfortunate that the titanium stud issue was characterized as a service or maintenance issue right up to the Alert Service Bulletin of January 28, 2009, and the crash of March 12, 2009. I see the issue as being the correction of a design flaw, by requiring steel studs instead of titanium.

It is important that readers with an interest in or a responsibility for offshore air safety should reflect on the following excerpts from the TSB Report. I will now quote several passages directly so that readers will be clear as to the kind of rigorous regulatory oversight which is necessary for the maximum level of safety in helicopter operations. The following excerpt is the evidentiary basis for what I say in this Phase II Report and I have inserted it so that anyone who has not studied the TSB Report will be able to understand the context of what I will say. The TSB Report provides me with knowledge of the causes of the March 12, 2009, crash, and that is why public hearings were not necessary in Phase II.

1.18.3.2 CHC Helicopter Incident in Western Australia on 02 July 2008

On 02 July 2008, a S-92A helicopter (registration VH-LOH, serial number 920036) operated by Canadian Helicopters Corporation (CHC) Australia was returning from an offshore oil facility en route to Broome, Australia with 2 pilots and 14 passengers onboard. The helicopter had been flying at 6000 feet asl for approximately 90 minutes when there was a red MGB OIL PRES warning message followed by the audio warning “Gearbox Pressure...Gearbox Pressure.” The MGB oil pressure was less than 5 psi and decreasing and the MGB oil bypass switch was activated approximately seven seconds after noticing the low oil pressure warning.

The PF, who was the first officer, commenced an immediate descent. The captain elected to continue the non-flying pilot duties to carry out the emergency checklist and to focus on the diagnosis of the problem. It was the flight crew’s understanding that the MGB would fail in a progressive manner rather than suddenly. Since the “less than 5 psi” condition coincided with the illumination of the red MGB OIL PRES warning message, the crew did not initially consider the low pressure to be a secondary indication of an impending gearbox failure. In addition, there were no other secondary indications detected and the MGB oil temperature remained below 80C. This led the crew to respond as if they were in a “land as soon as possible” condition. The rapid drop in oil pressure was so different to their simulator training that they initially believed they had experienced a sensor or

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indicator problem. However, through collaboration, the pilots realized that the warning and oil pressure indication did not come from a single sensor, eliminating that possibility.

As the crew approached the only suitable landing area nearby, the rate-of-descent was increased and the pilots carried out a landing without further incident approximately seven minutes after the first warning. The captain indicated that if they had been flying over water, and there had been no other secondary indications, he would have continued flight toward land at an altitude of 200 feet agl and an airspeed of 80 knots.

The initial visual examination by CHC maintenance personnel and a Sikorsky field representative revealed that two of the three MGB oil filter bowl studs had fractured and the filter bowl had partially separated from the MGB causing a total loss of oil. One of the failed studs had been repaired on 09 June 2008 (see 1.18.3.4).

A boroscope inspection was subsequently carried out to assess the condition of the internal MGB components. Following this inspection, it was determined that the helicopter was safe to fly to the maintenance base. The MGB was subsequently removed and shipped to Sikorsky on 20 July 2008. The MGB was disassembled, refurbished at a Sikorsky-approved overhaul facility, then returned to service and installed on another helicopter. Based on the information available at the time, the Australian Transport Safety Bureau (ATSB) chose not to investigate and the FDR/CVR data was not retrieved or analyzed.

1.18.3.3 Sikorsky's Safety Management Process

Sikorsky has a safety management program integrated into its operation. This program utilizes several processes to identify hazards and manage risk from preliminary helicopter design, field operations, and the continuing airworthiness program. Once potential hazards are identified, the level of risk is assessed utilizing processes such as: functional hazard assessments; fault tree analysis; failure mode and effects analysis; and common cause analysis.

Sikorsky has many ways of detecting hazards such as operator reports or deficiency trend monitoring. One of Sikorsky's primary sources of hazard identification is its network of field service representatives. Throughout a helicopter's life cycle, Sikorsky assigns a Lead System Safety Engineer who is responsible for providing guidance for safe designs, identifying potential safety hazards, conducting risk assessments, tracking safety hazards, and verifying that risk has been eliminated or properly mitigated. When a mitigation plan is arrived at and a corrective action is put in place, Sikorsky closes the safety process loop by continuing to monitor the outcome of the corrective action. Mitigation decisions for higher-level potential safety hazards are reviewed by an internal Senior Safety Council at Sikorsky.

Sikorsky has the highest-level Organization Designation Authorization ¹²¹ issued by the FAA, and works closely with both the Boston Aircraft Certification Office and the Rotorcraft Directorate's Aircraft Evaluation Group in addressing potential safety issues.

¹²¹ Organization Designation Authorization (ODA) means the authorization to perform approved functions on behalf of the Administrator.

1.18.3.4 Previous Maintenance and Follow-up Action

VH-LOH's MGB oil filter bowl had been removed and reinstalled 17 times during the helicopter's total time in service (1233.4 hours). Approximately 58 flight hours before the July 2008 incident, on 09 June 2008, a MGB oil filter bowl mounting stud had fractured during removal of the attachment nut. Because a new stud and the proper tools were not immediately available, after consulting with Sikorsky's local field service representative, CHC carried out a temporary repair, installing a self-locking nut on the fractured stud. The self-locking feature of this nut did not fully engage the shortened length of the fractured stud so a hole was drilled in the nut to lockwire it for security. Although Sikorsky's engineering department was not specifically consulted, no technical objections to the temporary repair were presented by the Sikorsky field service representative.

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Following the 02 July 2008 incident, Sikorsky unsuccessfully attempted to have the failed studs returned to them. In the absence of the parts, Sikorsky relied on photographs and written observations to determine if there was an issue that may affect the S-92A fleet. Based on the information that was available at the time, Sikorsky believed that the repair carried out on the stud likely led to the MGB's total loss of lubricant. Even though Sikorsky began a design review of the stud, without their metallurgists examining the studs, they could not positively identify the cause of the failure nor could they conclude if there was an issue that would affect the S-92A fleet.

On 14 July 2008, the Australian Civil Aviation Safety Authority and CHC decided to have the fractured studs inspected by an Australian engineering firm.

On 22 July 2008, the Australian engineering firm examined the studs. Representatives from Sikorsky were not present for this examination. The firm's preliminary conclusion was that the stud fractures were most likely due to overload, probably from over tightening of the nuts. Although the report noted that the examination had not been comprehensive, and recommended that a full metallurgical examination be carried out, the findings appeared to support Sikorsky's belief that the failure was likely due to the CHC maintenance actions.

1.18.3.5 Early Action Taken by Sikorsky

Each week, Sikorsky conducts a webcast with its S-92A operators, covering various topics. These webcasts have very good participation and operators are not hesitant to ask questions or provide comments. On 12 August 2008, Sikorsky's S-92A weekly webcast addressed the CHC incident, stating that while the exact failure mode was still under investigation Sikorsky personnel suggested that extra attention be given to the condition and torque of filter bowl fasteners. They then discussed the field repair as the possible cause of the stud failure. Sikorsky did not receive any feedback about this information from any of its S-92A customers. Cougar Helicopters personnel participated in the 12 August 2008 webcast; however, this incident was not

considered a cause for concern since the problem was attributed to another company's field repair.

1.18.3.6 Independent Examination Work in Canada

CHC contracted a Canadian engineering firm to carry out a further examination of the fractured studs from VH-LOH. The Australian Government Civil Aviation Safety Authority (CASA) contacted the TSB and requested that the TSB oversee the examination on its behalf. On the 26-27 August 2008, a TSB investigator, along with Sikorsky and CHC representatives, attended the examination of the fractured studs. The TSB provided examination notes and observations to CASA and the FAA (29 August 2008). Based on the information that was available, the Canadian engineering firm's 25 September 2008 report indicated that two oil filter housing attachment studs failed in a low cycle, one way bending, fatigue mode of progressive cracking. The most probable cause for the stud to fracture was either inadequate preload¹²² when the nuts were installed or a loss of preload after the nuts were installed. While the cause of the preload discrepancy could not be positively determined, one possibility that was identified was galling on the titanium studs.

¹²² The tension created in a fastener when it is first tightened. Preload must be greater than the external forces applied to the assembly to prevent joint failure.

1.18.3.7 Further Analysis and Risk Assessment by Sikorsky

Sikorsky received the failed studs from the CHC occurrence on 04 September 2008. By 09 September 2008, Sikorsky's material laboratory produced its initial results. Even though titanium studs had been successfully used in other MGB oil filter attachments, Sikorsky commenced a review of the use of titanium studs in the S-92A MGB oil filter bowl application. Sikorsky, with FAA consultation, performed a risk assessment and determined that the titanium studs should be replaced by steel studs. However, Sikorsky determined that the immediate risk of a reoccurrence could be mitigated by modifying existing maintenance procedures. By the end of September 2008, Sikorsky began working on S-92A Aircraft Maintenance Manual (AMM) Revision 13.

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On 08 October 2008, Sikorsky issued Safety Advisory (SA) SSA-S92-08-007, to advise operators of upcoming changes to the AMM which included an interim enhanced inspection procedure for the removal and installation of the MGB filter bowl assembly. These procedures included an enhanced visual examination of the studs, checking run-off and run-on torques, and mandatory replacement of used nuts with new nuts.

Task 63-24-02-210-001 of Revision 13 of the AMM required a 10x magnifying glass and an inspection mirror. The AMM provided the following direction for the inspection of the gearbox mounting stud threads:

(1) Using magnifying glass and inspection mirror, inspect gearbox mounting studs for damage:

- Galled threads
- Broken threads
- Missing threads
- Flattened threads

NOTE: A slight shininess on stud threads from silver plating on nuts is acceptable.

(2) No damage of any kind is allowed. Contact Sikorsky field representative if any damage is found.

On 05 November 2008, with AMM Revision 13, these enhanced inspection procedures became mandatory industry-wide. As of that date, Sikorsky had not received any reports of damaged MGB oil filter bowl attachment studs nor had any of the operators ordered replacement studs, with the exception of the Australian incident helicopter.

On 20 October 2008, Sikorsky released Engineering Instruction (EI) 92-725-35-080 requiring the replacement of the titanium studs with steel studs. This internal document, issued specifically to address a safety related issue, was effective from that date onward. As a result, titanium studs would no longer be used during the manufacture of new S-92A helicopters, and any failed

titanium studs from the field would have to be replaced with steel studs.

On 04 and 09 September 2008 and 04 November 2008, Sikorsky's S-92A weekly webcast provided operators with an update on their investigation into the CHC loss of lubricant incident. Personnel from Cougar Helicopters were online for the 09 September and 04 November webcasts. All three of these webcasts provided information pertaining to the titanium studs. During these webcasts, discussions included the obvious signs of damage (galling) to the stud threads. In addition, Sikorsky recommended that a new nut be used with each installation and they also indicated that work was underway to change the studs from titanium to steel because steel was stronger and more resistant to galling. Some of the operators who participated in the webcasts questioned how the field replacement of the studs would be carried out, asking when the material evaluations would be available and they also requested some general information about the use of titanium versus steel. During the 04 November 2008 webcast one operator indicated they were performing the run-on torque measurement, as described in SSA-S92-08-007, and requested clarification as to the final torque procedure. No comments were received pertaining to the 10X visual examination of the stud threads or to the enhanced inspection procedures.

On 28 January 2009, Sikorsky issued Alert Service Bulletin (ASB) 92-63-014 requiring the replacement of the MGB filter bowl titanium mounting studs with steel studs, within 1250 flight hours or 1 year. The compliance time was based on Sikorsky's assessment of the risk and the time it would take to replace the studs in the field without compromising safety. At the time the ASB was issued, the replacement of the studs was an overhaul facility maintenance action and Sikorsky needed time to develop, validate, and verify the field procedures. Because the enhanced inspections had been mandatory since the release of AMM Revision 13, both Sikorsky and the FAA felt the immediate risk of reoccurrence had been adequately mitigated and would allow continued safe operation during the specified compliance period. In January 2009, there were approximately 80 S-92As in operation worldwide. In addition, the S-92A had been in service for about 6 years prior to the CHC occurrence, which was the first

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reported instance of a MGB total loss of lubricant related to a stud failure.

1.18.3.8 TSB Examination of CHI91 Filter Bowl Mounting Studs and Nuts

Fatigue initiation was at the minor diameter of the first fully engaged thread on one stud and at the inboard radius of the serrations of the other stud. Fatigue cracking in the first engaged thread of a stud is consistent with insufficient preload causing an excessive vibratory loading to be transmitted to the stud.

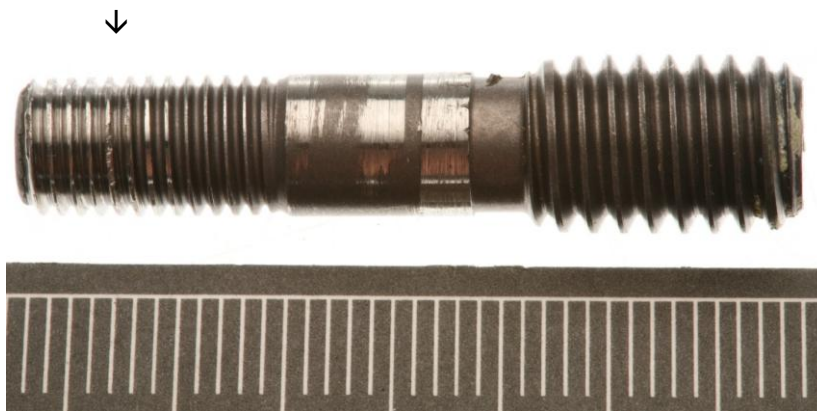


Photo 15. Stud removed from another Cougar Helicopters' MGB (scale in mm)

Galling was observed on the threads of the occurrence helicopter's studs, as well as on some of the studs removed from other Cougar helicopters. The galling noted on these studs would have been detectable using 10X magnification, and on some studs the damage would have been visible without the aid of magnification (see circled area – Photo 15). The TSB examination suggested that the occurrence nuts and studs had accumulated sufficient galling damage to prevent the correct preload from being applied during installation. The reduced preload led to an increase of the cyclic load experienced by the studs during operation and to initiation and propagation of fatigue cracks. The TSB's examination of new studs found that even though the studs were manufactured with a coating to prevent galling, galling damage developed after the first installation of a nut, and the damage became more severe the more frequently the nut was

removed and re-installed. The occurrence helicopter, as well as at least three other Cougar helicopters, had MGB oil filter bowl attachment nuts with a grey paint residue that had been applied when the MGB was manufactured.

1.18.3.9 TSB Examination of Cougar Helicopters' MGB Filter Replacement Practices

On 07 November 2008, Cougar Helicopters inserted AMM Revision 13 into its maintenance computers and acknowledged it by signing off on the revision.¹²³ Company procedures require that maintenance personnel become aware of AMM revised procedures. Cougar Helicopters maintenance personnel are required to read each new instruction and acknowledge having done so, by signing off on the mandatory "Must Read" board.

¹²³ Upon receipt of AMM Revision 13 the enhanced inspection procedures were mandatory.

At the time of the accident, the nuts that were used on the MGB filter bowl were considered free issue and therefore, if any were used they would not be recorded in the helicopter's maintenance records. Cougar Helicopters relied on a standard industry practice for determining the serviceability of a self locking nut, which is to replace the nut when the self locking feature is no longer effective.

Between the time the occurrence helicopter was manufactured and the accident the helicopter underwent 11 MGB oil filter replacements. During the last two MGB oil filter replacements on the occurrence helicopter, AMM Revision 13 was in effect. At the time of the accident, there was no record of the 10X magnification inspection being performed, nor was there a record of a torque wrench being used to measure the run-off torques on any of Cougar Helicopters' S-92As, even though required by AMM Revision 13. AMM Revision 13 also required the oil filter mounting nuts to be changed at each removal; however, the nuts installed on the occurrence helicopter were original.

When Cougar Helicopters receives an ASB,¹²⁴ it looks at the compliance date/hours to determine how quickly it will comply

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with the work defined. Typically, the priority of an ASB with a 12-month compliance timeline is considered lower than one with a much shorter compliance timeline. Cougar Helicopters ordered the parts and tools to carry out ASB 92-63-014 on 19 February 2009, the parts request form indicated the items were a routine order for base stock and the purchase order stated that the items could be shipped in the next consolidated shipment.

¹²⁴ Occasionally aircraft manufacturers will issue documents to improve the level of flight safety, and/or to provide specific advice or instructions. These documents include Service Bulletins, Alert Service Bulletins (ASB), Service Letters, All Operator Letters, etc. The type of document issued depends upon the issuer's assessment of the urgency/severity of the information being presented, the ASB having the highest priority. However, it is left up to the owners/operators discretion as to whether they comply with these documents, as compliance is not mandatory by the regulator. Only an Airworthiness Directive, which is issued by the regulator, must be complied with.

Since the CHC occurrence had been linked to improper maintenance, Cougar placed a lower level of importance on the issue, and this had an influence on the priority of completing ASB 92-63-014. Additionally, as none of the operators participating in the webcast indicated they were having problems with the filter bowl mounting studs, there appeared to be general consensus among the S-92A community that the issue was not urgent.

1.18.3.10 Sikorsky Actions

About 2 months after the filter bowl stud problem was discussed during the Sikorsky webcast, Sikorsky issued SSA-S92-08-007 on 08 October 2008 that stated:

Sikorsky has been advised that an operator experienced the loss of MGB system oil due to a leak at the filter bowl. The investigation revealed that two of the three MGB filter bowl assembly titanium studs had sheared allowing the filter bowl to displace. As a result, Sikorsky is enhancing the current Aircraft Maintenance Manual (AMM) procedures to aid in identifying potentially damaged studs during the removal or installation of the filter bowl. It is recommended that particular attention and care be taken during the removal and installation of the

MGB filter bowl assembly to minimize any potential damage to the threaded portions of the mounting studs.

Approximately 3.5 months after the SSA, Sikorsky released ASB 92-63-014 on 28 January 2009 to its customers, which stated:

Undetected damage to an oil filter stud can lead to failure of the stud. Enhanced procedures are being added to the maintenance manual to help identify potentially damaged studs. To further enhance reliability of this connection, the titanium studs are being replaced with steel.¹²⁵

¹²⁵ Steel studs would not be as susceptible to galling as titanium.

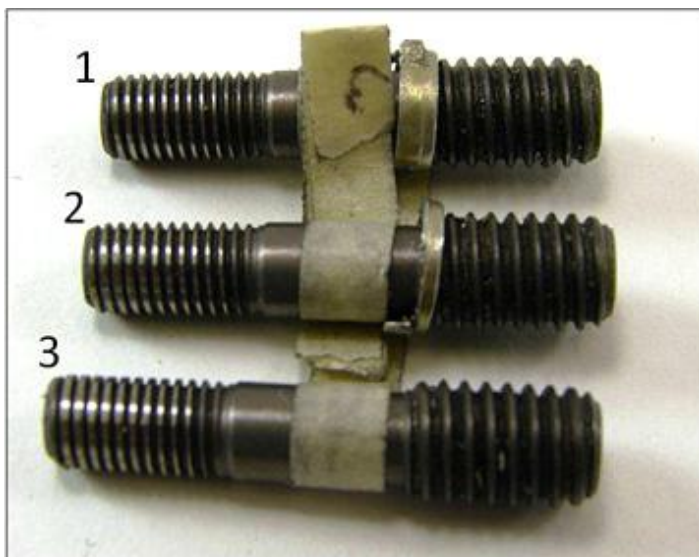


Photo 16. Studs returned to Sikorsky

Between 05 November 2008 and 23 March 2009, none of the S-92A operators reported to Sikorsky they had found any damaged studs while performing the enhanced inspection, nor had they contacted Sikorsky to comment on the steps involved with the enhanced procedures.

On 23 March 2009, the FAA issued Emergency AD 2009-07-53 for Sikorsky S-92A helicopters, which required, before further flight, removing all titanium studs that attach the MGB filter bowl

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assembly to the MGB and replacing them with steel studs. Sikorsky did not receive any reports of damaged studs between issuance of AMM Revision 13 in November 2008 and when AD 2009-07-53 was issued in March 2009. However, it did receive 59 studs from various operators after they had complied with the AD. Sikorsky examined these studs and found that they had varying degrees of galling of the threads, indicating multiple nut removals. Some of the thread damage was visible without the use of magnification. Photo 16 shows a sample of studs returned to Sikorsky, with varying degrees of galling, ranging from coating loss and minor damage to the threads (stud 1), coating loss and moderate damage to the threads (stud 2), to extensive coating loss and severe damage to the threads (stud 3). The thread damage in stud 3 of Photo 16 was visible to the naked eye. Sikorsky could not provide the time-in-service for the returned studs; however, considering the timing of the AMM revision on 05 November 2008 and the issuing of AD 2009-07-53 on 23 March 2009, and the average S-92A utilization times, they would have come from helicopters that had their filter bowls removed at least three times.¹²⁶

¹²⁶ In addition to the number of filter replacements recorded in the aircraft records, all S-92A helicopters would have had the filters replaced twice at Sikorsky Aircraft (initial test and pre-delivery) before delivery.

1.18.4 Emergency Flotation Systems

1.18.4.1 Background

Offshore oil and gas installations that rely on helicopter flights to transport workers exist around the world. In the North Sea, the United Kingdom (UK) operates some 215 such installations, employing approximately 30 000 workers. By comparison, in Canada, there are presently 7 offshore oil and gas installations with some 2000 workers. Worldwide, there are approximately 2800 offshore platforms on which workers are regularly employed. Between 1976 and 2009, there were 14 fatal helicopter accidents in UK offshore helicopter operations for a total of 136 fatalities. In Canada there has been only one other fatal accident of an offshore helicopter before CHI91.¹²⁷ In 2004, there were approximately 20 offshore helicopter accidents reported worldwide.

¹²⁷ TSB Investigation Report A85H0002.

In October 2008, a study of Canadian registered helicopter accidents into water identified drowning as the leading cause of death, a finding that is consistent with research work published in other countries.¹²⁸ Likewise, the UK CAA conducted a study into UK military and world civil helicopter water impacts over the period from 1971 to 1992. In that study, the CAA found that the majority of fatalities in both UK military (83%) and world civil (57%) helicopter impacts on water were attributed to drowning.

¹²⁸ C. J. Brooks, L. Donati, C. V. MacDonald and J. T. Taber, "Civilian Helicopter Accidents into Water: Analysis of 46 Cases, 1979-2006", *Aviation, Space, and Environmental Medicine*, 79(10), 2008, 935-940.

Two paragraphs in the Report are in my view especially important. They are the paragraphs in section 1.18.3.7 which essentially say as follows:

- (a) Sikorsky's internal Engineering Instruction of October 20, 2008, required from that date that steel studs would be used in the manufacture of new helicopters and that failed titanium studs from the field would have to be replaced with steel studs.
- (b) In webcasts on September 4 and 9 and November 4, 2008, Sikorsky discussed the obvious signs of damage (galling) to the stud threads. The webcasts also said work was underway to replace titanium studs with steel studs, "because steel was stronger and more resistant to galling."

Finally, on January 28, 2009, Sikorsky issued Alert Service Bulletin (ASB) 92-63-014, requiring the replacement of MGB filter bowl titanium studs with steel studs within 1250 flight hours or one year. The reasons given for an apparent lack of urgency related to the previously-required inspections and the fact that the July 2, 2008, Australian incident had been the only previous occurrence of stud fracturing and oil loss.

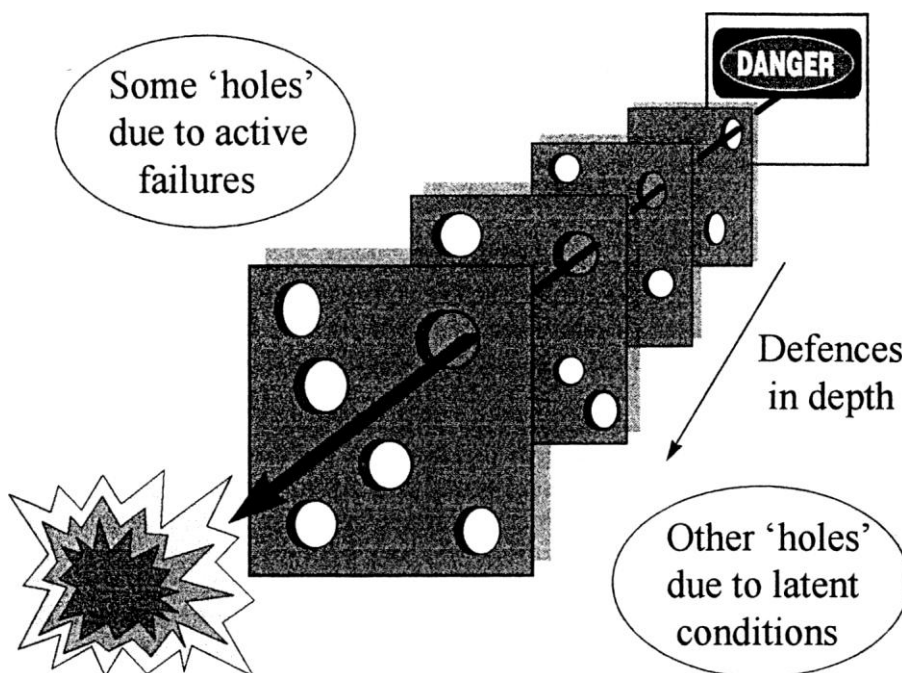
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I find it difficult to understand why the replacement studs could not have been installed forthwith or as quickly as possible. The same applies to the three-month delay in issuing the Alert Service Bulletin. Even less can I understand the replacement time frame of one year or 1250 flight hours.

It is clear from their submissions that the families of the passengers who died in the March 12, 2009, crash also have difficulty understanding why the titanium studs were not required to be replaced much sooner, and so do many offshore workers and members of the public. It is also difficult to understand why the FAA did not insist on earlier replacement, because the October 20, 2008, determination had included FAA consultations. It was well known that the S-92A was being used to transport passengers long distances over hostile ocean waters. Despite the apparent lack of urgency, Cougar Helicopters, to its credit, ordered the steel studs within three weeks of the Alert Service Bulletin, but unfortunately the parts did not begin to arrive until shortly after March 12, 2009.

James Reason describes the management of risk using what is known as the Swiss cheese model. That process requires that there are, or should be, a number of defences in place, pictorially represented by slices of Swiss cheese, representing defence barriers. The holes in the cheese represent weaknesses in the defence barriers. An accident will happen only when the holes line up and the defences become ineffective. When that happens, the arrow representing the accident passes straight through the aligned holes in the barriers and the accident occurs. The Swiss cheese model can be used to illustrate how the accident of March 12, 2009, came about.



(Figure 1.5 in James Reason's *Managing the Risks of Organizational Accidents*: Ashgate, 1997.)

Prior to the Australian incident on July 2, 2008, some of the defence barriers that prevented against accidents included:

- (a) the design processes of the manufacturer, e.g., safety features built into helicopters
- (b) the regulations of the FAA (US) and Transport Canada, which require, among other things, that certain standards be met before rotorcraft are certified for flight
- (c) the training of flight crew
- (d) the maintenance requirements of the operator, e.g., Cougar Helicopters' regular scheduled maintenance of its rotorcraft

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After the Australian incident of July 2, 2009, additional defence barriers included:

- (a) the manufacturer's assessment of the investigative evidence
- (b) the stud inspection procedures prescribed by the manufacturer
- (c) the regulatory role of the FAA and Transport Canada in assessing the manufacturer's preventative measures

Each slice of Swiss cheese represents a barrier. Nevertheless, each barrier has weaknesses. When the holes, which represent the weaknesses, line up, an accident will occur.

The TSB also identified a communications problem by saying that, as none of the operators participating in the maintenance webcasts of the manufacturer indicated they were having problems with the filter bowl mounting studs, there appeared to be general consensus among the S-92A community that the issue was not urgent.

Tragically, on March 12, 2009, all barriers were ineffective and the crash and loss of lives occurred. I have been told that problems with the studs would not necessarily have been apparent to the helicopter operators, because when the filter bowl was opened, only a small portion of the stud became visible. Thus it was that the studs fractured and a total loss of oil occurred unexpectedly on March 12, 2009.

After the C-NL offshore crash, all S-92A operators were required to substitute steel studs for titanium studs before flying again. Sikorsky asked all operators to return the titanium studs which had been removed from their S-92As. It was not obligatory for operators to return them and some did not. Nevertheless, 59 such used studs were returned and all showed evidence of galling, as did the studs removed from Cougar's other helicopters. One of the submissions to this Inquiry described that information as "chilling." I cannot argue with the use of that word. The galling of so many studs meant that in the period leading up to March 12, 2009, many S-92A passengers and crew members had been in jeopardy. The filter bowl studs could have fractured because of galling and all

gearbox oil could have been lost, as happened here on March 12, 2009. It could have occurred anywhere these aircraft were being flown. What this demonstrates is that the remedial measures instituted after Sikorsky's initial determination of September 9, 2008, were not effective. The Swiss cheese model demonstrates that, despite the defences which were in place, multiple weaknesses went undetected and the accident occurred.

The foregoing information raises a serious question: why did not Sikorsky and the aviation regulators recognize the danger and cause the titanium studs to be replaced as quickly as possible?

I would also have expected the helicopter operators to have been clearly warned of the danger of a failure. Failure over a hostile ocean could and on March 12, 2009, did have catastrophic consequences. Such a result could occur in either a crash or a ditching, with further serious consequences likely to follow after the passengers, or some of them, escaped the helicopter. One can only conclude that, for whatever reasons, neither Sikorsky nor the regulators grasped the significance of the July 2, 2008, incident off the coast of Australia.

The TSB Report then considered the consequential dangers involving Emergency Flotation Systems and continued as follows:

2.7.9.3 Future EFS Research and Development

Occupant survival following a survivable helicopter crash at sea initially depends on the individual's ability to quickly exit the helicopter if it capsizes and begins to sink. Past accidents have shown that shock, disorientation, and the disabling effects of the impact on the occupants often adversely influence the outcome. In the event of a survivable crash at sea, a helicopter's EFS is one of the primary defences to reduce the possibility of occupant fatalities due to drowning.

Currently, EFS only need to meet the certification requirements for a controlled ditching, despite the fact that research has shown that crashes into the water happen almost as frequently as ditchings. In a crash situation, there is a risk that the EFS may be disabled by the impact forces and that the occupants drown before

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they can successfully escape from the sinking helicopter. The CHI91 accident is one example where occupants survived the crash impact only to drown in the rapidly sinking helicopter before they could escape.

This is due in part to enhanced over-land survivability features. Aircraft certified under Part 29 are designed with strict crash survivability requirements; however, these requirements are largely oriented towards an over-land crash scenario. In contrast, helicopters certified under Part 29 are not subject to a comparable level of over water crash survivability. Although studies like the WIDDCWG in 2000 have suggested structural ditching requirements should not be expanded, they have also suggested more work needs to be done to improve EFS crashworthiness by considering designs like the side-floating concept. As technology advances, the future may hold some promise for more robust EFS systems as ongoing research and development continues. If offshore helicopter EFS systems are only designed to withstand the force associated with a ditching there is a continued risk that these systems will be disabled in survivable impacts contributing to occupant deaths from drowning. While CHI91 is only the second offshore helicopter accident in Canada, there is an important risk due to the large numbers of workers being transported to offshore facilities not only in Canada but internationally. (p. 129)

I agree that flotation systems are necessary, but the North Atlantic can offer conditions which will make them ineffective. The decision of when not to fly is a crucial one.

Further Regulatory Requirements

The inherent dangers in offshore oil exploration and production involving the use of helicopters offshore make it necessary for me to bring offshore safety regulation again to the attention of parliamentarians, legislators, and governments.

I will not revisit the reasons for my Recommendation 29 in the Phase I Report, in which I recommended the creation of an independent and stand-alone safety regulator or, in the alternative, the creation of a separate and autonomous safety division of C-NLOPB which would be unconnected with other offshore regulatory activities.

After a full study of the Transportation Safety Board's Report, I have concluded that not only should such an independent safety regulator be created, it should also be given a clear and unambiguous safety mandate. This need is more urgent in the light of the TSB Report.

The C-NLOPB's mandate encompasses aviation, but its exact mandate is unclear. Its powers are not precisely detailed and defined. What I will be recommending in this Phase is that Parliament and the Legislature amend the Atlantic Accord Implementation Acts or use other appropriate means to delegate to the offshore safety Regulator a clearly-defined set of specific powers and responsibilities which will not allow for uncertainty. I would suggest that the foregoing be done at the same time as the planned occupational health and safety amendments to the Implementation Acts.

It has emerged in the course of the Inquiry that C-NLOPB, which has been in existence since 1985, was never given a clear and detailed mandate as to how to regulate, oversee, and lead in the aviation safety aspects of the offshore, perhaps because of the overriding role of Transport Canada in aviation. The power to add to the requirements of Transport Canada, when this is appropriate for the offshore, should always be in the mind and in the mandate of the offshore safety Regulator. Possible improvements should be discussed with the oil operators, the helicopter operator, and worker representatives. When appropriate, additional safeguards should be put in place. The lack of guidance given to

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C-NLOPB in aviation matters contrasts sharply with its more detailed mandate in other offshore activities.

The C-NLOPB is the only regulator specifically legislated for the C-NL offshore. It has not ignored helicopter transportation, but, as I expressed it in my Phase I Report, it was not deeply involved in it. Transport Canada certifies aircraft and pilots, and regulates other aspects of aviation. Its work is crucial and its jurisdiction is Canada-wide. It is not dedicated solely to the safety of offshore helicopter operations. It is the offshore safety Regulator which should be aware of all aspects of offshore safety, no matter what other agencies may be involved. It is an enormous responsibility.

I will recommend that the offshore safety regulator of the future be given wide powers, not to encroach upon Transport Canada's jurisdiction or other agencies' jurisdictions, but to complement their roles. In my view, every safety aspect of the offshore should be within the offshore safety regulator's mandate. No matter what concerns are identified, the offshore safety regulator, in consultation with the oil operators, helicopter operator, and workers, must search out and inquire into the possibility of inadequacies and take appropriate action. That was the thrust of my Recommendation 29 in Phase I, the need for which is now reinforced by the Report of the Transportation Safety Board on the events leading up to the March 12, 2009, crash.

In the course of the Inquiry I have learned much about the need for independent, safety-focused offshore regulation from the general public; the participants in the Inquiry, including the families of those who died in the crash; the offshore union; and workers generally. They have articulated clear positions. They recognize Transport Canada's role and those of other agencies, but they envisage for the future, as do I, a C-NL offshore safety regulator to which overarching federal and provincial powers have been delegated, truly making it the regulator of last resort. They see such a safety regulator as having the responsibility, along with the oil operators and workers, to lead in safety matters, to ensure that safety is given the highest priority, not only in aviation but in all aspects of the offshore. The public does not compartmentalize safety into separate sectors, with air safety being a matter only for Transport Canada. The

public perceives the offshore safety Regulator as having been entrusted with the responsibility of safety leadership and the development of the best possible safety regime for the C-NL offshore. It is important to emphasize that the safety responsibility for and of offshore workers begins when they arrive at the base heliport in St. John's and does not end until they return and disembark.

This Inquiry is entitled to make recommendations, through C-NLOPB, to "other legislative or regulatory agencies." The "other legislative agencies," with respect to this offshore, are the Parliament of Canada and the Legislature of the Province of Newfoundland and Labrador.

What then should the safety Regulator's mandate be? I believe that it should have the right and the duty to examine and inquire into every operational aspect of the C-NL offshore. Only then can it ensure that safety is being advanced in every possible way. Helicopter transportation is, as we know from Phase I, the most dangerous part of an offshore worker's work.

In Phase I, I recommended a separate and autonomous Safety Authority, or if that is not feasible at this time, a separate, independent, and autonomous Division of C-NLOPB which would have as its sole function the responsibility for safety. It should also be supported by an Advisory Board comprising mature citizens. Such a Safety Authority should have an all-embracing safety jurisdiction in the offshore, supported by the knowledge and expertise to apply its collective mind to all offshore safety issues, and be empowered to take appropriate action in consultation with others to prevent potential hazards from becoming accidents.

Vigorous oversight and prompt action can avert accidents and prevent injury and loss of life. The offshore safety regulator should be the final barrier in the Swiss cheese model and truly be the regulator of last resort.

To express it bluntly, I envisage a safety regulator for the offshore as having a mandate to learn about the background of any equipment being used or to be used in the offshore, including helicopters, and the mandate

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to set performance goals. It should have the knowledge and authority to say when additional measures are needed and the duty to pursue improvements.

An independent and autonomous safety regulator, as I envisage it, would have known the history of the certification of the S-92A and also known of the Australian incident and of the danger that a complete loss of main gearbox oil might occur again; it could have taken appropriate steps to mitigate such a danger. On March 12, 2009, there were four helicopters in Cougar's fleet. Three replacement steel studs were required for each helicopter. The cost of the studs and the labour to replace them would have been negligible and the task could have been quickly accomplished. Sadly, there was no one there to say, "Do it now, replace these studs as quickly as possible and not over the course of one year or 1250 hours."

I will recommend to Parliament and the Legislature of Newfoundland and Labrador that they grant to the safety Regulator a mandate to do whatever may be required, in any given circumstance, to promote safety and prevent injury or death and to be informing itself, always, of potential dangers. It is that kind of safety regulator that Parliament and the Legislature of Newfoundland and Labrador have the power to create. I believe that offshore workers, and the public generally, deserve the reassurances which such a regulator, with such a safety mandate, would provide.

For the convenience of the reader I will reproduce again the operative clauses of my Phase II Terms of Reference, which say:

Upon completion of the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92-A Crash, the Commissioner shall undertake a review of the sections of the Report therefrom that deal with matters which are specifically within the mandate of the C-NLOPB and particularly the findings in respect thereof and shall advise the C-NLOPB:

- (a) which findings should result in actions being recommended to be undertaken by C-NLOPB and how they should be implemented,**

- (b) **which findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.**

As my review of the TSB Report has demonstrated, a significant number of the TSB's conclusions and Findings dovetail with those of my Phase I Report and are being addressed by C-NLOPB, the oil operators, the helicopter operator, the Canadian Association of Petroleum Producers, the offshore workers, Helly Hansen, and the Marine Institute's Offshore Safety and Survival Centre.

I am directing only one additional Recommendation to C-NLOPB and it involves an amendment to my Phase I Recommendation 7. Other recommendations will be made to C-NLOPB either for Transport Canada or for the Parliament of Canada and the Legislature of Newfoundland and Labrador under Phase II (b).

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Cautionary Note – Response of FAA, Transport Canada, and EASA

Prior to the completion of this Report, I have had the advantage of reading the June 23, 2011, TSB assessment of the responses to its four aviation safety Recommendations.

As I have said, I strongly endorse and support the TSB's four Recommendations and its assessment of the responses to these aviation safety Recommendations; that being so, there is in my opinion no need for me to make further recommendations through C-NLOPB to Transport Canada.

I note also that at this stage the TSB has found that the responses of the Federal Aviation Administration, Transport Canada, and the European Aviation Safety Agency show "Satisfactory Intent."

I note also that the TSB intends to monitor the work of the foregoing regulatory agencies as their work progresses and that it will assess their progress at a later date. It is heartening to me, and no doubt to many others, that the TSB does not intend to allow its Recommendations to be forgotten.

I do, however, have some observations to make for the three aviation regulators. The FAA ends its response to TSB's Recommendation A11-01 by saying:

The FAA is participating in a coordinated formal review of the rules related to the "extremely remote" provision and the 30 minute requirement, with Transport Canada (TC) and the European Aviation Safety Agency (EASA).

It then adds:

The FAA does not believe it is practical or necessary to require that all existing and newly-manufactured transport Category A helicopters be equipped with MGBs [main gearboxes] that meet the 30-minute "loss of lubrication" requirement under 14 CFR 29.927(c), (Amendment 29-26). The cumulative flight hours on

these helicopters are well into the millions, and their service history supports that they are operating at a satisfactory level of safety. Furthermore, modifying these helicopters to be equipped with new MGBs would have a significant economic impact on the aviation community, and the costs would outweigh any improvements in safety.

That paragraph in particular caught my attention and causes me to inject a cautionary note. I remember learning at the International Helicopter Safety Conference in Montreal, in October 2009, that helicopters themselves are not inherently dangerous, but the uses to which they are put can be dangerous. An example which stayed in my mind was the use of helicopters to round up wild animals in parts of Africa for transfer to other locations. These helicopters chase and manoeuvre while only a few feet above the ground: that is when the use of the aircraft becomes dangerous. The transportation of passengers on long journeys over hostile oceans I believe also qualifies as a more dangerous use of helicopters than operating them over dry land. Weather in the C-NL offshore is especially unpredictable, and in fog, conditions can change from minute to minute.

The 30-minute run-dry requirement originated from the military for reasons which I think are obvious. The Canadian military, I understand, proposes to purchase the military version of the S-92, called the Cyclone. I would be surprised if the military did not insist on at least a 30-minute run-dry capability, because for obvious reasons military uses can be dangerous.

The July 2, 2008, incident off the coast of Australia was a clear indication that the main gearbox filter bowl studs of the S-92A could fracture, with a total loss of oil from the main gearbox. On September 9, 2008, Sikorsky, after consultation with the FAA, determined that all new S-92As would be equipped with steel studs instead of titanium studs. Any studs which had to be replaced in the field would be replaced with steel studs.

Nevertheless, fleet operators were not required to replace titanium studs in their S-92As with steel studs because the S-92A's record, other than on July 2, 2008, was good. Operators were required to carefully

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monitor the studs, but the record shows that that this instruction was not as effective as hoped. It was not made mandatory for all S-92A operators to replace the titanium studs with steel until January 28, 2009, and then with a latitude of one year or 1250 flight hours. I doubt that there could be any clearer demonstration of the dangers of delay than the offshore crash of March 12, 2009.

Offshore workers should not be asked to bear the anxiety which flows from an 11-minute run-dry capability when other S-92As will have a 30-minute run-dry capability. I hope within the next year or two there will be a clear timeline imposed for the introduction of the new and improved main gearbox, applicable to all S-92As that are to be used in the offshore.

I know that the industry generally regards the S-92A as an excellent aircraft and I have no doubt that in most respects it is. All the concerns of which I have heard relate to the main gearbox.

A requirement that existing helicopters be equipped with new main gearboxes would be costly, but I think it should be unacceptable, especially in the offshore, that one group should have the protection afforded by a 30-minute run-dry capability while another group, in that hostile environment, should make do with a machine that has only an 11-minute run-dry capability.

The TSB favours the development of a greater-than-30-minute main gearbox run-dry capability for the offshore. If that development comes to pass, I believe that existing offshore helicopters should be so equipped, as well as new ones.

The crash of March 12, 2009, is still very fresh in many minds, hence my cautionary note to the three regulators, vis-à-vis anything less than the 30-minute run-dry requirement when it becomes available.

Chapter Three

Phase II Recommendations

Phase II Recommendations

Recommendation to C-NLOPB

Explanatory Note:

In Recommendation 7 in the Phase I Report, I recommended that airworthiness directives and incident reports be communicated to workers/passengers by notices posted on the helicopter operator's website. I did not include Alert Service Bulletins in that recommendation because, as I wrote, "they are usually maintenance-related." I did not know during Phase I that what I now consider as the rectification of a design flaw was characterized as a "maintenance" matter and treated without urgency.

- 1. It is recommended that Alert Service Bulletins be posted on the website of the helicopter operator(s) in the same way as airworthiness directives and incident reports.**

Recommendation to C-NLOPB for Transport Canada

Explanatory Note:

As I have said in the discussion portion of this Report, the Helly Hansen recommendation is that the offshore helicopter flight immersion suit should be an aviation immersion suit only, because a combination of aviation and marine capabilities in a single suit results in buoyancy and bulkiness issues which can cause problems for a passenger escaping a ditched and overturned helicopter.

- 2. It is recommended that the Helly Hansen recommendation that the helicopter passenger suit be certified only as an aviation immersion suit be given careful consideration by Transport Canada and the Canadian General Standards Board, following receipt of Helly Hansen's detailed reasons for such a recommendation.**

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Recommendation to C-NLOPB for Transport Canada in respect of the Transportation Safety Board of Canada's four recommendations

Explanatory Note:

For reasons which have been explained, the four TSB recommendations are important for offshore safety and I support them. They are:

- a. The Federal Aviation Administration, Transport Canada and the European Aviation Safety Agency remove the "extremely remote" provision from the rule requiring 30 minutes of safe operation following the loss of main gearbox lubricant for all newly constructed Category A transport helicopters and, after a phase-in period, for all existing ones.
 - b. The Federal Aviation Administration assess the adequacy of the 30 minute main gearbox run-dry requirement for Category A transport helicopters.
 - c. Transport Canada prohibit commercial operation of Category A transport helicopters over water when the sea state will not permit safe ditching and successful evacuation.
 - d. Transport Canada require that supplemental underwater breathing apparatus be mandatory for all occupants of helicopters involved in overwater flights who are required to wear a Passenger Transportation Suit System.
- 3. It is recommended that Transport Canada adopt and act upon the four recommendations of the Transportation Safety Board and that cooperation when required should be sought from other regulators.**

Recommendation to C-NLOPB for the Parliament of Canada and the Legislature of Newfoundland and Labrador

Explanatory Note:

I have in the discussion portion of this Report given detailed reasons as to why I believe that the C-NL offshore regulator, whichever model is decided upon, should have a new, clear, and detailed mandate, so that it would become, as I have expressed it, the regulator of last resort. The oversight role which I am recommending would not conflict with the roles of other regulators, but it would when necessary enhance other regulatory measures. The regulator should as a matter of course consult with the major offshore stakeholders and take any action which it considers necessary to prevent or forestall the risk of injury or death in the offshore. Some such actions would be developed over time; others could be as straightforward as requiring something to be done immediately.

Our legislators in their deliberations should also be aware that though Canada's offshore oil and gas operations are small by world standards, the future will in all likelihood bring further development on the east coast, in the Arctic, and perhaps elsewhere in Canada. The Atlantic Accord was signed in 1985 and the Accord Implementation legislation was passed in 1987. Worldwide, the thinking and practices of safety have developed and changed greatly in the past quarter-century. In the C-NL offshore, it is time for a new and more comprehensive approach to offshore safety regulation.

What is being recommended in the Reports of Phases I and II of this Inquiry, if endorsed in principle and refined in detail, could become a template for the future of offshore safety regulation in Canada.

- 4. It is recommended that an independent offshore safety regulator be given a new and expanded mandate. Its mandate should be an all-encompassing oversight role to consult with any persons or entities, regulatory or otherwise, with regard to offshore safety issues and to take such action or actions as may be necessary in the interests of safety and transparency. An independent offshore safety regulator should**

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be complemented and strengthened by an Advisory Board of mature citizens as I recommended in Phase I.

In the final paragraph of the Phase I Report, I wrote:

The interests and concerns of the public extend especially to safety, which encompasses prevention of injury, prevention of loss of life, and protection of the environment.

In my opinion, these objectives of offshore safety could be effectively combined in the safety regime of the future.

Abbreviations

BST	Basic Survival Training
BST-R	Basic Survival Training-Recurrent
CAPP	Canadian Association of Petroleum Producers
CEP	Communications, Energy and Paperworkers Union of Canada
CGSB	Canadian General Standards Board
C-NL	Canada-Newfoundland and Labrador
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
DND	Department of National Defence
E-452	a model of passenger helicopter transportation suit
EASA	European Aviation Safety Agency
EBS	Emergency Breathing System
EFS	Emergency Flotation System
EUBA	Emergency Underwater Breathing Apparatus
FAA	Federal Aviation Administration

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HEUBA	Helicopter Emergency Underwater Breathing Apparatus
HMDC	Hibernia Management and Development Company Ltd.
HOTF	Helicopter Operations Task Force
HSE	Health and Safety Executive (UK regulator)
HTS-1	Helicopter transport suit approved for use offshore Newfoundland and Labrador
HUEBA	Helicopter Underwater Escape Breathing Apparatus
HUET	This abbreviation is widely used in the industry to designate either Helicopter Underwater Escape Training or Helicopter Underwater Evacuation Trainer. In the first case, the phrase refers to a course in which offshore workers learn how to escape from a submerged helicopter; in the second, it refers to a piece of equipment, the simulated helicopter used in such training.
MGB	Main gearbox
MHA	Member of the House of Assembly of Newfoundland and Labrador
MP	Member of Parliament of Canada
NL	Newfoundland and Labrador
NRC	National Research Council
NS	Nova Scotia
OHSI	Offshore Helicopter Safety Inquiry

Abbreviations

OLF	Norwegian oil industry association
OPITO	Offshore Petroleum Industry Training Organization
PSA	Petroleum Safety Authority (Norway)
PLB	Personal Locator Beacon
PTSS	Passenger Transportation Suit System
SAR	Search and Rescue
S-92A	a model of Sikorsky helicopter
TC	Transport Canada
TSB	Transportation Safety Board

PHASE II SUBMISSION

On Behalf Of The

CANADA – NEWFOUNDLAND AND LABRADOR OFFSHORE
PETROLEUM BOARD

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Following the receipt of the Phase I Report and Recommendations from this Commission, the C-NLOPB has established a team comprising Board staff, worker representatives, operator representatives, a representative from Cougar, and representatives from other agencies where necessary (the “Team”).

The Team is under the direction of two experts in the field of safety and aviation, Peter McKeage and Terrance Kelly. These individuals have been retained specifically for the purpose of reviewing, analyzing and making recommendations for implementation for each of the Recommendations from Phase I (“Inquiry Recommendations”).

Peter McKeage is a former Commanding Officer 424 Squadron and Wing Commander 9 Wing Gander and has been retained by the C-NLOPB as an Aviation Safety Advisor. Mr. McKeage has a long and distinguished search and rescue background, predominantly on the east coast, that spans from 1979-2005. He has over 28 years of strategic, operational and tactical military flying experience. He has accumulated over 5100 hours of pilot-in-command experience on numerous aircraft, including the Labrador and Cormorant Helicopters.

Terry Kelly is the President and founder of *SMS Aviation Safety Inc.*, based in Ottawa, and has been retained by the C-NLOPB as a Safety Advisor. Mr. Kelly has 30 years experience progressively as a professional pilot, accident investigator, safety analyst, safety evaluator, and safety advisor to industry executives and senior management of Civil Aviation Authorities. Much of his work focuses on the design and evaluation of aviation safety management systems; procedures for the proactive safety management of change; and the design and application of practical, proactive safety measurement tools. He is an internationally recognized advisor to industry executives and government officials who develop and implement long-term transportation plans, policies and safety programs. He is recognized for his expertise in conducting proactive, strategic-level risk assessments and has extensive experience in evaluating the safety performance of organizations across all sectors of the aviation industry.

The Team has been working full time since January 2011, and will

continue to work on a part-time basis after the end of April 2011. The Team has begun providing response recommendations to the Board on the Commissioner's Phase I Recommendations and expects to have completed its work by the end of 2011.

Phase II of the Offshore Helicopter Safety Inquiry requires the Commissioner to review the sections of the report of the TSB investigation into the crash of Cougar 491 that are specifically within the mandate of the C-NLOPB, with particular attention to the findings ("TSB Findings"), and then advise the C-NLOPB which of the TSB Findings should result in actions being recommended to be undertaken by the C-NLOPB.

The Commission shall also advise the C-NLOPB which TSB Findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.

The purpose of this submission is to identify for the Commissioner which TSB Findings the C-NLOPB considers being within its mandate and which should result in review of recommendations being undertaken by the C-NLOPB.

The C-NLOPB has undertaken its review of the TSB Findings in concert with the Inquiry Recommendations. For ease of reference, this submission reiterates each of the TSB Findings and identifies those within the C-NLOPB mandate and those within the mandate of other legislative or regulatory bodies and then correlates them to the Inquiry Recommendations, where applicable. The TSB Finding number corresponds to the numbering contained in the TSB report.

TSB FINDINGS RELATING TO THE C-NLOPB

The C-NLOPB states that there are several TSB Findings within the jurisdiction of the Board. None of these require further recommendations from the Commissioner.

It is the position of the C-NLOPB that the Phase I report of this Commission was comprehensive such that there are no new issues arising from the TSB Findings that require new recommendations to the Board.

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The Inquiry Recommendations contained in the Phase I report address all of the TSB Findings.

The C-NLOPB submits that the following TSB Findings are within the jurisdiction of the C-NLOPB:

2. In distant offshore operations, including the East Coast of Canada, a 30-minute run dry MGB capability may not be sufficient to optimize eventual landing opportunities.
(p.134)

This TSB Finding is directly related to the TSB Recommendation A11-02:

Recommendation A11-02

The Federal Aviation Administration assess the adequacy of the 30 minute main gearbox run dry requirement for Category A Transport helicopters.

TSB Recommendation A11-02 is directed at air regulators and in particular the Federal Aviation Administration. The C-NLOPB has no jurisdiction in relation to regulation of helicopter operating limitations.

The C-NLOPB acknowledges that it has the ability to place additional requirements on the operators in relation to helicopter transportation safety. Inquiry Recommendations 22 and 23 deal with this issue by recommending that the C-NLOPB acquire sufficient aviation expertise and establish appropriate areas of oversight for helicopter transportation.

14. The current basic survival training (BST) standards in Canada lack clearly defined, realistic training standards and equipment requirements. This could lead to differences in the quality of training and affect occupant survivability.
15. An interval of 3 years between recurrent BST may result in an unacceptable amount of skill decay between recurrent training sessions. This skill decay could reduce the probability of successful egress from a submerged helicopter.
(TSB Report p. 135)

Inquiry Recommendation 13 specifically states that training should involve greater fidelity and more broadly states that safety training goals should be established by the C-NLOPB in consultation with the suppliers of personal protective equipment (PPE), trainers, oil operators and worker representatives. This would involve a review of the interval between BST refresher courses.

16. Passenger Transportation Suit Systems (PTSS) designed to meet the standard for marine abandonment have high buoyancy and flotation capabilities. While useful in a marine abandonment situation, these features may interfere with a successful egress from a submerged helicopter.
17. There are minimal regulations and standards pertaining to offshore helicopter flight crew suit use and maintenance. This increases the risk that flight crews will be inadequately protected following a ditching or crash at sea.
18. Offshore helicopter flight crew suits that are not a high visibility colour reduce the probability of detection by search and rescue crews following a ditching or crash at sea. This could significantly delay rescue at night or in bad visibility.
19. Without regulations and standards pertaining to personal locator beacons (PLB) for helicopter occupants, inappropriate PLB types may be selected for helicopter transportation, resulting in delays locating a person floating in the ocean.

(TSB Report p. 136)

The C-NLOPB does not regulate air operators. However, Inquiry Recommendation 16 states that additional personal protective equipment for use by the pilots and passengers should be studied and then discussed with Transport Canada and other stakeholders.

20. The use of improper passenger transportation suit system (PTSS) fitting techniques may result in unacceptable

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levels of water ingress and a subsequent rapid loss of body temperature, following a ditching or crash at sea.

(TSB Report p. 136)

The Canadian General Standards Board (CGSB) is reviewing the standard for the PTSS. In any event, the operators in the Newfoundland and Labrador Offshore implemented a new sizing technique prior to return to flight following the crash of Cougar 491.

21. There is no requirement for occupants of a helicopter to be equipped with EUBAs for prolonged over water flight. As a result, occupants are exposed to an increased risk of drowning following a ditching or crash at sea.

(TSB Report p. 136)

The C-NLOPB has made it a requirement that all passengers on flights to and from installations be trained on and equipped with EUBAs. It is the jurisdiction of Transport Canada to make such a requirement a regulation applicable to all prolonged overwater flights. Inquiry Recommendation 13 relates to training aspects associated therewith.

22. The lack of regulation requiring pilots to wear helmets and visors places them at greater risk of incapacitation due to head injuries following a ditching or crash. This type of injury jeopardizes a pilot's ability to assist in the safe evacuation and survival of the passengers.

(TSB Report p. 136)

Inquiry Recommendation 15 specifically addresses this issue. The enactment of a regulation is solely within the jurisdiction of Transport Canada.

23. Ditching in adverse weather conditions, and sea states in excess of the capability of the emergency flotation system (EFS), places passengers and crew at risk.

(TSB Report p. 136)

Inquiry Recommendation 9 covers this aspect of operational requirements that are in addition to those required by Transport Canada.

24. If offshore helicopter EFS systems are only designed to withstand the force associated with a ditching, there is a continued risk that these systems will be disabled in survivable impacts contributing to occupant deaths from drowning. (TSB Report p. 136)

Issues relating to the certification of the helicopter are the jurisdiction of Transport Canada. However, Inquiry Recommendation 9 deals with limits on helicopter operations in adverse sea states and conditions and Inquiry Recommendation 27 deals with involvement in further research on offshore helicopter safety.

TSB FINDINGS RELATING TO OTHER REGULATORY BODIES

The C-NLOPB submits that the following TSB Findings are within the jurisdiction of other regulatory bodies, specifically Transport Canada or the Canadian General Standards Board:

1. Certification standards for Category A rotorcraft do not require a capability of continued safe operation for 30 minutes following a failure that leads to loss of MGB lubricant if such failures are considered to be extremely remote, placing passengers and crew at risk.
2. In distant offshore operations, including the East Coast of Canada, a 30-minute run dry MGB capability may not be sufficient to optimize eventual landing opportunities.
3. Inadequate systems knowledge related to abnormal and emergency conditions increases the risk of pilots relying on previously learned knowledge. This could lead to unintentional errors in interpreting symptoms of a system malfunction.
4. The decision not to identify time critical actions as memory items in the S-92A MGB malfunction procedure could lead to delays in carrying out actions that are vital to the safe continuation of flight.

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5. The decision not to automate an emergency system activation, such as the MGB oil bypass system in the S-92A, increases the risk that critical actions will be omitted or delayed unnecessarily.
6. The lack of established standards for landing guidance definitions used in abnormal and emergency procedures leaves the definitions open to misinterpretation.
7. The lack of specific guidance and/or recommendations in the RFM pertaining to optimum airspeed and torque setting could result in the selection of a flight profile that accelerates the catastrophic failure of a gearbox that has lost oil pressure.
8. The combination of abnormal and emergency procedures into a single procedure, which focuses first on the abnormal condition, increases the risk that critical emergency actions will be delayed or omitted.
9. If manufacturers do not clearly identify critical aircraft performance capabilities in flight manuals, such as run dry time, there is increased risk that pilots will make decisions based on incomplete or inaccurate information during abnormal and emergency situations.
10. The omission of caution or warning messages from a quick reference legend could result in delays in locating the appropriate abnormal or emergency response in a pilot checklist.
11. The use of non-current publications such as RFM, standard operating procedures (SOPs) and checklists, increases the risk that critical steps of an approved procedure will be omitted or delayed.
12. Under the current regulations, CAR 703 and 704 operators are not required to provide CRM. As a result, there is an increased risk that crews operating under CAR 703 or 704 will experience breakdowns in CRM.

13. The current CRM regulation and standard for CAR 705 operators have not been updated to reflect the latest generation of CRM training or to include CRM instructor accreditation. As a result, there is a risk that flight crews may not be trained in the latest threat and error management techniques.

(TSB Report pp. 134-135)

TSB Findings from #1 - #13 are outside the mandate of the Board and can only be addressed by Transport Canada, the manufacturer, air operator and other aviation regulators.

16. Passenger Transportation Suit Systems (PTSS) designed to meet the standard for marine abandonment have high buoyancy and flotation capabilities. While useful in a marine abandonment situation, these features may interfere with a successful egress from a submerged helicopter.

(TSB Report p. 136)

The standards for Passenger Transportation Suit Systems are developed by the Canadian General Standards Board and then this standard is 'called up' in the CARs by Transport Canada for flights over water. The CGSB is reviewing these standards and certifications with expected changes to the standard in 2011 or 2012. Inquiry Recommendation 16 relates to further study and consultation into PPE for helicopter passengers.

17. There are minimal regulations and standards pertaining to offshore helicopter flight crew suit use and maintenance. This increases the risk that flight crews will be inadequately protected following a ditching or crash at sea.

(TSB Report p. 136)

This TSB Finding relates specifically to regulations by Transport Canada in relation to the use and maintenance of helicopter pilots' PPE. The C-NLOPB cannot enact regulations in relation to helicopter pilots. Inquiry Recommendation 16 relates to further study and consultation into the need for additional PPE for the helicopter pilots.

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18. Offshore helicopter flight crew suits that are not a high visibility colour reduce the probability of detection by search and rescue crews following a ditching or crash at sea. This could significantly delay rescue at night or in bad visibility.
(TSB Report p. 136)

The current standards for helicopter pilot suits are developed by Transport Canada and then the individual suits are chosen by the air operator – in this case Cougar. The C-NLOPB does not regulate air operators. Inquiry Recommendation 16 relates to PPE worn by helicopter pilots.

19. Without regulations and standards pertaining to personal locator beacons (PLB) for helicopter occupants, inappropriate PLB types may be selected for helicopter transportation, resulting in delays locating a person floating in the ocean.
(TSB Report p. 136)

Regulations and standards for personal locator beacons are outside the mandate of the C-NLOPB. Inquiry Recommendation 16 relates to PPE for the helicopter pilots and passengers.

20. The use of improper passenger transportation suit system (PTSS) fitting techniques may result in unacceptable levels of water ingress and a subsequent rapid loss of body temperature, following a ditching or crash at sea.
(TSB Report p. 136)

The Canadian General Standards Board is currently reviewing the standards for the passenger transportation suit system. In addition, since the return to flight in May 2009, the Newfoundland and Labrador offshore industry has been using individual fitting techniques.

21. There is no requirement for occupants of a helicopter to be equipped with EUBAs for prolonged over water flight. As a result, occupants are exposed to an increased risk of drowning following a ditching or crash at sea.
(TSB Report p. 136)

The C-NLOPB has made it a requirement that all passengers on flights to and from installations be trained on and equipped with EUBAs. It is the jurisdiction of Transport Canada to make such a requirement a regulation applicable to all prolonged overwater flights.

22. The lack of regulation requiring pilots to wear helmets and visors places them at greater risk of incapacitation due to head injuries following a ditching or crash. This type of injury jeopardizes a pilot's ability to assist in the safe evacuation and survival of the passengers.
(TSB Report p. 136)

Inquiry Recommendation 15 specifically addresses this issue. The enactment of a regulation is solely within the jurisdiction of Transport Canada.

24. If offshore helicopter EFS systems are only designed to withstand the force associated with a ditching, there is a continued risk that these systems will be disabled in survivable impacts contributing to occupant deaths from drowning.
(TSB Report p. 136)

Issues relating to the certification of the helicopter are the jurisdiction of Transport Canada. Inquiry Recommendation 9 deals with limits on helicopter operations in adverse sea states and conditions and Inquiry Recommendation 27 deals with involvement in further research on offshore helicopter safety.

25. Without an immediate signal being transmitted from an emergency locator transmitter (ELT), water attenuation of a useable ELT signal from a submerged aircraft may continue. This increases the risk of an ELT signal not being received and SAR resources not being launched in a timely manner.
26. The use of *g*-switches for the purpose of stopping a cockpit voice recorder (CVR) or combined CVR/FDR (flight data recorder) will likely continue to result in the loss of potentially valuable CVR or CVR/FDR data. As a result, there is an increased risk that future accident

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investigations will be impeded.

(TSB Report p. 136)

These TSB Findings are not within the mandate or jurisdiction of the C-NLOPB.

CHANGES SINCE MARCH 2009

Since the crash of Cougar 491 there have been many changes to safety by all the stakeholders involved in the Newfoundland and Labrador offshore. These include:

SAR Response / Night flying

On February 8, 2010, the C-NLOPB received an interim recommendation from Commissioner Wells in relation to Search and Rescue response times. As a result of this correspondence the C-NLOPB provided the operators with a directive, dated February 12, 2010, which stated:

The Commissioner noted and the Board has confirmed that a “one hour wheels up” response for First Response SAR provided by industry should be improved; effective SAR skills must be available in a response situation as quickly as possible. We believe this can only be achieved by having a fully equipped SAR helicopter on standby at St. John’s at any time when flights for workers are being undertaken. The effective “wheels up” time for such a SAR helicopter must be 15 – 20 minutes, consistent with practices in other offshore oil and gas jurisdictions. At times when worker transportation is not being undertaken a “wheels up” time of 45 minutes is acceptable. We agree with the Commissioner that the full-time dedicated and fully equipped response helicopter must be equipped with technology to locate and retrieve personnel from the water in all low visibility circumstances (auto-hover and forward-looking infrared radar) as soon as practicable. We expect you collectively or individually to advise as soon as possible how you will effect this service, certainly advising us not later than February 19, 2010, of your plans for earliest implementation.

In revisiting the acceptability of night flying, the Board recognizes that effective first response SAR cannot be delivered in conditions of impaired visibility until the dedicated and fully equipped SAR helicopter described above is available. That

being the case, effective February 14, 2010, except for emergency circumstances, helicopter transportation to the offshore facilities will not be permitted to start or finish between dusk and dawn (or in any low visibility conditions where rescue cannot be effected without auto-hover) until such time as the First Response SAR provided by industry is properly equipped to effect personnel retrieval from water in these conditions.

Following the release of the Phase I Report and Recommendations, the C-NLOPB provided the following response in relation to Inquiry Recommendation 12, that night flights be banned:

The Commissioner's recommendation on banning night flights is made on the basis that successful search and rescue during the night is hampered by the unavailability of a properly equipped dedicated SAR helicopter. The Board accepts this rationale, and therefore is continuing the ban on night flying, except for medical emergencies. However, the Board has also directed operators to improve their first response capability, and they have acquired a dedicated SAR helicopter equipped with forward-looking infrared (FLIR) and night vision. The required auto-hover is still in the certification process with the US Federal Aviation Authority and Transport Canada. When the auto-hover is certified, the Board will revisit the decision to ban all night flights.

Personal Protective Equipment

Since the return to flight in May 2009, all operators in the Newfoundland and Labrador offshore have been using new suit fitting criteria to ensure proper fit of the Passenger Transportation Suit Systems.

Helly Hansen has developed and had approved the new HTS-1 PTSS for use in the Newfoundland and Labrador offshore to address sizing issues.

Since May 2009, all persons traveling to and from offshore installations in the Newfoundland and Labrador offshore are required to be trained on and equipped with underwater breathing apparatus.

The C-NLOPB is actively engaged, along with other stakeholders, in the review of the certification of the Passenger Transportation Suit Systems

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through the CGSB. A staff member from the C-NLOPB participates in this process and the Board has provided the necessary funding for research, testing and development.

Emergency Floatation

S-92 helicopters currently in use in the Newfoundland and Labrador offshore are now equipped with a 5-bag floatation system designed to increase the likelihood of a ditched helicopter remaining upright.

Descent Profile

Cougar, in conjunction with Transport Canada, has developed a descent profile which allows for an S-92 to ditch within 11 minutes in the event of a main gear box malfunction.

SUMMARY

Phase I of the Canada-Newfoundland and Labrador Offshore Helicopter Safety Inquiry resulted in 29 recommendations to the Board. The Board has established a dedicated team led by two highly qualified safety and aviation experts and comprising Board staff, worker representatives, operator representatives, and a representative from Cougar, to review the Inquiry Recommendations and provide analysis and implementation recommendations to the Board.

The Inquiry Recommendations are comprehensive. The report of the TSB into the crash of Cougar flight 491 did not identify any new issue within the mandate of the C-NLOPB not already covered by the Inquiry Recommendations.

All of which is respectfully submitted.

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Curtis, Dawe
Solicitors for the C-NLOPB

OFFSHORE HELICOPTER SAFETY INQUIRY

PHASE II

April 14, 2011

**Offshore Safety and Survival Centre
Fisheries and Marine Institute
Memorial University of Newfoundland**

Submitted by:

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Offshore Safety and Survival Centre, Marine Institute, Memorial University.

The Offshore Safety and Survival Centre of the Marine Institute of Memorial University would like to take this opportunity to thank the Commissioner and all involved in this Inquiry for their significant contribution to Offshore Helicopter Safety.

In our submission to Phase II of the Inquiry we would like to update the Inquiry on actions taken to date and proposed actions with respect to Recommendations 13 and 14, which are the two recommendations relating to issues of training.

Recommendation 13

It is recommended that safety-training goals be established by the Regulator in consultation with suppliers of personal protective equipment, trainers, oil operators, and worker representatives. HUET and HUEBA training are necessary, but should not be so rigorous as to pose safety risks. Training should be done with greater fidelity, which objective is already being pursued. Fidelity should encompass survival training in more realistic sea conditions than is currently the case. The Regulator, oil operators, worker representatives, and, as appropriate, other stakeholders should be involved in the discussions as to how training goals should be met. [emphasis added]

The Marine Institute, through its Offshore Safety and Survival Centre (OSSC), has been actively involved with the Canadian Association of Petroleum Producers (CAPP) training and qualifications committee, other training providers and the regulator with respect to the development of a definitive and rigorous suite of optimal survival competencies which should be attained during Basic Survival Training (BST), Basic Survival Training Recurrent (BST-R) and Offshore Survival Introduction (OSI) training.

At this time, the OSSC meets or exceeds the standards, but the improvements to the optimal competencies identified are not fully achievable with existing facilities and infrastructure. Hibernia

Management and Development Company Ltd. (HMDC) has, however, provided a significant contribution to the Marine Institute of Memorial University of Newfoundland which will allow the OSSC to retrofit a new integrated helicopter training system incorporating a new configurable Helicopter Underwater Escape Trainer (HUET), up rated crane and environmental theatre. A tender document has been developed and is posted for bid submissions. It is expected that the retrofit work will take place this year. With these modifications in place, the Marine Institute will be outfitted with current *state of the art* training aids for helicopter underwater escape training.

The modifications will permit the introduction of more complex and challenging training evolutions. As noted in the Commissioner's recommendation, however, training should not be so rigorous as to pose safety risks. When the new equipment is installed, OSSC will assess new exercises in accordance with internal risk management protocols. The participation, during risk assessments, of key stakeholders such as regulators, operator representatives and worker representatives would be welcomed. It may be that initial risk assessments identify a need for structured research and development and associated ethics approval to formally assess risk against benefit to properly inform the implementation decision. The OSSC is well positioned to undertake such research if and as deemed necessary.

Recommendation 14

It is recommended that the Regulator set goals for physical fitness of workers in preparation for safety training, after consultation with oil operators, worker representatives, trainers, and medical experts. [emphasis added]

The Marine Institute confirms that it would be pleased to work with the Regulator in assisting in the establishment of appropriate goals for physical fitness in preparation for safety training. It is likely that such goals may have to be established and re-established in conjunction with increasing the level of difficulty of training exercise evolutions. In the short term, we have available resources that can assist within our research unit and other units/ departments of the Marine Institute and Memorial

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University. For the longer term, we are pleased to advise that an interdisciplinary team at Memorial University led by the Faculty of Medicine and involving the Marine Institute Offshore Safety and Survival Centre (OSSC) has developed a graduate program for occupational physicians entitled *Human Physiology, Performance and Safety in Extreme Environments*. OSSC involvement in the course will be to provide short course safety/cold water/high temperature training as part of the program as well as to provide opportunities for occupational physicians to undertake applied research. The occupational medical expertise of the program participants will be appropriate for developing necessary underpinning research for the establishment of training fitness goals, particularly if more difficult and challenging evolutions are envisaged.

Offshore Helicopter Safety Inquiry
The Honourable Robert Wells, Q.C., Commissioner

**Submissions in relation to Phase II of the Offshore Helicopter Safety
Inquiry**
by Helly Hansen Canada Limited

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Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

INTRODUCTION

At the commencement of the Offshore Helicopter Safety Inquiry (the “Inquiry”), Helly Hansen Canada Limited sought and received limited standing on the grounds that it was the supplier of helicopter transportation suits to the operators of the offshore oil installations in the Nova Scotia and Newfoundland and Labrador offshore areas (the “Operators”). At a meeting of the Inquiry on March 9, 2011, Helly Hansen Canada Limited was granted full standing for Phase II of the Inquiry. Although granted full standing, Helly Hansen Canada Limited has limited its submissions to the issues surrounding the helicopter transportation suits.

Update on Safety Initiatives

HTS-1 Suit System

As part of Helly Hansen Canada Limited’s commitment to continually improve the effectiveness and comfort of the helicopter transportation suits, it embarked on major design changes known as the HTS-1 suit project on December 5, 2008. As previously outlined for the Inquiry, the HTS-1 suit is a modification of the E-452 suit that was only possible after Helly Hansen Canada Limited received approval from the Operators and Transport Canada to produce a suit that only met the aviation suit standards, rather than also having to meet the marine abandonment suit standards.

The HTS-1 has an internal adjustable suspension system as well as a new hood design and redesigned wrist cuffs. The gloves and cuffs now have more stretch for ease of donning and doffing. The hood is now neoprene and has an adjustment strap to allow a better fit; in addition, the HTS-1 has options for different sizes of hoods, boots, cuffs and gloves. In addition to being a better fitting suit, the HTS-1 is less bulky, which improves the mobility of the suit.

The HTS-1 received initial approval as an aviation suit on November 25, 2009. By July 2010, the HTS-1 suit was in use by all passengers travelling to the Newfoundland and Labrador offshore area. On July 6, 2010, the

HTS-1 suit received approval from Transport Canada as a marine abandonment suit.

On May 12, 2009, the Helicopter Emergency Underwater Breathing Apparatus (“HEUBA”) units were added to the HTS-1 suits. Helly Hansen Canada Limited also added a HEUBA cover, as well as low-profile exhaust valves, in order to reduce snag hazards.

Suit Fittings

As part of the return to flight process following the crash of Cougar Helicopter Flight 491, the Operators engaged Helly Hansen Canada Limited to conduct mandatory individual suit fittings for all personnel travelling offshore. The individual suit fittings were conducted at the Cougar Heliport, at offsite fitting sessions and at the Helly Hansen suit maintenance facilities in St. John’s. The fitting process consists of the following categories:

- 1) donning of the suit;
- 2) verification of the ability to zip up the suit;
- 3) size verification;
- 4) checking of face and wrist seals;
- 5) mobility checks.

Helly Hansen Canada Limited provided training to Cougar Helicopters personnel in order to enable them to conduct suit fittings at the Cougar Heliport as required. However, Helly Hansen Canada Limited continues to conduct individual suit fittings on a daily basis – five days a week, as well as at other times when needed outside of the regularly scheduled daily sessions.

Although the suspension system in the new HTS-1 suit accommodates a wider range of heights, Helly Hansen Canada Limited developed and obtained approval for a 2XS suit for smaller passengers. During the individual fitting process, Helly Hansen Canada Limited had to obtain custom-made suits for several individuals who fell outside of the range of

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the standard suit sizes. Fourteen (14) such custom-made suits have been produced and seven (7) more custom-made suits are in the process of production. It takes several months to obtain approval from Transport Canada for each custom-made suit.

Once a passenger has been individually fitted, that passenger's suit size is kept on file by Cougar Helicopters in order to ensure that the passenger is provided with the same suit size for every flight.

Canadian General Standards Board (“CGSB”)

Helly Hansen Canada Limited is currently actively involved in the CGSB committee that is reviewing the helicopter transportation suit standards. The CGSB is considering various issues with respect to the helicopter transportation suits, including revisions regarding the test methods for various components of the suits, the proper clothing to be worn under the suit system during the tests and the conducting of tests in realistic conditions involving wind speed simulators, wave generators and rain generators.

The CGSB committee is scheduled to meet in June 2011 in order to discuss the latest draft revisions and any issues arising.

Transportation Safety Board of Canada (“TSB”) Report

The TSB Report touched on a couple of issues in relation to the helicopter transportation suits, both of which were discussed in our previous submissions to the Inquiry:

1. The first issue is in relation to the fit of the suits. The TSB noted that the E-452 suit was designed to function with up to 654 grams of water in the suit, however following the crash, more than 654 grams of water entered the survivor's suit and the survivor's body temperature dropped rapidly. The TSB made the following conclusion with respect to the reason for the leakage:

The water ingress was likely due in part to inadequate PTSS seals around the face (hood seals) and wrists (wrist seals) resulting from the survivor wearing a PTSS that was too big.

*Transportation Safety Board of Canada- Aviation Reports –
2009-A09A0016, s. 1.15.9*

The TSB noted that when the E-452 suits were first introduced, suit sizing was carried out using visual estimates based on height and weight, hood donning ability and the passenger's assessment of mobility. This approach confirmed mobility but it did not necessarily confirm that the passenger had the proper suit size and seal. The TSB noted that many passengers based their assessment of suit size on comfort rather than fit. A properly fitted suit is somewhat uncomfortable and therefore most passengers selected a suit that was comfortable, but too large. The TSB concluded as follows:

Relying on visual estimates of height and weight, and passenger assessments of hood donning ability and mobility, without confirmation of PTSS size through functional testing performed by PTSS technicians may result in passengers wearing inappropriate PTSS sizes. The use of improper PTSS fitting techniques may result in unacceptable levels of water ingress and a subsequent rapid loss of body temperature, following a ditching or crash at sea.

*Transportation Safety Board of Canada- Aviation Reports –
2009-A09A0016, s. 2.7.4*

As noted above, Helly Hansen Canada Limited commenced individual suit fittings for all passengers travelling offshore in March 2009, at the request of the Operators. In her expert testimony before the Inquiry, Dr. Susan Coleshaw testified that such individual suit fittings are not normally done in the industry. She stated that suit manufacturers normally provide a range of suits and it is up to the individual to choose their own suit size. She also stated that if an individual has an ill-fitting suit, there is some responsibility on the individual to ask for a different sized suit. As acknowledged by Dr. Coleshaw, the Operators have addressed the fit issue by contracting with Helly Hansen Canada Limited to conduct individual suit fittings for all workers travelling offshore before they are cleared to fly. These individual suit fittings continue to be performed on a daily basis by Helly Hansen Canada Limited.

2. The second issued addressed by the TSB is in relation to the design of suits to meet both the aviation suit standards and the marine

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abandonment suit standards. The TSB noted that there is considerable overlap in the buoyancy and thermal protection requirements between both standards. As a result, this produces a suit that represents a compromise between two very different applications. The TSB noted that in a helicopter ditching, an individual may be required to maneuver through small openings in order to egress from the helicopter. If the helicopter transportation suit is too bulky or too buoyant, egress may not be possible. The TSB concluded as follows:

Passenger Transportation Suit Systems (PTSS) designed to meet the standard for marine abandonment have increased buoyancy and flotation capabilities. While useful in a marine abandonment situation, the increased suit buoyancy and bulkiness may interfere with a successful egress from a submerged helicopter.

Transportation Safety Board of Canada- Aviation Reports – 2009-A09A0016, s. 2.7.3

Finally, the TSB made a specific finding that the E-452 suits met the CGSB standards:

The E-452 PTSS met the Canadian General Standards Board (CGSB) standards and was considered adequate for the risks of the operational environment at the time of the occurrence.

Transportation Safety Board of Canada- Aviation Reports – 2009-A09A0016, s. 3.3

Recommendations

Helly Hansen Canada Limited reiterates the recommendations contained in the submissions which it filed in Phase I of the Inquiry. In particular, we submit that the TSB report supports the first two of Helly Hansen Canada Limited's recommendations, which appear in Volume 1 of the Offshore Helicopter Inquiry Report (p. 94):

- 1) Remove the requirement for dual approval with respect to the helicopter transportation suits. The suits should only be required to meet the Transport Canada aviation suit standards and not be required to also meet the Transport Canada marine abandonment suit standards.

- 2) Confirm that offshore workers have a level of personal accountability for their own safety in helicopter transportation.

We submit that the current CGSB review supports the following recommendation contained in our previous submissions:

- 4) Require that future testing of the helicopter transportation suits recreate as realistically as possible the conditions where the suits will be used in order to obtain an accurate assessment of their performance in real world scenarios.

Conclusion

Since the tragic events of March 12, 2009, there have been significant efforts to improve the safety of helicopter transportation to the Newfoundland and Labrador offshore area. Helly Hansen Canada Limited has continued its efforts to improve the effectiveness and comfort of the helicopter transportation suits as well as being an active participant in the CGSB committee that is reviewing the helicopter transportation suit standards. Helly Hansen Canada Limited is proud to have played a role in the important work of this Inquiry, which has already made substantial recommendations for improved safety in this area.

All of which is submitted on behalf of Helly Hansen Canada Limited.

DATED at St. John's, Newfoundland and Labrador, this 15th day of April, 2011.

BENSON•MYLES PLC INC.

Per: _____

Geoffrey L. Spencer

Solicitors for Helly Hansen Canada
Limited

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PHASE II

OFFSHORE HELICOPTER SAFETY INQUIRY

WRITTEN SUBMISSIONS FOR

COUGAR HELICOPTERS INC.

(A VIH AVIATION GROUP COMPANY)

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Date of Submission: **April 15, 2011**

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Although the second anniversary of the loss of Cougar Flight 491 has already passed, the staff and officials at Cougar Helicopters Inc. (“Cougar”) continue to be deeply affected by this tragic event. Of course, it is the families of the passengers and the pilots who perished in the accident and the sole survivor and his family who are the persons profoundly affected. Cougar again offers its condolences to the families who lost loved ones and its best wishes to the survivor that his recovery from his injuries will be complete.

Following the submission by the Commissioner of his Report and Recommendations, Cougar’s officials have, in consultation and cooperation with its oil operator clients, set about to implement, at the earliest opportunity, those recommendations directed primarily to Cougar’s activities and operations. While, where possible, recommendations have already been fully implemented, certain recommendations are, by their nature, only able to be implemented with input and participation and, in some cases, agreement by and with other interested parties. In the case of the latter, the work toward implementation continues and Cougar remains optimistic that full implementation will be achieved in a timeframe and manner acceptable to the Canada-Newfoundland and Labrador Offshore Petroleum Board (“C-NLOPB”) and to the oil operators and all others with an interest in assuring that the risks of helicopter transportation of offshore workers are as low as reasonably practicable in the Newfoundland and Labrador offshore area.

Although this issue was not raised in the Commissioner’s Phase I Recommendations, Cougar, prior to return to service on 15 May 2009, replaced the titanium MGB oil filter bowl studs and took other actions required by Sikorsky and the FAA in relation to the S-92s. Since then, Sikorsky has redesigned the MGB filter bowl housing. The original one-piece bowl was replaced with an adapter that is permanently attached to the gearbox and a new bowl with additional fasteners (six instead of three) for increased redundancy and strength has been fitted on all the S-92s operated by Cougar.

Now, in the second Phase of the Commissioner’s Terms of Reference, Cougar makes no proposals to the Commissioner for further

recommendations by him for actions by C-NLOPB or by other legislative or regulatory agencies arising specifically out of the Report of the Transportation Safety Board of Canada following completion of its investigation into the crash of Cougar Flight 491. It is Cougar's position that any recommendations that might have arisen out of the findings of the Transportation Safety Board of Canada have already been captured by the Commissioner in the twenty-nine recommendations previously released.

Once again, Cougar expresses its gratitude to the Commissioner for the comprehensive and fair-minded approach taken in the conduct of the Inquiry and for the benefit of his thoughtful analysis of the evidence and submissions presented and for the benefit to Cougar and others of his observations and ultimate findings and recommendations.



**SUBMISSION TO THE OFFSHORE HELICOPTER SAFETY INQUIRY
(PHASE II)**

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

15 APRIL 2011

*Contact: Department of Justice, Confederation Building, 4th Floor,
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Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

The Offshore Helicopter Safety Inquiry was established by the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) following the March 12, 2009 crash of Cougar helicopter flight 491. The Offshore Helicopter Safety Inquiry Phase I Report was released on November 17, 2010 and contained important recommendations to improve safety in the Newfoundland and Labrador offshore area to ensure the risks of helicopter transportation are as low as reasonably practicable.

The causes of the Cougar Flight 491 helicopter crash were investigated by the Transportation Safety Board. The Transportation Safety Board Report, issued on February 9, 2011, contained a number of findings as well as four recommendations.

For Phase II of the Offshore Helicopter Safety Inquiry, Commissioner Wells has requested that the parties provide submissions respecting the findings of the Transportation Safety Board Report as well as an update on their respective safety initiatives.

Safety Initiatives

Phase I Recommendations

The safety of all offshore workers is of paramount importance to the Government of Newfoundland and Labrador. For that reason, on December 13, 2010, the Premier announced that the Government of Newfoundland and Labrador had accepted all twenty-nine recommendations of the Phase I Report from the Offshore Helicopter Safety Inquiry, including the recommendation for a stand-alone safety regulator (Recommendation 29).

To accommodate the implementation of these recommendations, the C-NLOPB has taken interim measures to address each of the first 28 recommendations. The C-NLOPB has concentrated on an internal restructuring solution by establishing two teams – Aviation and Safety Teams – with responsibility to develop implementation plans for these recommendations.

With regard to Recommendation 29, it is the intention of the Government of Newfoundland and Labrador that this recommendation be implemented, and to that end the Province has entered into discussions with the federal government to achieve this goal. The Government of Newfoundland and Labrador is committed to completing this important task in an expeditious manner.

It is important to note that the Atlantic Accord Agreement was implemented by the enactment of mirror (parallel) legislation, the federal *Canada Newfoundland Atlantic Accord Implementation Act* and the provincial *Canada Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*, collectively the Atlantic Accord Acts. Creation of a stand-alone safety regulator will require amendments to these Acts.

Proposed Occupational Health and Safety Amendments

The Province, in conjunction with the federal government and Nova Scotia, continues to work on the proposed occupational health and safety (OHS) amendments to the Accord Acts with a collective target of a spring 2011 legislative introduction. Due to the current federal election it is unlikely that this target will be met. Provincial officials from the Departments of Government Services and Natural Resources continue to work closely with their federal counterparts to conclude legal drafting and advance the proposed amendments.

The proposed OHS amendments will not impact on the safety or airworthiness of helicopters used in the transportation of workers to and from the offshore as these matters are within the exclusive jurisdiction of Transport Canada.

The underlying principles in the proposed amendments include offshore OHS laws that provide workers with protections equivalent to those which exist for onshore workers; the continued protection of employee rights (to know, to participate, to refuse, protection from reprisal); an OHS culture which recognizes the shared responsibilities in the workplace; a clear separation of OHS and production issues; joint management by the federal and provincial governments; and an effective and efficient regulatory and

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enforcement regime including a governance model with oversight by the provincial minister responsible for onshore OHS.

Currently, in Newfoundland and Labrador, the provincial Minister of Natural Resources has responsibility for offshore safety. Under the proposed amendments, there will be a separation of oversight responsibilities. The provincial Minister of Government Services, who is also responsible for onshore OHS, will have ministerial responsibility for offshore OHS oversight. This separation of roles will provide additional assurance that there is no conflict or appearance of conflict between the Ministry of Natural Resources' role in promoting offshore development and the Ministry of Government Services' role in overseeing offshore OHS. The minister with oversight responsibility will be entitled to any OHS information and documentation under the control of the C-NLOPB. The Government of Newfoundland and Labrador was encouraged by Commissioner Wells' support for this change as noted in the Phase I Report.

The Government of Newfoundland and Labrador was pleased that Commissioner Wells noted that the proposed OHS amendments "will play a significant role in enhancing safety in the offshore" and that he commended the proposed advisory council. The proposed OHS amendments include an Advisory Council comprised of an equal number of representatives of employees and industry as well as representatives from the provincial and federal governments. The Advisory Council will advise on the administration of the OHS part of the Accord Act.

Report of the Transportation Safety Board

The safety of individuals traveling to and working offshore is of paramount importance to the Government of Newfoundland and Labrador. The Transportation Safety Board Report provides valuable information on the Cougar Flight 491 accident, and strong recommendations on how such a tragedy can be prevented.

The Government of Newfoundland and Labrador supports the recommendations and findings of the Transportation Safety Board and the improvements which will result in safer offshore transportation.

Implementation of the TSB report will strengthen safety practices and will ensure that all precautions are taken to protect individuals working in our offshore.

Transport Canada is the federal government department responsible for most transportation related policies and regulations. It regulates marine and air transportation including offshore helicopter transportation. Transport Canada has a responsibility to act on the recommendations and findings contained in the Transportation Safety Board's Report and the Government of Newfoundland and Labrador will look to Transport Canada to fulfill its mandate.

The Government of Newfoundland and Labrador looks forward to the results of Phase II of the Offshore Helicopter Safety Inquiry and the recommendations from Commissioner Wells.

**Newfoundland and Labrador
Offshore Helicopter Safety Inquiry
Phase II**

**Submission of the
Canadian Association of Petroleum Producers**

April 15, 2011

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Introduction

The Canadian Association of Petroleum Producers (CAPP) represents companies, large and small, that explore for, develop and produce natural gas and crude oil throughout Canada. CAPP's (see last page for list of abbreviations) member companies produce more than 90 per cent of Canada's natural gas and crude oil. CAPP's associate members provide a wide range of services that support the upstream crude oil and natural gas industry. Together CAPP's members and associate members are an important part of a national industry with revenues of about \$100 billion a year. CAPP has offices in St. John's, NL and Calgary, AB. CAPP's mission is to enhance the economic sustainability of the Canadian upstream petroleum industry in a safe and environmentally and socially responsible manner, through constructive engagement and communication with governments, the public and stakeholders in the communities in which we operate.

The purpose of the Offshore Helicopter Safety Inquiry (OHSI), as set out in its Terms of Reference, is to determine what improvements can be made so that the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) can determine that the risks of helicopter transportation of offshore workers are as low as is reasonably practicable in the Newfoundland and Labrador offshore area. CAPP supports the purpose of this Inquiry and has participated since the Inquiry began by providing evidence and information where appropriate.

CAPP participated in Phase I of the Inquiry and provided evidence related to four key issues: process of implementing a helicopter underwater emergency breathing apparatus, work on a helicopter passenger transportation suit standard and related issues, development of an Escape, Evacuation and Rescue guideline, and CAPP participation in the United Kingdom Helicopter Task Force. CAPP also provided a written submission to the Inquiry on issues of particular interest to CAPP with a view to assisting the Commissioner with the investigation. CAPP's submission is included in Volume 3 of the Offshore Helicopter Safety Inquiry Phase I report¹.

¹ Shortcut to: http://www.cnlopb.nl.ca/pdfs/ohsi/ohsir_vol3.pdf

CAPP is providing this submission to assist in Phase II of the Inquiry. This submission represents the views of CAPP members with interests in the Newfoundland and Labrador offshore area and has been endorsed by CAPP's Atlantic Canada Executive Policy Group (EPG)².

Update on OHSI Phase I Recommendations:

In the Phase I OHSI report, the Commissioner made a recommendation that the C-NLOPB review its relationship with CAPP and that the oil operators define CAPP's authority so that stakeholders understand that authority³. CAPP, on behalf of the operators in Newfoundland and Labrador, has addressed this recommendation with the C-NLOPB and we believe this issue has now been resolved. CAPP has clarified that as the national industry body, it provides collective comment on proposed policy, regulations or guidance documents as they are developed by governments and regulators. There is, therefore, no confusion with respect to roles - governments and regulators implement and enforce guidelines and regulations. CAPP builds upon these guidelines and regulations to develop supporting best practice documents for industry member use.

In order to improve communications with the C-NLOPB and to ensure CAPP's committee structure and processes support timely achievement of industry consensus and effective interactions with the regulator, CAPP has implemented a number of process improvements over the last year. These include:

- Improving the interface between CAPP and the regulator(s) by ensuring expectations, priorities and timelines are clear and providing formal progress reporting at regular intervals.
- Improving CAPP's internal processes for managing complex projects by identifying a project champion from the Atlantic Canada EPG for complex projects.

² CAPP's Atlantic Canada EPG is comprised of senior management from CAPP member companies with interests in Atlantic Canada, in particular those with interests in offshore Newfoundland and Labrador and Nova Scotia.

³ Recommendation 21 of the Offshore Helicopter Safety Inquiry Phase I report

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- Ensuring CAPP member company engagement and support by developing clear terms of reference for complex projects including expectations and roles of committee members and expectations related to member resources.
- Improving stakeholder engagement by developing stakeholder engagement plans for every complex project and developing communication materials and feedback templates.
- Ensuring the C-NLOPB is aware of CAPP's priority issues and vice versa by holding formal meetings at least twice per year between the C-NLOPB and CAPP member executives/staff.

CAPP has also had involvement in discussions/initiatives related to other Phase I recommendations, specifically, helicopter safety training and survival, and personal protective equipment. As these issues are also raised in the Transportation Safety Board of Canada (TSB) report on its investigation into the crash of the Cougar Helicopter Sikorsky S92-A, CAPP's involvement in these issues is outlined in the section below entitled "CAPP Initiatives in Relation to TSB Report."

Phase II Submission:

In Phase II of the Inquiry the Commissioner will review the report by the TSB on its investigation into the crash of the Cougar Helicopter Sikorsky S92-A. In reviewing the investigation report, the Commissioner will advise the C-NLOPB: "a) which findings should result in actions being recommended to be undertaken by the C-NLOPB and how they should be implemented; and, b) which findings should result in actions being recommended to be taken by other legislative or regulatory agencies."⁴

The TSB report contained four recommendations, findings in relation to cause and contributing risk factors.

Following the issuance of that report, the C-NLOPB established teams who will facilitate the implementation of those recommendations. Given

⁴ Shortcut to: http://www.oshsi.nl.ca/?Content=About_the_Inquiry

the extensive response that is already underway, we respectfully submit that no additional recommendations are required by the Commissioner in response to the TSB report.

CAPP Initiatives in Relation to TSB Report:

CAPP understands that written submissions should highlight improvements that have been made in relation to safety performance.

In this section, CAPP will provide additional information on work industry is doing, over and above the activities underway through the C-NLOPB's safety teams, in relation to some of the contributing risk factors identified in the TSB report.

Basic Survival Training:

The TSB report highlights two risk factors related to training:

- The current basic survival training (BST) standards in Canada lack clearly defined, realistic training standards and equipment requirements. This could lead to differences in the quality of training and affect occupant survivability⁵.
- An interval of 3 years between recurrent BST may result in an unacceptable amount of skill decay between recurrent training sessions. This skill decay could reduce the probability of successful egress from a submerged helicopter.⁶

In order to provide context around current training standards, it is important to understand the model used in Atlantic Canada to oversee training for the offshore. This model was presented in CAPP's Phase I submission to the Inquiry.⁷

⁵ TSB Report, section 3.2, Finding 14

⁶ TSB Report, section 3.2, Finding 15

⁷ Shortcut to: http://www.cnlopb.nl.ca/pdfs/ohsi/ohsir_vol3.pdf

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The Training and Qualifications Committee (TQC) is a collaborative effort between CAPP, the Canadian Association of Oilwell Drilling Contractors (CAODC), training institutions, the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB) and the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB). The TQC maintains the Atlantic Canada Offshore Petroleum Industry Standard Practice for the Training and Qualifications of Personnel (the TQSP), and undertakes other initiatives related to training. The purpose of the TQSP is: to outline the training required by individuals working offshore in Atlantic Canada and the qualifications per position for drilling installations, production installations and supply and standby vessels. It further defines the emergency preparedness and response teams and their training required on offshore installations. CAPP is the custodian of the TQSP and the C-NLOPB and CNSOPB administer it. The TQC reports to the CNSOPB and the C-NLOPB as well as to the CAPP Atlantic Canada Safety Committee. The decisions of the TQC are ratified by the CAPP Atlantic Canada EPG and the C-NLOPB and CNSOPB. Feedback mechanisms and annual reviews have been built into the TQSP to ensure that there are opportunities for engagement of the workforce and other stakeholders.

The TQC has put in place an inclusive process by which stakeholders involved in offshore training, those with the expertise as well as those with the responsibility for oversight, work together to ensure that training for the offshore workforce in Atlantic Canada is the most appropriate for the offshore environment in Atlantic Canada. The process is founded on the principle of continuous improvement so the document is a living document, updated regularly with processes built in to receive feedback from key players in the offshore. The TQC has not only developed common training and qualifications requirements but has become a vehicle through which suggested improvements to training and qualifications can be tabled and discussed by experts and regulators.

Basic Survival Training (BST)/Basic Survival Training Recurrent (BST-R) Standards and Consistency

In recent years, the TQC has taken on evaluation of the course quality for offshore training. The course quality review is a transparent, flexible process whereby a third party industry consultant together with subject

matter experts review training courses against established criteria and make recommendations on areas where there is a potential for improvement.

The BST and BST-R courses at both the Marine Institute – Offshore Safety and Survival Centre in Newfoundland and Labrador and Survival Systems Training Limited in Nova Scotia were reviewed in 2009. Training at both institutes was found to be of good quality and met the intent of the TQSP. The review also identified suggested enhancements to align training approaches between jurisdictions. The TQC identified that the standard can be improved by the development of performance based learning objectives which would have the effect of achieving higher levels of consistency in training program delivery.

The TQC has initiated a process to develop performance based learning objectives for the BST and BST-R courses. Work to develop competency-based performance standards which identify skills and knowledge requirements is expected to be completed in the next revision of the TQSP. The TQC will also be following this approach for other courses.

Training Equipment

Consistency in the training equipment used by the respective training institutes is also being considered as part of the TQC's review of the BST and BST-R courses. The TQC has committed to defining the criteria for equipment related to BST training with the goal of including this information in a revised standard.

Frequency of Training

The purpose of the BST-R is to ensure retention of the practice skills learned in the BST. In many other jurisdictions, the recurrent training takes place every four years. In Canada, the recurrent training takes place every three years, exceeding the standards in other jurisdictions such as the North Sea. The TQC has considered the issue of frequency of training a number of times and has maintained the view that the recurrent training should take place every three years rather than increasing to four to be more in line with other jurisdictions.

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The discussion and evaluation of whether or not the BST-R should increase in frequency is complex in that industry will be required to strike a balance between the potential benefits and any increased risk to trainees which could be caused by increasing the frequency of training. A thorough evaluation of this issue is therefore required and CAPP maintains that the TQC is the proper venue for discussing and evaluating this issue.

Helicopter Passenger Transportation Suit Systems and Related Standard

The TSB report identifies the following issue related to helicopter passenger transportation suits:

- Passenger Transportation Suit Systems (PTSS) designed to meet the standard for marine abandonment have high buoyancy and flotation capabilities. While useful in a marine abandonment situation, these features may interfere with a successful egress from a submerged helicopter.⁸

All of the helicopter passenger transportation suits used for industry operations in the Atlantic Canada offshore are certified to a Canadian General Standards Board (CGSB) helicopter suit standard which takes into account escape buoyancy⁹ considerations. These suits are also designed to meet the CGSB Immersion Suit Systems Standard (65.16-05), sometimes referred to as the marine abandonment standard, but must meet escape buoyancy requirements as part of the helicopter suit standard as well.

In early 2009, the CGSB sought funding to review their Helicopter Passenger Transportation Suit Systems standard (CGSB 65.17-99). CAPP members supported the review of the standard. The review commenced in November 2009 and, under the auspices of the CGSB Committee¹⁰, is progressing through the establishment of a CGSB working group¹¹.

⁸ TSB Report, section 3.2, Finding 16

⁹ Escape buoyancy is defined as the buoyancy of the suit system on the wearer, which the wearer must overcome when escaping from an immersed, inverted helicopter.

¹⁰ CGSB Committee 65-2 maintains the Helicopter Passenger Transportation Suit System (CAN/CGSB 65.17-99) and the Immersion Suit System (CAN/CGSB 65.16-05); it is comprised of a balance of end users (e.g., ExxonMobil; Suncor; Husky; Communications, Energy and Paper Workers Union; Fish, Food and Allied Workers; DND; etc.), regulators (Offshore Petroleum Boards; National Energy Board; Transport Canada), producers (e.g., Helly Hansen; Mustang

CAPP Role in the Review

The process established for the review of 65.17-99 includes oversight by CGSB staff, review and direction provided by the CGSB Committee, establishment of a working group comprised of Committee members to undertake the work of the revision and final vote by CGSB Committee to confirm the final standard.

CAPP has a formal seat and vote on the CGSB Committee, and has actively participated in all Committee meetings pertaining to this review. Additionally, CAPP is a member of the CGSB Working Group established to undertake the review. The CGSB Working Group meets weekly and is responsible for content, drafting and research direction for the overall review. CAPP is managing the Working Group and, in combination with Petroleum Research Atlantic Canada, managing the research components of the review. CAPP communicates with members to apprise them regularly of the status (via the CAPP Atlantic Canada Safety Committee) and ensures industry feedback on the review is incorporated into the process.

In addition, in 2009, industry sought through CAPP to improve the evaluation of water ingress into suit systems. CAPP worked with researchers to develop a new water ingress test methodology incorporating submerged helicopter egress, simulated survival at sea and realistic weather conditions. Industry, through CAPP, presented this approach to the CGSB Committee and sought support to include it in the revised standard. The CGSB Committee agreed and directed a thorough review of the proposed test method by the CGSB Working Group. This has been completed and the Working Group is finalizing the approach to the inclusion of the new test in the recommended revised standard.

Survival; DSS Group of Companies; etc.), and general interest (e.g., Marine Institute; The CORD Group; National Research Council of Canada; etc.).

¹¹ Each CGSB membership category is represented on the working Group: *Regulators*: C-NLOPB, *End Users*: ExxonMobil and CAPP, *Producers*: Mustang and Helly Hansen, *Other*: CORD Group (suit research and test facility).

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CGSB Review Process:

The review of the standard is focusing on three areas: performance requirements, drafting and end-user considerations:

- *Performance Requirements:* the standard is being evaluated from the basis that a suit certified against it is expected to either perform in a defined way, or not hinder expected actions required of the individual wearing it. For instance, test methods are being researched and developed to better evaluate the suit for matters such as impacts on mobility; ability to exit a submerged helicopter (including impediments to physical egress and underwater buoyancy requirements); thermal protection (including improved evaluation of water ingress into the suit during simulated realistic sea conditions); material durability and visibility (including colour and retro-reflective material requirements); critical donning, survival and rescue actions.
- *Drafting:* the standard is undergoing thorough review to ensure that the content is up to date with respect to matters such as existing research, other related standards, improvements in technology and that the requirements and test methods contained within it are clear, concise and specific.
- *End-user considerations:* The standard review is also addressing some aspects of the use of a suit built to meet this standard. This includes a requirement that the manufacturer provide fitting instructions for the suit system. Additionally, it is recognized that components can be added to a suit system, such as personal locator beacons or breathing devices. The standard is expected to require that where this is intended the suit system must be tested for certification with all additional components.

CGSB Research

Significant research undertakings are associated with this review, including: validation of thermal requirements; more realistic water ingress and escape buoyancy evaluation; cold hand dexterity and hand protection requirements. This research is, as noted below, ground-breaking in the evaluation of buoyancy in underwater egress. Research is being conducted by several researchers at various facilities including Memorial University of Newfoundland; National Research Council – Institute for Ocean Technology facility in St. John's, NL; Dalhousie University in Halifax, NS; and The CORD Group in Dartmouth, NS.

Several areas of this research are highlighted below.

Thermal Requirements:

The standard defines protection limits¹² for impacts from cold shock and the onset of hypothermia. It requires a suit to have a minimum in-water thermal value to meet these protection limits. This value had been derived in the past from models of thermal physiology and provides the defined protection for calm water. The research commissioned to support the review has the objective of determining whether this minimum level of thermal insulation is sufficient to provide the same level of protection in cold air, water, wind and wave conditions. This is ground-breaking research in which humans are being exposed to these conditions and their core temperature monitored.

Other aspects of the test method used to ensure a suit meets the minimum thermal insulation requirement are also being researched and improved, including the development of a much more realistic and thorough water ingress test method as discussed above.

¹² CGSB 65.17 defines thermal protection limits to protect from the onset of hypothermia as follows: no more than a 2-degree Celsius core body temperature drop in 0-2 degree Celsius water over a six-hour period.

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Cold Hand Dexterity:

Research to evaluate hand dexterity in cold water temperatures has been conducted. The objective of the research was to determine whether there is sufficient dexterity in the first few minutes of submersion to allow the undertaking of critical survival actions (i.e. deployment of critical suit components and donning of gloves) or to determine the minimum required hand protection should there not be sufficient hand dexterity maintained. The research found that there is sufficient dexterity maintained to accomplish the required survival actions. Thus, the standard is being prepared with a test method that is intended to ensure that a suit meeting it has components and gloves that are easily deployed and donned within two minutes.

Escape Buoyancy:

Buoyancy and flotation requirements of the suit system are a significant aspect of the commissioned research. Performance expected of a helicopter suit requires that it not be so buoyant that it hinder submerged egress, but does provide for buoyancy and flotation when at the surface. The commissioned research is intended to evaluate what the limits are in the ability of a person to maneuver underwater given the added force of buoyancy. The intent is to present a range of buoyancy limits based upon size that will ensure appropriate maximum buoyancy for escape purposes is achieved. Further, the existing test for escape buoyancy is being evaluated and a new test which would be performance based is under consideration. The new test would require test subjects to perform underwater egress scenarios and considers buoyancy impacts on the test subjects' ability to egress. Other research commissioned for the review includes evaluating the tests used to assess a suit for flotation stability considerations.

Supplemental Underwater Breathing Apparatus

The TSB report recommends that:

- Transport Canada require that supplemental underwater breathing apparatus be mandatory for all occupants of

helicopters involved in overwater flights who are required to wear a PTSS [Passenger Transportation Suit System]¹³.

A supplemental underwater breathing apparatus has been in use by the offshore oil and gas workforce in Atlantic Canada since May 2009 and a thorough overview of the implementation process used by industry was provided as part of Phase I of the Inquiry. As an industry we support the carrying of this device on all flights over water where passengers are required to wear a passenger transportation suit system.

Other CAPP Initiatives Related to Offshore Helicopter Safety:

As part of Phase II of the Inquiry, the Commissioner has also requested that parties submit information on any other relevant work in the realm of safety. This section will provide information on several other safety issues CAPP is working on. Given the number of safety initiatives CAPP is involved in, we will focus in this submission only on those that are somewhat related to, or may strengthen, the safety of helicopter transport.

As an industry, we are committed to continuous improvement in safety performance. CAPP's Atlantic Canada Safety Committee is one venue in which CAPP members discuss safety issues and initiatives and consider safety from a continuous improvement perspective. Highlighted below is a description of CAPP's Atlantic Canada Safety Committee and some of the issues currently being undertaken by the Committee.

Atlantic Canada Safety Committee

CAPP's Atlantic Canada Safety Committee reports to the Atlantic Canada EPG. The Safety Committee is chaired by a member company employee and supported by senior safety employees of member companies with interests in the Atlantic Canada offshore, representatives from local drilling contractors, and CAPP staff. The Committee meets monthly and works on safety related issues and initiatives that affect the broader industry. The Safety Committee meets with the C-NLOPB and CNSOPB

¹³ TSB Report, section 4.2.3

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formally at least once a year to share information about committee work and seek feedback from the boards.

The Safety Committee and related task forces and working groups reporting into the Safety Committee, are involved in many issues and initiatives. This list of issues changes depending on requests that come to CAPP from the C-NLOPB or CNSOPB or from offshore operators who wish to approach a particular safety issue from an industry perspective as it broadly impacts the industry. Three of these issues are outlined below and may be of interest given their connection to helicopter travel.

Use of Helicopter Underwater Emergency Breathing Apparatus (HUEBA) in Helicopter Underwater Escape Trainer (HUET)

The current HUEBA training program is designed to ensure that risks associated with the training are as low as reasonably practicable. Industry understands that efforts to maximize the fidelity of training can result in increased risk; therefore determining whether or not to use the HUEBA in the HUET requires greater analysis. The Safety Committee will undertake this research with a goal of reaching a training recommendation.

Medical Assessment Guideline

A requirement in Atlantic Canada prior to taking basic survival training and working offshore is to have a medical assessment. It is a requirement that the medical assessment meet or exceed the *CAPP Guide for Medical Assessment for Fitness to Work Offshore*. This Guide provides direction to physicians in conducting an appropriate medical assessment for the offshore environment. The Guide defines the roles of the operator's medical advisor and of the physician; provides the objective of the assessment and considerations regarding the offshore working environment; and specifies the components required of the assessment itself. CAPP members are in the process of evaluating the guide and possible enhancements in the medical tools presented.

Fatigue Management in the Offshore Petroleum Industry

CAPP is developing a Best Management Practice describing key considerations to be assessed by offshore industry operators and drilling contractors in their determination of appropriate fatigue management measures to be implemented on offshore drilling and production facilities. The document outlines responsibilities for operators related to fatigue management, which considers such things as work scheduling; developing a policy, program or plan related to fatigue; and developing programs to educate the workforce about the risks of fatigue and how to minimize these risks.

Conclusion

In conclusion, CAPP is providing the information included in this submission to assist in Phase II of the Inquiry. The intent is to provide up-to-date information about what industry is doing related to the TSB recommendations which are broadly applicable to the industry and those in which CAPP has a role. Given the response that is already underway following Phase I of the Inquiry, CAPP respectfully submits that no additional recommendations are required by the Commissioner in response to the TSB report.

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List of Abbreviations

BST	Basic Survival Training
BST-R	Basic Survival Training Recurrent
CAODC	Canadian Association of Oilwell Drilling Contractors
CAPP	Canadian Association of Petroleum Producers
CGSB	Canadian General Standards Board
C-NLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
EPG	Executive Policy Group
HUEBA	Helicopter Underwater Emergency Breathing Apparatus
HUET	Helicopter Underwater Escape Trainer
OHSI	Offshore Helicopter Safety Inquiry
TQC	Training and Qualifications Committee
TSB	Transportation Safety Board of Canada
TQSP	Atlantic Canada Offshore Petroleum Industry Standard Practice for the Training and Qualifications of Personnel

JOINT OPERATOR SUBMISSION

Presented to

OFFSHORE HELICOPTER SAFETY INQUIRY

Presented by

**Hibernia Management and Development Company Ltd., Husky Oil
Operations Limited and Suncor Energy Inc.**

April 15, 2011



Offshore Helicopter Safety Inquiry

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INTRODUCTION

The Offshore Helicopter Safety Inquiry (Inquiry) was established to review matters respecting worker safety associated with helicopter transportation in the Newfoundland and Labrador offshore area that are within the jurisdiction of the Canada-Newfoundland Offshore Petroleum Board (C-NLOPB) and the mandate of the Inquiry. The Inquiry's mandate is to determine and recommend improvements to the safety regime to ensure the risks of helicopter transportation of offshore workers in the Newfoundland and Labrador offshore area are as low as reasonably practicable. The Operators have supported and participated in the Inquiry since its initiation and value the comprehensive review and perspective demonstrated by the Commissioner's Phase I report, including 29 recommendations, which was issued in November, 2010. The Operators have reviewed the recommendations and since December 2010 have been actively involved with the C-NLOPB addressing the recommendations and reviewing implementation plans. As well, the Operators provided experienced, dedicated full-time personnel to work with the C-NLOPB's Safety and Aviation teams, established in response to the Phase I report recommendations, to assist in their assessment of the recommendations and implementation plans and progress. The Operators also continue to work directly with the C-NLOPB to address the recommendations.

Phase II was initiated with the February 9, 2011 release of the Transportation Safety Board of Canada report on the crash of flight 491 (TSB Report). The TSB Report contained four recommendations as well as findings as to causes and contributing factors and findings as to risk. The mandate of Phase II of the Inquiry is to undertake a review of the TSB Report and its findings that are within the mandate of C-NLOPB and determine which should result in actions being recommended to be undertaken by C-NLOPB and by other legislative or regulatory agencies. The Operators have carefully reviewed the TSB Report. We are of the view that the findings and recommendations that fall within the mandate of C-NLOPB were addressed in the Phase I Report.

The Inquiry process has been a thorough and welcome addition to the Operators' own continuous efforts to ensure the safety of our workforce. When Phase II commenced, the Commissioner requested that the

Operators provide information on the improvements to safety that they have undertaken since March 2009 and are now undertaking. What follows below is a summary of that information.

Introduction to Safety Initiatives

Many safety initiatives have been taken since the loss of Cougar Flight 491 and many are still underway. Notable perhaps are the implementation of helicopter underwater escape breathing apparatus (HUEBA) and HUEBA training; enhanced first response search and rescue (SAR), including a dedicated SAR helicopter and reduced ‘wheels up’ time; the donation by HMDC of \$2.4 million to the Marine Institute’s Offshore Safety and Survival Centre to facilitate the installation of state-of-the-art simulation training equipment, including a new helicopter underwater escape trainer (HUET) and training pool upgrades which can provide a higher level of fidelity for HUET training; greater workplace communication and involvement in helicopter safety matters; the provision of dedicated full-time Operator personnel to C-NLOPB to assist its Safety and Aviation teams; and ongoing research through the Canadian Association of Petroleum Producers (CAPP) to improve offshore training and development of an improved passenger helicopter transportation suit standard. These efforts are demonstrative of the Operators’ ongoing commitment to safe offshore helicopter transportation.

SAFETY IMPROVEMENT INITIATIVES**Helicopter Operations Task Force/HUEBA**

Immediately following the loss of Cougar 491, the Operators established the Helicopter Operations Task Force (HOTF). The HOTF evaluated all aspects of flight safety, including an aviation safety review to determine the readiness of Cougar Helicopters Inc. (Cougar) to resume helicopter passenger services. At the conclusion of this evaluation, the Operators recommended to the C-NLOPB that flight operations resume. That recommendation was accepted by the C-NLOPB on May 15, 2009.

The HOTF also offered a total of eighteen forward-looking recommendations regarding helicopter passenger service. These eighteen recommendations were discussed in considerable detail by the Joint Operator Panel during the Phase I public hearings. The individual

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recommendations, and an overview of the action items taken in 2009, can be found in the Joint Operator Panel Presentation.

Many of the HOTF recommendations ultimately overlapped with the subsequent Phase I issues and recommendations, including sea state limitations, SAR protocols, night flying and HUET training, which are addressed below. The complete HUEBA implementation program, including associated training of the workforce, was completed by October, 2009. HUEBA training was subsequently incorporated into the Basic Survival Training program and is thereby subject to recurrent certification. A revised helicopter briefing video was also introduced which addressed many issues, including HUEBA and the HTS-1 suit. In late 2009, Cougar completed the introduction of its new Safety Management System.

Sea States/Flotation

The Operators, in consultation with Cougar, pursued the installation of enhanced flotation on the S-92A fleet. Parts were ordered in May 2009 and final installation on the core fleet (four S-92As) was completed in March 2011. The Operators also implemented revised guidelines for restricting flight operations during higher sea states. This change was made effective February 10, 2011. Helicopters that are outfitted with enhanced flotation equipment are permitted to fly when offshore significant wave height is six metres or less.

Immersion Suit and Glove Enhancements

A suit assessment and fitting protocol, including training for Cougar heliport technicians, was developed and implemented in May, 2009. A database was created to link individual workers with their properly fitted suit size requirements. Helly Hansen and Cougar personnel continue to use this database to ensure that every worker traveling offshore is fitted with an immersion suit which meets the size requirements determined under the suit assessment and fitting protocol.

By June of 2010, Helly Hansen, in conjunction with the Operators, had developed and implemented the HTS-1 immersion suit, including individual fit testing and passenger orientation to the suit's features. The HTS-1 replaced the E-452 suit, and provided significant improvements in overall suit fit. 3036 personnel have been fitted with the HTS-1 suit. For

the small number of workers who could not achieve a correct fit wearing the HTS-1 immersion suit, customized suits were created. Full accommodation was achieved in late 2010.

By mid-2010, the Operators had completed a replacement of the existing helicopter transportation suit glove with a new glove that provides easier donning capability.

Further, as a part of the CGSB review of helicopter passenger transportation suit standards which the Operators are supporting and in which they are participating, research to evaluate hand dexterity in cold water temperatures has been conducted.

First Response SAR Enhancements

The Operators, working in conjunction with Cougar, have made significant enhancements to the First Response SAR capability. The Operators provide the C-NLOPB with a quarterly update on the status of First Response SAR enhancements.

A specially equipped Sikorsky S-92A helicopter was procured and is designated as the dedicated First Response SAR air frame. This helicopter is equipped with a dual hoist, a stretcher stacker, FLIR and Night Sun capabilities. Auto-hover is awaiting regulatory approval.

In addition, since May 2010, a 30-minute ‘wheels up’ time for the First Response SAR helicopter has been maintained. Work is ongoing to further reduce the ‘wheels up’ time. A critical element of this improvement is the completion of a new hangar facility to support the dedicated First Response SAR helicopter and crew. With approvals in place as of the first quarter of 2011, the hangar is anticipated to be operational by the end of 2011.

Cougar has also retained additional pilots and rescue specialists. Pilots and rescue specialists are also receiving additional comprehensive SAR training.

To enhance in-flight tracking, the Blue Sky system has also been introduced at the Canadian Coast Guard Marine Rescue sub-center which

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provides real time information on the location of all Operator helicopters and support vessels.

A protocol regarding search and rescue efforts is being developed between Cougar and the Department of National Defence. Operators are engaged in this process and are reporting to the C-NLOPB on its progress.

HUET/Facilities Enhancements

HMDC recently announced \$2.4 million funding to the Marine Institute's Offshore Safety and Survival Centre (OSSC) to fund the installation of state-of-the-art simulation training equipment. OSSC will now purchase a new helicopter underwater escape trainer (HUET). The HUET will be equipped with windows that can be configured to conform with those found on the S-92A, high-back seats with four point harnesses, stroking seats, auxiliary fuel tanks, and cockpit.

In addition, OSSC's training pool will be upgraded to permit simulation of more realistic environmental conditions including a wind machine (80 km), wave machine (1 meter), rain machine (light to heavy rain), sound system (rotor noise), lighting system (search and strobe lights), and an integrated control system.

This upgrade can provide a higher level of fidelity for HUET training.

Workforce Engagement and Communications

Significant efforts have been made to further enhance communications with the workforce regarding helicopter operations and safety. The Operators will continue to look for opportunities to further enhance communications practices.

Cougar Flight Information

Since October 2009 Cougar has been required to complete and submit to the Operators within 24 hours a flight notification form reporting any information such as turn arounds. This form captures events related to helicopter transportation, including events that may not otherwise be defined as incidents or occurrences. These reports are reviewed weekly with Cougar. The flight notification information is maintained offshore and is available for review.

Pre-Flight Checks

In 2009 Cougar and the Operators took steps to enhance pre-flight checks. Each personal locator beacon (PLB) is subjected to a visual inspection each time it is issued with a suit for travel offshore (and is tested once a month). A suit-donning check for each passenger is conducted before embarkation. And, to ensure that the correct usage of passenger seatbelts was and is reinforced, prior to takeoff the Cougar ground crew (outbound) or the helideck personnel (inbound) conduct a check of each passenger's seatbelt to confirm the seatbelt is properly used and does not impede access to the PLB and HUEBA units affixed to each suit. Following the TSB's comments on the performance of the PLBs, the Operators have also asked Helly Hansen and Cougar to review their respective PLB maintenance protocols.

CAPP Safety Research

The Operators, through CAPP, are involved on an ongoing basis with the Canada General Standards Board evaluation of the existing Canadian helicopter passenger transportation suit standards and the development of a new standard. Research into the appropriate standard has included consideration of maximum escape buoyancy, hand dexterity in cold water, floating characteristics, stability, water ingress and thermal protection.

The Operators, through CAPP, are also in the process of reviewing and updating CAPP's Atlantic Canada Offshore Petroleum Industry Standard Practice for the Training and Qualifications of Personnel, conducting research and analysis for the purpose of making recommendations as to whether or not to use HUEBA in HUET training, conducting an evaluation of CAPP's Guide for Medical Assessment for Fitness to Work Offshore, and developing a fatigue management best practice for the offshore.

C-NLOPB and OHSI Safety and Aviation Teams

The Operators, at C-NLOPB's request, have provided full-time personnel with subject matter expertise to work with the C-NLOPB safety and aviation teams to assist them in their assessment of the Phase I recommendations and the development of implementation plans and process.

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Additionally, the Operators continue to work directly with the C-NLOPB to address the recommendations that the C-NLOPB assigned to the Operators for implementation. The Operators are reporting to the C-NLOPB on the progress of work plans and implementation. This information is available on the C-NLOPB website.

Pilot Helmets

While the issue of pilot helmets is currently under consideration by the C-NLOPB, a program has been implemented to fully fund the cost of pilot helmets.

**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 – PHASE II
ON BEHALF OF THE ESTATES AND FAMILIES OF THE
FLIGHT CREW OF COUGAR HELICOPTER SIKORSKY S92-A
FLIGHT 491**

BY:
KATE O'BRIEN
O'BRIEN & ANTHONY
Counsel for the Estates and
Families of Matthew Davis and
Timothy Lanouette (as agent).

279 Duckworth Street
St. John's, NL A1C 1G9

TO:
COMMISSIONER ROBERT WELLS, Q.C.
OFFSHORE HELICOPTER SAFETY INQUIRY

Suite 213, 31 Peet Street
St. John's, NL A1B 3M7

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Introduction

This submission is made on behalf of the Estates and Families of Matthew Davis and Timothy Lanouette (as agent), pilots of Cougar Helicopter Sikorsky S92-A flight 491, in response to the Commissioner's invitation to make submissions as to what recommendations he should consider making under the following clauses of the Terms of Reference for the Offshore Helicopter Safety Inquiry:

Phase II

Upon completion of the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92-A Crash, the Commissioner shall undertake a review of the sections of the Report therefrom that deal with matters which are specifically within the mandate of the C-NLOPB and particularly the findings in respect thereof and shall advise the C-NLOPB:

- (a) which findings should result in actions being recommended to be undertaken by C-NLOPB and how they should be implemented,
- (b) which findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.

The Commissioner may retain and as needed request the services of independent specialists whose function would be to provide information on and interpret information and issues relevant to the Inquiry. Independent specialists retained by the Commissioner may be requested by the Commissioner to appear before the Commissioner as experts.

This submission will focus on the following findings of the Transportation Safety Board, numbered as they appear in *section 3.2 Findings as to Risk* in Aviation Investigation Report A09A0016:

Regarding Basic Survival Training:

- 14. The current basic survival training (BST) standards in Canada lack clearly defined, realistic training standards

and equipment. This could lead to differences in the quality of training and affect occupant survivability.

15. An interval of 3 years between recurrent BST may result in an unacceptable amount of skill decay between recurrent training sessions. This skill decay could reduce the probability of successful egress from a submerged helicopter.

Regarding Flight Crew Suits:

17. There are minimal regulations and standards pertaining to offshore helicopter flight crew suit use and maintenance. This increases the risk that flight crews will be inadequately protected following a ditching or crash at sea.
18. Offshore helicopter flight crew suits that are not a high visibility colour reduce the probability of detection by search and rescue crews following a ditching or crash at sea. This could significantly delay rescue at night or in bad visibility.

Regarding Helmets and Visors:

22. The lack of regulation requiring pilots to wear helmets and visors places them at greater risk of incapacitation due to head injuries following a ditching or crash. This type of injury jeopardizes a pilot's ability to assist in the safe evacuation and survival of the passengers.

TSB's Findings and the Role of the C-NLOPB Generally

A number of the TSB's findings relate to pilot training and flight procedures that are not particular to the Newfoundland and Labrador offshore operating environment. Nonetheless, deficiencies in these areas will directly affect the safety of our offshore workers. We do not expect the Commissioner to make direct recommendations on issues such as Crew Resource Management (CRM) training and malfunction procedures and the like; however, we feel these TSB findings merit some general consideration.

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In his Phase I Report at Volume 1, Chapter 8 the Commissioner made observations on the role of the C-NLOPB in helicopter safety:

C-NLOPB does not appear to have had a strong engagement in helicopter operations. It has never had aviation or helicopter experts on staff or under consulting contract, and I believe that is still so.

The oil operators, who have access to expertise, presented helicopter operations contracts for review by C-NLOPB. As Regulator, C-NLOPB could demand changes to the proposed contract or contracts, but I do not think it was equipped, or required to be equipped, with the expertise to make it a major force in the regulation of helicopter operations. Furthermore, I am not aware that an organized forum exists, even today, whereby workers or other stakeholders can have direct input, nor have I been told that any safety information vis-à-vis the helicopter contracts has ever been made public on a regular basis.

After contracts were signed and became operative, C-NLOPB conducted audits of the helicopter operator to ensure that it was complying with the contract, but audits do not really address the crucial aspects of what should or ought to have been included in such a contract. Furthermore, in the Canadian context it would be easy to conclude that offshore aviation, which falls under the jurisdiction of Transport Canada, is covered in all its aspects by federal regulation.

Transport Canada does regulate crucial aspects of offshore helicopter operation, but there are areas of helicopter offshore safety which it does not regulate. It is also important to note that some important regulated areas can be and, in some cases, are addressed by additional requirements which exceed those of Transport Canada. That should not come as a surprise to anyone because, as I have often said in this Report, the C-NL offshore environment is for a variety of reasons probably the harshest in the offshore world, especially where helicopter flight and rescue operations are concerned.

These observations by the Commissioner underpinned a number of his recommendations, particularly those on Regulatory Oversight. We

wholeheartedly support these recommendations. We also acknowledge and support the C-NLOPB's response to the recommendations to date, which has included creating an Aviation Team led by an experienced Aviation Safety Advisor.

Throughout the course of the Inquiry, we have urged the importance of the C-NLOPB seeing beyond the boundary of what might at first be perceived as the sphere of Transport Canada. There is no doubt that Transport Canada is the primary regulator but, as recognized by the Commissioner in the passages quoted above, there will be areas of offshore helicopter safety which it does not regulate and there will also be areas where additional requirements exceeding those of Transport Canada will be needed. Through its oversight of the helicopter service provider contracts, the C-NLOPB has the ability to require top-tier training for pilots, frequent review of rotorcraft flight manuals (**RFMs**), standard operating procedures, checklists and the like and a number of other recommendations directly related to the TSB's findings.

To give a specific example, the TSB found that a lack of recent, modern, CRM training likely contributed to communications and decision-making breakdowns with the flight crew of flight 491. As a result, TSB *Findings as to Risk* numbers 12 and 13 directly concern deficiencies in the current Transport Canada regulations around CRM. The C-NLOPB could require that helicopter service providers to our offshore installations be contractually required to have latest generation CRM training and frequent recurrent training.

The pilots who fly in the Newfoundland and Labrador offshore fly over one of the harshest marine environments in the world. If something goes wrong, as it did for Matt Davis and Timothy Lanouette, the pressure on the pilots cannot be overstated. These pilots deserve the best training possible; they deserve to have up-to-date, unambiguous RFMs and emergency procedures. The passengers of the helicopters deserve it too. The C-NLOPB has a role to play in ensuring that this happens and we ask the Commissioner to consider that role in his recommendations with respect to the TSB findings generally.

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TSB Findings Regarding Basic Survival Training

TSB findings 14 and 15, reproduced below for convenience, relate directly to the Commissioner's recommendation number 13, also reproduced below.

TSB:

14. The current basic survival training (BST) standards in Canada lack clearly defined, realistic training standards and equipment requirements. This could lead to differences in the quality of training and affect occupant survivability.
15. An interval of 3 years between recurrent BST may result in an unacceptable amount of skill decay between recurrent training sessions. This skill decay could reduce the probability of successful egress from a submerged helicopter.

(p. 135)

Commissioner Wells:

13. It is recommended that safety-training goals be established by the Regulator in consultation with suppliers of personal protective equipment, trainers, oil operators, and worker representatives. HUET [helicopter underwater escape training] and HUEBA [helicopter underwater emergency breathing apparatus] training are necessary, but should not be so rigorous as to pose safety risks. Training should be done with greater fidelity, which objective is already being pursued. Fidelity should encompass survival training in more realistic sea conditions than is currently the case. The Regulator, oil operators, worker representatives, and, as appropriate, other stakeholders should be involved in the discussions as to how training goals should be met.

(p. 297)

Our submissions on these survival training recommendations are simply that any consideration of the training requirements should include a distinct consideration of the pilots' survival training. While there may be considerable overlap between the needs of the pilots and the passengers,

there may also be instances where the pilots' requirements differ. Fidelity in training is no less important for flight crew and so, whenever possible, the HUET, breathing apparatus training, and other survival training for pilots should mimic their actual equipment and conditions, including suits worn, breathing apparatuses used and cockpit environment.

TSB Findings Regarding Flight Crew Suits:

TSB findings 17 and 18, reproduced below for convenience, relate directly to the Commissioner's recommendation number 16, also reproduced below.

TSB:

17. There are minimal regulations and standards pertaining to offshore helicopter flight crew suit use and maintenance. This increases the risk that flight crews will be inadequately protected following a ditching or crash at sea.
18. Offshore helicopter flight crew suits that are not a high visibility colour reduce the probability of detection by search and rescue crews following a ditching or crash at sea. This could significantly delay rescue at night or in bad visibility.

(p. 136)

Commissioner Wells:

16. It is recommended that, before the Regulator establishes goals for the oil operators, the need for additional personal protective equipment for pilots and passengers be studied and discussed by Transport Canada (with their agreement), the Regulator, oil operators, helicopter operator(s), trainers, manufacturers and suppliers of personal protective equipment, and worker representatives.

Our submissions on this topic may somewhat repeat our submissions on Phase I; however, we believe that the deficiencies in the current regulatory

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regime and the absolute lack of data with respect to pilot suits used in the Newfoundland and Labrador offshore are such that repetition is warranted.

The findings of the TSB and the recommendations of the Commissioner are supportive of each other but they do not align exactly.

The TSB has identified three issues pertaining to flight crew suits:

1. The lack of standards and regulations for flight crew use increases the risk to pilots of inadequate protection;
2. The lack of standards and regulations for flight crew maintenance increases the risk to pilots of inadequate protection; and
3. The use of flight crew suits that are not a high visibility colour reduces the probability of detection in ocean waters by search and rescue crews.

The Commissioner's Recommendation 16 deals with flight crew suits:

16. It is recommended that, before the Regulator establishes goals for the oil operators, the need for additional personal protective equipment for pilots and passengers be studied and discussed by Transport Canada (with their agreement), the Regulator, oil operators, helicopter operator(s), trainers, manufacturers and suppliers of personal protective equipment, and worker representatives.

We strongly support the Commissioner's recommendation for further study and work and see it as a critical first step to addressing the concerns raised by the TSB. It is only a first step, though, as ultimately, a standard is needed and the Canadian General Standards Board (CGSB) has to be engaged. Even without a standard in place we see a role for the C-NLOPB to be proactive and require that the helicopter operators have empirical data to support their choice of suit and robust maintenance procedures in place. Our thoughts on these matters will be expanded on below.

The Lack of Standard for Pilot Suits

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). Currently a Working Group has been established within the CGSB to review these standards and, according to the summary of a meeting between representatives of this Working Group and Inquiry Counsel published in the Phase I Report at Volume 3, page 479, a new standard is expected in the spring of 2011. It seems, though, that this is only a first step, as noted by the Commissioner in his Phase I Report at Volume 1, Chapter 7, page 235:

In the September 8 and 9, 2010, hearings, I heard for the first time that the Working Group is now considering the development of a suit purposely designed for the C-NL offshore. That is a concept which has been in my mind for months and which I mentioned at a previous hearing.

So, for passenger suits we have: (1) a current standard; (2) a forthcoming revised standard; and (3) consideration being given to a further standard specific to our offshore conditions. Conversely, there are no regulatory initiatives in place for pilots' suits. According to the TSB report at page 42: "There are no current Canadian standards for flight crew immersion suits and no current requirements in the CARs for flight crew to wear them." According to Rick Burt of Cougar in his testimony at the Inquiry, the only mandate for flight suits is Transport Canada's requirement that the suits provide "suitable protection against hypothermia."

It does not have to be this way, nor should it. The attention given to passenger suits over that given to flight crew suits is short-sighted given that in terms of flight-hours, pilots face the greatest risk.

The unique circumstances of flight crew have not stopped European regulators from developing standards. As noted at page 42 of the TSB report:

In contrast [to the Canadian situation], EASA [European Aviation Safety Agency] explicitly states that its immersion suit design standards apply to both crew and passengers. In 2006, EASA published the following standards:

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1. European Technical Standard Order (ETSO-2C502) Helicopter Crew and Passenger Integrated Immersion Suits; and
2. European Technical Standard Order (ETSO-2C503) Helicopter Crew and Passenger Immersion Suits for Operations to or from Helidecks Located in a Hostile Sea Area.

The Lack of Maintenance Standards

This issue, identified by the TSB, did not come to the fore during the inquiry. As such, some background taken from the TSB report at page 43 is helpful:

Suit manufacturers provide recommended care and maintenance guidelines for crew suits and ancillary lifesaving equipment such as flotation vests. Although, there is no regulation outlining care and maintenance requirements for immersion suits, CARs Standard 625 Appendix C Item 11 states, "survival and emergency equipment shall be overhauled at the intervals recommended by the manufacturer." At the time of the occurrence, a formal pilot immersion suit maintenance program with scheduled inspections was not in place at Cougar Helicopters and crew were expected to inspect their own suits. After the accident, an inspection of the pilot immersion suits revealed that 16 out of 25 crew suits were unserviceable, with 5 of those requiring major repairs. It was determined that some pilots were not completing thorough suit inspections and some of the unserviceable issues would not have been easily detected by a cursory visual inspection.

Since the accident, Cougar has taken corrective action as noted at page 142 of the TSB report:

Cougar Helicopters implemented a Lifesaving Equipment Tracking System (LETS). The LETS tracks scheduled and completed maintenance for pilot and rescue specialist flotation vests, pilot and rescue specialist suits, helmets and personal locator beacons.

We submit that the C-NLOPB should ensure that helicopter operators are contractually required to:

- Educate their employees about the survival and emergency equipment they use, including its proper care and maintenance; and
- Have regularly scheduled inspections and maintenance of such equipment.

As noted by the Commissioner in the quotes above, C-NLOPB audits of the helicopter operator will not reveal deficiencies on items that are not included in the contracts.

High Visibility Colour Suits

The visibility of pilot suits is clearly a safety issue for which there is currently no consensus in the industry. The TSB, experts in their field, have included in their findings that the blue suits currently used by Cougar pilots reduce the probability of detection in ocean waters by search and rescue crews. This is a serious concern given that all but a small percentage of their flying time is over water.

In the TSB report at page 41, background information is given which helps clarify the lack of consensus:

Blue is the only color available in this model [used by Cougar pilots]. There are other pilot immersion suits commercially available with international orange or yellow exteriors which have been identified as playing a beneficial role in SAR recovery activities.⁴⁴ However, there is not universal acceptance of these types of suits because of the potential for reflections in the cockpit which may distract the pilots. European Technical Standard Order (ETSO)-2C503 - *Helicopter crew and passenger immersion suits*, Appendix 1, states that where possible flight crew immersion suits shall meet the same requirements as those for passenger suits, which require that those parts of the suit which will be visible when in the water shall be of a highly conspicuous colour. ETSO-2C503 further states that “the choice of suit colour may vary to minimize the risk of the suit reflecting on surfaces within the flight deck.” As a result, some operators opt for pilot immersion suits that are not of a highly visible colour to reduce

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the potential for distractions caused by reflections off cockpit surfaces.

⁴⁴ In the AAIB's investigation report (No: 7/2008) of an Aerospatiale SA365N, G-BLUN, the AAIB identified the advantages of high visibility colour immersion suits and recommended (2008-036) that 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 issue of suit colour was canvassed by two experts retained by the Inquiry. In his expert report to the Commissioner (OHSI Phase I Report, Vol. 2, p. 262) 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 minimize the risk of the suit reflecting on surfaces within the flight deck” (p. 4).

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.”

The colour issue was also canvassed with Captain Jakobus Johannes Gerber, Director of Flight Operations with Cougar, during his testimony. 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.

Now that the TSB has advised us of their concern, we request that the Commissioner review the matter again and consider making a more specific recommendation. We do not expect the Commissioner to make a specific recommendation as to suit colour, but we believe that the mitigating measures described by Captain Gerber need to be formally assessed to ensure that they are enough to make the risk of not being seen in the water as low as practicably possible. An assessment of the Cougar flight suit against the EASA standard would be informative and a good starting point. In any event, a lack of a Canadian flight crew suit standard is not justification for no assessment of the suits at all.

The Need for Further Study and Discussion by Stakeholders

We wholeheartedly support the Commissioner's recommendation for further study and discussion amongst the stakeholders. The need for further study and cooperative work underlies all of our submissions on flight suits above.

Separate and apart from the need for such work to advance the regulatory deficiency, we would like to reiterate our Phase I submission that testing needs to be done as soon as possible to quantify the thermal protection Cougar pilots are getting from their suits. Currently, we have no data to indicate how these suits will perform in our offshore conditions.

The TSB's comments on the thermal protection of the Cougar flight crew suits at page 41 of its report are as follows:

Both occurrence pilots were wearing blue Viking pilot suits (Viking Life-Saving Equipment; model number PS4177). The Viking PS4177 is a dry-suit with neoprene wrist seals, a waterproof zip fastener, and a neoprene collar and hood. There is no inherent buoyancy provided by the Viking PS4177 nor does it provide thermal protection. Buoyancy is provided by a separate flotation vest and thermal protection is provided by undergarments.

Testing has been done on the passenger suits as it is required for the CGSB standard. In addition to that testing, the Canadian Association of Petroleum Producers (**CAPP**) recently funded the CORD Group to do further, more stringent testing on the passenger suits. The CORD Group

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test conditions were for longer periods of time than the CGSB testing and in more realistic, wave water conditions.

Again, compare this to the current situation for the flight crew suits for which no testing has been done. 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. We remind the Commission that during the Inquiry, Cougar provided information on its suits, but it was largely a qualitative description of the suits without any quantification of thermal rating, water ingress rate, or buoyancy specifications. This data is critical for any risk assessment of the flight suits.

In his report for the Inquiry, Michael 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 specifications have been provided.

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, thus we do not know how they will perform when exposed to rough water.

Helmets

TSB finding 22, reproduced below for convenience, relates directly to the Commissioner's recommendation number 15, also reproduced below.

TSB:

22. The lack of regulation requiring pilots to wear helmets and visors places them at greater risk of incapacitation due to

head injuries following a ditching or crash. This type of injury jeopardizes a pilot's ability to assist in the safe evacuation and survival of the passengers. (p. 136)

Commissioner:

15. It is recommended that the wearing of pilot helmets be made compulsory. (p. 297)

We wish to thank the Commissioner for this recommendation. We were pleased to see his recommendation echoed by the TSB. If accepted by the C-NLOPB, we believe it will do much to enhance pilot and passenger safety in the Newfoundland and Labrador offshore. Without this protection, the risk of a pilot becoming incapacitated from head injury is greatly increased and an injured pilot is not only less able to help himself, he is unable to guide and assist his passengers.

Conclusion

We thank the Commissioner for inviting us to make this submission for Phase II. We look forward to receiving his recommendations in relation to the TSB findings.

We also thank the Commissioner, Inquiry Counsel and staff for the hard and serious work they have done. Thanks to their efforts, and the efforts of the many others who participated in this Inquiry, we are optimistic that good will come from the immeasurable sorrow of March 12, 2009.

All of which is respectfully submitted this 15th day of April, 2011.

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LAWYERS	

April 7, 2011

Offshore Helicopter Safety Inquiry

31 Peet Street, Suite 213

P. O. Box 8037

St. John's, NL A1B 3M7

Attention: Commissioner Robert Wells

Dear Sir:

**RE: Offshore Helicopter Safety Inquiry
Phase II**

We write on behalf of the families of deceased passengers. We refer to our meeting of March 9, 2011 concerning Phase II of the Offshore Helicopter Safety Inquiry (Inquiry). As the terms of reference for the Inquiry indicate, Phase II is to involve a review of the Transportation Safety Board (TSB) report specifically within the mandate of the C-NLOPB.

At the outset, we should indicate that there is considerable commonality of interest between your Phase I report and that of the TSB, especially in such areas as training, the necessity of having underwater breathing devices and overall the need to improve the level of accountability by industry and the helicopter providers with the end user, the passengers on the helicopter.

In formulating your recommendations on Phase II and in terms of charting a future course of action for the C-NLOPB, we encourage you to provide an expansive view of the C-NLOPB's role as opposed to a narrow, technical or strictly jurisdictional perspective. We believe the role of the C-NLOPB is essentially that of a regulator of last resort insofar as it has a mandate to promote safety. Moreover it has a mandate to respond to industry concerns and directly or indirectly, it has a role to play with the service providers who are employed by industry to facilitate development

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of the offshore oil field in the Province of Newfoundland and Labrador. The service providers include, in this case, those who provide helicopter transportation to the workers' place of employment.

In the above context, we identify the issue of certification of the Sikorsky S92 helicopter. The concerns of the families of the deceased passengers on this issue were expressed in a letter dated February 18, 2011 to the Honourable Chuck Strahl, Minister responsible for Transport, Infrastructure and Communities, a copy of which is enclosed. This issue was one which the families maintain the TSB failed to provide a suitable analysis of. Our clients maintain and call on the Minister of Transport to investigate the certification of the S92 aircraft and take all necessary steps to ensure that in future, Transport Canada will rigorously enforce the safety standards and certification requirements of the Canadian Aviation Regulations to prevent serious senseless tragedies such as what happened on March 12, 2009 from occurring again.

We also attach for your interest the speaking notes of Lori Chynn, Spokesperson for the families, in relation to a press conference she participated in in Ottawa on March 23, 2011, principally on the certification issue.

At first glance, the certification issue would appear to fall outside the mandate of the C-NLOPB and would therefore not merit consideration as part of your Phase II report. For the reasons stated above, we believe that it is an issue on which you may wish to comment as the C-NLOPB is a regulator of last resort. We ask that you take this matter into consideration when you prepare your final report. We look forward to receiving that report in due course.

We trust this is satisfactory.

Yours truly,

ROEBOTHAN • MCKAY • MARSHALL

JAMIE MARTIN /jmo

Enclosures:

- Letter dated February 18, 2011 from Families to Hon. Chuck Strahl
- Speaking notes of Lori Chynn, Press Conference – Ottawa - March 23, 2011

Glen Roebathan, QC • David D. McKay, QC • Stephen D. Marshall, QC • Glenda C. Best, QC • D. Bradford L. Wicks, QC • Jamie Martin
Valerie A. Hynes • Colin D. Feltham • John Ennis • Blair J. Rogers • Natalie O'Donnell • Kate McGarry • Allison M. Whelan • John Drover

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Joe Fiorante
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February 18, 2011

File Ref: 09005-999

BY E-MAIL

Office of the Honourable Chuck Strahl
Minister of Transport, Infrastructure and Communities
330 Sparks Street
Place De Ville
Tower C, 29th Floor
Ottawa, Ontario K1A 0N5

Dear Minister:

*An Open Letter From Brenda Anwyll, Janet Breen, Cecilia Corbett,
Robert Decker, Wanda Drake, Melinda Duggan, Karen Eddy, Janet
Escott, Susan March, Richard and Marjorie Maher, Heather
Warren, Roxanne Mullooney, Marilyn Nash, Lori Chynn, and
Sharon Pike - the Families of the Passengers Killed in, and the Sole
Survivor of, the Crash of Cougar Flight 491*

As you are undoubtedly aware, on March 12, 2009, a Sikorsky S-92 helicopter, operated by Cougar Helicopters, carrying 2 pilots and 16 passengers crashed into the seas off St. John's, NL, killing the crew and all but one of the passengers. The Transportation Safety Board of Canada ("TSB") released its final report regarding the accident on February 9, 2011.

While the TSB report is extensive and detailed in many respects, it does not satisfactorily address critical questions pertaining to the manner in which the Sikorsky S-92 helicopter was initially certified by Transport Canada and how Transport Canada responded to an S-92 Main Gear Box ("MGB") failure in July, 2008. Transport Canada never should have certified as airworthy a helicopter that could not fly for at least 30 minutes after the complete loss of MGB oil. Transport Canada should have responded in 2008 after learning about the "Achilles heel" of the S-92 MGB: titanium studs prone to failure. The cold, harsh reality is that this accident never would have happened had Transport Canada enforced the certification requirements of the Canadian Aviation

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Regulations ("CARs") and standards, as is required by law.

On behalf of the surviving family members of the passengers of Cougar Flight 491 and on behalf of the passenger who survived the crash, we call on the Minister of Transport to investigate the certification of the S-92 aircraft and take all necessary measures to ensure that in the future Transport Canada will rigorously enforce the safety standards and certification requirements of the CARs so as to prevent senseless tragedy, such as this, from occurring again.

Our call for an investigation is based on the following incontrovertible facts:

- 1 The TSB determined that Cougar Flight 491 crashed eleven minutes after, and as the direct result of, a complete loss of MGB oil caused by the failure of two of the three titanium studs securing the oil filter (the studs are very small; the exposed threading of each stud is 1/4 inch in exterior diameter and 1/2 inch in length).
2. The Sikorsky S-92 helicopter was certified by the United States Federal Aviation Administration ("FAA") as meeting the requirements of Part 29 of the Federal Aviation Regulations ("FAR"). It was subsequently certified by Transport Canada on February 2, 2005.
3. FAR 29.927(c) and its identical counterpart in the CARs (Airworthiness Manual 529.927) requires that the helicopter's MGB be capable of operating for 30 minutes following a "complete loss of lubricating oil" (quote from Sikorsky's 2002 test criteria), unless it can be demonstrated that the likelihood of such a failure is "extremely remote".
4. This design standard, referred to in the industry as "30 minute run dry" capability, was derived from military requirements and is considered crucial for helicopter safety.
5. While the development of the S-92 helicopter was underway, Sikorsky made numerous announcements to the industry that the helicopter would have 30 minute run dry capability, similar to its primary competitors, the EH-101 and EC Super Puma. For instance, see the enclosed technical information bulletin published by Sikorsky in July of 2000 that unequivocally states that the S-92 helicopter has 30 minute run dry capabilities.

6. On August 6, 2002, Sikorsky carried out its initial certification test to demonstrate to the FAA that the MGB could run dry in accordance with the requirements of FAR 29.927(c). The MGB suffered a catastrophic failure approximately 11 minutes into the test. At that point, it was obvious to Sikorsky and the FAA that the helicopter was incapable of meeting the run dry requirements for certification.
7. Rather than redesign its MGB to ensure safe operation for 30 minutes after the complete loss of oil, Sikorsky asserted that the S-92 should be certified on the basis that the risk of a complete loss of oil from the MGB was "extremely remote", a term that has been defined by the FAA in various publications to mean that a failure would be expected to occur no more than once per 10 million flight hours and in some circumstances, no more than once per 1 billion flight hours.
8. Despite the fact that the S-92 MGB design was unproven and had catastrophically failed during certification testing, the FAA accepted Sikorsky's conjecture that the risk of a complete loss of MGB oil was extremely remote. Transport Canada also accepted this conjecture and certified the aircraft in Canada on that basis.
9. The S-92 is the only helicopter ever certified by the FAA under Part 29 or by Transport Canada under AWM 529.927 that does not have 30 minute run dry capability.
10. The S-92 is the only helicopter that was designed to use three titanium studs to mount the oil filter bowl assembly; the Sikorsky Black Hawk helicopter, whose airworthiness data was relied upon to certify the S-92, uses steel bolts.
11. Titanium studs, in contrast to those fabricated from steel, are particularly vulnerable to fatigue failure from a process known as galling, a type of adhesive wear.
12. On July 2, 2008, a Canadian owned S-92 helicopter off the coast of Australia suffered a complete loss of MGB oil caused by the failure of the titanium mounting studs, exactly the same problem which would bring down Flight 491. Fortunately for the crew and 14 passengers onboard that aircraft, it was only 7 minutes away from land when the failure occurred. The pilots were able to land the aircraft without incident.

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13. In August, 2008, the studs, nuts, washers and oil filter assembly from that helicopter were brought to Vancouver for analysis under the supervision of the TSB. The investigation determined that the titanium mounting studs had failed due to fatigue cracking initiated by galling. It was suspected that the galling damage to the titanium studs occurred as a result of the nuts being removed and reinstalled during servicing of the oil filter.
14. The Australian incident demonstrated that the extremely remote assumption upon which the S-92 helicopter was certified both in the United States and Canada was erroneous. At the time of the incident, the S-92 fleet had accrued approximately 100,000 hours in service.
15. Notwithstanding the fact that the CARs require Transport Canada to take mandatory safety action once it becomes aware of an unsafe condition, Transport Canada did not take any safety action as a result of the Australian incident.
16. Following the crash of Cougar Flight 491, Transport Canada issued an Airworthiness Directive requiring the mandatory replacement of the titanium mounting studs.
17. To this date, the S-92 Helicopter lacks 30 minute run dry capability, a capability enjoyed by the vast majority if not all of the helicopters that compete with the S-92. Passengers and crew flying on this aircraft offshore remain at risk in the event of another loss of MGB oil.

As a result of the Australian incident, which occurred eight months before Flight 491, it should have been obvious to Transport Canada that the potential for complete loss of oil from the S-92 MGB was anything but extremely remote and that the assumption on which the aircraft was certified was invalid. Notwithstanding this, Transport Canada did not take any steps to properly rectify the situation. Transport Canada's lack of action raises serious issues regarding aviation safety which remain unanswered by TSB report. Did Transport Canada succumb to pressure from the FAA or Sikorsky or did they simply fail to recognize a serious safety/certification issue? Either way, something needs to be done to prevent future accidents of this nature. Safety standards are of little benefit to the flying public if the regulators charged with enforcing them lack the conviction or resources to do their jobs and, instead, grant exemptions to manufacturers.

We can assure that we are seeking answers to these questions in order to advance aviation safety and not for compensation purposes as our legal claims have been resolved.

We call on you as the responsible minister to investigate the failure of Transport Canada to take appropriate steps pertaining to both its initial certification of the S-92 aircraft and its response to the Australian accident.

We look forward to a timely response and we will be pleased to respond to any questions or concerns you may have.

Yours truly,

CAMP FIORANTE MATTHEWS

By:

Joe Fiorante

JJC:slm

cc: *Brenda Anwyll*
Janet Breen
Cecilia Corbett
Robert Decker
Wanda Drake
Melinda Duggan
Karen Eddy
Janet Escott
Susan March
Richard and Marjorie Maher
Heather Warren
Roxanne Mullowney
Marilyn Nash
Lori Chynn
Sharon Pike

Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

Press Conference March 23, 2011

Good morning,

I would first like to thank Mr. Bevington and Mr. Harris for the opportunity to speak today on behalf of the surviving family members of the passengers of Cougar Flight 491, as well as the passenger who survived the crash.

My name is Lori Chynn and my husband, John Pelley, was aboard Cougar Flight 491 that crashed in the North Atlantic on March 12, 2009. My intention today is to once again make a plea to the Minister of Transportation, the Honourable Chuck Strahl, to investigate the certification of the Sikorsky S-92 helicopter which we the families and Mr. Decker feel has yet to be addressed. We want nothing more than to lend our support for a safe work environment for those who continue to work in the offshore industry. Safety needs to be the priority.

My husband was a proud man who stood up for what he believed in and did not hesitate to articulate his opinion. Unfortunately, he is not here to express his view, so as I always say "I am also here today to give my husband, John Pelley, a voice.

I have spent the past 2 years trying to piece together and process information that has been presented concerning the crash. I attended many sessions of the Helicopter Inquiry, Phase I and was one of the family members who presented. Last month, I also attended the Transportation Safety Board briefing. The report certainly provided comprehensive and detailed analysis regarding the crash and reinforced the fact that this was a preventable crash. Having said that, questions still remain regarding the certification of the Sikorsky S-92 helicopter.

How did the S-92 pass the initial certification process when it did not meet the safety standards? Why didn't Transport Canada enforce the certification requirements of the Canadian Aviation Regulations and standards as required by law? The S-92 does not have the required capability to fly for 30 minutes after the complete loss of Main Gearbox oil. Why was this particular helicopter given an exemption, known as the

"extremely remote" possibility" when it did not meet such rigorous and necessary safety regulations? Why did Transport Canada follow the lead of the FAA? Why was any risk taken, remote or not?

Then there's the incident in Broome, Australia in July 2008. It is quite obvious to me that this crash nullified any assumption of an "extremely remote" possibility. This incident would not have happened if the certification standards had been upheld. The crash also revealed additional concerns with the failure of the titanium studs.

So, how was the S-92 permitted to continue flying when there were clear indications of problems with this particular helicopter? I see the Australian incident as an enormous red flag or wake-up call. Why were the warning signs ignored by the FAA and Transport Canada? I fail to understand why there wasn't an attempt to re-examine these machines and to take them out of the air until the problems were rectified. If this had happened, Cougar Flight 491 would not have crashed. IT MAKES NO SENSE!!! There are other helicopters that meet the certification standards, i.e., have 30 minute run-dry capability. Our offshore workers remain at risk in the event of another loss of main gear box oil.

So the obvious question becomes this....is the S-92 the right helicopter to fly our workers over the North Atlantic? This question was posed during the TSB briefing in February. The TSB presenters stated that all S-92 helicopters should be able to run dry for at least 30 minutes: this, they stated, is key. Then logically, the next question is, Why is the S-92 still the helicopter used to transport our offshore workers? It is positive to see the recommendation that the "extremely remote" provision be removed but phasing in with the already existing helicopters means that workers are still at risk.

We have learned that the crash of Cougar Flight 491 was a senseless tragedy that was in one word - PREVENTABLE. 17 precious lives were lost unnecessarily on March 12, 2009:

Thomas Anwyl

Peter Breen

Gary Corbett

Matthew Davis

Wade Drake

Wade Duggan

Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

Corey Eddy

Keith Escott

Colin Henley

Timothy Lanouette

Kenneth MacRae

Allison Maher

Greg Morris

Derrick Mullaney

Burch Nash

John Pelley

Paul Pike

And one survivor, Robert Decker

The offshore oil industry is very important and profitable for the province of Newfoundland and Labrador and its riches will be felt for generations to come. I believe that we must learn from this tragedy and do what is necessary to ensure the safety of those who continue to work offshore. My husband and the passengers and crew of Cougar Flight 491 still have friends, family, and colleagues who travel by helicopter to the offshore and they deserve to be safe. We keep hearing about the concept of **Safety Culture but to ensure this idea, safety must come before profit.**

Such a tragedy cannot happen again, no family should ever endure such heartache. So I beg the Government of Canada and the Minister of Transportation to address this matter and leave no stone unturned.

I would like to close with a quote from the eloquent Commissioner Robert Wells of the Newfoundland and Labrador Offshore Helicopter Safety Inquiry.... "Safety should never, ever be taken for granted. Oil operators are going further afield into deeper and more dangerous waters. Therefore, the emphasis on safety has to be absolutely top-notch."

Thank you again for this opportunity this morning.

Offshore Helicopter Safety Inquiry

Phase II Submission

April 15, 2011

Jack Harris, Q.C.
St. John's East Constituency Office
342 Freshwater Road
St. John's, Newfoundland and Labrador
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This submission for Phase II is in response to the Aviation Investigation Report A09A0016, issued by the Transportation Safety Board of Canada into the Cougar Helicopters Inc. crash on March 12, 2009 (“Transportation Safety Board Report”).

In keeping with my request for standing and my remit with respect to the inquiry and submissions in relation thereto, I will restrict myself to commenting on the aspects of the report that can be considered to impact search and rescue capability and responsiveness in the Newfoundland and Labrador offshore.

1. Emergency Flotation Systems

The Rotorcraft Flight Manual (RFM) for the S-92A stated that the helicopter’s emergency flotation system (EFS) was “designed to keep the helicopter upright and afloat long enough for all crew and passengers to evacuate the aircraft in mid sea state 5 (wave height of 8-12 feet with a wind speed of 18-24 knots) sea conditions” (TSB Report, page 16).

However, according to the Transportation Safety Board Report, page 129:

CHI91 was equipped with an EFS system certified for sea state WMO 4. Given the high probability of encountering sea state conditions greater than 4 (i.e., a “hostile environment”) in the waters off Newfoundland, without the use of helicopters equipped to provide ditching stability in excess of sea state 4 conditions, immediate capsizing is highly probable, increasing the risk of loss of life during a ditching scenario.

And at page 130:

In the event of a survivable crash at sea, a helicopter's EFS is one of the primary defences to reduce the possibility of occupant fatalities due to drowning.

Currently, EFS only need to meet the certification requirements for a controlled ditching, despite the fact that research has shown that crashes into the water happen almost as frequently as ditchings. In a crash situation, there is a risk that the EFS may be

disabled by the impact forces and that the occupants drown before they can successfully escape from the sinking helicopter. The CHI91 accident is one example where occupants survived the crash impact only to drown in the rapidly sinking helicopter before they could escape.

The sea state 4 capability referenced above is based on the helicopters being equipped with “Three Bag EFS Kits.”

The TSB Report, at page 149, quotes Environment Canada statistics indicating that sea state 4 is exceeded approximately 50% of the time throughout the year and 83% of the time between December and February. Even sea state 6 is exceeded 3.3% of the time over the year and approximately 9% of the time between December and February.

The response to date to the issue of providing stability in the hostile environment of the Newfoundland offshore after ditching has been addressed in part by the installation of “Five Bag EFS Kits” to 3 of the S-92As operated in St. John's by Cougar. Although a 4th was to be installed in January of 2011 (see TSB Report, para. 4.1.4.13 at page 144) a report in the St. John's *Telegram* of February 11, 2011 notes information from the Canadian Association of Petroleum Producers indicating that only 3 helicopters are equipped with sea state 6 flotation systems.

One further issue with respect to the need for adequate flotation is the question of ability to deploy. As noted by the Transportation Safety Board's Report at p. 130:

If offshore helicopter EFS systems are only designed to withstand the force associated with a ditching there is a continued risk that these systems will be disabled in survivable impacts contributing to occupant deaths from drowning. While CHI91 is only the second offshore helicopter accident in Canada, there is an important risk due to the large numbers of workers being transported to offshore facilities not only in Canada but internationally.

The offshore operators have determined that they would not conduct helicopter operations offshore when the sea state is greater than six, and in

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the case of the other helicopters still only equipped for the sea state 4 condition, they would not be operated in sea states greater than 4.

The TSB Report recommends (page 149) that Transport Canada prohibit commercial operations of Category A transport helicopters over water where the sea state will not permit safe ditching and successful evacuation. It is not known whether Transport Canada has yet adopted such a regulation.

Despite these improvements, the risks will remain high for occupants of helicopters transported over water in the Newfoundland and Labrador offshore. As noted by the TSB Report, twin-engine helicopters invariably turn upside down when EPS systems do not operate successfully.

As noted above, approximately one-half of the incidents involve crashes into the water as opposed to controlled or semi-controlled ditchings. And the TSB reports that the EFS systems are often disabled or cannot operate in such crashes.

The consequences are that in the event of an incident there is serious likelihood that occupants will be in the water in less than ideal circumstances and in need of the swiftest possible rescue.

It is worth noting that the improvements made as a result of better EFS, as well as the other recommendations of both the Phase I Report and the TSB Report, should also give rise to the increased likelihood of multiple survivors of a crash or ditching of a helicopter, which is greatly to be desired.

The result is a significant improvement but highlights the caveat that the industry first-response Search and Rescue capability is just that, a first response. The importance of the second response, provided by the Department of National Defence, is heightened. The more people in the water in need of rescue, the greater the need for search and rescue capability adequate to the circumstances.

The need for the second responder to get airborne quickly is especially true the farther away from the coast any incident may occur, and is of

greatest significance outside the 8:00 a.m. to 4:00 p.m. weekday period, after which the response time for DND Search and Rescue is increased to 2 hours from 30 minutes.

2. Emergency Locator Transmitters

The TSB Report states at page 130:

If an aircraft crash occurs over land, an ELT that survives a crash will normally transmit at full strength after the required 50-second delay. In a helicopter crash in water, there is a strong possibility that a fixed ELT antenna will end up below the surface of the water before the 50-second delay has elapsed. In this case, it is possible that the ELT signal will be badly attenuated and rendered incapable of detection by the COSPAS-SARSAT satellite system.

As shown in this occurrence, without an immediate signal being transmitted from an ELT installation, water attenuation of a useable ELT signal from a submerged aircraft may continue. This increases the risk of an ELT signal not being received and SAR resources not being launched in a timely manner.

Although no recommendation is made by the TSB concerning this issue, it is important that ELT equipment be used that can be certain to transmit in a timely manner or deploy in such a way as to avoid the situation encountered in the crash of CHI91, and the Commissioner should consider such recommendation.

3. Need for Personal Locator Beacons

The TSB Report states at page 128:

PLB are not required by Canadian aviation regulation for the occupants of a helicopter flying prolonged distances over water. As a result, there are no aviation standards for their design, function, and performance capabilities. Unlike the PLBs used by the occurrence flight crew, the PLBs carried by the passengers of CHI91 were designed for a man overboard situation and did not transmit on 406 MHz. As a result, they would not have been detected by the COSPAS-SARSAT satellite system, which would provide location information to SAR personnel following a

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ditching or crash at sea. Without a helicopter occupant PLB regulation and standards, inappropriate PLB types may be selected for helicopter transportation, resulting in delays locating a person floating in the ocean.

Despite the lack of a regulation requiring personal locator beacons for helicopter passengers over water, the report notes that the PLBs in use at the time of the Cougar crash by the passengers were designed for a man overboard situation and did not transmit on the band which would have permitted easier location by SAR personnel attempting to find a person floating in the water. However those in use by the flight crew did.

Even without a change in Transport Canada regulations it would be desirable to ensure that passengers were equipped with suitable Personal Locator Beacons in the Newfoundland and Labrador offshore and the Commissioner should consider such a recommendation.

4. Significant Finding as to Risk

On page 134 the Transportation Safety Board Report paragraph 3.2 (2) states:

In distant offshore operations, including the East Coast of Canada, a 30-minute run-dry MGB capability may not be sufficient to optimize eventual landing opportunities.

On page 148 the TSB Report states:

If a helicopter has to ditch in hostile waters such as those off the Canadian east coast, the occupants are at considerable risk. Many of these offshore facilities now have flight times over 2 hours and future development of offshore petroleum resources include plans for facilities even further from land.

Available information indicates that other helicopters are now capable of run-dry performances that exceed 30 minutes. It may now be both technically feasible and economically justifiable to produce a helicopter that can operate over 30 minutes following a massive loss of MGB lubricant.

Therefore, the Board recommends that:

The Federal Aviation Administration assess the adequacy of the 30 minute main gearbox run-dry requirement for Category A transport helicopters.

Even with the existing standard of a 30-minute run-dry requirement, it is clear that the “extremely remote” exception is no longer viable and not acceptable to regulators.

The TSB Report states at page 147:

Category A rotorcraft certified under the "extremely remote" criteria may not be capable of continued operation for 30 minutes with only residual lubrication. These helicopters remain vulnerable to gearbox failures stemming from unforeseen massive losses of MGB lubricant, placing passengers and crew at risk.

Therefore, the Board recommends that:

The Federal Aviation Administration, Transport Canada and the European Aviation Safety Agency remove the "extremely remote" provision from the rule requiring 30 minutes of safe operation following the loss of main gearbox lubricant for all newly constructed Category A transport helicopters and, after a phase-in period, for all existing ones.

And, importantly, the Transportation Safety Board Report advises at page 104:

With the exception of the S-92A, all other Category A helicopters certified by the FAA, the JAA [Joint Airworthiness Authority], and TC [Transport Canada] to Part 29.927(c)(1), or its equivalent, have met the requirements by draining the MGB then continuing operation using only residual oil for 30 minutes.

It appears then that despite the obscurity of the wording and recommendations, the only aircraft that doesn't meet the requirement of a

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30-minute run-dry capability is the one being used for transport in the Newfoundland and Labrador offshore.

Even the S-92A may in the future meet this standard. According to information provided to the Standing Committee on National Defence, the S-92A aircraft being purchased by the Canadian government, modified for military use and named the Cyclone, will be required to meet the 30-minute run-dry capability, and Sikorsky is developing the technology required.

This discussion and the recommendations above raise significant concern with respect to the operation of the S-92A in our offshore conditions. The comments and recommendations of the Transportation Safety Board lead inevitably to the conclusion that the S-92A, without the 30-minute run-dry capability, is not a suitable aircraft for use in the conditions which exist in the Newfoundland and Labrador offshore environment.

This helicopter is unable to successfully land in the event of a MGB failure and may be required to ditch or potentially crash in hostile conditions, providing a great risk to passengers and crew.

If the Transportation Safety Board has concluded that all new helicopters should meet the 30-minute run-dry requirement and all existing ones must also, after a phase-in period, the S-92A should be unacceptable for use in the hostile conditions of the Newfoundland and Labrador offshore during the “phase-in period.”

It therefore calls into question the continued use of the S-92A in the Newfoundland and Labrador offshore and the Commissioner should consider requiring alternative aircraft to the S-92A or placing even further restrictions on operations, to reduce the risk to the lives and safety of helicopter passengers and crews.

It also further exacerbates the crucial need for adequate search and rescue capability and response times for both first and second responders, given the risks, distances from land, and the hostile environment in which this helicopter transport takes place.

All of which is respectfully submitted this 15th day of April, 2011, by

Jack Harris, Q.C.

Submissions to the Canada-Newfoundland and
Labrador Offshore Helicopter Safety Inquiry
Phase II

on behalf of Communications, Energy and
Paperworkers Union of Canada, Local 2121

V. Randell J. Earle, Q.C.
Solicitor for CEP, Local 2121
P. O. Box 5955
323 Duckworth Street
St. John's, NL
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April 15th, 2011

Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

Introduction

The mandate of the Inquiry, as amended on October 7th, 2010, provides in respect of Phase II:

Upon completion of the Transportation Safety Board of Canada investigation into Cougar Helicopter Sikorsky S-92A Crash, the Commissioner shall undertake a review of the sections of the Report therefrom that deal with matters which are specifically within the mandate of the C-NLOPB and particularly the findings in respect thereof and shall advise the C-NLOPB:

- (a) which findings should result in actions being recommended to be undertaken by C-NLOPB and how they should be implemented;
- (b) which findings should result in actions being recommended to be undertaken by other legislative or regulatory agencies.

The Commissioner may retain and as needed request the services of independent specialists whose function would be to provide information on and interpret information and issues relative to the Inquiry. Independent specialists retained by the Commissioner may be requested by the Commissioner to appear before the Commissioner as experts.

This mandate is subject to the limitation contained in Section 6 of the Terms of Reference which state, in part, as follows:

The Commissioner's mandate does not include an examination of any issues related to the airworthiness of aircraft, training of flight crew, or flight procedures or any other matters which are included in the Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S-92A crash except to the extent specifically described in Paragraph 5 hereof.

Paragraph 5, on the other hand, provides:

Specifically the Commissioner shall inquire into, report on, and make recommendations in respect of:

- (a) safety plan requirements for Operators and the role that Operators play in ensuring that their safety plans, as represented to and approved by the Board are maintained by helicopter operators.

CEP, Local 2121 understands that the C-NLOPB has the authority, in respect of operators' safety plans, to require the operators to impose contractual obligations, on helicopter operators providing services to the operators, which are in excess of the requirements of Transport Canada. An example of this sort of obligation imposed by C-NLOPB on the offshore operators is the current requirement that passengers be trained to use and be issued the HUEBA. CEP, Local 2121 takes the limitation imposed in Section 6 of the Terms of Reference to mean, for instance, that it would be inappropriate for the Commissioner to inquire into the standards for flight training for helicopter pilots or the content of simulator training, but it would not be inappropriate for the Commissioner to consider whether helicopter pilots ought to have extra knowledge where that knowledge is relevant to the safety of the passengers who are workers being transported to offshore installations in the Newfoundland and Labrador offshore.

Simply put, CEP, Local 2121 feels it is appropriate for this Inquiry to make recommendations to the Regulator whereby the Regulator will be advised to alter the content of the contractual relationship between helicopter operators and offshore installation operators so as to make the helicopter transportation of workers in the Newfoundland and Labrador offshore safer than that would be the case given compliance only with the minimum standards set by Transport Canada.

Information Disclosure

In its Phase I Report, the Inquiry recommended as follows:

It is recommended that information about airworthiness directives and incident reports should be promptly communicated to the workers/passengers by notices posted on the website of the

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helicopter operator(s), so that those who want the information may have access to it. Alert Service Bulletins are not included in this recommendation because they are usually maintenance-related. The actual protocol, including the details of the information to be posted, should be developed by the Regulator in conjunction with the oil operators, the helicopter operator(s), and worker representatives. (Phase I Report, Vol. 1, p. 294)

The Transportation Safety Board Report indicates that on October 8th, 2008, Sikorsky Helicopters “issued Safety Advisory (SA) SSA-S92-08-007, to advise operators of upcoming changes to the AMM which included an interim enhanced inspection procedure for the removal and installation of the MGB [main gearbox] filter bowl assembly. These procedures included an enhanced visual examination of the studs, checking run-off and run-on torques, and mandatory replacement of used nuts with new nuts.” On November 5th, 2008, “with AMM Revision 13, these enhanced inspection procedures became mandatory industry-wide.” On January 28th, 2009, “Sikorsky issued Alert Service Bulletin (ASB) 92-63-014 requiring the replacement of the MGB [main gearbox] filter bowl titanium mounting studs with steel studs, within 1250 flight hours or one year.” Inspections had been mandatory since the release of AMM Revision 13 and “both Sikorsky and the FAA felt the immediate risk of reoccurrence [stud failure] had been adequately mitigated and would allow continued safe operation during the specified compliance period.”

Reference: Transportation Safety Board Report, Section 1.18.3.7

During the period between the release of Revision 13 of the Aircraft Maintenance Manual and March 23rd, 2009,

none of the S-92A operators reported to Sikorsky they had found any damaged studs while performing the enhanced inspection, nor had they contacted Sikorsky to comment on the steps involved with the enhanced procedures.

On March 23rd, 2009, the FAA issued Emergency AD2009-07-53 for Sikorsky S-92A helicopters, which required, before further flight, removing all titanium studs that attach the MGB [main gearbox] filter bowl assembly to the MGB [main gearbox] and

replacing them with steel studs. Sikorsky did not receive any reports of damaged studs between issuance of AMM Revision 13 in November 2008 and when AD2009-07-53 was issued in March 2009. However, it did receive 59 studs from various operators after they had complied with the AD. Sikorsky examined these studs and found that they had varying degrees of galling of the threads, indicating multiple nut removals. Some of the thread damage was visible without the use of magnification.

Considering the timing of AMM Revision 13 on November 5th, 2008 and the issuing of AD2009-07-53 on the 23rd of March, 2009 and the average S-92A utilization times, the studs received by Sikorsky would have come from helicopters that had their filter bowls removed at least three times.

Reference: Transportation Safety Board Report, Section 1.18.3.10

In its findings as to causes and contributing factors, the Transportation Safety Board found:

5. Cougar Helicopters did not effectively implement the mandatory maintenance procedures in Aircraft Maintenance Manual (AMM) Revision 13 and, therefore, damaged studs on the filter bowl assembly were not detected or replaced.

Reference: Transportation Safety Board Report, Section 3.1

The Transportation Safety Board found that there appeared to be a general consensus amongst the S-92A community that the issue respecting maintenance of the main gearbox filter bowl assembly was not urgent.

Reference: Transportation Safety Board Report, Paragraph 1.18.3.9

It is quite clear that the issue was in fact entirely urgent. The maintenance procedure was determined by the manufacturer, and with the sanction of the Federal Aviation Administration, to be mandatory. The premise of Recommendation 7, Phase I for the exclusion of Alert Service Bulletins was that they were maintenance-related. It is submitted that the findings of the Transportation Safety Board suggest that this is not a sound basis

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for exclusion of these items from an obligation to post information on the website.

The posting of these items on the website performs two functions. Firstly, it satisfies the right of passengers to know that matters crucial to their safety are extant. Secondly, the posting of the matter for public disclosure elevates the importance of the issue in the mind of the helicopter operator and its employees. Good management and human nature respond to the principle that it is easier to do something required than to explain why it has not been done. Elevation of the disclosure obligation to include air safety advisories and Alert Service Bulletins will reinforce that behaviour.

It is submitted that the Commissioner ought to recommend that Recommendation 7 in Phase I be amended so as to require immediate posting on the helicopter operator's website of all safety advisories and Alert Service Bulletins.

Operational Restrictions on Flights

Recommendation 9 arising from Phase I of the Inquiry recommended as follows:

It is recommended that operational requirements in addition to those of Transport Canada, specifically those relating to items such as operational sea states and visibility, be set by the Regulator as goal-oriented objectives to which the oil operators will respond. Approaches to meeting selected goals should be widely discussed by the Regulator, oil operators, helicopter operator(s), worker representatives, other stakeholders, and experts engaged by any of the parties.

(Phase I Report, Vol. 1, p. 295)

The Transportation Safety Board Report recommended:

Transport Canada prohibit commercial operation of Category A transport helicopters over water when the sea state will not permit safe ditching and successful evacuation.

Reference: Transportation Safety Board Report, Section 4.2.2

The Transportation Safety Board found that the S-92A was certified to accomplish ditching in accordance with FAR 29.801, which provided for stability in a sea state 4 established by the World Meteorological Organization. The Transportation Safety Board found that sea state 4 was exceeded approximately 50% of the time throughout the year and 83% of the time during the December through February period in the Newfoundland and Labrador offshore. Sea state 6, on the other hand, is exceeded only 3% in the year or 8.9% of the time during the December through February period. The oil operators have caused flights to cease because of this TSB recommendation. It is not apparent that the five-bag option for emergency flotation used in the North Sea, which achieves stability in a sea state 6 on the JONSWAP standard, is equivalent to a World Meteorological Organization sea state 6.

Referring to work done by the UK Civil Aviation Authority, the Transportation Safety Board noted the finding that

“reasonably probable water conditions” for ditching equipment certification should be amended to take into account regional climatic sea conditions. Specifically, in a “non-hostile environment”, emergency flotation equipment based on sea state 4 was appropriate. However, in a “hostile environment”, a higher standard of sea state should be required for ditching equipment certification.

Reference: Transportation Safety Board Report, Section 1.18.4.2

Five-bag kits for the emergency flotation system were installed on three of the S-92s operated by Cougar Helicopters at the time of the writing of the Transportation Safety Board Report and a fourth kit was ordered. These five-bag kits are designed for and have been demonstrated in sea state 6 JONSWAP conditions. “JONSWAP recognizes a steeper wave profile than the WMO scale, which is more typical of the wind waves encountered in the North Sea.”

Reference: Transportation Safety Board Report, Section 1.6.6

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It should not be assumed that the sea state 6 JONSWAP system is automatically transferable to the Newfoundland and Labrador offshore. If helicopters are going to fly in conditions such that sea state 6 WMO exists, an appropriate certification process should be first undertaken so as to determine that such helicopters will, in fact, be stable in sea state 6 in the Newfoundland and Labrador offshore. Further, the sea state for the certification obtained must be the operational limit.

The Commissioner should recommend to the Regulator that helicopters be subject to operational requirements which require certification of the stability of the aircraft for any sea state over which it flies such that safe ditching and successful evacuation can be achieved and that such sea state will then be the operational limit.

EFS Integrity

The Transportation Safety Board found that the gas lines and electrical wiring necessary for the operation of the emergency flotation system were severed at multiple locations as a result of the crash CHI91. As well, “the immersion switches in the wheel wells were disabled when the sponsons were torn away by the impact.” The right float “had multiple tears and punctures likely due to the impact or the subsequent recovery or movement of the wreckage.” The left float, on the other hand, “remained in its protective cover. It was subsequently inflated by the TSB [Transportation Safety Board] and both cells held pressure.” The two inflators for four floats were found undamaged and fully charged. The aft float and associated inflators were not recovered. Both of the life rafts with which the aircraft was equipped were recovered fully inflated and floating near the impact site.

Reference: Transportation Safety Board Report, Section 1.12.7

The Transportation Safety Board found that “it is standard practice for helicopter EFS to be powered from the helicopter’s emergency bus or directly from the main battery.” In some instances,

flotation systems have failed to activate because the necessary electrical power to fire the pyrotechnic devices (squibs) on the gas

supply tanks was disrupted. As a result, the gas is unable to inflate the flotation bags.

An independent power supply to activate the flotation system following a crash landing on the water has been designed and certified to complement current electrical supply systems. This is a small, low mass device designed to be installed a short distance from the squibs, limiting the potential for power loss due to wiring harness damage.

Reference: Transportation Safety Board Report, Section 1.18.4.5

The Transportation Safety Board found that

The S-92A's EPS is manufactured by GKN Aerospace. In February 2008, GKN Aerospace announced that it had developed a direct inflation EFS that utilized cool gas generator (CGG) technology. CGG units store gas as an uncompressed solid material in small, lightweight, rugged units instead of the larger pressure vessels currently installed in the S-92A. The CGG unit releases a sufficient amount of gas at ambient temperature, through a controlled reaction, to inflate the EFS bags. These small units, mounted adjacent to the EFS bags, replace the traditional heavy pressure vessels and greatly reduce the length of gas supply line needed. CGG units were evaluated for the S-92A EFS design; however, Sikorsky determined that they were not sufficiently developed to meet S-92A certification requirements.

Reference: Transportation Safety Board Report, Section 1.18.4.6

The Transportation Safety Report indicates on the basis of the Medical Examiner's investigation that while they suffered significant lower body injuries, all the occupants who remained in the wreckage died of drowning. In short, while severely injured, they survived the catastrophic impact. The EFS did not; it is apparent from the findings of the Transportation Safety Board that it is only designed to withstand ditching. In Risk Finding No. 24, the Transportation Safety Board found that "if offshore helicopter EFS systems are only designed to withstand the force associated with a ditching, there is a continued risk that these systems will

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be disabled in survivable impacts contributing to occupant deaths from drowning.”

Reference: Transportation Safety Board Report, Section 1.13.3 and Section 3.2 No. 24

The Transportation Safety Board has indicated that some other modern helicopters have EFS designed to withstand being deployed in flight at speeds up to 120 knots and withstand water landing speeds up to 30 knots. The rate of descent for CHI91, at impact, was determined by the Transportation Safety Board Engineering Laboratory to be “somewhat less than 5100 feet per minute but much higher than 2300 feet per minute.”

Reference: Transportation Safety Board Report, Section 1.11.3

It is likely then that the rate of descent was greater than 30 knots (3,000 feet per minute). It is equally apparent that a survivable impact could occur in circumstances which would not be considered a controlled ditching at a descent rate which would not destroy some existing EFS technology. This Inquiry is not about what one does with an existing fleet of S-92A helicopters. The mandate of this Inquiry is to inquire into conditions of safety affecting workers in the offshore of the Province of Newfoundland and Labrador as it pertains to helicopter transportation. The C-NLOPB or a new Regulator has the authority to require in the safety plans of operators conditions for safety beyond those required by other Regulators. We submit that the Commissioner should recommend to the Regulator to establish requirements to be implemented not later than 24 months from the publishing of the Phase II Recommendations of the Commissioner for the following:

- (a) Helicopters providing transportation for persons travelling to installations in the Newfoundland and Labrador offshore should be equipped with emergency flotation systems able to withstand impacts significantly greater than the force of a controlled ditching.
- (b) Emergency flotation systems should be able to be activated and inflated without dependence upon the helicopter’s electrical system

and any gas lines should be the shortest possible distance from the emergency flotation system.

Helicopter Fleet Size

The wisdom of Recommendation No. 9 in the Phase I Report of the Inquiry has been validated by the findings of the Transportation Safety Board. Compliance with these recommendations from the Transportation Safety Board and from the Inquiry itself will limit the opportunities for flights. There is no doubt that this will lead to increased pressure for flights when sea states permit.

It is apparent from the Transportation Safety Board Report that there is a concentration of extreme sea states by this time of the year [December to February]. Evidence in Phase I suggested that visibility problems caused by fog were considerably more common in the summer months.

Reference: Transportation Safety Board Report, Section 1.18.4.2

CEP, Local 2121 is concerned that night flights are seen as an alternative to reduce the pressure for flights when sea state conditions or visibility conditions limit opportunities for flights. There seems to be a failure to recognize that losses from helicopter crashes dramatically increase when a ditching or crash occurs at night. This is not only because of the limitations put on Search and Rescue by lack of visibility at night (a matter addressed by the Inquiry's recommendation that the standby Search and Rescue helicopter be equipped with forward-looking infrared radar and autohover capability), but also because the process of controlled ditching is extremely difficult without visual reference to the water's surface.

When the Inquiry made its interim recommendation on SAR response time, Cougar Helicopters was able to augment its helicopter fleet. Augmenting the helicopter fleet provides an opportunity to undertake flights to the installations at a higher rate "in windows of opportunity" when operational limitations on the ability to fly prevail. Evidence given by the operators in Phase I suggested that persons being on the installations for too long a period poses a safety risk in itself. Pressure to fly is a safety consideration. We submit that the Inquiry should

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recommend that installation operators require, as part of their safety plan, that the Helicopter Transportation Operator be able to augment its fleet during periods of the year when operational restrictions limit flight time availability.

BST

The Transportation Safety Board found that “current BST standards in Canada lack clearly defined, realistic training standards and equipment requirements. This could lead to differences in the quality of training and probability of occupant survival following a ditching or crash at sea.” “In particular, the current standard lacks guidance to the individual providers on course duration, instructor competency, course completion requirements and level of realism that should be included in their programs.”

Reference: Transportation Safety Board Report, Section 2.7.2

The Transportation Safety Board also focussed on the value of repetition of exercises during training. Increased exposure during each recurrent training session (i.e., saturation training) would help participants retain the required knowledge and skills during the intervening period. Repetition also helps make procedures more automatic and reduces the time required to escape.

Reference: Transportation Safety Board Report, Section 2.7.2

A higher level of frequency and greater intensity for BST training is not necessarily a popular thing. BST is, for many individuals, a highly anxiety-provoking experience. Nevertheless, the findings of the Transportation Safety Board cannot be ignored in the interests of the potential survival of individuals obliged to escape from a ditched/crashed helicopter. We submit that the Inquiry should recommend to the Regulator that the BST training include a greater level of repetition of the HUET exercises than is presently the case. Further, the Inquiry should recommend to the Regulator that it act with other Canadian Regulators, industry and worker representatives to provide clearly defined realistic

training standards and equipment requirements for Basic Survival Training.

Flight Crew Safety Equipment and BST

The Transportation Safety Board made a number of observations respecting the flight crew which reflect significantly upon the safety of passengers. The Transportation Safety Board has found that BST is not mandatory for flight crew “and occasionally some flight crew were only completing a one day HUET training session every three years,” during which “flight crew were not required to egress from one of the pilots’ seats.” The Transportation Safety Board observed:

If flight crew are not familiar and confident in their chances of escaping an inverted submerged helicopter, they could be influenced in their decision to ditch.

Reference: Transportation Safety Board Report, Section 2.7.2

The Transportation Safety Board identified that flight crew are not required by regulation to wear an immersion suit. There are only minimal standards of regulations relating to the maintenance of the flight crew immersion suits like those worn by the pilots of Cougar Flight 491. Indeed, inspection of the flight crew suits shortly after the crash of Flight 491 “showed that many of the suits were unserviceable.” The minimal regulations or standards pertaining to offshore helicopter flight crew suits’ use and maintenance increase “the risk that flight crews will be inadequately protected following a ditching or crash at sea.”

Reference: Transportation Safety Board Report, Section 2.7.5

The pilots of Flight 491 were wearing Viking PS4177 dry suits. The Transportation Safety Board states that

There is no inherent buoyancy provided by the Viking PS4177 nor does it provide thermal protection. Buoyancy is provided by a separate flotation vest and thermal protection is provided by undergarments.

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The Viking PS4177 has not been tested nor is it required to be tested through the PTSS standards set out by the Canadian General Standards Board. It is submitted that the air crew cannot rely upon their immersion suits to provide the same protection as the passengers' immersion suits. This, too, may influence the decision to ditch.

The Transportation Safety Board found that no helmet use policy was in place at Cougar Helicopters at the time of the crash of Flight 491 and helicopter pilots were under no regulatory requirement to wear head protection. Only 10% of the Cougar Helicopter pilots were routinely wearing head protection. The TSB found that U.S. military research indicated that

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. The effects of non-fatal head injuries range from momentary confusion and inability to concentrate, to a full loss of consciousness. Incapacitation can compromise a pilot's ability to quickly escape from a helicopter and assist passengers in an emergency evacuation/survival situation.

Reference: Transportation Safety Board Report, Section 1.15.14

Although Transport Canada has acknowledged the benefit of head protection use and has committed to promoting the use of helmets by helicopter pilots, it remains optional behaviour and the majority of helicopter pilots continue to fly without head protection.

Reference: Transportation Safety Board Report, Section 1.15.14

These issues are not simply issues of pilot safety. They are equally issues of passenger safety. It is clear that in the interest of passengers, pilots should have the same level of confidence in their safety equipment and their ability to successfully exit a submerging or submerged helicopter as any other passenger. The findings of the Transportation Safety Board make it clear that there is a marked potential for aircrew to be at higher risk from a ditching than other passengers. The Transportation Safety

Board conclusion that lack of confidence in safety equipment may affect a decision to ditch is a very valid and real concern. We submit that the Inquiry should recommend to the Regulator:

That operator safety plans include a provision which requires, as a matter of contract between the installation operators and helicopter operators,

- (a) That the emergence suit supplied to air crew be subject to the same certification standards as the PTSS;
- (b) That aircrew have, at a minimum, the same basic survival training as passengers flying offshore in Newfoundland and Labrador, with the proviso that such training must include HUET training which includes exercises in exiting the pilot's seat of the helicopter;
- (c) That crew operating for helicopter operators contracted to the oil operators be required to wear head protection while operating helicopters carrying passengers.

Run-Dry Time

The S-92A was tested on August 6th, 2002

to demonstrate that the S-92A transmission could provide, 'continued safe operation for a minimum of 30 minutes following a complete loss of lubricating oil in accordance with the requirements of FAR 29.927(c)(1).' The MGB [main gearbox] suffered a catastrophic failure about 11 minutes after the test was started"

Reference: Transportation Safety Board Report, Section 1.18.5.2

The S-92A was certified, notwithstanding this failure, on the basis of a modification allowing for bypass of the main gearbox external air cooler system and the assertion that all other causes for a massive gearbox lubrication failure were "extremely remote."

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Reference: Transportation Safety Board Report, Section 1.18.5.4

“At the time of the S-92A certification, the FAA had certified only one helicopter, the McDonnell Douglas Helicopters MD900,” to a 30-minute run dry standard. The European Air Safety Authority had, on the other hand, tested and certified at least four helicopters using the 30-minute run dry criterion.

Reference: Transportation Safety Board Report, Section 1.18.5.1 and Section 1.18.5.4

In Risk Finding No. 2, the Transportation Safety Board found that

In distant offshore operations, including the East Coast of Canada, a 30-minute run dry MGB [main gearbox] capability may not be sufficient to optimize eventual landing opportunities.

Reference: Transportation Safety Board Report, Section 3.2

The continued use of the S-92A in the Newfoundland and Labrador offshore seems to suggest that the Newfoundland and Labrador offshore should, as it did with search and rescue response time, the helicopter underwater emergency breathing apparatus and the three bag (as opposed to five bag) emergency flotation system, be satisfied with less than the best international practices. As previously stated, the issue is not what is to be done with an existing fleet of S-92As. The issue is what are the appropriate steps to ensure worker safety in helicopter transportation in the Newfoundland and Labrador offshore. There is no logical reason why workers in the Newfoundland and Labrador offshore should have less than the best available safety capacity in the helicopters which they must ride to their work. The Newfoundland and Labrador offshore is arguably an even more hostile environment than the North Sea. Thirty minutes of flying time is invaluable in terms of assessing the problems with a helicopter which has suffered a loss of main gearbox oil. In an emergency, time is everything. Run dry time of a helicopter being extended to the maximum available time is, in essence, no different than the requirement that search and rescue response be reduced to the minimum possible time. It is simply about preserving life in a life-threatening situation. We submit that the

Inquiry should recommend to the Regulator that it be a condition of the Oil Operator Safety Plan that the contract for helicopter operations provide a condition that the helicopter used for transportation of workers to and from installations in the Newfoundland and Labrador offshore have a run dry capability equal to the maximum available in a helicopter at the time such contract is made and that no such contract should be for a period of greater than five years.

Audit Effectiveness

The Transportation Safety Board made a number of findings with respect to the behaviour of Cougar Helicopters and Sikorsky Helicopters which are troubling. The findings referencing Cougar Helicopters are listed below:

- (a) The pilot checklist utilized by Cougar Helicopters exhibited a lack of established standards for landing guidance definitions used in abnormal and emergency situations, which leaves definitions open to interpretation.

Reference: Transportation Safety Board Report, Section 1.18.1.2

- (b) The Cougar Helicopter S-92A Pilot Checklist had not been updated by Cougar Helicopters to include changes associated with two revisions of the Rotorcraft Flight Manual. These involve significant changes bearing upon actions and indications in the circumstances of a loss of main gearbox lubrication.

Reference: Transportation Safety Board Report, Section 1.18.1.8

- (c) Cougar Helicopters' Standard Operating Procedures likewise contain significant differences in respect of the procedures in the event of a main gearbox malfunction when compared to the current version of the Rotorcraft Flight Manual.

Reference: Transportation Safety Board Report, Section 1.18.1.7

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- (d) Cougar Helicopters did not implement the Sikorsky Safety Advisory issued in October, 2008 nor did it implement the revisions in the Aircraft Maintenance Manual provided by AMM Revision 13, which was issued in November of 2008. The Safety Advisory and Revision to the Maintenance Manual were in respect of a requirement for an enhanced inspection of the oil filter mounting studs, run on and run off torque and replacement of nuts on the oil filter mounting studs with each change of the oil filter.

Reference: Transportation Safety Board Report, Section 1.18.3.9 and Section 1.18.3.10

- (e) Cougar Helicopters did not specifically assess the operational risk associated with flying the S-92A in the Newfoundland and Labrador offshore as this helicopter was promoted as meeting the most stringent safety standards and certified by the FAA and JAA.

Reference: Transportation Safety Board Report, Section 1.17.2.2

The findings with respect to Sikorsky reflect upon the Flight Manual provided for the S-92A by Sikorsky Helicopters. They are as follows:

- (a) lack of specific guidance and/or recommendations in the Rotorcraft Flight Manual pertaining to the optimum airspeed and torque settings used in the event of a loss of main gearbox oil, which could result in selection of a flight profile that accelerates catastrophic failure of a gearbox that has lost oil.

Reference: Transportation Safety Board Report, Section 1.18.1.3

- (b) Sikorsky Helicopters did not clearly identify in the Rotorcraft Flight Manual for the S-92A critical performance capabilities such as run dry time and this increased the risk of pilots making decisions on incomplete or inaccurate information during abnormal and emergency situations.

Cougar Helicopters is arguably one of the most intensely supervised helicopter operations in Canada, if not in the world. Cougar Helicopters

was audited 16 times by external bodies between 2007 and the crash of Flight 491. It is subject to supervision by the oil operators, C-NLOPB and Transport Canada. All have conducted audits of one type or another in respect of Cougar's operations.

Reference: Transportation Safety Board Report, Section 1.17.2.5

The role of a safety audit is to ensure that within an organization procedures exist to maintain safety and ensure that the behaviours of the people who make up the organization are supportive and consistent with the procedures. The Transportation Safety Board found that "despite Cougar Helicopters' commitment to SMS [safety management systems], some additional risks associated with its operation went undetected prior to this occurrence, including flight crew immersion suit maintenance, MGB inspection procedures, CRM training, checklist revision practices and emergency procedures training conducted during annual and recurrent simulator training."

Reference: Transportation Safety Board Report, Section 2.8

In Volume I of the Phase I Inquiry Report at Page 252, the Commissioner observed:

The oil and helicopter operators are very aware of the consequences of the failure of safety, from whatever source it comes, and strive to keep their operations accident-free. The net result is that all four have good risk-management systems...

The foregoing statement is frankly challenged by the findings of the Transportation Safety Board. The internal procedures of Cougar Helicopters were, at the time of Phase I of this Inquiry, matters appropriately dealt with by the Transportation Safety Board. As a consequence, while sample audits were presented as exhibits in Phase I, the manner of undertaking such audits and the findings of such audits were left largely unexplored. Indeed, most were redacted. Reviewing the audits and Exhibits 192 and 194 discloses, for instance, that the auditors did not review maintenance records nor did they check the checklists and Standard Operating Procedures against the Rotorcraft Flight Manual. Likewise, no

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check was done to determine if the Rotorcraft Flight Manual was up to date. It is submitted that one would have expected such an intensive audit process to have identified deficiencies in some of the behaviours and procedures found to be lacking by the Transportation Safety Board. It appears then that there may be an issue with the audit standards or methodology. We submit that Phase II should include an inquiry by the Commissioner which will review the audit standards applied to the operations of Cougar Helicopters by the Regulator and the oil operators with a view to determining whether it is necessary to develop a new and more appropriate audit standard. We further submit that if the Commissioner is not prepared to undertake such further inquiries, that the Commissioner should recommend to the Regulator that it undertake a review of the audit standards applied by the Regulator and the installation operators with respect to the operations of Cougar Helicopters so as to develop a new and more effective audit standard.

Safety Management and Crew Resource Management

Cougar Helicopters is what is known as a 704 operation and, as a consequence, is not required to have a safety management system. Although Cougar Helicopters is in the process of implementing a safety management system, it has not been assessed by Transport Canada.

Reference: Transportation Safety Board Report, Section 1.17.2.1

Similarly the current regulations only require CAR 705 operators to conduct crew resource management training. While Cougar Helicopters provided some crew resource management training, the investigation by the Transportation Safety Board determined that “this voluntary training may not incorporate the most modern CRM concepts.”

Reference: Transportation Safety Board Report, Section 2.6.1

In fact, the Transportation Safety Board found in respect of the crash of Flight 491 that

[A]s soon as the crew was alerted to the MGB [main gearbox] oil pressure problem, the division of crew duties deviated from accepted CRM [crew resource management] best practices.

The Transportation Safety Board additionally found that

Cougar Helicopters had been in the process of implementing modern safety management concepts into its operations for several years; however its program was still not fully implemented and all the proactive elements were not yet being utilized effectively. It is likely that an operator with a fully mature SMS [safety management system] would have identified the need to apply hazard identification and risk management processes to all aspects of the introduction of a new helicopter, like the S-92A, into its operation. In this case, Cougar Helicopters believed that the manufacturer's and regulator's own safety processes had mitigated all potential risks. Despite Cougar Helicopters' commitment to SMS, some additional risks associated with its operation went undetected prior to [the crash of Cougar Flight 491], including flight crew immersion suit maintenance, MGB inspection procedures, CRM training, checklist revision practices, and emergency procedures training conducted during annual and recurrent simulator training.

Reference: Transportation Safety Board Report, Section 2.6.3.1 and Section 2.8

It is hard to conceive of any valid reason that the level of attention to safety and, in particular, matters of safety like crew resource management should be any different for a passenger travelling to one of the offshore oil production installations than for that same passenger if he or she boards an Air Canada flight at the same airport. This, however, is the effective result of limiting the current regulatory environment respecting safety management systems and crew resource management training to CAR 705 operators. It is entirely appropriate for the Regulator in the Newfoundland and Labrador offshore to require that offshore installation operators contracting with helicopter operators for the transportation of their employees contractually provide that the standards employed by such helicopter operators for safety management systems and crew resource

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management training be the same as are applicable to a CAR705 operator. CEP, Local 2121 requests that the Inquiry so recommend.

Emergency Locator Transmitters

The Transportation Safety Board identified an issue with respect to the emergency locator transmitter on Cougar Flight 491. In common with emergency locator transmitters used on other aircraft, this transmitter did not activate until 50 seconds after the helicopter crashed. This is not a matter of defect in the equipment but is a matter of design. In the circumstances of a helicopter crashing into the water or ditching but not maintaining flotation, the consequence of this design feature is that the emergency locator transmitter will activate when the helicopter is already submerged, thereby rendering the signal pointless. The Transportation Safety Board has identified this circumstance as a risk.

Reference: Transportation Safety Board Report, Section 2.7.9.4 and Section 3.2, No. 25

We submit that this is a classic case of the circumstance where the general Regulations of Transport Canada are not adequate for the particular circumstances of helicopter transportation to and from offshore installations in the Newfoundland and Labrador offshore. CEP, Local 2121 therefore requests that the Inquiry recommend to Transport Canada that helicopters in the Newfoundland and Labrador offshore be equipped with emergency locator transmitters which are activated immediately upon ditching or crash of the helicopter into water. We further request that the Regulator of the Newfoundland and Labrador offshore oil industry require the operators of the offshore installations to include in their contracts with helicopter operators providing transportation for their employees to and from such installations a provision which requires that such helicopters be equipped with an emergency locator transmitter which is activated immediately upon ditching or crash of the helicopter into water.

Personal Locator Beacons

The Transportation Safety Board found that the personal locator beacons carried by passengers on Flight 491 did not transmit on the 406 megahertz

band. The PLBs were transmitting on the 121.5 megahertz band, which is designed for man overboard use. Due to recent changes, the COSPAS-SARSAT satellite system no longer received the 121.5 megahertz frequency. The Transportation Safety Board found selection of an inappropriate PLB type for helicopter transportation could result in delays locating a person floating in the ocean.

Reference: Transportation Safety Board Report, Section 2.7.6

There are unquestionably some advantages in the 121.5 megahertz frequency when dealing with a man overboard situation. However, it is apparent from the crash of Cougar Flight 491 that the first response for Search and Rescue must be by helicopter. Search and Rescue helicopters use the 406 megahertz signal to locate persons in the water.

The personal locator beacons used by the passengers on Flight 491 were designed to withstand submersion to a depth of one metre. No signal on the 121.5 megahertz frequency was found by any of the responders. The Transportation Safety Board found that “all of the recovered PLBs had contamination due to salt water ingress.” Additionally, a number of them exhibited serious maintenance issues. It is apparent that PLBs used at the time of the crash of Cougar Flight 491 are of little use for passengers escaping from a submerged or submerging helicopter. The importance of PLBs cannot be underestimated. In conditions of low visibility, they can be a very significant aid to location of an individual in the water. Visibility of an individual in the water in seas approaching sea state 6 would be challenging to say the least. It is therefore crucial that such individuals be equipped with functioning personal locator beacons.

Reference: Transportation Safety Board Report, Section 1.15.12

The Transportation Safety Board identified that neither Transport Canada nor the offshore Regulator requires passengers on helicopters transporting employees to and from offshore installations to carry personal locator beacons. This is an oversight which must be cured. CEP, Local 2121 submits on the basis of the above that the Inquiry should recommend to the C-NLOPB that offshore installation operators be required to provide in their contracts with helicopter operators that all passengers and crew on

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flights to and from the offshore installations be issued personal locator beacons which are able to withstand immersion to a depth of 50 metres and which are able to transmit, in addition to any other frequency, on the 406 megahertz frequency. CEP, Local 2121 further submits that the offshore regulators should require the offshore installation operators, as a matter of contract with any helicopter operator, to maintain such PLBs in good working order at all times.

Worker Representation

There is an additional matter which CEP, Local 2121 wishes to raise with the Offshore Helicopter Safety Inquiry. Recommendations from Phase I appropriately made reference to worker representatives being involved in various stages of the Recommendations made and, indeed, in their implementation. When the C-NLOPB announced its process for implementation of the Phase I Recommendations, CEP, Local 2121 contacted the C-NLOPB seeking to put forward worker representatives. The response from Max Ruelokke, on behalf of the C-NLOPB, of which he is Chair, was, *inter alia*, “we will ask the offshore operators to nominate the appropriate individuals. The operators are the only organizations with whom we have formal relationships, so we have an obligation to proceed in this way.”

It is apparent that the offshore regulator does not recognize that which it accepted in evidence before Phase I; it is the custodian of the occupational health and safety rights of workers in the offshore. As matters currently exist, worker representatives are actually individuals appointed by the offshore operators. Even the one individual on the C-NLOPB Offshore Helicopter Safety Implementation Team who has had involvement with the union, was appointed by the operator. It is respectfully submitted that any organization that thinks that worker representatives are appointed by the employer simply has it all wrong. Worker representatives ought to be selected by the employees and, where there is a certified bargaining agent in place, that bargaining agent should manage the mechanism by which such worker representatives are chosen. Similarly, it must be made clear that worker representatives engaged in safety matters are performing the work of their employer and are to be paid by the employer for such work. We would ask the Commissioner to clarify the intent of the Phase I

Recommendations so that we will not have the current situation where there is an Offshore Helicopter Safety Implementation Team with all worker representatives appointed by the operators and where one of such worker representatives is, in fact, a supervisor.

Dated at St. John's, NL this 15th day of April, 2011

**COMMUNICATIONS, ENERGY
AND PAPERWORKERS UNION,
Local 2121**

Per: _____

**V. Randell J. Earle, Q.C.
Counsel for CEP, Local 2121**



Considerations for Phase II – Wells Inquiry

Building a Preventative
Safety Culture in the C-NL
Offshore Oil and Gas
Industry

Submitted April 15, 2011
Submitted by:
Newfoundland and
Labrador Federation
of Labour President
Lana Payne

Offshore Helicopter Safety Inquiry

Canada-Newfoundland and Labrador

The Newfoundland and Labrador Federation of Labour (NLFL) represents nearly 30 affiliated unions, 500 union locals and 65,000 working women and men in every sector of our provincial economy, including the offshore oil and gas industry.

For 75 years, we have worked to advance the rights of working people, including in the area of occupational health and safety, by advocating for stronger laws and regulations, enhanced enforcement and inspections, safer workplaces, worker health and safety rights and real worker participation and engagement in their health and safety at work.

Our Federation appreciates this second opportunity to make representation to this Inquiry.

As we noted in our Phase I submission, improved health and safety in any workplace, but especially in one like the offshore, means understanding how democratic models in our workplaces can make a difference. It means understanding that workers' rights – such as the right to know, the right to participate and the right to refuse – must be more than rights on paper. They must be supported through strong communication and structures that allow them to be exercised. They must be supported by a powerful and independent safety regulator and through strong, engaged and active joint workplace OHS committees.

It means viewing workers as more than a part of production. It means workers come to the table as true partners in occupational health and safety and prevention, not as tokens because that is what the law requires.

Of all of our work in the labour movement, advocating for enhanced health and safety is the most important. There is nothing, nothing – not profit or production – more important than ensuring workers come home to their families at the end of the day or the end of their shift. And that should be the foundation of every decision we make.

In this Phase of the Inquiry, interested parties have been asked what matters dealt with by the recent Transportation Safety Board Report into the crash of Cougar Flight 491 should be considered by Commissioner

Wells. As well, interested parties have been asked to make recommendations. Our Federation will endeavour to do both.

For our Federation, the TSB report into the crash raised as many questions as it answered. It left us questioning just how regulators do their job; the jurisdictional ambiguity; their relationship with industry; how decisions affecting health and safety are made; how risk assessments are determined; what role does and should Transport Canada be playing. We are extremely concerned with how little information is actually fed back to the workplace Joint Occupational Health and Safety Committees – undermining the workers’ right to know.

It left us questioning just how minor a role the C-NLOPB has played in terms of the safety of helicopter transport and how that needs to change, as was recommended in Phase I report of the Wells Inquiry.

The TSB report confirms our Federation’s position that there is a systemic problem with respect to offshore safety – 16 different factors and causes as identified by the TSB fortify our position that there is too much self-regulation and not enough inspection, enforcement, and follow-up – not enough vigilance. Regulators play more of an auditing and monitoring role than a proactive and vigilant role.

We question how matters are handled and carried out between the helicopter manufacturers and operators. How is compliance enforced or non-compliance penalized? We question the role and responsibilities of those oil companies granted authorization (and the privilege) to operate in our offshore to ensure helicopter transport is as safe as it can be.

The TSB report has also raised the issue of standards and how those standards are set or weakened because of industry “consultation.” We saw how industry can influence the setting of lower standards as was the case with the creation of the “extremely remote” provision with respect to the certification of helicopters or how industry can delay implementation of important health and safety advancements, such as was the case with the EUBAs.

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But perhaps the most troubling is how 16 different causes or contributing factors played a role in the loss of 17 lives on March 12, 2009. This raised many questions about protocols, safety culture, reporting mechanisms, how directives are ignored, the lack of enforcement with respect to maintenance directives and the lack of repercussions for companies that do not act on mandatory directives. What does it say about enforcement or the lack of it? What does it say about monitoring and who does that follow-up? What does it say about safety culture when so many things went wrong (unchecked) or contributed to this tragedy and what does it say about the role of the regulators charged with the health and safety of the people who work in the offshore oil and gas industry?

In its February 2011 report into the crash of Cougar Flight 491, the Transportation Safety Board recommended that

1. The Federal Aviation Administration, Transport Canada and the European Aviation Safety Agency remove the “extremely remote” provision from the rule requiring 30 minutes of safe operation following the loss of main gearbox lubricant for all newly constructed Category A transport helicopters, and after a phase-in period, for all existing ones.
2. The Federation Aviation Administration assess the adequacy of the 30-minute main gearbox run dry requirement for Category A transport helicopters.
3. Transport Canada prohibit commercial operation of Category A transport helicopters over water when the sea state will not permit safe ditching and successful evacuation.
4. Transport Canada require that supplemental underwater breathing apparatus be mandatory for all occupants of helicopters involved in overwater flights who are required to wear a Passenger Transportation Suit System.

Our Federation supports these recommendations and has written the Prime Minister of Canada and the Minister Responsible for Transport Canada

demanding these recommendations, in conjunction with those made by Commissioner Wells in the Phase I report, be adopted in their entirety. We would also recommend that mandatory maintenance directives or Alert Service Bulletins be included in Recommendation # 7 of Phase I, which notes that information about the “airworthiness directives and incident reports should be promptly communicated to workers/passengers by notices posted on the website of the helicopter operator” (Phase I Report, vol.1, p. 295).

While the recommendation notes that these bulletins are excluded because they are maintenance-related, the TSB report confirms that effective maintenance and safety go hand in hand and workers have a right to know of such matters. Indeed, the TSB has argued that the failure to do proper maintenance contributed to the crash of Flight 491. We would also suggest that such bulletins be posted by the C-NLOPB on its website and communicated to the workplace JOHSCs.

We also believe the TSB could have gone further in its investigation and analysis by examining in more depth the role of Transport Canada in this case and in particular with respect to its audit, enforcement and communications responsibilities. For example, the TSB report (section 1.17.2.5) discusses the oversight role of Transport Canada. This section of the report notes that “oversight is conducted regularly through inspections, audits, meetings and phone contact. Cougar Helicopters typically undergoes two separate audits, carried out by a team of TC inspectors, on either the operational or maintenance areas of the company.” Cougar Helicopters is also audited by the oil companies with which it is under contract. Since 2007, Cougar has been subjected to 16 external audits, as well as its own internal audits.

And yet no one picked up on the fact that a mandatory directive from the manufacturer with respect to enhanced visual inspections had not been carried out. Our question is: was Transport Canada made aware of the directives and bulletins from Sikorsky? If so, what protocols, if any, were put in place to see if these directives were being followed? And if TC was not made aware of them, then this needs to be remedied. Otherwise how will the directives be picked up on in the audits conducted by TC staff?

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In addition, when the TSB was called on in the fall of 2008 by the Australian Civil Aviation Safety Association (CASA) to oversee the examination/investigation of the fractured studs from the VH-LOH, it found that one of the possible causes of the Australian incident “was galling of the titanium studs.”

Further analysis by Sikorsky confirmed this was more than a possibility, but was rather the cause. As a result of this involvement by the TSB, were any internal recommendations made to Transport Canada? Was any of this information passed along to audit officers? Were there any checks and balances to ensure that the operators were actually complying with the orders? Or was it merely left in the hands of industry in the form of “self-regulation?”

Phase II of this Inquiry has asked that we deal with matters raised in the TSB report, which is why we have the above questions. In addition, we would like to make the following comments, raise the following issues and put forward the following recommendations for consideration.

While we do not have any confirmation of this matter, we do understand that discussions may be taking place with respect to the resumption of night flights based on certain modifications to the S-92s.

With respect to the matter of night flights, our Federation believes there should be a permanent moratorium on them. The evidence is clear; not only is a rescue much more difficult after dark, but the risk associated with ditching poses much too great a risk for workers. The risk is quite frankly unacceptable.

As well, the lack of a minimum 30-minute dry-run capability adds to the risk workers are exposed to all the time, but even more so at night-time flight.

The confidence of workers and the public in the C-NLOPB is still quite low, and much is required in order to restore an adequate level of confidence, including the establishment of a separate, independent safety agency with helicopter expertise.

Despite the outstanding analysis and recommendations contained in the Phase I report, there appears to still be very little proactive action being taken by the regulator.

Long before the TSB report, the C-NLOPB, based on concerns raised in Phase I of the Wells Inquiry, should have and could have imposed a ban on helicopter transport when sea states prevented a safe ditching or evacuation. The Board did not. This speaks to the difficulty this regulator is having in terms of changing its ways and developing a proactive safety culture as stressed throughout the Phase I report.

Commissioner Wells noted in his Phase I report that “the matter of operational limitations on transport helicopters is... easier to regulate. Winds, sea states, darkness, and lack of visibility are factors which can be evaluated to a considerable extent before flights depart to or from the offshore” (Phase I Report, vol. 1, p. 200). Commissioner Wells continues by stating that “helicopters cannot and must not fly in weather which compromises the safety of passengers either in the air or in a possible ditching” (p. 204).

Commissioner Wells pointed out that “sea states seriously affect the survival times of any persons who survive a helicopter ditching or crash and can have a serious impact on the ability of a downed helicopter to stay upright” (p. 60).

Phase I Recommendation 9 deals with the issue of operational sea states and visibility and the role of the regulator to set goal-oriented objectives. A proactive regulator ought to have banned flights in sea states that prevented safe ditching and evacuations. It did not.

Instead, it awaited the report of the TSB. TSB Chair Wendy Tadros noted on February 9, 2011 upon the release of the TSB report that “if a helicopter has to ditch in rough waters, its Emergency Flotation System should keep it afloat long enough for everyone to evacuate safely. If it can’t do that – if a helicopter isn’t up to the task – it shouldn’t be operating. Period” (opening remarks by Ms. Tadros, February, 9 2011).

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And even then it was the oil and gas operators that responded to the TSB recommendation, not the C-NLOPB. Despite the incredible scrutiny, the outstanding Phase I Inquiry report, and the TSB investigation, it's as if the C-NLOPB still does not get what its job is to be. It's as if it does not understand the difference between proactive governance and reactive governance. Proactive governance saves lives. Reactive governance means it is too late.

It is all the more reason for both levels of government to act upon the recommendations contained in the Wells Inquiry Phase I report, including what Commissioner Wells called his most important recommendation, # 29: the creation of a powerful, independent Safety Regulator.

ISSUES FOR CONSIDERATION:

1. Stunning number of contributing factors and causes

Our Federation was struck by the stunning number of causes and contributing factors to the crash of Cougar Flight 491 - 16 in total - found by the TSB. The TSB noted that if just one of those factors were different, 17 workers might not have died March 12, 2009. If two of those factors had been different, imagine the increased possibility of preventing this crash or the possibility of a higher rate of survival.

The entirety of what went wrong confirms a bigger and more systemic problem in offshore helicopter safety, including the lax regard by the helicopter operators of mandatory directives from Sikorsky, the helicopter manufacturer, and the failure by the manufacturer to send very clear directives that contain the very real possible consequences if action is not taken.

Our question is why were copies of these mandatory directives not provided to the workplace JOHSCs? Why were these directives not posted to Cougar's website? To the C-NLOPB's website? To Transport Canada's website?

This would certainly have provided another layer of pressure to comply with the orders. In addition and quite simply, according to our laws,

workers have “the right to know” and the “right to participate” and the “right to refuse” dangerous work. They cannot exercise their right to participate, to have a say, or their right to refuse, if their right to know has been violated. And what of the oil companies - those authorized to operate in the offshore. Are they informed of such matters? And if so, what of their follow-up?

We recommend more clarity and disclosure with respect to mandatory directives and Alert Bulletins. We recommend that the consequences of not acting are clearly conveyed to helicopter operators, to workplace health and safety committees, and on public websites. We recommend that the regulators be involved in follow-up and ensure such directives are being complied with and that there are severe repercussions for non-compliance. It must be made clear that it is the C-NLOPB’s job to enforce such matters.

Workers offshore need to know who is in charge and that there is a clear path of jurisdictional responsibility.

The TSB makes the following comments about the “just culture” of safety at Cougar Helicopters (p. 50): “The safety program at Cougar Helicopters is very visible and all the employees of the company from the owner on down actively promote safety in all its activities.” Workers, says the TSB report, are encouraged to report any safety issue.

But actions of Cougar in this case clearly highlight that their safety program is lacking, as it appears are the safety programs of many helicopter operators who failed to act on the October 2008 notice and the November 2008 mandatory directive from the manufacturer which highlighted the problem with the titanium studs and recommended an “enhanced” visual inspection. That enhanced inspection called for the use of a 10x magnifying glass to examine the studs during oil filter repairs and to look for galled, broken, missing or flattened threads. It’s not as if the studs had to be examined under a microscope in some far-off laboratory. This was a pretty simple and straightforward procedure.

This enhanced inspection became mandatory in November 2008. In January 2009, Sikorsky followed up with an Alert Service Bulletin. That

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Bulletin, in addition to the enhanced visual inspections, required the replacement of all MGB filter bowl titanium mounting studs within 1,250 flight hours or one year.

This, of course, gave the absolute wrong message to operators. It lacked urgency. The message: there is plenty of time to get this done. It also failed to convey the serious consequences of inaction.

Despite that, it does appear as if the earlier directive, regarding enhanced visual inspections, was all but ignored by the operators. In addition to the written directive, this matter was conveyed to helicopter operators through Sikorsky's webcast meetings.

This apparent failure of Cougar - to act on the Safety Advisory SSA-S92-08-007 from Sikorsky, issued in October 2008, and the subsequent November 2008 AMM Revision 13 following the investigation of what caused an S-92 to make an emergency landing in July 2008 (Australian incident/occurrence) when it started to lose oil from the main gearbox - raises a number of serious questions.

For example, why was the enhanced visual inspections directive not followed?

It is noted by the TSB that there were opportunities to act on the enhanced visual inspection directive as the helicopter underwent possibly as many as three filter changes between October/ November 2008 and the time of crash in March 2009.

What protocols are in place to ensure compliance with such directives? And again what role, if any, does the C-NLOPB play? We recommend that it should be taking a more involved and proactive role in ensuring such directives are executed. What is the role of Transport Canada in picking up on these matters during its audits and inspections? Is Transport Canada made aware of such directives and if so what role does the regulator play in ensuring compliance?

It is appropriate that in this Phase II report, the TSB's report section entitled "Conclusions: Findings as to Causes and Contributing Factors" be

examined by this Inquiry. For example: Finding #5 states that Cougar Helicopters did not effectively implement the mandatory maintenance procedures in Aircraft Maintenance Manual (AMM) Revision 13 and, therefore, damaged studs on the filter bowl assembly were not detected or replaced.

Again, what protocol is in place for dealing with and following up on such directives from the manufacturer? Clearly, as is pointed out in the TSB report, had the enhanced visual inspections been performed, the galled studs would have been detected and replaced as per the directive. Are the directives incorporated into the helicopter operator's safety plan? If not, why not?

It is the position of the Federation of Labour that the C-NLOPB has a clear role to play here in terms of ensuring such directives and Service Alert Bulletins are acted upon in future.

The TSB did find galling on the threads of helicopter flight 491 as well as on some of the studs removed from other Cougar helicopters. This begs the question as to why the enhanced visual inspections were not performed. The TSB found that the galling would have been detected using 10x magnification as recommended by Sikorsky and on some studs the galling would have been detected even without the enhanced visual inspections (Section 1.18.3.8 - TSB report). What is Cougar's protocol for acting on mandatory directives from the manufacturer? And from a regulator's perspective how is compliance with directives monitored?

If as pointed out in the TSB's report (section 3.15) the general consensus among the S-92 community was that this issue of the maintenance of the main gearbox was not urgent, then wouldn't the manufacturer have some understanding that the so-called S-92 community of which it is obviously a part was not taking its mandatory directives seriously? We assume the manufacturer of the S-92s is part of this community. What action did the manufacturer take to ensure its directives were being followed?

The TSB notes that because enhanced inspections were mandatory since the release of AMM Revision 13 in November 2008, both Sikorsky and the FAA felt the "immediate risk" of recurrence had been adequately

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mitigated and would allow for continued safe operation during the specified compliance period (Section 1.18.3.7, TSB report).

Very clearly, we are seeing a pattern where risk assessments by both industry and regulators are erring too much on the side of self-regulation and assumption of industry compliance. As well, since the TSB was part of an earlier investigation into the Australian occurrence and uncovered the fact that one possibility for the incident was galling and since Sikorsky then confirmed this through their own analysis, what if anything did the TSB do as a follow-up in this matter? Did the TSB inform Transport Canada of the problem so that it could be picked up during their inspections and audits? Or was once again the matter left up to industry without adequate oversight? Our experience in the labour movement is self-regulation does not work. Regulators must be vigilant; they must monitor, inspect and enforce. Some of the conclusions at the 3rd International Regulators' Offshore Safety Conference, held in October 2010 in Vancouver, referred to government and industry promoting an improvement mentality, not a compliance mentality. Our Federation would suggest we are still far from reaching this goal, when there is such an obvious problem with compliance.

We question whether the protocol and procedures for helicopter operators are sufficient with respect to how they act or fail to act on mandatory directives and Alert Service Bulletins. It is apparent that there was little follow-up from the manufacturer with the operators with respect to whether the directives, in this case, were being followed. How are such mandatory directives enforced? The honour system? How are such directives incorporated into a helicopter operator's safety plan? How are these issues conveyed and communicated to the staff, the pilots, and the passengers? Simply put, if the directive was mandatory, why was it not followed?

The TSB report noted (Section 2.8) that following the Australian incident, Sikorsky identified and mitigated the risk of the galled studs by implementing the AMM Revision 13. However, according to the TSB, "the communication of the rationale for this revision and the guidance in the associated maintenance manual revision proved ineffective in stressing the potential consequences of non-compliance" (p. 131).

This was not unlike the issue around the “confusion” with respect to the marketing of the S-92 as having a 30-minute dry run capability (Section 1.18.5.6, TSB report): “There is a perception in some parts of the aviation community that helicopters that meet the certification requirements...will have a MGB which has a 30 minute run dry capability. This perception is fostered by numerous sources such as manufacturers’ brochures, websites, magazines, and trade journals. Often, these information sources are not verified, or approved, by the applicable aircraft manufacturer” (p. 104).

It appears the manufacturer did little to clear up this confusion among industry once the S-92 was certified under the “extremely remote” provision.

The TSB report confirms that a powerful, independent safety authority/regulator with helicopter expertise and beefed up resources can and should play a proactive role here – holding industry to account. This is in alignment with a recommendation from the 3rd International Regulators’ conference which noted that “regulatory regimes function most effectively when a single entity has broad safety and pollution prevention responsibility. Gaps, overlaps and confusion are not in the interest of safety or regulatory efficiency.”

2. Certification of the S-92

Since the release of the TSB report in February 2011, there has been much public discourse about the issue of the certification by the FAA of the S-92 **without** a 30-minute run-dry technology – even though this was to be the new standard for commercial aviation. The FAA had certified the S-92 under the “extremely remote” provision. It is the only helicopter to be certified under this provision.

This extremely remote provision was developed after industry (stakeholders), presumably the manufacturers of helicopters, provided feedback to the FAA after its decision to require that Category A helicopters have a 30-minute run-dry time after total loss of lubricant. This was proposed in 1984 as the new standard. The FAA’s final rule was published in 1988 and included the wording: “unless such failures are extremely remote.” This is not defined by the FAA in its rule, but

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according to the TSB report (Section 1.18.5.1), regulatory documents and industry practices describe those failure conditions as “those not anticipated to occur to each aircraft during its total life, but which may occur a few times when considering the total operational life of all aircraft of the type.”

Like the families of the 17 workers who died in the crash of Cougar flight 491 and the sole survivor, Robert Decker, our Federation questions how the S-92 was certified in the first place when even after repairing the initial problems with the main gearbox’s cooling system, it still did not meet the 30-minute run dry requirement. If this was to be the new standard in commercial aviation why was an exception to the rule granted, negating the standard?

The 30-minute run-dry capability is now 25-year-old technology and yet helicopters operating in the toughest offshore environment in the world, the North Atlantic, do not meet this international best practice. This is not unlike the issues with search and rescue response times or the EUBAs. While higher standards are being practised in many parts of the world, our offshore is far behind and that is totally unacceptable.

Our Federation is extremely troubled by the fact that more serious action was not taken after the Australian incident/occurrence in July 2008 and the subsequent investigation and findings with respect to the galling of the titanium studs causing rapid oil loss.

This incident completely negated the “extremely remote” possibility.

In other words, no longer was it an extremely remote possibility for the gearbox to run dry of oil. Indeed, the findings by the Canadian engineering firm and the TSB in the fall of 2008 on behalf of CHC – the operators of the S-92 in the Australian incident – highlighted that the possibility of further problems was no longer remote, but considerable, so considerable that the titanium studs were to be replaced. Presumably this was why the manufacturer issued its *mandatory* enhanced visual inspection directive and followed it up with a Service Alert in January 2009.

This Australian incident should have triggered a different reaction from the FAA, given it had certified this helicopter, and this helicopter only, under its “extremely remote” provision. It should have triggered some kind of reaction from Transport Canada. And what of the C-NLOPB? Did our offshore regulator even know of this serious safety issue?

Yet the helicopters were not grounded. That did not happen until 17 workers died off the coast of Newfoundland and Labrador, eight months later.

The Australian incident brought to light another serious problem with the S-92’s gearbox, a completely separate problem from the one that occurred during the certification simulation tests resulting in the rebuilt cooling valve system.

This should have been enough to send a huge red flag to the regulator. Yet it was not. Once again a regulator, charged with protecting the interests of health and safety of workers and passengers, does not appear to have taken into account in its risk assessment analysis the consequences of non-compliance. There is clearly too much reliance on self-regulation.

This leaves our Federation with even more questions about the role and relationship between regulators and industry. The FAA should have to answer for its decisions and actions. Why did the FAA not take more serious steps in the fall of 2008 when the “extremely remote” possibility was negated by the Australian incident? And what of Transport Canada’s role as a regulator of aviation matters in Canada?

Our Federation would agree with the TSB’s assessment (Section 2.1) that by focussing on the “extremely remote” concept, both the FAA and Sikorsky “lost sight of the purpose of this rule” of the 30-minute run dry capability. As investigator Mark Clitsome pointed out in his opening remarks during the release of the TSB report,

It’s important to note that if the rules state that you don’t have to pass a test, then you don’t have to pass a test. The problem is with the rule. And this hasn’t changed. Yes the titanium studs have now been replaced with steel ones, thereby addressing the causes

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of this specific crash. But the gearbox has not changed. In the event of a sudden loss of oil, there would still only be 11 minutes before the gearbox fails.

So we need to fix the rule. There is absolutely nothing preventing the C-NLOPB from requiring a certain standard be met with respect to helicopters used in the North Atlantic – in our offshore. Why can not our regulator require a higher standard? Such standards can be a condition of authorization in order to operate in the C-NL offshore.

As was pointed out by Commissioner Wells in the Phase I report, the Canada-Newfoundland and Labrador offshore helicopter conditions are as severe or more severe than those elsewhere in the world.

Those of us with knowledge of the offshore waters of Newfoundland and Labrador are aware that the challenges of these waters make for one of the most difficult operational environments in the offshore helicopter world. (p.59)

This begs the question of why the S-92 is being used offshore Newfoundland and Labrador when helicopters with the 30-minute dry-run capability are available and being used in other parts of the world where sea states and operational environments are not as challenging or difficult. It also raises the question of what role the C-NLOPB has been playing and what role it should play, in conjunction with Transport Canada, with respect to helicopter safety and how those roles will be co-ordinated to ensure the best possible safety protection for workers.

We are also left to question the discussions and the relationship between the FAA, as regulator, and the helicopter manufacturer, Sikorsky. How was the 1,250 hours or one-year time frame to replace the titanium studs reached?

Is it, for example, the same kind of relationship that resulted in the lack of action with respect to the implementation of the use of EUBAs in the C-NL offshore - a nearly decade-long conversation about underwater breathing apparatuses between the C-NLOPB and the oil industry with no real action being taken until 17 workers lost their lives?

Is this a case of what Commissioner Wells describes in his Phase I report as “regulatory capture?” (page 277):

It has long been known that regulators and those they regulate work so closely together that friendships and close working relationships can develop. Common interests and what are sometimes referred to as cosy relationships may unconsciously influence the hard decisions that safety regulation requires. In fact, the safety authority in the United Kingdom advised me when we met that they are always wary of the dangers of regulatory capture, always guarding against it and taking steps to make sure the risk of it is minimized by rotation of personnel to avoid the development of too-close relationships. (p. 277)

Surely it was plain luck that there was not another serious incident involving an S-92 during the five months between November 2008 when the AMM Revision 13 was issued and March 23, 2009 (11 days after the crash of Cougar flight 491) when the Emergency Airworthiness Directive was issued by the FAA.

During this five-month period, every time the MGB oil filter was changed it was mandatory for operators to carry out the enhanced inspections and to replace damaged studs. They did not.

After issuing its March 2009 directive, Sikorsky requested operators return the studs they removed in order to show compliance with the AD. (This should and could have been part of the original November 2008 mandatory directive to perform enhanced visual inspections as part of a compliance tracking system. Had this been the case and no studs were returned, it would have been an indication to the manufacturer and the FAA that further action was necessary as the operators were in non-compliance.) As it stood, there was no way to ensure compliance of the mandatory directive.

And even when it was requested that operators return the studs, operators were under no obligation to do so. As a result, Sikorsky only received 59 studs from various operators.

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The story of those 59 studs is chilling. All the studs had different degrees of galling consistent with the number of times the nut was installed and removed. Based on its investigation, the TSB found that it is likely that most, if not all, of the 59 studs returned to Sikorsky would have been subject to inspection at least once during that period of November 2008 to March 2009.

What this tells us is there is a serious breakdown in safety plans for the operators with respect to acting on directives from the manufacturer. It also tells us that we have had a serious regulatory failure. Despite numerous audits, inspections and communications, this issue was not detected.

In addition, the manufacturer appears to have a history of not being as clear or as firm as it should be: consider for example (as referred to above) the confusion over the S-92's 30-minute run-dry capability and the failure of the manufacturer to address or clarify this in any real or meaningful way.

And what of the role of the regulators in this mix? Shouldn't the regulator, whether it is the C-NLOPB, the FAA or Transport Canada, be charged with the responsibility of follow-up, monitoring and enforcement? And to avoid regulator ambiguity and confusion over who is in charge of what, perhaps the simplest thing in this case is to make the C-NLOPB in charge. The C-NLOPB should receive notice of such directives and the C-NLOPB should ensure the directives are acted upon.

This entire incident reeks of self-regulation. Too much is left up to industry without any accountability by the regulator and in the end to the people who depend on safety being the number one priority.

Once again safety didn't come first.

The compliance time to replace the studs as issued in the Alert Service Bulletin of January 2009 was based on Sikorsky's assessment of the risk and the time it would take to "replace the studs in the field without compromising safety" (TSB report).

This issue of “compromising safety” is not explained. But we are left to question the assessment when after the crash of Cougar Flight 491, the studs in the S-92s were replaced in far less than the one-year compliance time allotted in January of 2009. In this case, the studs were replaced as a condition of being able to resume flying.

The Emergency Airworthiness Directive from the FAA in March 2009 stated that all S-92s were required - before further flight (unless accomplished previously) - to replace the titanium studs with steel studs. If this could be accomplished just after the crash of Cougar 491, it begs the question why the year was needed in the first place and why it took so long for the FAA to make such an emergency directive. Too little, too late.

3. 30-minute run dry: is it even enough?

Our Federation supports the recommendation of the TSB calling for the elimination of the “extremely remote” provision. This provision negated the requirement for a 30-minute run-dry capability:

Therefore, it needs to go. It’s as simple as that: We recommend that all Category A helicopters, including the S-92, should be able to fly for at least 30 minutes following a massive loss of main gearbox oil. Moreover, with advances in technology, we want the FAA to look at today’s operating environments – Hibernia, the Arctic, the North Sea, any of these extreme locations – and decide whether even 30 minutes is enough time. (Wendy Tadros, Chair, TSB, opening remarks upon release of TSB report February 9, 2011)

Our Federation struggled with the question of whether to call for the grounding of the S-92s until they were equipped with a minimum 30-minute run-dry capability, if such repairs to the gearbox were even possible.

We asked ourselves: wouldn’t the TSB have made such a recommendation had it been necessary? This entire matter should be considered under Phase II of the Inquiry.

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Our Federation concurs with all the recommendations from the CEP Union and their lawyer Mr. Randell Earle in their Phase II submission and in particular the recommendation dealing with the 30-minute run-dry capability.

As Mr. Earle points out:

The issue is not what is to be done with the existing fleet of S-92s. The issue is what are the appropriate steps to ensure worker safety in helicopter transportation in the NL offshore? There is no logical reason why workers in the NL offshore should have less than the best available safety capacity in the helicopters which they must ride to work.

Certainly the evidence is compelling that such technology should be the minimum standard and indeed within our offshore there is just as compelling a rationale that this minimum is still insufficient. Given the winds, the extreme cold, the rough seas, a higher standard is likely required and complements the notion of a performance/goal-based regime. We have also struggled with the role of the C-NLOPB in this matter. Why, for example, do we need to await Transport Canada's review of the TSB's recommendations? Can not the C-NLOPB make its own recommendations, issue its own directives? After all, we heard in testimony from the Board's chief safety officer during hearings for Phase I of this Inquiry that:

Again, failure to comply with such conditions can result in cancellation of the authorization, in other words, the operator has to stop work, or it is considered an offence under the Act and the operator can be prosecuted. (page 195, transcript October 20, 2009)

Can not the C-NLOPB, for example, require helicopters transporting workers in the C-NL offshore be equipped with a 30-minute dry run capability? Certainly there should be no logical reason why as part of the oil operator safety plan the helicopter operations contract should not

provide a condition that the helicopters used to transport workers to and from installations in the NL offshore have a run dry

capability equal to the maximum available in a helicopter at the time such contract is made and that no such contract should be for a period of greater than five years. (CEP submission, Phase II)

The Third International Regulators' Conference concluded that "wherever possible, the best standards should be identified and applied internationally."

Our Federation concurs, which is why the best possible and highest standards for helicopter transport should apply in the NL offshore.

4. The EUBAs – why 10 years?

Our Federation has from the beginning found this matter inexplicable, and unfortunately too typical of how matters relating to safety have been dealt with.

There is no excuse for the failure of the C-NLOPB to require and enforce the implementation and use of emergency underwater breathing apparatuses (EUBAs) in our offshore. It was another case of a regulator not acting as it should, in a proactive manner, but rather buying into the "fudge and delay" tactics of industry.

The TSB found that had the workers been equipped with these devices, it may well have made a difference to their survival, given all 17 victims did not die from the impact of the crash, but rather from drowning.

They lost their breath hold ability before they could escape the rapidly sinking helicopter...Cold water makes it almost impossible to hold your breath. That is why passengers and crew on flights offshore NL are now being provided with EUBAs. (TSB Chair Wendy Tadros, February 9, 2011)

It took the loss of 17 lives before the apparatuses were introduced. It is this patterned procrastination on matters of safety that is so troubling and speaks to why a vigilant and proactive safety regulator is not only required, but essential to worker safety.

The lessons learned from the delayed implementation of the EUBAs:

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1. Industry must be given firm deadlines; those deadlines must be met or there must be consequences for not meeting them.
2. Workers must be kept informed of matters like this so they can be part of the decision-making. Their right to know was clearly violated. Therefore how could they exercise their right to participate on this issue and in turn their right to refuse? Both the right to participate and the right to refuse have as their foundation the right to know. Indeed, when workers did ask the C-NLOPB to intervene on their behalf, no action was taken. It's as if the C-NLOPB never felt compelled to respond to issues brought forward by the workers, as if their only interactions were to be with industry as part of their safety audit role.
3. As Randell Earle, Counsel for CEP, pointed out in his concluding submission to Phase I of the Inquiry: "the delays demonstrate an incredible lack of will on the part of the operators to make the implementation happen... Neither the C-NLOPB, CAPP nor the operators presented any insight as to why their respective organizations failed so dismally in bringing this obvious safety improvement about."

Our Federation would suggest that it was simply not a priority, not important enough. And that is part of the safety culture in our offshore that needs changing. Safety improvements for safety's sake (those which have no impact on improved production or profit) cannot be relegated to a secondary list as too often appears to be the case. It speaks to why Commissioner Wells' Recommendation #29 is so important. Clearly industry needs to be held accountable for proactive safety even when those investments do not yield additional profit. Safety cannot be secondary to production or profit. If that means establishing a system where inaction on safety costs the industry profit, then so be it.

5. Training – Basic Survival Training

The TSB noted that the BST is completed every three years, but that research shows that this may be too long. According to the TSB, frequency

of training is important because repetitive exposure has been shown to reduce the time required to escape.

As there are no training standards, per se, our Federation recommends the establishment of a multi-stakeholder training standards board, with clear worker/union representation (appointed by the union), to review this matter and recommend standards, frequency of training, etc. This Board should consider how to avoid what the TSB refers to as “skill decay.” A more frequent BST requirement should be considered, as repetition certainly can make a difference.

6. Night Flights

While the TSB report does not make specific recommendations with respect to night flights, it does, as does Phase I of the Inquiry, refer to the dangerous environment of the North Atlantic. Indeed the rationale behind the recommendation dealing with prohibiting commercial operation of Category A transport helicopters over water when the sea state will not permit safe ditching and successful evacuation might also be considered while examining this issue of night flights.

As Commissioner Wells pointed out (page 205), helicopter travel is the most dangerous part of an offshore worker’s employment:

Asking passengers to fly at night adds considerable risk to that part of their work which is already the riskiest.

Night rescue is by its nature that much more difficult. And “almost every nighttime condition will contribute to risk.” Statistics from the North Sea support this analysis.

Our Federation supports Commissioner Wells’ recommendation to halt night flying. Certainly the workers we have spoken with would have a great deal more confidence in the transport if night flights were banned. Workers do not feel that a safe ditching or rescue can be accomplished at night. Therefore, we recommend a complete ban on night flights.

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Conclusion

The TSB report confirms why it is we need a separate, powerful, independent safety regulator for the C-NL offshore.

It also raised as many questions as it answered.

It raised real concerns around the role of the regulators and their relationship with industry.

The TSB report raised our anger with respect to how so much could go wrong. This is not a case of one error. This is a case of a stunning 16 factors or causes. This is a shocking statement about a health and safety culture littered with holes that need plugging.

It raised the question of why workers in our offshore do not have the best available safety capacity in the helicopters in which they ride to work.

It raised questions about the relationship between helicopter operators and manufacturers and how directives from the latter are dealt with by the operators. It raised issues about how compliance is enforced and who does that, and about how these directives are incorporated into safety plans and fed to the regulator and the joint workplace occupational health and safety committees.

Surely there must be a role for the regulator, like the kind recommended by Commissioner Wells in Phase I, to ensure compliance with such orders. Manufacturers should be required to inform all regulators governing offshore helicopter transport as well as operators. And regulators must be vigilant about ensuring directives are followed and complied with, and if they are not then steps need to be taken to enforce compliance.

The TSB report also raised the issue of what role Transport Canada actually plays. Has it conceded too much of its decision-making authority to its sister organization, the FAA?

The workers employed in the C-NL offshore deserve the best international practices. They deserve to have the safest and best of helicopter

technology available. We should indeed be setting standards, not lagging by a quarter of a century. As we expressed in our Phase I submission, we believe in and support a model of industrial democracy. We believe this concept was embraced by Commissioner Wells in his first report.

In a free and democratic society such as Canada, as much information as possible on all safety matters should be made public at all times. Exceptions ... should be kept to a minimum.
(p. 303)

In free and democratic societies, unions have an important and legitimate role to play. The union representing workers in the offshore must be given every opportunity to play that role – this means electing and choosing their own representatives for bipartite and multi-stakeholder boards as we would expect in any democracy. It means they must be part of the communication stream, but they can only do that if they have the knowledge and information to share.

Finally, we thank you for this opportunity. We hope our comments are helpful to your deliberations.

We firmly believe that every accident is preventable. Our hope is through this Inquiry process, offshore health and safety is transformed. The families of 16 men and one woman who died March 12, 2009 deserve this to be the least of our efforts. The women and men who continue to seek their living offshore deserve the same.

**Phase II Written Submission to
The Honourable Robert Wells, Q.C.**

Commissioner

Offshore Helicopter Safety Inquiry

**By
Lorraine Michael M.H.A. (Signal Hill-Quidi Vidi)
Leader of the Newfoundland and Labrador
New Democratic Party**

April 15, 2011

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I would like to thank the Commissioner for the opportunity to make this submission.

I also want to reiterate that my work on this issue is done in memory of those people lost in the crash of Cougar Flight 491 on March 12, 2009. We owe it to them and their families, as well as the women and men who continue to fly offshore on a daily basis, to make our offshore as safe as possible.

In that spirit I offer these thoughts and concerns on the situation today regarding the improvement of safety for all those who work in the offshore oil industry.

I understand my submission must be directly related to the findings of the Transportation Safety Board. I believe the observations and concerns I list below are related to those findings.

As I noted in my previous presentation to the Commissioner, I do not have a lot of technical knowledge about the various aspects of helicopter operation or safety.

I am a politician and the leader of the province's New Democrats, and as such my concerns and my expertise are about people. I know their safety comes first in any consideration — *before* any other consideration.

I read with interest the Commissioner's report and applauded his recommendations. I also was heartened to hear the provincial government say it would support the Commissioner's recommendations.

I read with interest the report of the Transportation Safety Board investigation into the crash of Cougar Flight 491, and its recommendations. I was pleased to hear the federal minister say the federal government would "support the intent of the TSB recommendations to improve helicopter safety."

Minister Strahl noted the federal government would "work cooperatively with the Canada Newfoundland Offshore Petroleum Board (C-NLOPB) to do all we can to maintain and enhance the safety of Canadian aviation."

The Premier and some of her ministers have said similar things in the House and in the press.

What concerns me is the lack of tangible work done on either set of recommendations by either level of government since those announcements.

Since the federal government publicly stated they would “support the intent” of the TSB recommendations, the Newfoundland and Labrador public has heard little more.

This reflects a similar silence from the provincial government, who, outside of promises to get working on your recommendations, have offered nothing tangible.

With the release of their report, the TSB noted 16 interconnected factors contributed to the tragedy. On that day, I called on government — both levels — to implement their recommendations immediately.

The C-NLOPB, the agency responsible for offshore safety, issued a release stating they would review the recommendations. At the time of this writing nothing more has been issued from the C-NLOPB on this. Two months have passed.

This is not good enough. People are flying back and forth every day from the oil rigs on S-92As, without any indication that all the factors addressed by the TSB have been mitigated, or even addressed.

The TSB has recommended certification rules be changed to require all S-92As to be able to fly for 30 minutes after the loss of main gearbox oil, and for the FAA (an American agency) to assess whether a 30-minute “run-dry” requirement is adequate for helicopters operating in extreme environments.

In the House I have brought to the attention of the provincial government more on-going concerns regarding the suitability of S-92 helicopters for offshore oil industry service.

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I asked government, in light of Sikorsky bringing out a replacement Main Gear Box (MGB) which must be inspected every ten hours — because it still cracks — what were they doing to address these safety concerns.

I did not get a clear answer.

Most people would not feel comfortable driving a car that needed to be checked every ten hours.

I asked the Premier in Question Period, in light of Sikorsky's plans to introduce *yet another* redesign of its MGB for the S-92A — a “Phase III” — and their refusal to specify its “run-dry” capacity, would government demand replacement helicopters be brought in to service in the province's offshore.

I did not get a clear answer.

Federal New Democrat MP Jack Harris brought similar questions to the fore in Ottawa.

Yet the people of this province see little or no action, and hear nothing more than assurances from the Premier and ministers that they are busy working on the issue.

Mr. Commissioner, I have real concerns whether or not this make of helicopter — the Sikorsky S-92A — is appropriate to service our offshore industry.

No level of government or the C-NLOPB is willing to come forward with any information that would allay my concerns, which are shared by many in the offshore oil industry, their families and loved ones, and the public at large.

Even more disturbing is what I continue to hear from workers in the offshore.

In my previous presentation to the Commission, I spoke of a work culture tainted by secrecy and fear of reprisal. I am sorry to report that it appears

worker's fears are not being allayed. It appears from what I have been told that workers still fear speaking up on safety issues.

To this day, despite all the recommendations and all the high-minded statements by politicians both here in this province and federally, I get calls from workers who work offshore, and are afraid to speak up on safety issues through formal channels.

I am still receiving communications from offshore workers regarding serious work safety issues they do not feel are being properly addressed by either the companies they work for, or the C-NLOPB.

Nevertheless, the fact that I *am* approached like this speaks to the dysfunctional nature of the work culture that continues to exist offshore.

Such a culture is the antithesis of what is needed to ensure that all safety concerns, from the frivolous to the serious, are aired, discussed and resolved in an atmosphere of complete openness and trust.

As the Commissioner has noted in his report, the immediate creation of an independent offshore safety authority is the best way of truly establishing an open culture of safety in the offshore oil industry.

Such an authority would be able to very publicly set about ensuring all TSB recommendations — and any other safety concern — were addressed and implemented. It is something the Commissioner has recommended.

My concern is both levels of government — now in receipt of all recommendations from both investigations — seem unwilling to commit to clear timelines about how to proceed.

The agency responsible for overseeing safety in this province also seems to have no sense of urgency. To date we have no idea what the C-NLOPB will do regarding the TSB recommendations. It appears they have yet to conclude their review.

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Safety is always an immediate concern. These long delays breed more anxiety, concern and fear among offshore workers, families and loved ones, and the people of the province.

What concerns me is the evidence that the C-NLOPB *still* does not release safety information in a timely manner. We have seen that clearly with other offshore safety issues that have arisen over the past few months.

What concerns me is that as time passes, safety concerns are trumped in the public eye by other pressing matters, and the public forgets about these issues.

Mr. Commissioner, pressure must be placed on all responsible government agencies to act on the TSB recommendations, and act in a responsible and appropriate manner that is truly in the best interests of the workers in the offshore industry and the public.

Mr. Commissioner, I believe the S-92A must be removed from servicing the offshore oil industry in this province, until it can be proven truly capable of a 30-minute run dry capability.

In other parts of the world we are seeing more and more concerns about this helicopter's suitability for offshore service.

While this may seem drastic and costly, I believe the evidence is there for this action, and the costs pale in comparison to the profits reaped by the oil companies.

The costs pale in comparison to the risks we are currently asking men and women who work offshore to take so they can provide for themselves, their families and loved ones.

I have done some research on this issue and I would like to offer the Commissioner a suggestion as to what I see as an alternative to the S-92A.

The Eurocopter EC225 Super Puma Mk II+ is a long-range passenger transport helicopter developed by the European manufacturer Eurocopter,

the world's largest and most respected designer/manufacturer of civil helicopters.

It is a twin-engine aircraft which can carry up to 24 passengers along with 2 crew and a cabin attendant. With a range of 857 kilometres the EC225 is currently used to service the European offshore oil industry by companies like Bond (UK), Bristow (UK) and CHC (UK/Norway).

It has a true 30-minute run dry capability.

This is a rotorcraft experts have called a “very viable alternative” to the S-92 and which some industry observers say is now preferred by some operators to the S-92 because of the S-92’s main gear box problems.

Mr. Commissioner, we are counting on you to emphasize the urgency of allaying the fears people have regarding the continuing operations of the Sikorsky S-92A helicopter.

If these machines cannot be certified, and certified immediately, to meet the requirements of safe operation in the offshore, then they should be not used.

You are in a unique position to apply pressure to all the agencies involved to address this urgent issue.

I thank the Commissioner for the opportunity to make these points.



Newfoundland and Labrador • Canada

Phase II

Report and Recommendations arising from the Transportation Safety Board's Report