Phase I

CANADA-NEWFOUNDLAND AND LABRADOR

OFFSHORE HELICOPTER SAFETY INQUIRY

Volume 1
Report and Recommendations

The Honourable Robert Wells
Commissioner

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
140 Water Street
St. John's, NL
A1C 6H6

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 I of the Inquiry.

The Honourable Robert Wells, Q.C.
St. John's, NL

October 2010

Offshore Helicopter Safety Inquiry
Canada-Newfoundland and Labrador

Volume 1
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Volume 1
Report and Recommendations
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DEDICATION

The people of Newfoundland and Labrador, and others beyond this province, feel the bereavement of the families of those who died on March 12, 2009, and respectfully acknowledge the harrowing experience of the lone survivor.

This Report is dedicated to the memory of the following persons and to the lone survivor, with the hope on the part of all who contributed to the Inquiry that our work will make a difference to the cause of offshore helicopter safety.

Thomas Anwyll	Peter Breen
Gary Corbett	Matthew Davis
Wade Drake	Wade Duggan
Corey Eddy	Keith Escott
Colin Henley	Timothy Lanouette
Kenneth MacRae	Allison Maher
Gregory Morris	Derrick Mullowney
Burch Nash	John Pelley
Paul Pike	

Robert Decker - Survivor

ACKNOWLEDGEMENTS

After my appointment as Commissioner, I was aided in the organizational process by Virginia Connors, who has played pivotal roles in the organization of other commissions. In this instance she could only give initial advice, but I do express my gratitude to her for taking the time out of her own schedule to point us in the right direction.

The core team was made up of five persons: Angela Williams as Office Manager and Registrar; Patricia Tinkham as Secretary with responsibility for accounting; and Inquiry Counsel, John F. Roil, QC, and Anne M. Fagan, LLB. I was the fifth person. Without the extraordinary efforts of the core team, we could not have succeeded in completing the Inquiry in a reasonable time.

Others who played important roles were the late Robert Healey, FCA, who provided financial oversight until days before his death on September 16, 2009. He was sorely missed. Neil Jackman, CA, succeeded Mr. Healey and continued that work in exemplary fashion.

Others involved were Edward Vanderkloet, LLB, Legal Research; Jeanette Fleming, Information Manager; Hubert Hibbs, Security; and Claire Wilkshire, PhD, Editor.

Technical services were provided by Discoveries Unlimited, Triware Technologies Inc., Eastern Audio Limited, Rogers Cable TV, and Pilot Communications.

John F. Roil and Anne M. Fagan were at the heart of the evidence-gathering process, the evaluation of materials, liaison with all participants with standing, planning our North Sea interviews, coordinating the public hearings, and supervising the amassing of thousands of pages of necessary documents in both paper and electronic form. I owe them a tremendous debt of gratitude.

I wish also to express my thanks to counsel and the participants with standing, the many persons who contributed to my knowledge of offshore helicopter safety, the many persons and offshore-related companies in the United Kingdom and Norway, and the regulators in both countries, all of whom took the time to explain their respective involvements. I thank Colonel Paul Drover of the Department of National Defence, Ottawa, for his presentation on national search and rescue; and DND Squadron 103, Gander, whose pilots and SAR technicians demonstrated helicopter rescue to Inquiry Counsel and me, both at night and in daylight, over ocean waters.

I wish also to thank Wendy Tadros, Chair of the Transportation Safety Board of Canada, for her presentation, and public-interest presenters Lorraine Michael, MHA; Lana Payne, President of the Newfoundland and Labrador Federation of Labour; and William Parsons, former President of that Federation.

I am especially grateful to the widows and children of deceased passengers, who demonstrated grace and courage, as did the survivor, Robert Decker, in making public presentations to the Inquiry.

To my wife, Lucy, who has taken over almost all family responsibilities for the past 18 months, I also express my gratitude.

PREFACE

The Offshore Helicopter Safety Inquiry was set up after the crash on March 12, 2009, of a Sikorsky S-92A helicopter about 30 nautical miles from St. John's. The helicopter, carrying 16 passengers and two pilots, was on its way to the SeaRose FPSO, with a first stop planned at the Hibernia platform. The aircraft crashed and sank with the loss of 17 lives. Only one person survived.

The Inquiry was established as required by law under the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act,* RSNL, 1990 and the Public Inquiries Acts of Canada and Newfoundland and Labrador. I was appointed as Commissioner on April 16, 2009, and the Terms of Reference were announced on May 25, 2009.

This Inquiry differs considerably from most public inquiries, which have as their mandate the task of determining the causes of a given event. In the case of this Inquiry, the cause of the crash was excluded from its work because in Canada, aircraft crashes and other accidents are investigated by the Transportation Safety Board.

My task then became an examination of aspects of offshore helicopter safety that do not involve airworthiness or other matters exclusively within the Transportation Safety Board's mandate.

Because of that, the first task became the selection of safety issues to examine and consider.

On a practical level, I assembled a team, found appropriate premises, and made arrangements for a hearing room. There followed a lengthy process of selecting the IT providers and the installation of a large amount of complex equipment, after which, in mid-August 2009, we began standing hearings.

I appreciate very much the logistical help provided by the Canada-Newfoundland and Labrador Offshore Petroleum Board, but in all other respects, the relationship between the Inquiry and the Board was arm's length, as it should be.

From the beginning, my concept of the process was that it would be transparent and participatory, and I believe we have achieved that objective.

Chapter One

Setting the Stage

Setting the Stage

Mandate and Terms of Reference

On March 12, 2009, at about 9:30 a.m., a helicopter crash occurred in the Canada-Newfoundland and Labrador offshore, about 55 kilometres east-southeast of St. John's. Seventeen people were killed, including the pilot and co-pilot; one person, miraculously, survived. The downed helicopter was a Sikorsky S-92A belonging to Cougar Helicopters Inc. and was one of a fleet of four S-92As which transported workers to and from the offshore oil fields on the Canada-Newfoundland and Labrador (C-NL) continental shelf.

The oldest of the producing fields in the C-NL offshore and the closest to land is 315 kilometres from St. John's and is operated by Hibernia Management and Development Company Ltd. (HMDC). It has been in production since 1997. The other offshore production installations are operated by Suncor Energy Inc. (Suncor) and Husky Oil Operations Ltd. (Husky), each between 325 and 400 kilometres from St. John's.

In addition to these producing fields, there are also fields in which exploratory wells have been and are being drilled, and which may or may not become producing wells in the future. The Hebron field is scheduled to begin production in 2017, and work on that development is underway. All oil developments require that exploration and production licences be granted to oil operators before work can begin. The oil operator manages the development, on behalf of a number of participating oil companies.

The Newfoundland and Labrador offshore is an oil-producing area, while the Nova Scotia offshore is primarily a gas producer. These are Canada's only developed offshore production areas at this time.

Some thirty years ago, the Governments of Canada and of Newfoundland and Labrador were in dispute over which of them should control and regulate these offshore oil and gas reserves. After some years of argument and litigation, it was decided to resolve matters by

negotiation, and as a result of that decision the Atlantic Accord was signed on February 11, 1985. Its formal title was:

> Memorandum of Agreement Between the Government of Canada and The Government of Newfoundland and Labrador on Offshore Oil and Gas Resource Management and Revenue Sharing.

For the purposes of this Report it is necessary for me to reproduce only clauses 1, 2, and 3 of the Accord, which are as follows:

THE ATLANTIC ACCORD

1. The Government of Canada and the Government of Newfoundland and Labrador have reached an Accord on joint management of the offshore oil and gas resources off Newfoundland and Labrador and the sharing of revenues from the exploitation of these resources. The Accord will be implemented, to the extent possible, through mutual and parallel legislation to be introduced by both governments into the Parliament of Canada and the Legislature of Newfoundland and Labrador.

PURPOSES OF THE ACCORD

2. The purposes of this Accord are:

   (a) to provide for the development of oil and gas resources offshore Newfoundland for the benefit of Canada as a whole and Newfoundland and Labrador in particular;
   (b) to protect, preserve, and advance the attainment of national self-sufficiency and security of supply;
   (c) to recognize the right of Newfoundland and Labrador to be the principal beneficiary of the oil and gas resources off its shores, consistent with the requirement for a strong and united Canada;
   (d) to recognize the equality of both governments in the management of the resource, and ensure that the pace and manner of development optimize the social and economic benefits to Canada as a whole and to Newfoundland and Labrador in particular;

(e) to provide that the Government of Newfoundland and Labrador can establish and collect resource revenues as if these resources were on land, within the province;
(f) to provide for a stable and fair offshore management regime for industry;
(g) to provide for a stable and permanent arrangement for the management of the offshore adjacent to Newfoundland by enacting the relevant provisions of this Accord in legislation of the Parliament of Canada and the Legislature of Newfoundland and Labrador and by providing that the Accord may only be amended by the mutual consent of both governments; and
(h) to promote within the system of joint management, insofar as is appropriate, consistency with the management regimes established for other offshore areas in Canada.

JOINT MANAGEMENT

3. The two parties agree to establish the Canada-Newfoundland Offshore Petroleum Board, hereinafter called "the Board", to administer the relevant provisions of the Canada-Newfoundland Atlantic Accord Implementation Act as enacted by the Parliament of Canada and the Legislature of Newfoundland and Labrador, and other relevant legislation.

There then follow a total of 68 clauses which set forth the structure of the agreement and in particular the makeup and structure of the Regulator, which is the Canada-Newfoundland and Labrador Offshore Petroleum Board, usually referred to as the "C-NLOPB."

Because this Inquiry is about safety, I will also reproduce clauses 61 and 63 of the Accord, which specifically refer to that subject:

61. The Government of Canada will introduce in Parliament legislation to extend federal laws to apply to activities in the offshore, and apply appropriate provincial laws, including social legislation such as occupational health

> and safety legislation and other legislation designed to protect workers.
>
> (…)
>
> COORDINATION
>
> 63. The Board shall conclude Memoranda of Understanding with the government departments and agencies having continuing responsibilities in the offshore area for environmental and safety regulation and for emergency measures with a view to ensuring effective coordination and minimum duplication.

The Accord also provided for the enactment of matching legislation by the Parliament of Canada and the Legislature of Newfoundland and Labrador, the details of which would enshrine the spirit of the Accord and legislate specific provisions to inaugurate a comprehensive regime for offshore exploration and development of the oil and gas reserves which were known to exist under the continental shelf. The Acts, which passed in 1987, are called the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Acts*.

I note the final clause of the Accord, which says:

> 68. The area covered by this Accord is that area below the low water mark lying off the coast of Newfoundland and Labrador out to the outer edge of the continental margin, coming within Canada's jurisdiction being north and east and south of the appropriate lines of demarcation between Newfoundland, the adjacent provinces, and the Northwest Territories.

If I may be permitted a comment, the Accord successfully resolved a dispute of the kind that from time to time arises in a federal state and as such it was a significant achievement.

Having provided the reader with a brief account of the historical framework within which the regulation of our offshore oil resources is organized, I now turn to the legal basis for this Inquiry.

Section 165 of the *Canada-Newfoundland Atlantic Accord Implementation Act* identifies the circumstances that lead to the establishment of an inquiry (this is mirrored in the Provincial Act):

> Inquiries
>
> (1) Where a spill or debris or an accident or incident related to any activity to which this Division applies occurs or is found in any portion of the offshore area and results in death or injury or danger to public safety or the environment, the Board may direct an inquiry to be made and may authorize any person it deems qualified to conduct the inquiry.
>
> Mandatory inquiry
>
> (1.1) Where a spill or debris or an accident or incident related to any activity to which this Division applies occurs or is found in any portion of the offshore area and is serious, as defined by regulation, the Board shall direct that an inquiry referred to in subsection (1) be made and shall ensure that the person who conducts the inquiry is not employed by the Board.
>
> Power of person conducting inquiry
>
> (2) For the purposes of an inquiry under subsection (1), a person authorized by the Board under that subsection has and may exercise all the powers of a person appointed as a commissioner under Part I of the *Inquiries Act*.
>
> Report
>
> (3) As soon as possible after the conclusion of an inquiry under subsection (1), the person or persons authorized to conduct the inquiry shall submit a report to the Board, together with the evidence and other material that was before the inquiry.

Clearly, an accident of the magnitude of the crash of March 12, 2009, fell within the purview of Section 165(1.1). Accordingly, on April 8, 2009, the C-NLOPB publically announced that a Commission of Inquiry would be established and on April 16, 2009, announced the name

of the Commissioner. On May 25, 2009, the Terms of Reference were made public.

They are as follows:

As Amended
February 11, 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;

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.

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.

- 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 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 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.

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.

On October 7, 2010, the C-NLOPB amended the Terms of Reference with respect to Phase II and the amended Terms of Reference (with **bolding** applied by C-NLOPB) are as follows:

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;

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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;

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8. Inquiry Methodology

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

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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.

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.

The reader will have noted the general and specific mandates of the Inquiry as well as the two limitations contained in Clause 6. Both of these were necessary and deserve some explanation. The first limitation excludes the investigation of the cause of the crash of March 12th from the work of this Inquiry. The reason for that exclusion is that federal law places the duty to investigate air crashes, as well as a wide variety of other transportation accidents, upon the Transportation Safety Board of Canada. It follows therefore that this Inquiry need not and cannot inquire

into the causes of the crash, or into matters involving the design or operation of the Sikorsky S-92A. The Inquiry must rely on the Transportation Safety Board with respect to these matters.

The Inquiry is therefore able to devote its efforts to the safety roles of the C-NLOPB, the oil operators, the helicopter operator, and other service providers, and to recommend possible improvements to offshore helicopter safety. These matters are succinctly set out in Clauses 4 and 5 of the Terms of Reference.

For the sake of completeness, I will reproduce the findings of the Transportation Safety Board to date, as they were given in publicly disclosed preliminary reports. I do that in order to give the reader some knowledge of the nature of the accident of March 12, 2009, and to give context to the work of the Inquiry, pending the final report of the Transportation Safety Board, which is expected later in 2010.

In three public communiqués, dated March 20, 2009, March 24, 2009, and June 18, 2009, the Board said:

> TSB # A01/2009
>
> **THE TRANSPORTATION SAFETY BOARD OF CANADA HAS IDENTIFIED A BROKEN MAIN GEARBOX FILTER BOWL ASSEMBLY MOUNTING STUD ON THE COUGAR HELICOPTER SIKORSKY S92-A**
> (Gatineau, Quebec, March 20, 2009) – Shortly after beginning the initial wreckage examination today, as part of the Transportation Safety Board of Canada (TSB) investigation into the March 12, 2009 accident of a Cougar Helicopter Sikorsky S92 A off the coast of St. John's, Newfoundland and Labrador, the TSB immediately informed Transport Canada (TC), the National Transportation Safety Board (NTSB) and the Federal Aviation Administration (FAA) that they had found a broken main gearbox filter bowl assembly mounting stud.
>
> On January 28, 2009, the manufacturer Sikorsky Aircraft Corporation had issued an Alert Service Bulletin (ASB92-63-014) indicating that the main gearbox filter bowl assembly mounting

titanium studs should be replaced with steel mounting studs. This one-time modification was to be accomplished within the next 1250 flight hours or within one year of the issue date of the ASB, whichever occurred first.

In light of TSB's discovery, the FAA will be issuing an emergency Airworthiness Directive stipulating that all operators of Sikorsky S92 A helicopters worldwide must install the improved studs in accordance with the existing ASB, before conducting any other flights.

(…)

TSB # A02/2009

Update: Transportation Safety Board of Canada Investigation into Cougar Helicopter Sikorsky S92 A Crash
(Gatineau, Quebec, March 24, 2009) - Following the Transportation Safety Board of Canada's (TSB) March 20th discovery of a broken main gearbox filter bowl assembly mounting stud on the Cougar Helicopters Sikorsky S92 A, more than half of the Sikorsky S92 A helicopters worldwide have had the defective studs replaced. The remaining studs are expected to be replaced in a timely fashion.

More information about the stud replacements and factual information about the March 12th accident will be made available at a final press conference on Thursday, March 26th. At this time, media will have an opportunity to photograph some of the wreckage from a specified distance.

Event Details

When:

1 p.m. Newfoundland and Labrador time, Thursday, March 26, 2009
12 p.m. Media have access to hangar to set up their equipment.
1 p.m. Photo op begins.
1:15 p.m. Press conference begins with presentation.
1:25 p.m. Questions and answers period begins.

Where:
Provincial Government Hangar (Hangar #3)
Torbay side of the Airport
St. John's, Newfoundland

Who:

Mr. Mike Cunningham, Investigator-in-Charge
Mr. Allan Chaulk, Technical Team Lead
Mr. Charles Laurence, Operations Team Lead

*Important Note:

Still photos of the recovery process are also now available on the TSB website at www.bst-tsb.gc.ca. Should you require a copy please contact TSB Communications at communications@bst-tsb.gc.ca. Media who are not able to attend the press conference but wish to have an interview can schedule one immediately following the press conference by contacting TSB Media Relations at the coordinates below. The same information that was provided at the press conference will be communicated.

The TSB is an independent agency that investigates marine, pipeline, railway and aviation transportation occurrences. Its sole aim is the advancement of transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

TSB # A03/2009

The Transportation Safety Board of Canada Issues an Investigation Update into the Sikorsky S-92A Helicopter Accident (A09A0016)
(Gatineau, Quebec, June 18, 2009) - The Transportation Safety Board of Canada (TSB) is well into a comprehensive investigation of the accident of a Sikorsky S-92A helicopter, Cougar Helicopters Flight 491, which occurred 30 nautical miles east of St. John's, Newfoundland and Labrador, on March 12, 2009.

A thorough, unbiased investigation is necessary to understand as completely as possible all the contributing factors involved in this accident. To this end, a dedicated team of TSB investigators and several TSB Engineering Laboratory specialists is working towards completing the investigation. A number of other specialists and observers from Cougar Helicopters, Transport Canada, Sikorsky, and the Federal Aviation Administration (FAA), along with the accredited representative of the United States National Transportation Safety Board (NTSB), continue to provide valuable contributions to the TSB investigation.

Work Completed to Date

A significant amount of work has been completed so far, but much remains to be done. Dozens of interviews have been conducted with individuals from various organizations. The latest interviews were conducted in May, including a follow-up interview with the sole survivor. More interviews remain to be conducted in the coming weeks. Hundreds of technical and operational documents, weather reports, air traffic control communications, incident reports, studies, and research papers have been gathered, and the review of this material continues. The TSB has examined the main gearbox (MGB), the tail rotor drive shaft, the flight data recorder (FDR), and cockpit voice recorder (CVR). As reported previously, the FDR stopped recording at approximately 1225:17, while the helicopter was about 800 feet above sea level (asl). The reason the recorder stopped remains under investigation. The TSB Engineering Laboratory, in concert with manufacturer's specialists, has been able to successfully retrieve additional data from the aircraft's Health and Usage Monitoring System (HUMS) and flight control computer (FCC) to be able to piece together most of Cougar Helicopters Flight 491's flight profile below 800 feet. While this portion of the flight profile is still in a preliminary stage, and further analysis is required, the following additional factual information can be released at this time.

Factual Information

Examination of the MGB indicates that there was no loss of main rotor drive and that the main rotor blades were rotating at the time

of the impact. The examination of the MGB also revealed that the tail rotor drive gears had been severely damaged, resulting in a loss of drive, causing it to stop producing thrust. Further examination is being carried out by the TSB Engineering Laboratory to determine the cause and sequence of this loss of tail rotor drive.

The metallurgical examination of the titanium oil filter attachment studs revealed fatigue cracking in the studs as well as evidence of thread damage. A detailed metallurgical examination of the studs, nuts, and filter bowl is under way to identify the origin of the fatigue cracks and to determine the fracture mechanism.

Just before the recorder stopped, engine power was reduced, a descent from 800 feet was initiated, and the speed of Flight 491 began to decrease from 133 knots. The helicopter continued to descend and to slow down in a controlled manner, until about 1225:44, at which time driving power to the tail rotor was lost. At this time, Flight 491 was heading 290° magnetic (M) at 85 knots and was descending through approximately 500 feet. At 1225:47, a shut-down of both engines was initiated, which is consistent with a tail rotor drive failure emergency.

Subsequently, the aircraft experienced a number of large and rapid attitude changes. At 1225:54, Flight 491's pitch attitude increased from approximately 10° nose down to about 16° nose up, which is consistent with a flare for an engines-off landing. The helicopter struck the water at approximately 1226 in a slight right-banked, nose-high attitude at an approximate location of 47°26'03" N, 051°56'34.8" W, with moderate speed and a high rate of descent. The wreckage was found at a depth of 165 metres on a bearing of 283° from the surface position.

The Sikorsky S-92A flotation system activation switch was found in the armed position after recovery. The helicopter experienced significant forces during the impact with the water, and examination of the inflation bottles indicates that they had not released their compressed gas to inflate the flotation collars. The reason the collars failed to inflate is still under investigation.

Investigation Activities in Progress

Continued investigation activities being finalized include evaluations of the Flight 491 flight profile in an S-92A simulator. Investigators from the TSB and other agency specialists will recreate as closely as possible the accident flight profile to add to the understanding of the challenges encountered by the pilots of Flight 491. In addition, pilot training, human performance aspects, crew resource management, and cockpit ergonomics will be evaluated.

Oil filter bowl studs on all Sikorsky S-92A aircraft have been replaced with new steel studs in accordance with a Sikorsky Aircraft Alert Service Bulletin (ASB). Compliance with the Sikorsky Aircraft ASB was subsequently mandated by an FAA Airworthiness Directive (AD).

The investigation has revealed that, even though the Sikorsky S-92A MGB was certificated to meet requirements of Part 29 of the *Federal Aviation Regulations* (FAR 29) of the United States FAA, there is a perception in some areas of the aviation community that the MGB can be run in a dry state - that is, without lubricating oil - for 30 minutes. FAR 29 does not require run-dry operation of a gearbox to meet the 30-minute "continued safe operation." Based on the applicable guidance material at the time of certification, the lubrication failure modes of interest were limited to the failure of external lines, fittings, valves, and coolers. This practice was consistent with industry experience, which had found that loss of lubrication tended to be associated with external devices. Therefore, the possibility of a failure at the oil filter was considered to be extremely remote. As a result of the fracture of the filter bowl mounting studs, resulting in the loss of a large quantity of oil, the certification guidance material is being reviewed. Additionally, the FAA and Sikorsky Aircraft are working to identify all the modes of failure that might lead to Sikorsky S-92A MGB oil loss, determining their probability of occurrence, and developing appropriate mitigation strategies.

The Sikorsky S-92A Rotorcraft Flight Manual (RFM) has been reviewed regarding MGB oil pressure loss below 5 pounds per square inch (psi) and the need for pilots to land immediately. An

RFM revision has been approved by the FAA and Transport Canada.

A number of issues regarding survivability such as passenger immersion suit and crew flight suit effectiveness, use of underwater breathing devices, adequacy of survival training, adequacy of general ditching procedures, personal locator beacons, weather/sea state flight limitations, and Sikorsky S-92A flotation system are currently under investigation.

Safety Action

As the TSB investigation progresses, the team continues to work closely with the other agencies involved. Safety concerns have been communicated directly to these change agents and have resulted in safety action taken by Cougar Helicopters, Sikorsky Aircraft, and the various regulatory bodies.

Cooperation with Other Agencies

The TSB is working in cooperation with other external agencies such as the Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) to ensure that the upcoming public inquiry by retired Justice Robert Wells does not impinge upon the work being done by the TSB under our mandate.

To this end, several exchanges of information have occurred and meetings have been held to coordinate activities. The general concerns of offshore workers have been passed to the TSB and those concerns appropriate to the TSB's mandate have been checked against the investigation issues already under consideration by the investigation team. The other concerns of offshore workers have been addressed by an external Helicopter Operations Task Force, a working group composed of representatives from the helicopter operator and the oil companies.

As always, the thoughts of the TSB investigation team go out first to the families who lost loved ones on board Flight 491. The investigation work of the TSB team on this accident will help all

> understand what happened in this accident and hopefully prevent any similar accidents from happening again in the future.
>
> *The TSB is an independent agency that investigates marine, pipeline, railway and aviation transportation occurrences. Its sole aim is the advancement of transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.*

I wish to express my thanks to the Transportation Safety Board for its cooperation throughout this Inquiry and to the Chair of the Board, who appeared at the Inquiry to explain its role and functions.

The second limitation in the Terms of Reference is also an exclusion from the Inquiry's mandate: the Inquiry is not to investigate the Government of Canada's provision (through the Department of National Defence) of search and rescue services for marine incidents within the Province of Newfoundland and Labrador. In that connection also, an explanation is necessary.

For more than 60 years, Canada has carried out maritime search and rescue through various directives and international conventions, beginning with the 1944 Convention on International Civil Aviation. Search and rescue capability was developed through a variety of Acts and Directives until, in 1976, the Prime Minister appointed the Minister of National Defence as the Minister for Search and Rescue, through his Department. The Department of National Defence (DND) remains to this day the public provider of search and rescue (SAR) services, operating in conjunction with other agencies such as the Canadian Coast Guard, the Auxiliary Coast Guard, and any other providers of search and rescue services.

It is unnecessary for me to detail the full range of public search and rescue in Canada. Suffice it to say that Canada's aeronautical search and rescue mandate applies in an internationally demarcated area of responsibility. That area extends from the US border in the south, northward to the North Pole, eastward about halfway across the Atlantic Ocean to 30 degrees west longitude, and westward over the Pacific Ocean to about 965 kilometres off the coast of Vancouver Island.

There are five Canadian Forces squadrons and three aircraft types assigned to provide primary SAR standby responsibility. They are based in:

(a) Comox, British Columbia
(b) Winnipeg, Manitoba
(c) Trenton, Ontario
(d) Greenwood, Nova Scotia
(e) Gander, Newfoundland and Labrador

Gander functions with three CH-149 Cormorant helicopters, equipped and staffed for search and rescue.

It is quite clear that the limitations imposed by the Inquiry's Terms of Reference were necessary. Federal search and rescue services were not included in the Atlantic Accord nor in the implementation legislation. The Federal Government has not delegated its search and rescue obligations to C-NLOPB, and DND has not involved itself in any contractual way with the offshore oil area. DND is ready to deploy its search and rescue resources to any requirement in its area of operations, including the offshore oil industry. It is not dedicated to the offshore oil industry, any more than it is dedicated to any other industry. It will deploy its resources as and where needed, but gives no preference to one individual requirement over another. Considering the huge area over which DND is required to provide service, it cannot dedicate specific resources of aircraft and personnel to one particular need. Likewise, it must station its equipment and personnel in locations where it can best meet the demands which can be made upon it at any time.

By reason of DND's role, I could not, even without the limitation, make recommendations to C-NLOPB with respect to what DND should or should not do vis-à-vis the offshore oil industry and its helicopter operations.

The functions and roles of Transport Canada in aviation were not included in the limitations to the Terms of Reference, but the roles of Transport Canada constitute further limitations by operation of law.

I do, however, express my appreciation to Transport Canada for taking a helpful interest in the Inquiry and for seeking and obtaining limited standing. Through its presence and the materials it presented, Transport Canada explained its role for the benefit of the Inquiry, those involved in the offshore, and the general public.

The Ocean Ranger Royal Commission reported some 26 years ago in respect of that tragedy.[1] On the subject of search and rescue in the context of offshore oil, the Royal Commission recommended

> **56**. That there be required a full-time search and rescue dedicated helicopter, provided by either government or industry, fully equipped to search and rescue standards, stationed at the airport nearest to ongoing offshore drilling operations, and that it be readily available with a trained crew able to perform all aspects of rescue.

There has never been any expressed disagreement with that recommendation, but it was never fully implemented.

The oil industry is primarily responsible for the safety of its workers and until now has provided a measure of helicopter search and rescue response. I will discuss the industry's role as a provider of search and rescue later in this Report.

I should note also that, although it was not obligated to do so, the Department of National Defence cooperated fully with the Inquiry by sending a high-ranking officer to explain to the Inquiry and to the general public its role and capabilities in search and rescue, as well as its national obligations. For that I also express my appreciation.

After hearing the evidence given in the public phase of the Inquiry and applying my knowledge of what is done in other offshore jurisdictions, I have concluded that the first offshore oil search and rescue response should be from St. John's and should be provided by a fully equipped and dedicated helicopter with appropriately trained personnel, the whole being contracted and funded by the oil operators. Additional

[1] In 1982, the drilling rig *Ocean Ranger* sank in a February storm with the loss of all 84 lives.

response and overall coordination will be provided as a matter of course by the Department of National Defence and by other providers such as the Coast Guard, as may be necessary.

The Interaction Between Governments and C-NLOPB

One of the more succinct explanations of the respective roles of Governments and the C-NLOPB was provided by the Government of Newfoundland and Labrador in their January 2010 submission. Section 2, paragraph 3 says in part:

> For the purposes of defining the role of the C-NLOPB and each government in the Accord Agreement, decisions on offshore resources were divided into four categories, namely:
>
> **Decisions of the Government of Canada.** Decisions made under legislation of general application not specifically related to oil and gas exploration and production, and decisions related to the application of federal taxes.
>
> **Decisions of the Government of Newfoundland and Labrador.** The royalty regime and other provincial type revenues (e.g. provincial corporate income tax, rental and license fees); and decisions related to provincial laws of general application having effect in the offshore.
>
> **Decisions made by the C-NLOPB.** The C-NLOPB is required to make decisions relating to the regulation and management of petroleum-related activities in the offshore area (e.g. administration of regulations respecting operational and occupational safety, declarations of discoveries, environmental protection and resource conservation).
>
> **Fundamental Decisions and Joint Directives.** Where a fundamental decision under the Accord Act (e.g. issuance of rights, approval of development plans) is made by the C-NLOPB it shall give notice of the decision to both the federal and provincial ministers responsible for energy issues for approval before the decision becomes final. In addition to fundamental decisions, ministerial joint directives may be issued to the C-

> NLOPB, which the C-NLOPB shall comply with, related to, among other things, fundamental decisions and Canada-Newfoundland and Labrador benefits plans.

In Section 3, the submission describes the roles of the parties:

> Under the Accord Acts, the C-NLOPB has the legal powers and capacities of a corporation incorporated under the *Canada Business Corporations Act*. It can only be dissolved by the joint operation of an Act of Parliament and the Legislature of the Province. The Accord Acts establish its structure and the capacity to hire staff to perform the duties and functions of the C-NLOPB under the Accord Agreement and the Accord Acts. The C-NLOPB consists of seven members, three appointed each by the federal and provincial government with the Chairman appointed jointly.
>
> The C-NLOPB's responsibilities include the administration of the Accord Acts and regulations, which includes operational and occupational health and safety; the issuance and administration of petroleum and exploration and development rights; administration of statutory requirements regulating offshore exploration, development and production; the approval of Canada-Newfoundland and Labrador benefits and development plans; and the mandate to administer the registration of interests and instruments in petroleum in relation to the offshore area. The C-NLOPB also has the power to attach as conditions of the authorization, terms and conditions including those related to safety or occupational health and safety.
>
> The Government of Canada and the Government of Newfoundland and Labrador are responsible for any amendments to the Accord Acts and the making of regulations. The C-NLOPB, as administrator of the Accord Acts and regulations, plays an essential role in advising governments, due to its operational and technical expertise, on matters relating to proposed amendments to the Accord Acts or the development of regulations. The Accord Acts provide the C-NLOPB with the ability to make recommendations to both governments with respect to proposed amendments to the Accord Acts and any regulations made under the Accord Acts.

The current status of occupational health and safety under the Accord Acts is set out as follows in Section 4 of the January 2010 submission of the Government of Newfoundland and Labrador:

> Amendments to both the Federal Accord Acts and the Newfoundland and Labrador and Nova Scotia Accord Acts that were made in 1992 and which implemented a number of major recommendations flowing from the *Ocean Ranger Royal Commission* and the *Harrison Task Force Report* had an unforeseen impact upon the ability of governments to promulgate occupational health and safety regulations under the Accord Acts.
>
> The provision in the Accord Acts dealing with 'social legislation' provides that the provincial occupational health and safety legislation applies in the offshore area. However, the 1992 amendments to the Accord Acts limited that application so that any content in the provincial occupational health and safety legislation would not take effect if the same subject matter could be addressed by regulations made under the Accord Acts. The regulation-making authority under the Accord Acts allows the creation of regulations with respect to safety and the result is that the power to regulate offshore occupational safety no longer rests with the Government of Newfoundland and Labrador and is instead made the subject of the joint management scheme under the Accord Acts. The wording results in rendering inapplicable in the offshore area all those provisions of the provincial *Occupational Health and Safety Act* that deal with safety. Regulations made under the joint management scheme under the current authority of the Accord Acts can only deal with safety and not occupational health and safety.
>
> The concepts of occupational health and occupational safety are too closely intertwined to be separated in this manner. It is difficult to determine which aspects of the provincial occupational health and safety legislation relate to occupational health as opposed to occupational safety. It is equally difficult to draft regulations under the Accord Acts that relate solely to occupational safety. There was never a policy direction to arrive at this result; it was an unanticipated consequence of the amendments coming out of the *Ocean Ranger Royal Commission* and the *Harrison Task Force Report.*

> Given the ambiguity regarding the ability to adopt regulations for occupational health and safety under the Accord Acts, the C-NLOPB uses terms and conditions of work authorizations as a means to ensure a comprehensive and enforceable occupational health and safety regime for offshore workers. The overall safety of individuals in the offshore area is protected under this regime. Amendments are under way to provide regulation-making authority for occupational health and safety under the Accord Acts ensuring a comprehensive legislative occupational health and safety regime for the offshore.

The ambiguity referred to above was addressed in a Memorandum of Understanding in 2001 which said:

> In 2001, various departments of the Government of Newfoundland and Labrador, the C-NLOPB and Natural Resources Canada renewed an earlier (1989, 1994) Memorandum of Understanding (MOU) concerning the administration of legislation related to the occupational health and safety of workers in the offshore area and the consultative process to be followed by the parties to the MOU. The purpose of the MOU was to enhance the C-NLOPB's ability to carry out its responsibility for occupational health and safety (OHS) under the Accord Acts. The MOU provided that the C-NLOPB would consult with the government departments to ensure that the OHS regime implemented by the C-NLOPB was consistent to the extent relevant with the OHS regime implemented by the Province. As well, relevant government departments agreed, upon request of the C-NLOPB, to provide advice to the C-NLOPB concerning regulatory practice in the Province affecting the occupational health and safety of the workers. The C-NLOPB committed to take into account regulatory practice in the Province and in other offshore jurisdictions in formulating recommendations or establishing OHS guidelines for the offshore area and, where appropriate, to promote consistency with other offshore jurisdictions in Canada. The MOU also contains provisions relating to co-operation between parties in matters dealing with occupational health and safety committees and worker representatives, the right to refuse unsafe work and the prevention of discriminatory action against workers, in the offshore area. For those purposes, provisions are included on inspections and

> investigation, the training of inspectors, the designation of C-NLOPB personnel as OHS officers, records and statistics required with respect to OHS, reports of incidents and the training of offshore workers.

It is well known that an amendment process with respect to occupational health and safety is ongoing. The process was described in May 2010 in a public statement by the provincial Government which said:

> In 1999, Canada, Newfoundland and Labrador and Nova Scotia embarked on a process to formulate amendments to their respective Accord Acts to provide for a comprehensive legislative occupational health and safety regime in the offshore area which would provide, among other things, an ability to make regulations relating to occupational health and safety.
>
> Amendments to either the Federal Accord legislation or the Provincial Accord legislation have force and effect when the amendments to both the Federal Act and the Provincial Act have been passed. This means that the amendment process will always involve both the Federal and Provincial governments. Governments have agreed that consistency in the East Coast offshore regimes, of Newfoundland and Labrador and Nova Scotia, is a desired outcome as well.
>
> The number of parties, the complexities and process involved in the subject matter of occupational health and safety as well as the realities of working within three separate government systems (Federal, Newfoundland and Labrador and Nova Scotia) has resulted in a much longer process that was envisioned when the amendment process was embarked upon. Negotiations around the amendments have involved affected groups within the three governments with each jurisdiction having representatives from the department responsible for the Accord legislation, representatives from the department responsible for occupational health and safety, and representatives from each of the Departments of Justice. Representatives from both the C-NLOPB and the Canada-Nova Scotia Offshore Petroleum Board have also been full participants in this process. Final decisions on policy that will form part of the drafting instructions for the amendments must also be approved by

the Federal Cabinet, the Newfoundland and Labrador Cabinet and the Nova Scotia Cabinet.

During 2000-01, discussions among the parties focused broadly on all aspects of the policy to be embodied in the legislative amendments, plus the administrative oversight roles of Labour and Energy ministries. Following these discussions, officials prepared a paper entitled *"Proposed Amendments to the Accord Acts to Incorporate an Occupational Health and Safety Regime – November 2002"* and held workshops in St. John's and Halifax with stakeholders to receive feedback. Following these sessions, detailed policy discussions and legal drafting continued and a draft Bill was prepared in 2003. A further discussion paper was prepared in 2003 followed by more stakeholder workshops. These consultations sessions resulted in further policy discussions respecting an appropriate occupational health and safety regime. In 2005 an agreement was reached on a new governance model for the occupational health and safety section of the Accord Acts; Governments then proceeded to seek a mandate to draft legislation based on this new governance model. Drafting began in 2007 and officials continue to meet on issues requiring further policy clarification in an effort to conclude legal drafting.

Officials plan to conduct stakeholder information sessions in early 2010 on proposed amendments to the Accord Acts to incorporate the occupational health and safety regime. These amendments would be presented to each jurisdiction's respective Cabinet for approval in 2010.

The longevity of this amendment process has not affected the ongoing regulation of occupational health and safety. As noted, occupational health and safety regulations have continued to be imposed in the offshore area through the terms and conditions of work authorizations. Nor do the amendments proposed to the Accord Acts impact the safety and 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.

In Section 8 the submission of the Government of Newfoundland and Labrador (January 2010) explains the general principles of occupational health and safety, saying in part:

> OHS legislative requirements impose strict duties and outline the legal responsibilities on the various workplace parties. The duty of care placed on employers obligates that they do all that is "reasonably practicable" to provide a safe work environment. Subject to the exercise of due diligence, the employer is normally held directly accountable for the working conditions.
>
> OHS legislation generally does not impose or prescribe specific "step by step" procedures one must take in achieving a healthy and safe workplace. Instead, it holds employers responsible for assessing the workplace and implementing the means, measures and/or mechanisms to ensure the health and safety of employees. OHS regulations, on the other hand, tend to be more prescriptive or prohibitive and address hazard specific controls in a more technical and or industry specific fashion.
>
> From the employee perspective, there are three generally accepted "rights" which are enshrined in OHS law. These rights are referred to [as] the "Right to Know", the "Right to Refuse" and the "Right to Participate". Essentially these rights translate into workers having the right to know about unsafe conditions that may exist in their workplace, having the right to participate in discussion affecting their health or safety through representation on an occupational health and safety committee, and ultimately having the right to refuse unsafe or unhealthy work. Workers have a duty to take care of their own safety and health, as well as the safety of anyone who may be affected by what they do or fail to do.
>
> OHS principles which are also reflected in legislation are based on the philosophy where one first does what is reasonable and practical to eliminate hazards altogether and then further minimize the risk of exposure by way of control measures or other administrative processes. This is commonly referred to as the "hierarchy of controls".

The joint occupational health and safety (JOHS) committee, a cornerstone of the IRS and reflected in legislative frameworks, is the forum for employers and employees to work together to achieve this goal. The JOHS Committee is given its mandate and also has duties and responsibilities assigned to it in the OHS Act. Government supports this responsibility through the setting of training standards for and making resources available to committee members and by providing advice and technical information as necessary.

The management of OHS in the workplace is also facilitated by the establishment of OHS programs, which are a set of written safety related documents specific to the work environment. Employers must develop a written program in consultation with their employees. The OHS committee is the mechanism to facilitate cooperation between the employer and employees in this regard.

Government's role, through enforcement activity, is to assess how effective the workplace parties are in working together to meet their respective responsibilities. Through inspections and investigations, OHS officers assess the workplace and intervene where necessary to ensure that the required mechanisms are in place for the workplace parties to manage safety themselves on a day to day basis.

The principles of occupational health and safety that form part of the safety regime in place in the offshore area through the provisions of the Accord Acts and as part of the conditions of the authorization issued by the C-NLOPB, are consistent with the general principles of occupational health and safety. Those principles, which are consistent with the provincial *Occupation Heath and Safety Act*, will be reflected in the amendments to the Accord Acts that are currently being drafted. The proposed amendments will reflect, to the extent they are applicable and practical, provincial or federal occupational health and safety legislative regimes. Where equivalent onshore provisions do not exist or do not reflect the unique nature of the relationship of operators [vis-à-vis] contractors or the remote nature of the work environment, provisions were drafted to reflect C-NLOPB practices and to be consistent with the spirit of occupational

> health and safety and the internal responsibility principles on land.

Of the current regime, the provincial Government's submission says:

> It is expected that each of the three governments will consider a Bill in 2010 that, if approved, would be placed before their respective legislatures for debate. In the interim, the draft regulations, as well as certain provisions of the provincial occupational health and safety legislation, will continue to be administered and enforced by the C-NLOPB as terms and conditions of authorizations for offshore drilling and production activities.
>
> Under the Accord Acts no person is entitled to carry on any work or activity related to exploration or drilling of petroleum in the offshore area unless the person is the holder of an operating licence and an authorization before the commencement of operations. The authorization is subject to such approvals, or conditions, as the C-NLOPB determines.
>
> The standard authorization issued by the C-NLOPB, referred to as an "operational authorization" contains two key conditions which together constitute a comprehensive occupational health and safety regime. First, the C-NLOPB as part of its standard conditions requires that a draft regulation entitled the "*Petroleum Occupational Safety and Health Regulations*" be complied with until the Act is amended to include occupational health and safety regulations. Another standard condition requires that Operators follow a supplementary document created by the C-NLOPB called the *"Other Requirements Respecting Health and Safety"* which includes requirements respecting employer general duties, occupational health and safety committees, and the right to refuse to work.
>
> The Accord Acts provide for effective enforcement of these conditions. The C-NLOPB may suspend or revoke an operating license or an authorization for failure to comply with, contravention of, or default in respect of a requirement, approval, fee or deposit subject to which the license or authorization was issued. Further, the Accord Acts create an offence for every

> person, including a corporation, who undertakes or carries on a work or activity without an authorization under or without complying with the approvals or requirements of the authorization and provides for a penalty of up to one million dollars or imprisonment for a term of up to five years.

And the conclusion to the Government of Newfoundland and Labrador's submission says:

> The protection of offshore workers is of paramount importance to all parties involved in the exploration and production of our offshore resources. Despite the slow progress on the occupational health and safety Accord Act amendments, worker safety in the offshore has not been compromised. Pursuant to the Accord Acts, the C-NLOPB, prior to authorizing a work or activity, must 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. In addition, the aspects respecting occupational health and safety are an integral component of the authorization process. Working in a harsh environment requires a concerted effort from all responsible and the ability to keep pace with technological advances and best practices both nationally and internationally. We are confident in the administration of this important component of offshore operations and are committed to the future advancement of offshore safety with all responsible parties.

In my opinion, despite the delay in instituting a new occupational health and safety regime, there was no evidence in Phase I of the Inquiry that safety in the C-NL offshore has been compromised in any measurable way by that delay. I have been told that the C-NL offshore safety record, in the past fourteen years of production, has been as good as that of the offshore industry generally. As might be expected, the accident rates may rise or fall to some extent in each year, but until the tragic event of March 12, 2009, there had not been any fatalities since the loss of the Ocean Ranger in 1982.

Chapter Two

The Process and the Context

The Process and the Context

(a) Standing at the Inquiry

The Canadian and the Newfoundland and Labrador Public Inquiries Acts permit persons, corporations, and other entities directly involved in the subject matter of a Public Inquiry to apply for and receive standing before the Inquiry. A grant of standing entitles the holder to become part of the Inquiry, rather than merely an interested observer. Parties with standing are entitled to make submissions and formally present evidence or information under oath or otherwise. They may examine witnesses who appear before the Inquiry, and at the end of the process they are permitted to present written and oral arguments on the Issues which have been identified and pursued.

The Inquiry held standing hearings on August 11 and 12, 2009, and standing was granted to the following parties. Some of the names which follow are self-explanatory, but where the reader may not be sure of a party's role, I will provide a brief explanation:

Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) (the Regulator of the C-NL oil operations) – full standing

(a) Hibernia Management and Development Company Ltd. (HMDC) (oil operator) – full standing

(b) Petro-Canada, which later became Suncor Energy Inc. (oil operator) – full standing

(c) Husky Oil Operations Limited (oil operator) – full standing

(d) Cougar Helicopters Inc. (the company which provides helicopter transportation to and from the C-NL offshore) – full standing

(e) Helly Hansen Canada Limited (the manufacturer of the helicopter transportation survival suit) – limited standing

(f) The Government of Newfoundland and Labrador – full standing

(g) Jack Harris, QC, Member of Parliament for St. John's East, Member of the Standing Committee on National Defence (this is the national committee with responsibility for search and rescue) – limited standing

(h) The families of deceased passengers (March 12, 2009) – full standing

(i) Sikorsky Aircraft Corporation (manufacturer of the S-92A helicopter) – limited standing

(j) The estates and families of the flight crew (March 12, 2009) – full standing

(k) Communications, Energy and Paperworkers Union, Local 2121 (the union which represents about two-thirds of the offshore workers) – full standing

(l) Survival Systems Training Limited (a survival training company located in Dartmouth, Nova Scotia) – full standing (later relinquished)

(m) Offshore Safety and Survival Centre, Marine Institute, Memorial University (a survival training institute located in St. John's, Newfoundland and Labrador) – full standing

In addition, Transport Canada and the Canadian Association of Petroleum Producers (the oil operators' association) later asked for limited standing, which was granted to both.

Public inquiries are also permitted to recommend funding for those persons or organizations permitted to participate in the Inquiry.

The following parties requested a recommendation for funding:

(a) Communications, Energy and Paperworkers Union, Local 2121 (granted)
(b) the families of the deceased passengers (granted)
(c) the estates and families of the deceased pilots (granted)
(d) Survival Systems Training Limited (denied)

I should note that those with limited standing largely confined themselves to their particular areas of interest and that Sikorsky Aircraft Corporation, after obtaining limited standing, took no further part in the proceedings. Survival Systems Training Limited later relinquished their standing and did not participate further in the Inquiry.

(b) Public Hearings

Public hearings began on October 19, 2009, and, including adjournments for various reasons, continued until February 18, 2010.

The persons and entities which presented information and/or evidence were as follows:

(a) John Andrews, Manager, Legal Department, and Howard Pike, Chief Safety Officer, Canada-Newfoundland and Labrador Offshore Petroleum Board

(b) Michael Stephenson, Regional Director, Transport Canada

(c) Wendy Tadros, Chair, Transportation Safety Board

(d) Kimberley Turner, CEO, Aerosafe Risk Management

(e) Paul Barnes, Manager for Atlantic Canada Division, Canadian Association of Petroleum Producers

(f) Mark Collins, Operations Manager, Helly Hansen Canada Limited

(g) Bob Rutherford, Director, Offshore Safety and Survival Centre, Marine Institute, Memorial University

(h) Bill Parsons, Past President, Newfoundland and Labrador Federation of Labour and Past Vice-President, Canadian Labour Congress

(i) Jack Harris, QC, Member of Parliament for St. John's East, Member of the Standing Committee on National Defence

(j) Joint Operator Panel of the Oil Industry (Paul Sacuta, President, Hibernia Management and Development Company Ltd.; Gary Vokey, Asset Manager, Terra Nova, Suncor Energy Inc.; and Trevor Pritchard, General Manager, Operations, Husky Oil Operations Ltd.)

(k) Lorraine Michael, Member of the House of Assembly for Signal Hill- Quidi Vidi and Leader, Newfoundland and Labrador NDP

(l) Paul Sacuta, President, and John Fraser, Offshore Installation Manager, Hibernia Management and Development Company Ltd.

(m) Gary Vokey, Asset Manager, Terra Nova; Brian Stacey, Manager, Drilling Completions and Interventions; and Michele Farrell, Manager, Environment, Health and Safety, Suncor Energy Inc.

(n) Trevor Pritchard, General Manager, Operations; Don Williams, Health, Safety, Environment and Quality

Manager; and Ken Dyer, Manager, Production Operations, Husky Oil Operations Ltd.

(o) Colonel Paul Drover, Department of National Defence, Search and Rescue

(p) Rick Burt, General Manager, Cougar Helicopters Inc. and Senior Vice President Oil and Gas, VIH Aviation Group; Hank Williams, General Manager Canada East, Cougar Helicopters Inc.; and Richard Banks, Director of Safety Management, Cougar Helicopters Inc.

(q) Government of Newfoundland and Labrador

(r) Sheldon Peddle, President, Communications, Energy and Paperworkers Union, Local 2121; Brian Murphy, Vice-President, Communications, Energy and Paperworkers Union, Local 2121; and Stan Hussey, Co-Chair, Occupational Health and Safety Committee, Terra Nova

(s) Sharon Pike, Marilyn Nash, Alicia Nash, and Lori Chynn, family members of three of the deceased passengers of Flight 491

(t) Lana Payne, President, Newfoundland and Labrador Federation of Labour

(u) Robert Decker, survivor of the crash of Flight 491

(c) Robert Decker (crash survivor)

The reader will, during the course of this Report, see references from time to time to Robert Decker, who presented information during the Inquiry's public hearings. Mr. Decker was the sole survivor of Flight 491, which crashed on March 12, 2009.

Early in the Inquiry process, I wrote to Mr. Decker asking him if he wished to make a statement to the Inquiry. He later informed me that he

would, and he did so on November 5, 2009. Mr. Decker is, of course, the only person who was able to give the Inquiry a first-hand account of what occurred on Flight 491 prior to the crash, the details of his escape from the sinking helicopter, his survival in the ocean, and his ultimate rescue.

Without his account of the crash, our knowledge would have been much more limited, but I will not describe his ordeal in detail. Mr. Decker had worked offshore for three years and was a weather observer for a company called Provincial Aerospace Limited, which was under contract to the oil operators to provide weather and ice observations to the operators and helicopter pilots. Ice observation involves tracking icebergs; weather observation includes monitoring wind speeds and directions, temperatures, and sea heights.

Mr. Decker checked in at 8:00 a.m. for his helicopter flight to the FPSO SeaRose at 9:00 a.m. All pre-flight procedures were normal, and after boarding the helicopter he was seated three seats from the front on the starboard side. Onboard there were two pilots and 16 passengers. Mr. Decker was told that the flight would go first to Hibernia and then to SeaRose.

After the helicopter took off, Mr. Decker fell asleep. He was awakened by his seatmate some time later and told that the helicopter had turned back to St. John's and had descended to 1000 feet. Shortly afterwards, the pilots announced on the PA system that there was a technical problem with the gearbox, that they were returning to St. John's, and that passengers should "don" survival suits (adjust the hood and zip up the face seal). Then came a call to brace, and the call "ditch, ditch, ditch." Immediately after that, the helicopter crashed into the sea.

The helicopter sank very quickly on its port side. Water was flowing up through the port side openings and out through the starboard openings (windows and doors were knocked out by the impact).

Mr. Decker was able to escape through a starboard window and the buoyancy of the suit floated him to the surface.

It is not necessary for me to recount the harrowing details of Mr. Decker's wait for rescue, or his comments with respect to survival training, survival suits and other equipment, and the rescue procedures. Nor is it necessary for me to describe Mr. Decker's injuries, which were serious, or his recovery.

I believe that his experience as a small boat sailing instructor stood him in good stead because he was used to finding himself in cold water. As a result, he did not panic either in the submerged helicopter or in the open ocean after his escape. Mr. Decker's comments on possible safety improvements appear in the transcript.

My point in making reference to Mr. Decker is to recognize his almost miraculous escape, his determination to survive, and his courage in coming to the Inquiry hearings, after an experience that nearly killed him, to describe in a public forum the crash and his ordeal.

In thanking him for his account of these events, I believe I speak for all those who heard and saw him that day.

(d) Understanding the Canada-Newfoundland and Labrador Offshore

Each offshore installation is either a large gravity-based structure, such as HMDC's Hibernia, which sits on the ocean floor, or a large, specifically-designed ship called a floating production, storage, and offloading (FPSO), such as Suncor's Terra Nova or Husky's SeaRose. Drilling, seismic, and other exploration activities are usually undertaken by either a semi-submersible rig or a drill ship. Each location houses a self-sufficient community of as many as one hundred or more employees, living and working usually for three-week periods at a time. It is a diverse workforce of persons with many skills and functions, from managers to highly trained technicians and workers of many kinds, including catering and housekeeping staff. Workers may be employed directly by the oil operators or by a contractor engaged by the operators to perform specific tasks.

The goods, supplies, and personnel brought to and from an installation are transported either by the fleet of supply boats or by heavy

lift helicopters, such as the Sikorsky S-92A. Because of the distances involved, helicopters are, and must be, the principal form of transportation for workers. Helicopters are also essential for quick medical evacuations or other emergency transport. The C-NL offshore helicopter fleet comprises four Sikorsky S-92As operated by the aviation contractor, Cougar Helicopters Inc., which provides a coordinated service for the oil operators. The S-92A is a relatively new, highly technical and complex aircraft that can carry up to 19 passengers. It is flown by a pilot and co-pilot, and carries no onboard flight attendant. The fleet operates from Cougar's heliport in St. John's and requires a complement of pilots, maintenance engineers, dispatchers, and ground personnel. It also contracts for some support services such as weather information.

A word about flight scheduling is necessary. Flights are scheduled to leave from St. John's in the early morning and may make two round trips per day when weather permits. Scheduling is of course easier in the long daylight hours of summer but more difficult in fall and winter. As might be expected, winter poses many scheduling and operational challenges, particularly if night flights are required. When flights are over the longest distances, one or two auxiliary fuel tanks may be installed in the passenger cabin, if required, to allow for multiple stops or a return flight without landing offshore because of bad weather. The auxiliary tank occupies the place of three seats, which reduces passenger payload and raises challenges for escape should the helicopter have to ditch.

There are physical risks inherent in the offshore. Each newly-hired worker must have an extensive physical examination to ensure that he or she is physically able to meet the challenges of the work and also the rigorous safety training which precedes it. Every worker must take a general safety training course called Basic Survival Training (BST) and, every three years, a refresher course called BST-Recurrent. Because helicopter travel is over the ocean, each worker must be trained in helicopter underwater escape techniques. That safety training is required by an arrangement among the C-NLOPB; the Canadian Association of Petroleum Producers (CAPP), a voluntary association of most companies engaged in Canada's oil and gas industry; and other industry stakeholders. That group sets out the criteria for all safety training for the C-NL offshore and the training is given by Memorial University's Offshore Safety and

Survival Centre (OSSC), located in Foxtrap, near St. John's. For some workers in the Newfoundland and Labrador offshore, the training is provided by Survival Systems Training Limited, a private company in Dartmouth, Nova Scotia.

There are two different survival suits worn by offshore workers. The "immersion suit" is a marine suit designed to assist an individual who must jump into the sea from a working facility or from a supply boat, in the event of a catastrophic event. The immersion suit must also provide thermal protection from the cold environment. One does not expect to walk in this suit, so its feet are made from the fabric of the suit itself. That suit must be approved by Transport Canada's marine division because of its use on vessels. During their BST training, workers usually wear that suit and train in cold ocean waters as part of the familiarization process.

The "helicopter passenger transportation suit" is used to protect the individual from cold water, wind, and waves, should a helicopter ditch or crash into the ocean. This suit also provides flotation, but must not be so buoyant that it hampers a passenger escaping from a downed helicopter. A passenger walks to and from the helicopter when flying, so the suit has securely-attached heavy rubber boots. The helicopter passenger transportation suit must be approved by Transport Canada's aviation division.

Both suits are developed by manufacturers using standards established by the Canadian General Standards Board (CGSB), a federal agency responsible for setting and maintaining standards for a wide variety of safety items used in Canada. The present helicopter passenger suit is made by Helly Hansen Canada Limited under contract from the oil operators. The reader should be aware that the current suit (the E-452) worn by passengers is manufactured to meet both the immersion standard and the transportation standard, to allow the industry greater flexibility to provide the suit on offshore vessels as well as helicopters. Recently a more limited number of modified suits, called the HTS-1, were brought into use; Transport Canada first approved that model for aviation use only, but very recently added approval for marine use in the C-NL offshore. There is currently no specification for what thermal undergarments a passenger should wear with the transportation suit. Most workers wear

everyday street clothing under the suit, but there are strong arguments for wearing thermal underwear, to give added protection in case of immersion in frigid water.

Helicopter evacuation training is done in a pool in which a Helicopter Underwater Evacuation Trainer (HUET) has been installed. It is a rough replica of a generic helicopter fuselage (see images in Michael Taber's report, which appears in Volume 2). The trainee, wearing a transportation suit, goes into the pool and does preliminary exercises to become moderately comfortable with being fully immersed in water. He or she then climbs into the HUET and sits in a window seat. The HUET is dropped into the water and is rotated to an upside-down position. The trainee must escape from it and swim to the side of the pool. I have done this training and it is demanding. I have oversimplified the process in this explanation, but these drills are necessary to teach workers the evacuation procedures so that they will know what to do in a ditching or a crash. The worker also is trained in the use of the HUEBA, which is a recently-introduced underwater breathing device. This device, which allows the user to breathe underwater for about two extra minutes, is attached to the worker's transportation suit during flight. Upon successfully completing all the safety training, the worker is ready to commence employment. It must be remembered that HUET and HUEBA training can pose dangers; thus, a balance must be struck between less rigorous and more rigorous training.

A short explanation of what awaits a departing or returning worker at the heliport may be helpful for the reader. When the worker is checked in, he or she is given an appropriately-sized transportation suit to wear during the flight. I will deal with sizing later, because it is critical to the suit's performance. It is important to know that the suit is not personal to the worker, but is used from time to time by any worker whom that size fits. The suits are cleaned when they are returned after use in offshore travel. The suits are maintained regularly by Helly Hansen. Most workers use a suit that is selected from a range of available sizes, but recently some have been fitted for individual workers needing specific alterations.

Before flights, Cougar Helicopters shows a safety video which describes the flight but is much more comprehensive than those shown on

commercial aircraft. When passengers are ready and the departure time is announced, all passengers put on their suits and walk to the helicopter, which is parked outside with engines running. The pilots are then in the cockpit and have little or no contact with the passengers prior to and during the flight.

Flight planning at Cougar Helicopters involves a "co-dispatch" system so that the pilots plan the flight and consider any issues or challenges, such as weather conditions, with a dispatcher who is trained for that role. Passengers are not part of the flight planning process, but should know that it exists. When all is ready, the flight leaves for the offshore.

Before departure, all passengers must ensure that their suits are fully zipped up and that all face and wrist seals are snug. They may release the face seal during the flight and pull back the hood because it is tight and uncomfortable but suits must be fully donned on departure, on landing, or otherwise when pilots issue directions over the loudspeaker.

On arrival offshore, the helicopter lands on a platform known as a "helideck," which is part of the installation. The passengers disembark and are led to a large room where they remove their suits. Each passenger then takes the suit to his or her room, where the suit is kept until that passenger leaves the installation. On the return journey, the procedures are the same and all workers wear their transportation suits for the flight back. There is a video briefing on safety before they board the flight. At the heliport in St. John's, the passengers return their suits to Cougar Helicopters' personnel, and the suits are returned to Helly Hansen for cleaning and maintenance.

The reader will have noted that Inquiry recommendations are confined to helicopter transportation and do not include sea transport. Sea transport, however, is used to some extent. Offshore supply boats, which essentially are ocean-going tugs, constantly go to and from offshore installations. They carry heavy equipment and drilling supplies, fresh water, food, other supplies of all kinds, and, from time to time, passengers.

There are limits on the transportation of personnel by vessel. As I have mentioned, the nearest platform, Hibernia, is 315 kilometres from the nearest point of land, which is St. John's. The journey by boat takes, depending on sea and weather conditions, from 15 to 18 hours and longer to more distant installations. Sea states in the North Atlantic for much of the year are often severe. Passengers on supply boats suffer from seasickness, which causes mild to extreme distress. It often happens that on arriving at an installation, workers need recovery time because initially they are unable to function safely and effectively in their jobs. Added to that is another complication: vessels are prohibited from docking at offshore installations because of the likelihood of damage to the installation itself and/or to the vessel. This factor applies to both large and small ships. For example, tankers receiving oil from the installations are required to stand off for considerable distances while oil is being pumped on board.

Because supply boats cannot dock, passengers are required to be transferred by crane from the boat to the installation. Several passengers sit in a pod known in the industry as a "frog" and are lifted by crane a distance of as much as 200 feet to an installation's deck. Leaving the installation requires the same procedure in reverse. It is not easy for a crane operator to place the frog gently on the deck of a heaving vessel, or for that matter gently to pick it up. The process is frightening for many passengers and dangerous for all.

In my opinion, while sea transportation is a possibility and must be used on occasion, the downsides and dangers which it presents do not allow it to be a viable alternative to helicopter transport in the C-NL offshore. I think most people who are familiar with the offshore would agree that helicopter transportation is the only practical method of conveying passengers to and from offshore installations.

(e) Canada-Newfoundland and Labrador Physical Environment

After extensive oral evidence was heard, thousands of pages of written material were entered, and the Issues were published, the Inquiry moved into its investigative phase, which involved the review and selection of particularly relevant materials in the many thousands of pages

of information presented. The process also involved a review of books, articles, research findings, and other materials which provided background understanding of organizational safety concepts and solutions and particularly the concepts inherent in offshore helicopter safety.

As part of the investigation, the Commissioner and Inquiry Counsel visited Aberdeen in the United Kingdom and Stavanger in Norway, and met with numerous persons who represented:

(a) regulators
(b) passenger helicopter companies
(c) training institutes (for offshore passengers)
(d) survival equipment manufacturers and suppliers
(e) search and rescue providers, including pilots and rescue technicians
(f) oil operators
(g) union/worker representatives

We visited the United Kingdom and Norway because of the maturity of North Sea exploration and oil production and especially because winds, weather, extreme cold, and rough seas, as encountered in the northern North Sea, are most comparable to those in the northwest Atlantic, although not as severe.

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. The principal factors are:

(a) bitterly cold sea water at all times, i.e., water temperatures as low as two or three degrees Celsius for the greater part of the year, with minimal improvement in summer and early autumn. The reason for this is the Labrador Current, an Arctic current which flows south past Newfoundland and Labrador as far out as the edge of the continental shelf and beyond. Frigid water severely restricts the survival times of persons immersed in it, such as the occupants of a downed

helicopter, if they were able to escape the machine. It follows that search and rescue is a major challenge in this jurisdiction.

(b) high winds and stormy conditions for much of the year, particularly from October to May. The jet stream is a strong upper atmospheric wind which circulates the globe from west to east. The jet stream is usually over or close to the island of Newfoundland, except in summer, when it may move north. It pulls low pressure weather systems toward this region from central Canada and the eastern seaboard of the US, with the result that storms and high winds occur frequently. These cause offshore sea states to be severe. 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. An inverted helicopter presents extreme danger to the survival of its occupants, which subject will be further addressed later in this Report.

(c) the threat of fog, which is an offshore constant. Fog causes at least three problems:

(1) It may cause a helicopter to be unable to land on an offshore installation or it may make an allowable landing more difficult with a combination of low visibility, wind speeds, and other conditions which can change in a moment.

(2) It makes search and rescue much more difficult should a helicopter crash or ditch in foggy conditions.

(3) It increases the dangers from sea ice and icebergs in the spring and early summer.

In all, I believe that C-NL offshore helicopter operating conditions are as severe as or more severe than those elsewhere. I believe that the conditions in the northernmost parts of the North Sea are the ones most comparable to those in the C-NL offshore and therefore the North Sea is the most appropriate comparator. In fact, the information gained when Inquiry representatives visited Aberdeen and Stavanger was invaluable.

(f) Helicopter Operations Task Force

After the loss of Flight 491, the oil operators created a Helicopter Operations Task Force (HOTF) to look at all aspects of helicopter operations, to consult with technical, safety, and aviation experts, and to solicit questions from the workforce. Helicopter operations in the C-NL offshore were voluntarily suspended by the oil operators until the HOTF had completed its work and concluded that it was safe to resume flight operations.

The HOTF was made up of oil industry representatives, including those holding safety and aviation expertise. It consulted with and engaged the workforce throughout. It received and answered 350 questions from the workforce, conducted town hall meetings with workers, and provided status reports to the Joint Occupational Health and Safety Committees on the HOTF's progress.

It is clear that the HOTF also informed the C-NLOPB of its progress, but the amount of engagement with the offshore Regulator appears to have been more limited. The HOTF was obviously a worthwhile exercise because it ultimately made 18 recommendations to improve the safety of helicopter operations.

(g) The Issues

At the conclusion of the evidence and presentations in Phase I, overarching and specific Issues were determined. That process, while not public, involved the Commissioner, Inquiry Counsel, and the parties with standing and their counsel. The Issues were decided through a collaborative process.

Overarching Issues:

1. Should there be a degree of separation within the C-NLOPB between offshore helicopter regulation and other offshore industry regulation?

2. Are the risk management systems of oil operators and the helicopter operator sufficient and adequate to ensure that the risks of helicopter transport are as low as reasonably practicable in the Newfoundland and Labrador offshore?

3. What is the role of organizational safety culture in offshore helicopter transport?

4. What are the most appropriate practices, standards, and forms of interaction between the C-NLOPB and the following:

   (a) industry (including suppliers and providers)
   (b) industry associations
   (c) regulators of associated services
   (d) other domestic and foreign oil and gas regulators and
   (e) worker representatives

   and are these interactions sufficient to ensure requirements that are understood, timely, achievable, and enforceable?

5. Does the C-NLOPB use best practices in relation to its regulatory role in helicopter transport safety?

Specific Issues:

6. What is the appropriate standard of first-response search and rescue that the C-NLOPB should require of all operators in the Newfoundland and Labrador offshore?

7. Are there circumstances other than declared emergencies in which a rescue helicopter should be dispatched to assist a transport helicopter?

8. Should there be a more formal protocol to identify the roles of the Department of National Defence and the helicopter operator regarding first response?

9. Are operational limitations on helicopter transport, in addition to those dictated by Transport Canada, required to ensure the standard of first-response search and rescue is able to be maintained at all times? (*Note: For example, operational sea states, night flight and low visibility.)*

10. Should the C-NLOPB impose additional operational requirements on operators to ensure that the risk from helicopter travel in the Newfoundland and Labrador offshore is as low as is reasonably practicable? *(Note: For example, safety systems, auxiliary fuel tanks, location of and restrictions on seating, safety screening, etc.)*

11. Can helicopter transport safety be affected by the capacity of the helicopter transport fleet and, if so, what role should the C-NLOPB play in the determination of fleet capacity?

12. What are the appropriate standards of offshore helicopter safety training to ensure that the risk to passengers is as low as is reasonably practicable, during both training and helicopter transport?

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

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

15. Should offshore workers have a level of personal accountability for their own safety in helicopter transport? *(Note: For example, clothing to be worn under the suit, fitness training, and reporting.)*

16. Does the C-NLOPB exercise sufficient oversight of the oil operators, aviation contractors, and other contractors to ensure that the risk to workers from helicopter transport is as low as reasonably practicable?

17. Should the C-NLOPB and oil operators' safety aviation audits include reviews of past responses to declared emergencies and emergency preparedness exercises?

18. What information from the helicopter operator about flight operations should the C-NLOPB require the oil operators to provide to offshore workers? *(Note: For example, alert service bulletins, airworthiness directives, incident reports, information regarding departures from normal flight times and routines, and the reasons.)*

19. Does the C-NLOPB have sufficient resources and expertise, including access to independent aviation expertise, to evaluate whether a proposal or plan for helicopter transport from industry ensures that the risks of helicopter transport are as low as reasonably practicable?

20. Should the C-NLOPB more directly involve itself in studies and research in Newfoundland and Labrador, and in other jurisdictions, to improve safety where the offshore oil industry uses helicopter transport? *(Note: For example, North Sea studies on preventing inversion of ditched helicopters and enhancement of passengers' ability to escape.)*

21. Should there be safety conferences for all parties involved in offshore helicopter transport, and if so, how often should they be held?

22. How often should the C-NLOPB review its regulations, guidelines, and standards with respect to offshore helicopter transport?

Chapter Three

The Evolving Role of the C-NLOPB

The Evolving Role of the C-NLOPB

Having explained earlier the respective roles of the Transportation Safety Board, the Department of National Defence, and Transport Canada, and generally explained the parameters of the Inquiry, I now turn to C-NLOPB's role in ensuring a safe offshore working environment, which includes the helicopter transportation of passengers to and from offshore installations.

It is appropriate that the work of the Inquiry deals with safety issues involved in helicopter transport. It is noteworthy that helicopters are used to transport offshore oil and gas workers all over the world. There are some exceptions in favour of boats, but these usually apply to installations which are quite close to land.

At the start of our public hearings, C-NLOPB representatives explained the old method of granting of authorizations to oil companies to conduct oil exploration, drilling, and production in the C-NL offshore. This method was changed at the end of 2009 by new regulations which adopted a performance-based regime. Although the new regime was mentioned in C-NLOPB's evidence in the fall of 2009, and the Inquiry was told that it was expected at the end of 2009, I have been told nothing of any internal reorganization within C-NLOPB to adapt to the new regime. The new regime is a performance- or goal-based system which allows the oil operators greater latitude to make changes to their operations. In my opinion, the foregoing requires much more vigorous and proactive regulatory action than was required under the old, prescriptive regime. A comparison of the new and old systems will clarify my concern.

The *Newfoundland and Labrador Petroleum Installation Regulations,* now repealed, had detailed requirements for helicopter operations, including specifications on helidecks and passenger suits:

> **Helicopter deck**
>
> 5.(1) Every helicopter deck or facility that forms a part of an installation shall:

> (a) conform to Transport Canada TP4414, Guidelines Respecting Helicopter Facilities on Ships; and
>
> (b) be equipped so that any fuel stored on or adjacent to the helicopter deck or the accommodation area;
>
> > (i) can be jettisoned by action taken at another location on the installation, or
> > (ii) is protected against damage or impact.

Other regulations required that any passenger travelling over water to an offshore workplace should wear a helicopter passenger suit which was required to meet certain standards prescribed by the Canadian General Standards Board.

There were many other directives in the Board's guidelines, called "guidance" for industry. That guidance generally was incorporated into authorizations and conditions. Helicopter safety was primarily addressed by means of a list of specific requirements to be met.

Each operator offshore is required to have a Safety Plan. The now-outdated *Safety Plan Guidelines* contain both obligatory items and suggested directions:

> To ensure flexibility and clarity within the regulatory regime, these Guidelines create a framework for activities in the Newfoundland and Labrador offshore area. These Guidelines provide specific direction where the Board has been given the authority to prescribe and guidance where the Board may approve certain activities...

Another set of former guidelines, the *Guidelines Respecting Drilling Programs,* states the following provision with respect to helicopter rescue:

> Operators on the Grand Banks are expected to maintain a standby helicopter dedicated to search and rescue on a 24-hour per day basis. This helicopter should be equipped with a rescue winch and survival equipment suitable for deployment from the helicopter. Personnel trained in the operation of the winch and deployment of

> the survival equipment should also be available. Provision should be made for helicopter training time sufficient to ensure that the helicopter and rescue crews can develop the necessary co-ordination to operate effectively.

Thus the "checklist" of prescribed items showed industry what the safety equipment and process requirements were for safe helicopter operation, with the Board giving direction and guidance to the oil operators, who had the primary responsibility for the offshore safety of their workers. This prescriptive approach worked well for C-NLOPB early on, but as equipment and processes improved in the world of industrial safety, the applicant oil operator often found that it had developed or discovered better safety practices and equipment. Thus C-NLOPB was faced with lists of "s.151 equivalency" applications. These lists were a mechanism enabling oil operators to substitute another solution, provided they could convince C-NLOPB that their proposed solution would be as good as or better than the prescriptive requirement. With time, a large number of equivalency applications caused the prescriptive elements to appear outdated.

As the evidence showed, the Board communicated as quickly as possible with the applicant/operator to ensure that the plans and submissions which were finally submitted accorded with C-NLOPB's regulatory regime and expectations.

The Board's evidence was that in 2009 the appropriate governments were developing new regulations and that the Board would establish new guidance, all of which was expected to be in place at the beginning of 2010. The intent expressed was to produce new performance- or goal-oriented regulations to govern offshore development, in a manner consistent with the approach which had already developed in Europe. It appears that the process of review had been underway for some years, and involved C-NLOPB, the CNSOPB, the provincial Governments of Newfoundland and Labrador and of Nova Scotia, the federal Government, and the National Energy Board (NEB). That group was tasked to produce the desired outcome that all petroleum exploration and development areas in Canada would have similarly-worded regulations. These multi-party processes produced a new regime which came into effect on December 31,

2009, and the new regulations had been approved by all necessary governments. The supporting guidelines, developed by the C-NLOPB and CNSOPB (in some cases, in concert with the NEB), are effective from the same date, but are still in draft form, and subject to review after one year to ensure that they are working properly.

The new regulations broadly mandate what results are to be achieved to ensure offshore safety, largely without specifying detailed requirements. Section 5 of the new *Newfoundland Offshore Petroleum Drilling and Conservation Regulations* says that operators in the offshore must have management systems to ensure the integrity of all structures, including supply boats and helicopters. Section 19 states:

> The operator shall take all reasonable precautions to ensure safety and environmental protection, including ensuring that
>
> > a) any operation necessary for the safety of persons at an installation or on a support craft has priority, at all times, over any work or activity at that installation or on that support craft

"Support craft," a term used in the old regime to refer to vessels and, sometimes, helicopters, has now been redefined so as always to include helicopters. Only general statements of intent make up the new regulations; the details are in the guidelines.

Similarly, in Section 25.5 of the new *Drilling and Production Guidelines,* we find another statement of goal-oriented objectives for operating support craft:

> Operators are expected to ensure the adequacy of installations and support craft to operate safely in the foreseeable physical environmental conditions prevailing in the area in which they are intended to operate.

The new guidelines on occasion combine prescriptive and goal-oriented directions for helicopter operation. For example, section 69.4.3 states:

> Helicopters and other aircraft are required to have a Certificate of Airworthiness issued by Transport Canada.
>
> In view of the fact that aviation rules and regulations focus exclusively on aviation risks and do not take account of the specific risks associated with providing effective support to offshore operations, operators should not rely solely on aviation regulations and certification when developing the functional specification noted in section 69.1 of these guidelines. In this regard, the operator should consider the following factors when developing a functional specification for helicopters:
>
> a) issues related to redundancy for long over-water flights;
> b) the aircraft's ability to land on water in various sea states…

The section gives nine specific objectives for helicopters. Their importance is two-fold: first, the directions are a blend of both prescriptive and goal-oriented objectives, but more importantly, the guidelines are still guidelines, and operators are free to interpret them and apply best practices as they see them, without having to seek equivalencies, as they would have to have done under the old Regulations and guidelines.

The Board has instituted new draft *Safety Plan Guidelines* effective December 31, 2009, with a proposed review after a one-year trial period. These *Guidelines* are identical for the C-NLOPB, the CNSOPB, and the NEB. The following proviso in the "Foreword" to the *Safety Plan Guidelines* highlights the fact that the document is only a guide to operators:

> It is important to note that guidelines are not statutory instruments, and the description of a means or method in the guidelines is not mandatory. The onus is on the Operator to comply with the Regulations and to be able to demonstrate to the appropriate Board the adequacy and effectiveness of the methods employed to achieve compliance.

As far as I know, the overall strategic approach of the C-NLOPB is similar to that used in the past. The Board allows the operator to develop its own plans, and then there is to be an assessment of the plans and processes of the operator when they have been formulated. Not much has really changed, except that the Board more than ever needs to be able to apply the necessary expertise to any review of the plans to ensure that the operator "has it right." The primary responsibility for safety in the offshore still rests with the operator to whom an authorization has been issued. While I agree on where the primary responsibility lies, I believe a more vigorous and proactive level of involvement by the C-NLOPB in helicopter safety is the right approach.

Until now, the level of stakeholder engagement by the C-NLOPB has depended on the party. There is clear engagement with the other Atlantic regulator, the CNSOPB, and with oil operators during the work authorization process and beyond. International communication and exchange of information with other offshore regulators are happening. There are some interactions with CAPP, the industry association, which has established training standards in conjunction with the Regulator. The C-NLOPB may make contact with the air regulator, Transport Canada, from time to time, but there is no ongoing dialogue. There is limited engagement with the helicopter operator and, except for promoting the work of the Occupational Health and Safety Committees, very limited contact with offshore workers. Even following the March 12, 2009, helicopter crash, when the industry created a strategic group (the HOTF) to plan the path forward toward a resumption of offshore flights, the C-NLOPB was a party "informed and consulted," not an active participant in the group. The process could, however, have been truly inclusive if the C-NLOPB had been involved throughout, instead of merely being informed of the HOTF's progress. Comprehensive engagement would have included active involvement from all stakeholders throughout the process.

The C-NLOPB has already developed a very user-friendly webpage allowing public access to its legislation, regulations, guidance, and forms. One is readily able to understand the Regulator's processes. But very little information is disseminated there about the decisions it undertakes, the plans and activities of the operators who have received authorizations, or the audits it conducts to verify compliance. As was explained to me, there

are concerns over too much public disclosure of proprietary information belonging to the operators, who work in a highly competitive world. Finding the right balance between full safety disclosure to the public and the protection of commercial interests for individual businesses has been a challenge.

To understand both the old and new regimes as administered by C-NLOPB, after an authorization is given, one must reread the underlying legislation, the Atlantic Accord Implementation Acts, which are unchanged.

The *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act, Amended, RSNL1990 Chapter C-2* says with regard to safety:

> 184. The safety officers and conservation officers necessary for the administration and enforcement of this Part and the regulations shall be appointed by the board.
>
> **Powers of officers**
>
> 185. A safety officer, the chief safety officer, a conservation officer or the chief conservation officer may at a reasonable time
>
> (a) enter a place, including lands, buildings, installations, vessels, vehicles and aircraft, used for any work or activity in respect of which this Part applies, for the purpose of carrying out inspections, examinations, tests or inquiries or of directing that the person in charge of the place carry them out, and the officer may be accompanied by another person that the officer believes is necessary to help carry out the inspection, examination, test or inquiry;
>
> (b) take photographs or make drawings of a place or thing referred to in this section;
>
> (c) order that a place or thing referred to in this section not be interfered with for a specified period;

(d) require the production, for inspection or copying, of books, records, documents, licences or permits required by this Part or the regulations;

(e) take samples or particulars and carry out, or have carried out, reasonable tests or examinations; and

(f) require the person in charge of the place, or another person in the place who has knowledge relevant to an inspection, examination, test or inquiry, to furnish information, either orally or in writing, in the form requested.

Certificate to be produced

186. The board shall provide every safety officer and conservation officer and the chief safety officer and the chief conservation officer with a certificate of appointment or designation and, on entering a place under the authority of this Part, the officer shall, if so required, produce the certificate to the person in charge of the place.

Assistance to officers

187. The owner, the person in charge of a place referred to in section 185 and every person found there shall give a safety officer, the chief safety officer, a conservation officer or the chief conservation officer all reasonable assistance to enable the officer to carry out duties and functions under this Part or the regulations.

Obstruction of officers

188. No person shall obstruct or hinder or make a false or misleading statement, either orally or in writing, to a safety officer, the chief safety officer, a conservation officer or the chief conservation officer who is engaged in carrying out duties and functions under this Part or the regulations.

Power of safety officer

189.(1) Where a safety officer or the chief safety officer, on reasonable grounds, is of the opinion that continuation of an operation in relation to the exploration or drilling for or the production, conservation, processing or transportation of petroleum in a portion of the offshore area is likely to result in serious bodily injury, the safety officer or chief safety officer may order that the operation cease or be continued only in accordance with the terms of the order.

(2) The safety officer or chief safety officer who makes an order under subsection (1) shall affix at or near the scene of the operation a notice of the order in prescribed form.

(3) An order made by a safety officer under subsection (1) expires 72 hours after it is made unless it is confirmed before that time by order of the chief safety officer.

(4) A safety officer who makes an order under subsection (1) shall immediately so advise the chief safety officer, and the chief safety officer may modify or revoke the order.

(5) The person carrying out the operation to which an order under subsection (1) makes reference or a person having a pecuniary interest in that operation may by notice in writing request the chief safety officer to refer it to a Provincial Court judge for review, and the chief safety officer shall refer the order to a provincial court judge having jurisdiction in the area closest to that in which the operation is being carried on.

(6) A Provincial Court judge to whom an order is referred under this section shall inquire into the need for the order and for that purpose has all the powers of a commissioner under the *Public Inquiries Act*.

(7) Where an order has been referred to a provincial court judge under this section, the burden of establishing that the order is not needed is on the person who requested that the order be so referred.

(8) A Provincial Court judge to whom an order is referred under this section may confirm or set aside the order and the decision of the Provincial Court judge is final and conclusive.

(9) No person shall continue an operation in respect of which an order has been made under this section, except in accordance with the terms of the order or until the order has been set aside by a Provincial Court judge under this section.

Priority

189.1 An order made by a safety officer or the chief safety officer prevails over an order made by a conservation officer or the chief conservation officer to the extent of an inconsistency between the orders.

Without belabouring the point with further excerpts from the legislation and regulations, the concept of the Regulator's role in interacting with oil operators under the previous legislation did not require a goal-oriented and proactive approach to measure safety performance, but rather a prescriptive regime. At the heart of the process was the Safety Plan, which was prepared by the oil operator. The plan had to conform to legislative and regulatory provisions. The Chief Safety Officer could require changes to strengthen the plan, or deletions, or any number of alterations, but even though it could be refined in that manner, it remained in essence the oil operator's plan.

In the case of helicopter transportation, oil operators negotiate contracts with a helicopter operator. In the C-NL offshore, the helicopter contracts are similar but not identical. The sole helicopter contractor is Cougar Helicopters Inc. and its contracts are with HMDC, Suncor, and Husky. Seasonal drilling operators also contract separately with Cougar Helicopters from time to time.

The C-NLOPB, through the Chief Safety Officer, has the same powers vis-à-vis the helicopter contracts as it has with other oil operator contracts.

In my opinion, important questions about helicopter contracts are:

(a) Should C-NLOPB as regulator have a more proactive role?

(b) Should C-NLOPB have input into these contracts from their inception?

(c) Should C-NLOPB have access to and use aviation expertise, especially offshore helicopter advice and guidance, in dealing with the oil operators and the helicopter operator?

(d) How should C-NLOPB have input into these contracts?

(e) Should there be aviation safety requirements, in addition to the existing Transport Canada standards, which the helicopter contracts should address?

(f) Should offshore workers, who form the great majority of helicopter passengers, have a role along with the oil operators, the helicopter operator(s) and C-NLOPB in the development of safety requirements in the contractual terms?

(g) Should the processes of safety development be public processes?

To date, from the inception of helicopter transportation of workers until now, these questions do not appear to have been a part of the contracting process. How any or all of these questions should be answered is something I will consider at a later stage of this Report.

Chapter Four

Governance Models

Governance Models

At this stage I propose to give an overview of the approach taken by the regulators in the United Kingdom and Norway to set out what they do and the extent to which each may differ from the Canada-Newfoundland and Labrador offshore approach.

(a) Governance in the United Kingdom

In the United Kingdom, safety in the offshore is regulated by the Health and Safety Executive (HSE), which is completely separate from the exploration and production authority regulator.

A paragraph in the HSE publication "How Offshore Helicopter Travel is Regulated" says:

> While the Health and Safety Executive (HSE) and the Civil Aviation Authority (CAA) are responsible for regulatory safety, the actual achievement of safety is the responsibility of all those on whom the law places a duty, including
>
> - helicopter operators;
> - flight crews;
> - installation operators;
> - offshore workforce.

The publication goes on to describe the Civil Aviation Authority (CAA) Air Operator's Certificate, which requires helicopter operators among other things to "publish detailed operational procedures in the company's Operation Manual." They are also responsible for the safety briefing of passengers and, in conjunction with the duty holders (described in C-NL as oil operators), for providing certain personal safety equipment aboard the aircraft.

The publication also describes the role and responsibilities of installation operators, who are responsible for the safety of an entire installation, and those of flight crews.

The governing statute is the *Health and Safety at Work etc. Act 1974*, supplemented by the Offshore Installations (Safety Case) Regulations 2005. The statute and regulations require the installation operators to identify all hazards which could cause a major accident, such as a helicopter accident, and to take measures to reduce the risks to as low as is reasonably practicable. In addition, further legislation applies to the offshore, namely:

(a) Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995
(b) Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995
(c) Offshore Installations and Wells (Design and Construction etc.) Regulations 1996

Lastly, under the heading "Working Together," the HSE publication "How Offshore Helicopter Travel is Regulated" describes the cooperative efforts of the CAA and HSE and other government agencies in areas such as:

(a) policy development
(b) operational matters
(c) research
(d) development of guidance for industry
(e) accident investigation (in conjunction with the Air Accidents Investigation Branch of the Department of Transport)

HSE and CAA meet several times each year to discuss major offshore safety issues and hold twice-yearly meetings of the Offshore Industry Advisory Committee Helicopter Liaison Group. Industry employer organizations and trade unions are also members of that Committee.

Examples of the results of such a cooperative approach include consultation proposals for new regulations and guidance affecting the safety of offshore helicopter travel. As well, the Committee initiates numerous research projects on offshore helicopter safety.

In the Inquiry's visit to HSE in Aberdeen, we met with the head of the Offshore Division and with the heads of four specialist safety areas, which are:

(a) emergency response, evacuation, and recovery
(b) helicopter emergency, escape rescue, and helidecks
(c) the marine side of helicopter safety
(d) survival suits and clothing

The Offshore Division of HSE employs 200 people, 100 of whom are the engineers and inspectors for the approximately 300 installations on the southeast and west coasts of the United Kingdom. Although there is aviation expertise in the HSE, it also relies on the UK Civil Aviation Authority for its expertise in safe offshore helicopter operation.

As to the separation of the safety role from the economic regulatory role, we were told that the Offshore Division of HSE has greater financial resources at its disposal than did the earlier Safety Section of the Department of Energy. Although there must be a liaison between safety on the one hand and exploration and production on the other, there is a clear separation between the two regulators, and the community perceives that separation to be the better model on which to rely.

HSE maintains a goal-oriented approach to safety. In the UK, the operator's obligation is to provide a Safety Case for review by the HSE, an approach similar to the Safety Plan required to be provided in the C-NL offshore. "Duty holders," as the oil operators are called, must in presenting their Safety Case to HSE ensure that the Safety Case meets the published safety criteria. Within the Safety Case, the operator must demonstrate how it can bring workers to a "place of safety" within a short time from any incident. This is clearly a goal-based approach which is dictated by regulation. Helicopter transportation and all other risks are analyzed by the duty holder and form part of the overall risk management, all of which is then assessed by the HSE. Approval must be forthcoming from the HSE before work can begin.

In the United Kingdom, there has been considerable movement towards public transparency and workforce engagement in relation to

offshore safety. Although union membership is not compulsory in the offshore, there is a high degree of trade union representation. By regulation, workforce involvement is required in the preparation, review, and revision of Safety Cases. As in other jurisdictions, public access to such documents is limited because of legitimate concerns about geological and financial information which is proprietary to the oil operator. There is also an overriding security concern that the details of Safety Cases not become available to persons who might want to cause harm to an installation or operation. The results of audits or inspections on operations are also shared with the workforce, but unlike in some jurisdictions such as Norway, public release of the results of such inspections is not routine. Some access can be available through Freedom of Information legislation. Worker representatives are always consulted on changes in helicopter airframes or aviation operators.

There is considerable interaction between HSE and other organizations. An Evacuation Escape and Rescue Technical Advisory Group (EERTAG) has representatives from workers, duty holders, and HSE. Its research is funded by HSE. There is also an Aviation Safety Technical Group, which deals with technical aviation issues. HSE also serves on this Committee, along with helicopter operators and manufacturers, Oil and Gas UK, and duty holders. The Helicopter Liaison Group has representatives from workers, helicopter operators, and duty holders. That group focuses on helidecks and helicopter operations within 500 metres of each offshore facility.

A Helicopter Task Group was formed after a helicopter crash in the North Sea in April 2009, and that Group has now reported. Even though that assignment is complete, the same parties have agreed that a similarly broad and inclusive group, the new Helicopter Safety Steering Group, should continue proactively to identify and address helicopter safety issues.

In addition, HSE sponsors numerous seminars and, from time to time, safety conferences, such as a safety conference for managers of all United Kingdom offshore facilities in the North Sea.

It is a requirement that the United Kingdom legislation on safety must be reviewed every five years. The regulator provides guidance and standards to assist with goal-oriented safety regulations.

(b) Governance in Norway

Norway is one of three offshore-oil-producing countries which have in recent years separated offshore safety regulatory roles from other offshore regulatory roles such as licensing and authorizing exploration and production. (The United Kingdom made the decision to separate safety from other functions in 1990, following a recommendation made in the Cullen report on the Piper Alpha disaster. Australia's separate safety authority, NOPSA, began operations in 2005.) When the Norwegian petroleum regulator was established in 1973, safety was one of its functions. However, the government made a decision that took effect on January 1, 2001, to separate the safety role from the production role, to avoid possible conflicts and criticisms which could arise from the continuation of both roles in one regulatory authority. The prevailing opinion in the country was to develop oil resources but with a special emphasis on safety, which resulted in the creation in 2004 of a separate Petroleum Safety Authority (PSA) reporting to the Ministry of Labour and not to the Ministry of Petroleum and Energy, to which the Petroleum Directorate continues to report.

The size of the offshore oil industry in Norway was not mentioned as a factor in the government's decision, nor was it mentioned in the United Kingdom, but it is noteworthy that offshore oil activity in both countries is far greater than it is in Canada. Oil and gas generate approximately 26% of Norway's gross national product. There are 57 producing oil and gas fields, and in 2008 there were 2,862 wells for production and inspection purposes. In fact, by way of comparison, Norway has 93 installations, the United Kingdom 318, the Netherlands 157, the USA 3862 (in the Gulf of Mexico), and Australia 165.

The Norwegian safety regulator, PSA, is responsible for safety in all offshore operations, in eight land-based operations (seven of which are connected by pipeline), and in one oil refinery. Offshore oil employs 130,000 people out of a population of 4.5 million.

A fundamental principle of Norwegian safety management is that the oil operator is responsible for regulatory compliance with safety objectives and must establish a management system to ensure compliance. The government and the PSA set safety goals and the achievement of these goals is the responsibility of each oil operator. In the Norwegian process, transparency and involvement of workers and the public are the hallmarks of the total system.

The development of regulations rests on a tripartite cooperative effort by the PSA, the oil operator, and worker representatives. These three groups collaboratively formulate the regulations, and if all suggested ideas cannot be incorporated into the regulations, the reasons must be explained to all stakeholders, which comprise a larger group. Representatives from the tripartite group become involved in reviewing applications from operators before the PSA authorizes activity in the offshore. Because all workers in Norway are represented by a trade union, worker representatives are consulted on safety matters from the outset.

The all-inclusive Safety Plan required in our jurisdiction, or the Safety Case, as it is identified in the United Kingdom, is not specifically sought in that format in Norway. The Norwegian "Application for Acknowledgement of Compliance" deals with safety on the installation itself and the "Application for Consent" incorporates safely issues arising from helicopter transportation. While neither document is normally released publically, they are provided to the worker representatives before the operator seeks consent to commence an activity. A written response from the worker representative is required, but the final decision to authorize an activity rests with the regulator. Commercial and public safety confidentiality is protected by the worker representatives having to sign non-disclosure undertakings.

Issues of concern involving helicopter safety and operation in any application are first reviewed by the PSA staff who hold some aviation expertise. On most matters of helicopter operation requiring greater scrutiny, the PSA defers to the Civil Aviation Authority of Norway, which holds greater aviation expertise.

The safety component of licensing approval is a very public process in Norway. Information about offshore helicopter transportation is disclosed on the PSA website. However, commercially sensitive geological information, and information that could affect public safety (for example, emergency planning information that might fall into the hands of those who would wish to cause harm) is not made public.

Public scrutiny of ongoing safety activities is not shielded. The PSA conducts verifications of the oil operators' level of compliance. These are not "inspections," which could imply approval, but a system whereby the PSA verifies the operators' compliance and imposes sanctions if there is non-compliance. Pertinent information from all audits and verifications is public and placed on the PSA website within seven days of the results being given to the oil operator. Members of the public may request and are entitled to receive the full audit report. Furthermore, all inspection and assessment reports are made public on the PSA's website.

The PSA has the delegated authority to formulate regulations, undertake total safety assessments, and decide on consents, legal sanctions, and exemptions relating to the offshore. These powers are vested in the PSA because it is funded by the Norwegian government to an extent that enables it to employ professionals such as engineers and other technically skilled persons who know what is required and what is feasible. Thus the PSA sets the goals and the oil operators must find acceptable solutions which conform to industry standards.

The PSA has established a Safety Forum, which is a tripartite group composed of oil operators, workers, and the regulator. This group meets four or five times a year and the minutes of its meetings are placed on the PSA website. The Forum also holds an annual safety conference. Workers can raise problems and issues which the oil operators attempt to resolve with input from the regulator. The Safety Forum has been a very productive feature of the overall safety system.

The PSA also develops an annual supervisory plan, which incorporates:

(a) the Ministry's priorities
(b) the operators' plans
(c) other input from authorities
(d) trends in technology and organization
(e) the operators' performance experience
(f) issues raised by the Safety Forum
(g) new or revised legislation

In addition to an annual report to the Minister of Labour, the PSA publishes on its website a status report to the public. This report focuses on matters about which the public has expressed an interest. Norway has a very strong element of transparency in its regulatory system and almost every aspect of offshore safety is placed in the public domain.

The PSA also identifies trends in risk levels, including helicopter risks. Helicopter-related risks comprise the largest risk component for offshore workers. The risk breakdown is:

(a) 30% related to major accidents
(b) 30% related to occupational accidents
(c) 40% related to helicopter accidents

It is noteworthy that the above trends echo the comments of James Reason in his book *Managing the Risks of Organizational Accidents* (Ashgate 1997), in which he said that helicopter transportation to and from the offshore installations is the most dangerous part of an offshore worker's employment.

Aside from information on trends, the PSA issues questionnaires once every two years in which it asks workers to identify issues relating to safety culture, the working environment, and perceived risk.

The PSA also issues requirements on specific matters such as helicopter passenger survival suits and helicopter emergency response, as well as guidelines for safety and emergency preparedness training.

As a result of a fatal helicopter accident on September 8, 1997, in the Norwegian offshore, it was decided to establish an ongoing Committee for Helicopter Safety. That Committee has held at least two reviews, which have resulted in 29 recommendations on subjects such as

(a) responsibility, authorities, and regulations
(b) helicopters (technical and operational)
(c) air traffic control, navigation, flight meteorological services
(d) helicopter decks and installations

The Committee comprises representatives from:

(a) the Civil Aviation Authority
(b) the industry, including helicopter operators
(c) the oil operators
(d) air traffic control
(e) the pilots' unions
(f) technical air traffic control providers
(g) the petroleum industry
(h) offshore workers/passengers
(i) the Armed Forces
(j) the Maritime Directorate
(k) the PSA

The Committee meets four times a year to address the status of recommendations from its reviews, to create working groups on specific issues, and to receive technical presentations. As an example of its wide range of activities, it held an extraordinary meeting on April 16, 2009, to discuss the following incidents:

(a) February 18, 2009: United Kingdom, Bond Helicopters, Super Puma EC225

(b) March 12, 2009: Canada-Newfoundland and Labrador, Cougar Helicopters, Sikorsky S-92A

(c) April 1, 2009: United Kingdom, Bond Helicopters, Super Puma AS332/L2

(d) 2009: Norwegian Shelf, three near misses involving helicopters

After that meeting, the Committee gave workers information on the above accidents and devised an information strategy in which all helicopter operators were required to give immediate information on any incident to the oil operator, for circulation to workers and the public.

It is noteworthy that the foregoing Committee chose to inquire into the crash in the C-NL offshore, as well as those in the North Sea, and to me it indicates an interest in accidents far from its own jurisdiction. I should also note that when throughout this Report I refer to the North Sea, I am using that term generically to include both the United Kingdom and Norway. The Netherlands also has offshore installations in the North Sea, but I have concentrated on the larger United Kingdom and Norwegian operations.

(c) A New Regulatory Approach

To conclude, the Inquiry's visits to the United Kingdom and Norway, coupled with the reading of materials on their safety approaches and mechanisms, have made it very clear that their safety measures are more dynamic, advanced, transparent, and inclusive of stakeholders than those which apply in the C-NL offshore. Similarly broad and more inclusive safety measures are needed in the C-NL offshore. Notwithstanding the much smaller number of offshore installations in our jurisdiction, it is apparent that additional financial support for C-NLOPB is necessary to meet the challenges of a goal-based regime.

Our federal and provincial legislation is now 25 years old. The safety provisions in it mirror the thinking of the 1980s. C-NLOPB has been required to operate under a regime which does not represent current international approaches to organizational safety in the offshore. I note that since the March 12, 2009, crash, more modern regulatory measures have been mandated by way of regulation rather than being legislated jointly by Parliament and the Legislature of Newfoundland and Labrador.

In our public hearings, the oil operators, in their public presentations, were unanimous in the opinion that safety in the offshore world has improved beyond all recognition in the past 25 years. New concepts and approaches have been adopted in the C-NL offshore and in other jurisdictions, particularly in the United Kingdom and Norway, where physical conditions are most comparable to those in this jurisdiction, though less severe.

I believe that the new performance-based regulations require a new regulatory approach to safety in our jurisdiction and, in particular, transport helicopter safety in our offshore. As I have said, C-NLOPB and the oil operators have made improvements over the years. Nevertheless, further regulatory guidance is needed and should be initiated by federal and provincial direction, to complement the new performance-based regulatory regime which came into force on December 31, 2009.

Chapter Five

Parties' Submissions

Parties' Submissions

On July 30, 2010, the parties with standing delivered their written submissions to the Commissioner. In all, 11 submissions were received, some of which were accompanied by supporting and/or explanatory documents.

All of the submissions were promptly placed on the Inquiry website and thus became public documents which are available to any interested person; they appear in Volume 3 of this Report. Therefore, it is not necessary for me to quote at length from them. I will, of course, refer to various submissions as I deal with the specific Issues, but as an aid to the reader, I will now make some general references to the respective submissions to provide a measure of context that may clarify the thrust of each party's positions on the various Issues.

I should note also that parties with a particular or limited interest usually confined themselves to addressing those Issues which especially concerned them, while other parties with more major interests or concerns dealt with most, but not necessarily all, of the Issues.

Helly Hansen Canada Limited

The following is a summary of the submission of Helly Hansen Canada Limited with respect to my forthcoming recommendations. The company is the manufacturer and supplier of the helicopter transportation suit now in use in the C-NL offshore and has confined its submission to suit issues. I will first reproduce Helly Hansen's five recommendations, which are followed by explanations.

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.

3) Revise the helicopter transportation suit standards in order to outline the required clothing to be worn under the helicopter transportation suits.

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.

5) Require that the regulatory standards move to a goal-based regime as opposed to the current specification-based regime.

Helly Hansen describes its contract with the oil operators for the supply of E-452 suits as being awarded on April 23, 2007. The specified suit was to have dual approval from Transportation Canada under both the aviation and marine standards.

Sizing was required at the smallest to fit a 90-pound person and at the largest a 425-pound person. The average is between 140 and 250 pounds. Two locator beacons were to be supplied per helicopter seat, and

40 HUEBA units per helicopter for passengers. HUEBA is the acronym for Helicopter Underwater Escape Breathing Apparatus. Helly Hansen supplied the required number of suits, locator beacons, and underwater breathing devices by the specified commencement date, but were instructed by the oil operators not to put the HUEBAs into service on the commencement date, but to await further instructions.

The HUEBAs were brought into service in the spring of 2009. They had been purchased earlier, but placed on hold by instructions from the oil operators.

Helly Hansen described in some detail its service and maintenance procedures. Prior to 2009, the main problems with the suits related to discomfort and the difficulty in zipping up the face seals. The foregoing was revealed in a 2008 survey. As a result of these problems, Helly Hansen proposed design changes that resulted in the adoption of the HTS-1 suit, which is a modification of the E-452 suit.

Helly Hansen obtained approval to produce a suit which first met only the aviation standard, rather than both the aviation and marine standards. The single standard meant a more speedy approval process from Transport Canada, which approval was obtained in November 2009. Transport Canada marine approval was granted in July 2010.

Those and the other issues referred to in Helly Hansen's summary will be included in my discussion of suit matters later in the Report. I am essentially in agreement with Helly Hansen's recommendations.

Suffice it to say at this stage that the matter of survival suits was one of the most discussed issues in the public hearings and in Aerosafe's survey of offshore workers.

Offshore Safety and Survival Centre, Marine Institute, Memorial University

The Marine Institute has confined its submission to Issue Number 12 (Offshore Helicopter Safety Training) and Issue Number 21 (Safety Conferences).

The submission describes its three levels of training courses and the purpose of each in the paragraphs which I am reproducing below:

> *Marine Institute Current Practice*
>
> The training requirements for offshore petroleum related helicopter travel in Eastern Canada are to successfully complete a Basic Safety Training (BST), Basic Safety Recurrent (BST-R) or Offshore Safety Introduction (OSI) course. With this training completed travel is permitted within the certificate validity period.
>
> Each of these courses is designed to provide personnel with a basic understanding of the hazards associated with working in an offshore environment, the knowledge and skills necessary to react effectively to offshore emergencies and the ability to care for themselves and others in a survival situation. The difference between them is that the BST is the preparatory course for new entrants to the industry, the BST-R is aimed at refreshing the skills and knowledge of those already in the industry and the OSI is aimed at short term visitors to offshore installations. Whilst these courses have differing content and duration, they all contain essentially the same module with respect to the training for Helicopter Safety and Emergency Procedures and Helicopter Underwater Escape Trainer (HUET) exercises.
>
> The purpose of the helicopter escape training is to provide trainees with knowledge regarding the appropriate response to an emergency situation, an appreciation of the disorientation that can result from a sinking and/or inversion in the water as well as to provide skills and knowledge that will assist them in responding to such a situation. In a ditching scenario in which the helicopter lands on the water and remains upright it is very important that persons in the helicopter work as a team to avoid destabilizing the

helicopter. Team training is included as part of the training course for response to this situation.

Helicopter Underwater Escape Training involves placing individuals in a situation over which they have limited or no control, in an environment in which they are unable to breathe and can easily become disorientated.

Items 6 and 7 in a list of points describing the Marine Institute's approach to training say:

6. To keep up to date with international standards of training through regular interactions and communications with other training providers. The Marine Institute was a founder member of the International Association for Safety and Survival Training (IASST). The IASST mission is: *To facilitate the exchange of information on matters relating to safety in the maritime environment and to promote continuous improvement in safety and survival training internationally.* The association has a membership of over one hundred training providers worldwide. Members meet and communicate regularly and as well engage in the mutual exchange of instructors with the objective of sharing experience and best practices with respect to safety, survival and emergency response training. Approximately 60% of the membership is engaged in the delivery of helicopter underwater escape training;

7. To deliver all training within an ISO 9001 quality environment, regular internal and external audits confirm that training is delivered consistently to the required standard.

The submission then goes on to discuss the Inquiry's consultants' reports; the development of competency standards for training, which has already begun; and a variety of other matters including window push-out, seating within the helicopter, the concept of fidelity in training apparatus, and research projects which would add to the proficiency of survival training.

Lastly, the Marine Institute supports conferences and the inclusion of a wide range of experts to increase the knowledge of survival trainers so that continuous improvement can be undertaken. It would assist in such efforts in any way possible.

I should note at this point that throughout the public hearings, survival training was near the top of the list of subjects which garnered close attention, discussion, and debate.

There are, of course, differing opinions on fidelity of training equipment, i.e., on how closely the mockup HUET should resemble the actual transportation helicopter. Ideas also differ on the frequency of refresher survival training, which in the C-NL offshore is every three years, and, of course, on the survival suit and its attachments.

It is not my role to give detailed recommendations on training regimes and survival equipment. Rather, it is my role to recommend the processes which should lead to the best training. Such a process, in my opinion, would be collaborative and initiated by the Regulator, and would involve the operators; the training institutes; the workers through their representatives; the manufacturers of suits and equipment; scientific bodies such as the National Research Council of Canada's Institute for Ocean Technology, which is doing very important cold water survival research; and the Canadian General Standards Board, which must approve survival suits. Reports of such meetings should be available to the public on a website or in other ways, for their knowledge and for any suggestions which may be forthcoming.

HMDC (Hibernia), Husky, Suncor
Joint Operator

The three producing oil operators in the C-NL offshore are, as I have noted earlier, HMDC, Suncor Energy, and Husky Energy. In keeping with their joint presentation during the course of the Public Inquiry, the three operators have elected to present the Inquiry with a joint submission which represents the views of all three.

The submission, which is quite lengthy and comprehensive, does not deal with all of the Issues before the Inquiry, but rather with the matters which are more directly related to their obligations as oil operators and the safety systems which are part of their operations.

I should note that during the oil operators' joint submission at the public hearings, I became aware that a number of safety initiatives had been begun by one or another of the operators, as well as some joint initiatives. At that time I asked their representatives to let me know before the Inquiry concluded the total extent of these initiatives. They agreed, and in the course of their joint submission, a number of initiatives were identified as ongoing safety projects. Before continuing with my references to the scope of their submission, I will refer to some of these ongoing initiatives. Examples are:

- safety improvements to the sizing and fitting of survival suits
- improvements to first-response search and rescue
- offshore safety training programs and facilities
- a revised system standard for the helicopter transportation suit
- an initiative to have Cougar and subsidiary revise the design and use of auxiliary tanks, and the use of auto-hover and FLIR (forward-looking infrared)
- initiatives toward the prevention of helicopter accidents and ways to improve helicopter flotation equipment
- an initiative to examine the design and import of the auxiliary fuel tank
- further study re: thermal undergarment requirements

- further review of continuous improvement opportunities re: emergency breathing standards, as well as personal locator beacons and goggles
- communication and stakeholder engagement initiatives arising out of Issues 4 and 18

I will assume, unless told otherwise, that all of these initiatives have been brought to the attention of C-NLOPB for comment and possible involvement. In addition to the above initiatives, the oil operators have provided in their submission the following recommendations:

1. Improvements to the C-NLOPB's annual OHS meeting, including:

   (a) the establishment of formal terms of reference setting out the goals and expectations of the meeting;
   (b) a survey of the workforce to determine topics of interest; and
   (c) the expansion of the subject matter to include safety learnings and new initiatives from other oil and gas jurisdictions.

2. The C-NLOPB should develop enhanced training specific to the offshore oil and gas industry for OHS Committee representatives.

3. Enhanced engagement between CAPP, the C-NLOPB and other stakeholders, such as the offshore workforce, training institutes and service providers should occur during the administration of complex projects, including:

   (a) more frequent and formal reporting by CAPP to the C-NLOPB at regular intervals to provide status updates on initiatives and activities of CAPP Committees;

   (b) the provision by CAPP of updates on safety related initiatives

> and activities at the C-NLOPB's annual OHS meeting;
>
> (c) the inclusion of a stakeholder engagement plan in the project scoping process to outline the extent to which stakeholders will be informed and engaged in CAPP projects; and
>
> (d) the development of communication materials and feedback forms.

In response to Inquiry Issue 13, the operators recommend the following:

> 1. Any further consideration of the appropriate standards for PPE [Personal Protective Equipment] and clothing necessary for helicopter passengers be done in consultation with the CGSB [Canadian General Standards Board] Working Group.
>
> 2. The C-NLOPB should audit the Operators' safety management systems and processes to ensure that:
>
> (a) passengers are equipped with the most appropriate PPE; and
> (b) MOC [management of change] processes are used to ensure equipment integrity, including appropriate fit, when changes are made in PPE.

They also recommend the establishment of a Helicopter Operations Safety Forum to be held twice per year.

The five appendices attached to the submission deal with:

- the jurisdiction of the C-NLOPB and Transport Canada
- the features of the Sikorsky S-92A
- CGSB survival suit research topics
- an agenda for the Helicopter Operations Safety Forum

- sample airworthiness directives

In summary, the operators have presented a comprehensive outline of the safety side of their operations, together with suggestions and recommendations as to where they think improvements should take place in specific safety areas.

There was very little discussion during the public hearings of the substantial regulatory change which came into effect on January 1, 2010. It is possible that participants did not realize the magnitude and implications of the change from prescriptive to performance-based regulation. I am of the opinion, after considering the oil operators' joint brief, that they do understand the significance of the change and that understanding is, I think, reflected in their recommendations.

Though the oil operators have not touched upon the concept of a reorganization and enlargement of the safety Regulator, it is implicit in their recommendations that they are now under a new regime. In my opinion, that new goal/performance-based regime requires the safety Regulator to have roles and functions along the lines of the Norwegian and United Kingdom regulatory regimes.

The oil operators' recommendations represent valuable input into the Inquiry's work and should be carefully considered by the C-NLOPB; I express my thanks.

Cougar Helicopters Inc.

Cougar, which is the sole helicopter operator in this offshore, has confined its written submissions to those Issues which directly involve its role in the offshore industry.

Cougar describes its risk-management system as ensuring that the risks of helicopter transport are as low in the C-NL offshore as is reasonably practicable. Some of the salient principles and procedures are attached to its submission as Appendix A.

Cougar speaks also of the importance of culture in the company and its focus on a sensitive and forward-looking system in which all employees play a part. In matters of aviation safety, Cougar sees the role of C-NLOPB as engaging with Transport Canada and the oil operators when it thinks appropriate to do so. Cougar has no reason to conclude that C-NLOPB does not use best practices in its regulatory role.

Regarding search and rescue, Cougar believes that the present 30 minutes wheels-up time is reasonable during normal flight time operations, otherwise 60 minutes. It does not mention the 15 to 20 minutes wheels-up time frame which I understand is now being organized following my February 2010 interim recommendation to C-NLOPB.

Assistance to a transport helicopter, it believes, should be given if requested in the case of certain specified warnings or malfunctions which are not declared emergencies. Declared emergencies would, of course, necessitate an immediate response.

Vis-à-vis a formal protocol with the Department of National Defence in rescue matters, Cougar notes that there is a Canadian National Search and Rescue Program that is linked to any overdue flight for which a flight plan has been filed.

The submission also deals with operational limitations on helicopter flights and essentially its position is that appropriate actions are best decided by those who have the training and experience and can immediately assess the nature of unfolding conditions and act accordingly.

Cougar does not believe that additional operational requirements are required of the oil operators and feels that fleet capacity is being maintained at a level which ensures that it can meet its contractual obligations. It does support appropriate passenger training, certifications, and re-certifications.

The submission also deals with the pilot immersion suit system and related issues such as life vests, personal locator beacons, egress devices, and protective equipment such as footwear and helmets for pilots. Cougar is committed to employee compliance with Transport Canada's rules and regulations and with its own personal protective equipment criteria and directives.

It notes also that in certain areas its procedures exceed the requirements of Transport Canada. For example, Cougar requires the dispatching of flights to be decided upon jointly by the pilot in command and the dispatcher. That means that both must be satisfied that it is safe to fly.

Insofar as regulatory matters are concerned, Cougar believes that the regulatory system which is in place is satisfactory.

It says also that there should be a requirement of personal accountability on the part of passengers. These suggestions involve physical fitness, the wearing of appropriate (thermal) undergarments under the flight suit, and swimming lessons for non-swimmers, to increase the person's level of comfort and confidence in water.

Cougar believes that safety audits should be the responsibility of Transport Canada and the oil operators, and that C-NLOPB's assumption of such a role would, presumably, necessitate aviation expertise on the part of the Regulator, which in Cougar's opinion is unnecessary.

Cougar believes airworthiness directives and service bulletins are so technical that the information would have limited value to passengers and raise anxiety levels. Likewise, it does not support pre-flight briefings by aircrew, which it believes could lead to negative interaction and increased stress for the pilots.

As to Issues involving the role and resources of C-NLOPB, Cougar makes no submission.

Cougar's observations deserve careful consideration by the C-NLOPB, but I am not persuaded on two issues, which are that service bulletins and airworthiness directives are too technical, etc., and that pre-flight briefings could lead to stress for the pilots.

The offshore workforce is generally highly educated in technical matters. Their work involves high levels of technology. They talk to each other all the time and if one does not understand the context of airworthiness directives, there are many on the installation who understand and will explain. Only highly trained aircraft technicians can attend to the problems referred to, but intelligent people can understand what the problems are. As concerns pre-flight briefings, I believe that they should take place. The passengers are intelligent people and would know better than to argue with the pilots or stress them. If hostile briefings became a common occurrence, then the briefings would have to be conducted by others with the necessary knowledge.

Families of Deceased Passengers

The families spoke of the personal impact of the tragedy of March 12, 2009, and described the offshore workforce as being composed of highly skilled individuals, doing work for which they were trained.

Significantly, they spoke of the expectation on the part of the offshore workforce that all the stakeholders, including the regulator(s), Government, and industry would provide a safe working environment. For my part, I believe that their expectation is fundamental to offshore safety regulation.

The families do not profess to have technical knowledge which would contribute to matters such as the appropriate survival suits, the underwater breathing device, the location of search and rescue facilities, and night flying. They know, however, that some of their loved ones were concerned over suit sizes and also had an aversion to flying offshore.

Nevertheless, the families wish to have input to help ensure that the offshore oil industry operates in a safe environment and, to the extent possible, that the events that led to Flight 491 will never happen again.

They raise the issue of the degree of separation within the C-NLOPB between offshore helicopter regulation and other industry regulation. They note also that they are proponents of a complete separation between the safety-regulating function of offshore helicopters and other regulatory functions.

Mention is made of the Aerosafe governance models which have been provided and they note that, while stakeholders have to be mindful of costs, costs are not the only determining factor. The families' hope is for a regulatory regime that fulfills the needs of industry and, at the same time, ensures a safe working environment.

In respect of the offshore workers' survey, they note that 65% of respondents have noticed improvements in helicopter safety procedures since March 12, 2009, but there are still significant numbers of people who do not feel safe while travelling to and from the rig/platform by helicopter.

They note that 122 respondents to the survey indicated the need for "improved communication by Cougar and the operators to passengers regarding all aspects of helicopter operations."

There has been better communication since the accident, but a significant number do not feel safe and feel that there should be better and more detailed information on all aspects of the flying process, including access to airworthiness directives and service bulletins. Finally, the needed changes should be reflected in the legislative and regulatory framework governing the offshore oil industry.

Their overriding message is that there is a need to ensure that regulators are responsive and that the regulators and industry both facilitate a safety culture that responds to the needs of the workers.

My comment at this time is that I am deeply appreciative that the families have taken such an interest in the work of the Inquiry, and that they, who have lost loved ones, are able to make such a balanced and thoughtful presentation.

Estates and Families of the Flight Crew

The submission on behalf of the foregoing is in relation to Inquiry Issues 13 and 14. Issue 13 involves personal protective equipment and clothing for passengers and pilots. Issue 14 asks whether changes are needed to maximize workers' and pilots' involvement in the development, implementation, and monitoring of flight safety issues.

The gist of the submission is contained in paragraph 2.1 General:

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

The specific topics discussed are these:

(a) Helmets are not compulsory in the C-NL offshore; the submission says they should be compulsory.

(b) Flight suits are not regulated by the Canadian General Standards Board: the argument is not that the pilots' suits are inadequate, but that lack of testing, comparative and otherwise, and lack of regulation prevent a proper examination of their effectiveness.

(c) Spray hoods are a very necessary piece of equipment in our waters. They are not mandatory in this jurisdiction, though they are in the North Sea. The argument is that they are essential in rough, cold, and storm-prone waters.

(d) Emergency breathing systems are now in use in this offshore, but the submission's concern is the length of time which it took to implement them after a direction by the Regulator to do so. Safety personnel in the oil operators, Cougar, and the

> Regulator were well aware that the military had been using the compressed-air system for 15 years. The combined approach to instituting a HUEBA was described as "at best reactive, not proactive."
>
> (e) Maximizing pilot participation in safety initiatives has not yet been achieved in offshore helicopter travel. The greatest challenge is described as the shifting of mindsets away from the separate box type of thinking, which they submit currently exists, to some extent, among air and oil regulators, air and oil operators, and flight crew and passengers.

The submission from the pilots' families says:

> No doubt the first objection to many of the suggestions made in this brief will be that the C-NLOPB does not regulate air operators and has no jurisdiction over the regulation of that industry. This is true, but does it make this road a dead end? We believe not.
>
> [Transport Canada Program Manager] Rob Freeman addresses this problem in the context of pilot helmets:
>
> > Should TC [Transport Canada] introduce regulations for mandatory helmet usage? Under the current government's Cabinet Directive on Streamlining Regulations, TC may consider regulatory action only when absolutely necessary. **Other alternatives must be considered first**.
>
> In our case, there are other alternatives. Through their contract with the air operator, the oil operators have a great deal of control over that company. In turn, the C-NLOPB has a great deal of control over the operators. These bodies could, and should, require assurance from Cougar, or whatever air operators they use in the future, that:
>
> (a) <u>All</u> safety equipment and clothing, including helmets, suits, and spray hoods, undergo a full risk assessment. This should require that the air operator be able to demonstrate the ability of the clothing and equipment

chosen to adequately protect flight crew in the conditions of the Newfoundland and Labrador Offshore. It should also include a comparison with equipment and clothing used by DND pilots operating in the North Atlantic.

(b) These risk assessments or evaluations are updated or repeated regularly as new technologies and safety equipment emerge.

(c) All approved safety equipment for flight crew, whether mandatory or not, is fully funded by the air operator.

(d) The air operator has a continuing education program in place for flight crew that includes information on safety equipment and clothing and the risks associated with not using it.

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

As Commissioner, I would like to express my thanks to the families of the deceased pilots for their contributions throughout the Inquiry.

Canadian Association of Petroleum Producers

CAPP is, as its name makes clear, the oil industry association and sometime spokesperson. The individual oil operators, including the three operators in the C-NL offshore, sometimes ask CAPP to represent their interests in dealing with specific issues. CAPP, of course, takes instructions from the oil operators who delegate matters to them. CAPP's role is fully explained in the submission.

CAPP begins its submission by saying that the upstream petroleum industry is committed to continuous improvement.

The next two sentences state CAPP's position on one of the more serious questions before the Inquiry:

> The regulatory structure for offshore Newfoundland and Labrador oil and gas regulation is fundamentally sound. In regard to the purpose of this Inquiry, any improvements can and should be made within the existing regulatory structure.

I should note for the reader that the foregoing assertion delineates what is, I think, one of the more pressing issues arising out of the Inquiry.

CAPP then refers to the items on which it presented evidence, which were:

(1) the HUEBA
(2) survival suits
(3) escape, evacuation, and rescue
(4) CAPP participation in the UK Helicopter Task Group

The Task Group was set up after events that included a petroleum industry helicopter crash in April 2009, in the North Sea, in which all 18 passengers and crew died, and the crash off St. John's, Newfoundland and Labrador, on March 12, 2009, with 17 fatalities and one survivor.

The process followed was not, as I understand it, to supplant the official investigations into these tragedies, but rather to help the industry

itself to understand and see how to prevent future serious helicopter accidents or incidents.

CAPP then dealt with Issues 1, 4, 12, 13, and 19. Its first Issue, therefore, is the regulatory issue. In its support of the present regulatory regimes, CAPP quotes from the C-NLOPB's statements of mandate. These I will reproduce in full as a prelude to further discussion later in this Report:

> 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.
>
> ROLE
> In the implementation of its mandate, the role of the C-NLOPB is to facilitate the exploration for and development of the hydrocarbon resources in the Newfoundland and Labrador Offshore Area in a manner that conforms to the statutory provisions for:
>
> - worker safety;
> - environmental protection and safety;
> - effective management of land tenure;
> - maximum hydrocarbon recovery and value; and,
> - Canada/Newfoundland & Labrador benefits.
>
> While the legislation does not prioritize these mandates, worker safety and environmental protection will be paramount in all Board decisions.
>
> OBJECTIVES
>
> SAFETY
>
> - To verify that operators have appropriate safety plans in place.
> - To verify, through audits and inspections, that operators follow their safety plans and applicable statutory requirements.

- To verify, through compliance actions, that deviations from approved plans and applicable statutory requirements are corrected.

ENVIRONMENT

- To verify that operators assess and provide for effects of the environment on the safety of their operations.
- To verify that operators perform an environmental assessment pursuant to Canadian regulations, of the effects of their operations on the environment, and prepare a plan and provide for mitigation where appropriate.
- To verify, through compliance actions, that operators comply with their environmental plans.

RESOURCE MANAGEMENT

- Effective and efficient administration of land tenure.
- Oversight of production activities for consistency with maximum recovery, good oilfield practice, production accounting and approved plans.
- To build a knowledge base for the Newfoundland & Labrador Offshore Area through the acquisition and curation of data from exploration and production activity.

BENEFITS

- To verify operators have an approved Canada/Newfoundland & Labrador Benefits Plan that addresses their statutory obligations."

Safety and protection of the environment are, as stated in the above passage from the CNLOPB, paramount values under this regulatory framework. Protection of safety and the environment do not exist as abstractions: they arise from and are integral to the management of the offshore petroleum resource. Knowledge and expertise in the one informs the others. This is reflected in the establishment of a single regulator for the Newfoundland and Labrador offshore.

CAPP describes the attributes of C-NLOPB, and the role of the industry, as follows:

> **Attributes of a High Quality Regulator**
>
> Regulators are servants of the public. Expected attributes include:
>
> - Commitment to the legislated policy goals of regulation and a well considered approach and organizational structure: professionalism and dedication
> - Objectivity and neutrality towards all who are affected by regulation: neither favouritism nor prejudice
> - Knowledgeable and well informed on the matters regulated: subject matter expertise
> - Open to information and views of those affected by regulation: accessible and open to fresh ideas
> - Consistency in approach and decisions: predictable
> - Approach and decisions grounded on a sound appreciation of what is reasonably achievable: practical and balanced
> - Even handed approach and decisions that communicate clearly rationales and expectations: fair and transparent
>
> The C-NLOPB possesses all these attributes. There is no evidence to the contrary. This should not be surprising. It should be obvious that the design of the model of regulation has these attributes in mind.
>
> **Role of Industry**
>
> Industry is accountable for the safety and protection of its workforce, its operations, and the environment. Industry brings enormous depth of knowledge, experience, systems, and processes. This depth of expertise comes from the fact that the industry has been operating successfully for many years, has adapted to many different operating environments, and continues to adapt as circumstances change. Developing energy resources safely is critical to success.

The submission goes on to speak about stakeholder consultation, regulation and the public interest, the absence of any evidence of regulatory capture, and the efficiency and value of C-NLOPB initiatives. The submission says:

> The C-NLOPB is a fully modern regulator that is moving towards goal oriented regulation with an organizational design appropriate for offshore Newfoundland and Labrador. The goal-based model is sound. The regulatory structure with a single regulator is fundamentally sound. There is no need to change the structure of regulation by introducing another regulatory body for safety in the Newfoundland Labrador offshore.

And:

> Changes that are brought about through this Inquiry should be grounded on demonstrated opportunities for change and sound reason to believe the change will lead to a significant net improvement over the current situation.

The submission describes the role of the industry in safety and the depth of its experience, and says:

> Given that a key goal of regulation is to make well informed decisions, it is simple common sense that the regulator should welcome the knowledge and expertise that industry can contribute to any discussion.
>
> Indeed, sound regulatory practice dictates that regulators invest in collaborative partnerships with stakeholders.

The submission then turns to the Issues, beginning with Issue 1. It points out that Transport Canada is the principal regulator of aviation; that under the C-NL offshore rules, the "Chief Safety Officer" is a statutory position with independent authority; and that the position demonstrates that there is already a degree of separation between offshore helicopter regulation and other offshore industry regulation. On the separating of safety issues, the submission repeats its general position to which I have

already alluded and reinforces its preference for the current model of regulation in the C-NL offshore.

On Issue 4, particularly on 4(b) (interactions between C-NLOPB and industry associations), CAPP refers to the lengthy delay in implementing the HUEBA (underwater breathing device), which took nine years from the time C-NLOPB requested that it be done, saying about that issue:

> The implementation of HUEBA was a particularly complex issue involving novel aspects and requiring many levels of expertise. Following the implementation CAPP committed to undertaking a review of the lessons learned from the implementation of HUEBA. The lessons learned exercise was completed and has been submitted to the Inquiry. The purpose of the exercise was to identify continuous improvement opportunities regarding the process by which issues of joint concern to the Atlantic Canada oil and gas industry can be worked through CAPP.
>
> The lessons learned highlighted several process elements that worked well, including the rigorousness of the process, documentation of decisions and research throughout the process and the value of a joint industry approach. It was determined that the existing processes that work well for handling most issues as between the Board and CAPP and within the CAPP structure do need improvement in the case of issues as complex as HUEBA. The lessons learned exercise identified the following opportunities for improvement for particularly complex issues:
>
> - *Stakeholder Engagement*: Stakeholder communication protocols and processes, including communication with the OHS Committees, require greater effectiveness and visibility within project management.
> - *Interface between CAPP and the Regulator*: Ensuring Regulator(s) expectations for deliverables and timelines are clearly articulated requires more attention as a first step in project management. Formal reporting of progress should be provided to the Regulator(s) at regular intervals.
> - *CAPP Internal Process*: Project management should be enhanced to identify an AC EPG project champion with the

responsibility to monitor the project to ensure that it is progressing in accordance with expectations.

- *CAPP Member Company Engagement and Support*: Project management should be further enhanced to:

    - support member company engagement and alignment,
    - utilize a project terms of reference document that is provided to all CAPP members and committees working on the project to ensure clear communication of expectations and responsibilities throughout the duration of the project,
    - document in the project terms of reference the nature of the project, project scope, roles, responsibilities, deliverables, key milestones, timelines, reporting relationships and requirements, resources available to the project including CAPP member and external resources, and the avenues for elevating and resolving issues,
    - be monitored by committee members to ensure they are current and to facilitate succession and management of change initiatives.

These recommendations have been adopted by CAPP and apply to particularly complex issues like HUEBA. They fully address, among other things, the relationship of the CNLOPB and CAPP.

In Issue 12 (safety training), CAPP affirms its confidence in the TQC (Training Qualifications Committee) as the appropriate mechanism to provide the proper training. The TQC is a collaborative effort of CAPP, the Canadian Association of Oil Well Drilling Contractors, training institutions, and regulators.

The submission goes on to describe the work of the TQC and the effectiveness of its approach. I would suggest that the reader go to Volume 3 of this Report to read CAPP's treatment of the issue.

The issue of training standards is currently under review and the TQC will be examining the recently-completed UK Helicopter Awareness Course to see if it could be helpful in this jurisdiction.

On Issue 13 (personal protective equipment), CAPP refers to the ongoing efforts of the Canadian General Standards Board's committee to address concerns with the suit, and also states that CAPP will indeed be in consultation with other safety committees in learning what is being done in the UK.

Because Issue 19 (Does C-NLOPB have sufficient resources, etc.?) is an important area, I will reproduce that submission in full, for the convenience of the reader:

> CAPP strongly supports having a regulator with the proper level of resources and expertise, as well as access to and connections to other bodies with expertise, to make regulation effective and efficient.
>
> The resources and expertise required by the C-NLOPB are dictated by its role as regulator. The regulator oversees the operator but it is the operator that is responsible for the operation and so the regulator does not have the responsibilities of the operator.[1] The regulator does not need the full suite of expertise possessed by the operator. The regulator does not need to have pilots who know how to fly a helicopter, or search and rescue technicians, or tool pushers or any of a myriad of other skills that the operator will need to employ. The goal of regulation is not to populate the regulator with one of every skilled occupation involved in offshore petroleum activity. The regulator needs to have the expertise appropriate for oversight: the expertise to assess the soundness of proposals, plans, and procedures for facilities and operations in the context of offshore petroleum operations. The regulator can also retain consultants to assist it on matters that do not justify a full time staff member. The expertise of other bodies, including other government entities, can also be obtained without the need to duplicate resources.
>
> Nor does the regulator need to re-invent the wheel. It is entirely appropriate for the regulator to rely on the expertise of others

whether that is CSA standards for offshore structures, CGSB standards for survival suits, certification of vessels by credible international bodies, or any other credible source of expertise including the learning that comes from doing, namely, industry best practices. Offshore operators bring to bear significant expertise in the proposals, plans, and procedures for their operations. This is exactly what one would expect from a business culture that values safe, reliable operations. When the regulator is satisfied with the due diligence of what is proposed it is entirely appropriate to reflect that in operating authorizations.

On occasion one hears the comment that a regulator is not doing its job because not enough (or any) proposals are denied. Comments like that are ill-informed. An enormous amount of work goes into proposals and plans. It is not surprising then that outright denial is rare and it is more common for discussion to focus on terms and conditions for approval.

While we consider the C-NLOPB is appropriately resourced in terms of expertise, CAPP strongly advocates for and stresses the importance of ensuring the C-NLOPB is well resourced and staffed, including at the Board of Directors level, so that it can provide the appropriate level of oversight.

Conclusion

In conclusion, CAPP welcomes this opportunity to assist the Inquiry. In regard to the issues addressed above, CAPP is of the view that the overall structures of regulation are appropriate and provide a sound framework within which continuous improvement in safety can be achieved.

[1]Transcript February 18, 2010 114-115 where it was noted that the Norwegian Petroleum Safety Authority's one comment about the C-NLOPB approach to safety regulation was that it was too involved in the detail and should be at a higher level. Shortcut to: http://www.oshsi.nl.ca/userfiles/files/HELF18.pdf

I recommend again that the reader read the entire CAPP submission. It is important because it represents the views of the Canadian Association of Petroleum Producers. The oil operators have not expressed themselves in their brief on some of the more important issues of regulation in the C-

NL offshore. Obviously, they have left those issues for their Association to deal with, and it has done so. In that regard I will take CAPP's position on C-NL regulation as mirroring the views of the oil operators in this jurisdiction.

Government of Newfoundland and Labrador

The Government of Newfoundland and Labrador presented a submission setting out the current provision of the Atlantic Accord Acts as well as excerpts from the Ocean Ranger Report and the Harrison Task Force Report. The Ocean Ranger Report said as follows in Recommendation 86:

> That Canada maintain the approach of a single regulatory agency, in concept and in practice, in exercising regulatory control over MODUs and the varied aspects of their drilling operations including the standby role of vessels and the rescue role of helicopters under contract to industry.

(A MODU is a Mobile Offshore Drilling Unit.)

That view was echoed by the Harrison Task Force Report on July 31, 1986. The Task Force was mandated to advise on the implementation of the Ocean Ranger Commission Report. It endorsed the single-regulator model which, as we know, was instituted in the C-NL offshore by the Atlantic Accord in 1985 and the subsequent Accord Implementation Acts. The C-NL offshore was then in its infancy and to this day Canada has no offshore oil and gas industry except for that in offshore Newfoundland and Labrador and Nova Scotia.

A great deal of change has occurred in regulatory thinking worldwide since 1985, and the trend in recent years has been to separate the safety aspects of oil offshore from licensing and production. That has occurred in Norway, the United Kingdom, and Australia, and is now being implemented in the United States in the Gulf of Mexico, following the human and environmental tragedy of 2010 in which a blowout occurred in a deep-water well with the loss of 11 lives and the spill of millions of litres of oil into the waters of the Gulf.

Nevertheless, other jurisdictions have retained the one-regulator model. In fact, an examination of offshore regulation shows a number of regulatory agencies governing single jurisdictions. The one-regulator model has its advantages but also its dangers and disadvantages, which

have been identified in more mature offshore areas such as the North Sea. For my own part, while supporting the performance-based model and a separate safety regulator, I believe that prescription should not be completely abandoned in offshore safety regulation.

The Government's submission goes on to discuss and enumerate the regulatory regimes in the United Kingdom, Norway, Australia, New Zealand, the United States, and Denmark. There is little consistency across the various jurisdictions but, in my opinion, they show a trend toward separation of safety from exploration and production.

The submission then goes on to detail and discuss the proposed federal and provincial matching Occupational Health and Safety legislation to enhance occupational safety in the C-NL and C-NS offshore. I have had the opportunity to familiarize myself with the concepts in the legislation and I believe it will play a significant role in enhancing safety in the offshore. I wish to express my thanks to the Government of Newfoundland and Labrador for their consideration in acquainting me with the proposed legislation.

OHS legislative provisions, although they will touch on offshore helicopter transportation, do not relate to many of the roles of the safety regulator, which are the subject matter of this Inquiry.

Overall, I believe the Province understands that there is need for a revised approach to offshore safety regulation. First, the Province recognizes in the draft legislation that OHS organization should report to the Minister of Government Services and not, as does the exploration and production side of the industry, to the Minister of Resources.

The Province is to be commended for endorsing the concept of an advisory board to assist OHS executives. This is a concept which I see as a desirable addition to the Safety Division, which I will be recommending as a separate and distinct pillar of a safety reorganization of C-NLOPB.

I shall recommend the reorganization of C-NLOPB because I believe, as do Norway, the United Kingdom, and Australia, that there can

be tensions between exploration and production on the one hand and safety on the other if both are combined in offshore regulation.

Communications, Energy and Paperworkers Union, Local 2121

The brief discusses the Inquiry's mandate, Inquiry evidence on safety issues to July 30, 2010, helicopter transportation suits, emergency breathing systems, and search and rescue response.

A question is then posed in the following terms, followed by Issues and a conclusion:

> Why have the Operators and C-NLOPB been deficient in their dealings with Helicopter Transportation Safety?

I will attempt to give the gist of the brief without comment at this stage, but as with all submissions, I encourage the reader to read it in full in Volume 3 of this Report.

The brief begins with some criticism of the Inquiry's mandate, citing insufficiency, and goes on to note that there is little legislative assistance provided to C-NLOPB in its pursuit of safety regulation and enforcement.

The brief moves on to deal with three issues, which are:

1. the introduction of a new helicopter transportation suit
2. the introduction and provision of an emergency breathing system
3. the matter of helicopter search and rescue response times and equipment

The transportation suits, it says, citing the evidence of the Chief Safety Officer, did not fit. Improper fit posed three distinct safety risks:

> (1) Leakage of water into the suit during usage due to improper seal leading to hypothermia on the part of the user;
>
> (2) Excess material in the fit leading to problems with air evacuation thereby causing increased buoyancy and buoyancy inherent in the material which interfered with the ability of an individual to exit a submerged helicopter.

(3) Improper fit reducing the mobility of a suit user making mobility in the event of a helicopter ditching or crash a problem or leading to a fall while wearing the suit in the ordinary course.

(**Reference:** Evidence of Howard Pike, February 18, 2010, pp. 50-55 – **Tab 2**)

The brief goes on to speak about the shortcomings in the suits and the disparities among what it alleges happens in reality, what appears in the operator Safety Plans, and what happened in the real-world test on March 12, 2009, of Robert Decker's suit.

The brief says that the operators were focused on making the existing suit work and achieving their goal of having a single suit with dual certifications. This was despite the criticisms of the suit given by workers in the Helly Hansen survey. The brief says that the oil operators' attention also was directed toward Transport Canada's approval rather than users' information.

The brief also says that C-NLOPB failed to focus on the safety risks of the E-452 suit. The foregoing is said by the brief to show that the safety system failed.

On the Emergency Breathing System (EBS), the brief says that these systems, of one type or another, had been in use by the military for some years, though their use by oil operators did not begin in the North Sea until 2003. They then opted for a re-breather system and a hybrid system, rather than only compressed gas.

I should note for the reader that C-NLOPB asked the Canadian Association of Petroleum Producers, as a delegated representative of the oil operators, to proceed with the EBS on February 25, 2000. In summary, the EBS was not put into service until the spring of 2009, after the March 12 crash. The total time to implement C-NLOPB's request was slightly more than nine years, despite interim requests from C-NLOPB for more prompt attention to the matter.

The entire matter of the slowness of the implementation of the EBS was thoroughly canvassed before the Inquiry in public hearings during which the operators admitted that nine years was long.

The brief concludes on the EBS issue:

> The delays demonstrate an incredible lack of will on the part of the operators to make the implementation of an emergency breathing system happen. …Neither CNLOPB, CAPP or the operators presented any insight as to why their respective organizations failed so dismally in bringing this obvious safety improvement about.

The brief discussed search and rescue response in terms of the operators' aviation contracts not following the recommendations of the Ocean Ranger Commission and yet being approved by C-NLOPB.

The response time (wheels up) in the C-NL offshore was one hour, while elsewhere in the offshore helicopter world it was 15-20 minutes. The CEP brief describes the failure to implement an improved response time as a question of applying resources. The brief also notes that C-NLOPB appears to be satisfied that the operators were meeting a standard of one hour wheels-up time and tolerated a first-response helicopter being available only to the extent that it was within 30 minutes flying time of St. John's and could meet the one-hour wheels-up time standard. The brief describes the operators' standard as being unacceptable and its acceptance by C-NLOPB as being equally unacceptable. The remainder of that part of the brief consists of criticism of the operators and C-NLOPB for, in CEP's view, failing the cause of safety. The key theme of this part of the brief is that C-NLOPB was too sympathetic and understanding of the problems of the operators and did not insist on rigorous standards being applied and enforced in respect of the three issues mentioned.

The overall thrust of the remainder of the brief is that the system of regulation is not strong enough in the C-NL offshore to meet the required standards of safety.

The portions of the brief to which I have specifically referred are sufficient to give the reader the overall view of CEP on safety issues. I encourage the reader in the case of this brief, as I have in the case of others, to read the brief in full. It is contained in Volume 3.

I wish to thank CEP Local 2121 for its contribution to the work of this Inquiry.

Jack Harris, QC, Member of Parliament for St. John's East

Jack Harris, QC, Member of Parliament, did not present a written submission to the Inquiry but he did, on September 8, 2010, make an oral presentation in which he spoke on response times for search and rescue as well as other issues. Mr. Harris's presentation pointed out that on evenings and weekends, Department of National Defence SAR response times are considerably longer than during working hours on weekdays, while, in contrast, offshore helicopter transportation is a seven-day-a-week activity.

Mr. Harris also made a presentation on November 25, 2009, on search and rescue, which presentation is contained in Volume 3.

I wish to thank Mr. Harris for his interest in and contribution to the Inquiry's work.

Transport Canada

Transport Canada did not submit a brief, but did write to me as a closing submission. Their letter, which was from the Department of Justice Canada, said as follows:

> July 30, 2010
>
> Commissioner Robert Wells, Q.C.
> Offshore Helicopter Safety Inquiry
> Suite 213, Tara Place
> 31 Peet Street
> P. O. Box 8037
> St. John's, NL
> A1B 3M7
>
> Dear Commissioner Wells:
>
> **Re: Transport Canada – Closing Submissions**
>
> Transport Canada is grateful for the opportunity to participate in the Inquiry. Please accept this letter as our closing submission.
>
> Transport Canada currently interacts with the C-NLOPB on a regular and informal basis. We are open to having this interaction formalized should you recommend it. The purpose of such interaction would be to communicate to the C-NLOPB any changes to aviation regulations that may impact offshore helicopter transportation in Newfoundland and Labrador. We feel this will serve to increase public confidence in the level of aviation safety, which is one of our goals.
>
> Please feel free to contact us if the Inquiry has further questions.
>
> Yours truly,
> Jonathan D.N. Tarlton & Mark S. Freeman
> Civil Litigation & Advisory Services
> Atlantic Regional Office
> JDNT/MSF/td

Canada-Newfoundland and Labrador Offshore Petroleum Board

The C-NLOPB's submission begins by referring to the powers and authorities given to it by the Atlantic Accord and Atlantic Accord Implementation Acts. Those I need not repeat as they are referred to earlier in this Report and have been well publicized throughout the Inquiry process.

The gist of the submission is that the C-NLOPB, through the Chief Safety Officer and his staff, has the authority to do whatever is required by the legislative scheme of regulation.

On that aspect, the submission said at paragraph 13:

> The Board has demonstrated that its safety regime is effective; removed from the aspects of production and royalties; and, has the power and authority to carry out its mandated duties.

The submission then makes the point that the C-NLOPB must be legislatively able to implement recommendations, but it cannot implement recommendations which are outside the C-NLOPB's authority.

If recommendations were outside the C-NLOPB's authority, then such recommendations would have to be forwarded to both levels of government for their consideration. In its submission, the C-NLOPB did not deal with the newly-passed performance-based Regulations and Guidelines, or their possible impacts on its regulatory role.

The brevity of the C-NLOPB's submission reflects its position that it is seeking recommendations for improvement from the Inquiry rather than suggesting to the Inquiry what it should recommend.

The C-NLOPB's submission can be examined in Volume 3.

Chapter Six

Expert Reports and Worker Surveys

Expert Reports and Worker Surveys

(a) Experts

In the investigative stage, Counsel and I were able to decide upon and engage experts to provide reports on matters which come within the Inquiry's Terms of Reference. These reports have been examined and analyzed in a public hearing. The experts are:

- **Aerosafe Risk Management** of Australia, a company with worldwide experience in corporate culture, risk management, and safety issues in aviation. Its mandate was to provide:

1. a passenger survey and a written report containing a tabulation of the results

2. a written report that details information on oil regulators' regimes in other areas of the world

3. a written report that contains an overview of best practice in organizational and safety culture

4. a list of possible reading material

- **Dr. S. R. K. Coleshaw** of Aberdeen, a world expert on cold water rescue and survival. Her mandate was to respond to the following:

1. What are the appropriate standards of offshore helicopter safety training to ensure that the risk to passengers is as low as reasonably practicable, during both training and helicopter transport?

2. What personal protective equipment and clothing are necessary for helicopter passengers and pilots; what are the standards, and should the C-NLOPB require

guidelines to ensure such equipment and clothing are properly fitted?

- immersion suits
- emergency breathing systems

3. Should offshore workers have a level of personal accountability for their own safety in helicopter transport (e.g., clothing to be worn under the suit, fitness training, and reporting)?

4. UK Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA) research into the prevention of inversion of ditched helicopters and enhancement of passengers' ability to escape (links to work on emergency breathing systems).

- **Mr. Michael Taber** of Ontario, Canada, a researcher on offshore and survival training, whose mandate was to respond to the following:

1. Should the C-NLOPB impose additional operational requirements on operators to ensure that the risk from helicopter travel in the Newfoundland and Labrador offshore is as low as is reasonably practicable? (Note: For example, safety systems, auxiliary fuel tanks, location of and restrictions on seating, safety screening, etc.) Placement of auxiliary fuel tanks and seating consequences are the only issues here.

2. What are the appropriate standards of offshore helicopter safety training to ensure that the risk to passengers is as low as is reasonably practicable, during both training and helicopter transport?

3. What personal protective equipment and clothing are necessary for helicopter passengers and pilots; what

are the standards, and should C-NLOPB require guidelines to ensure such equipment and clothing are properly fitted?

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

5. Should offshore workers have a level of personal accountability for their own safety in helicopter transport? (Note: For example, clothing to be worn under the suit, fitness training and reporting).

- **National Research Council - Institute of Ocean Technology**, St. John's, a world leader in cold water issues. Its mandate was to do the following:

1. Summarize existing knowledge of human thermal responses in varying environmental conditions.

2. Summarize current IOT-led research that has examined human performance in laboratory-controlled environments with immersion suits and varying conditions.

3. Identify knowledge gaps in immersion suit standard and expected performance. Compare a prescriptive to a performance-based methodology for standard-setting for immersion suits.

4. Provide comments on suggested safety approaches and best practices specific to immersion suits as well as part of a holistic safety approach.

5. Provide insight into emerging technologies areas for further research to support an enhanced Newfoundland and Labrador offshore safety system.

All expert reports were required to be filed with the Inquiry on or before May 31, 2010, and appear in Volume 2.

(b) Worker Surveys

During the course of the public hearings, it became apparent that the Inquiry would benefit from a more detailed description of worker concerns about helicopter transportation issues. Accordingly, I requested that surveys of helicopter passengers and Cougar personnel be carried out by Aerosafe Risk Management on my behalf. The responses to both surveys were helpful and important and I wish to thank the 991 offshore workers and the 67 Cougar Helicopters employees who responded, for their cooperation.

I have decided in this part of my Report to include a brief paragraph on how each survey was administered and then to reproduce the Executive Summaries prepared by Aerosafe for each survey.

For the reader who may wish to examine the full survey responses and the complete report, they are to be found in Volume 2 of this Report.

Helicopter Passenger Survey

The survey took place at Cougar's heliport at St. John's between April 1, 2010, and May 17, 2010. At the time there were approximately 1800 offshore workers on six installations. The survey was encouraged by the oil operators and took the workers 10 to 15 minutes to complete before they boarded. The participation rate was 51 percent, which allows for a margin of error of 3 percent. The directive was to identify any concerns which workers have respecting helicopter offshore transportation, including escape and rescue procedures.

The survey enabled offshore workers to express their views and contributed to my knowledge of the safety culture in the helicopter transportation of workers in the C-NL offshore.

Helicopter Passenger Survey: Executive Summary

> This Report was commissioned in 2010 by the Commissioner, Offshore Helicopter Safety Inquiry (OSHSI), Newfoundland and Labrador, Canada, the Honourable Robert Wells, Q.C. This Report presents the information and viewpoints gathered by means of a survey about helicopter safety matters from offshore oil workers who were passengers to offshore oil installations in the Newfoundland and Labrador offshore area between April 1, 2010 and May 17, 2010.
>
> The survey was qualitative in nature and was given to passengers to complete voluntarily. Direct encouragement to participate was offered by the Commissioner in a letter which accompanied each survey. Similarly, the oil Operators sent messages to their workers and contractors supporting passenger participation. All messages were on display at the survey distribution point (Cougar Helicopters Inc. heliport St. John's, Newfoundland and Labrador).
>
> There was a very high response rate to this voluntary survey over a relatively short period of six weeks. The level of worker participation in this survey indicates there is a strong voice and interest in helicopter safety. Several key issues have been identified through the survey results outlined in this Report. Overall the survey results are balanced and do not highlight any extreme safety issues that have not already been the subject of the Offshore Helicopter Safety Inquiry. Thirty-six questions were asked of passengers. In total 991 surveys were received by Aerosafe.
>
> The survey results can be classified into two primary categories, helicopter operations and survivability. Survivability only becomes an issue when an aircraft accident occurs; however, it is extremely important that passengers have confidence in this aspect of transportation. A high percentage of comments in the open free field part of the survey (Q35 and Q36) fell into this survivability category. Although there was a high percentage of responses with respect to helicopter operations, many of these responses indicated limited knowledge of aviation practices on the part of the passengers. It is

> difficult for non aviation specialists to appreciate the rigor and effort that go into safe helicopter operations and provide comment with the appropriate level of technical integrity.
>
> Responses to the survey were balanced and where concern was raised, it was raised by approximately 20% to 30% of respondents. This in itself is significant. 20% to 30% of survey participants is a noteworthy portion of the workforce and certainly enough to affect the centre of gravity for satisfaction in the workplace.
>
> Many could argue that the offshore industry of Newfoundland and Labrador has a good safety culture and has good safety practices. Regardless of this, there is a current and notable lack of confidence in a large percentage of the workforce on a range of issues under the safety umbrella. Whether the issues are real or perceived, proactive management of these issues is required.
>
> One of the key underlying issues that permeate throughout many of the responses is whether the level and type of communications among this workforce are adequate. Achieving the right level of communication and information flow will increase confidence around safety. (…)
>
> Overall the offshore helicopter passenger survey received a very high level of participation with just under 1000 workers responding, thus enabling this Report. In the interest of transparency, full disclosure of the raw data submitted by survey participants can be found in the annexes to this Report. The survey results contained in this Report provide an excellent foundation for the Inquiry, Regulator and Operators alike to address the concerns and take on board the ideas of the offshore workers. The building blocks are there but, as always in the "science" of safety management, more can be done.

Commissioner's Comment on Passenger Survey

The passenger survey's value is that it gives an insight into workers' concerns and their understanding of what is involved in offshore helicopter transport. The survey results are balanced and do not indicate extreme issues or extreme points of view.

There are two primary issues in helicopter offshore transportation. First, there is the operations issue and second, the issue of escaping the helicopter and surviving after a ditching or a crash.

There are concerns about flying offshore, and workers are aware that there are operational dangers which arise from weather such as fog and high winds, and from night flying. There are also concerns about the S-92A, especially since the March 12, 2009, crash and the loss of 17 lives. The published reports of troubles, either minor or major, with that aircraft are well known and have generated widespread news reports in both North America and Europe.

As I understand the survey results, the majority of respondents are not terrified or seriously afraid of helicopter flying, but they do, I think, have a greater or lesser degree of anxiety. That is especially understandable because of our long distances from land and our flying conditions, which can be among the most hostile in the offshore world.

The C-NL offshore workers, for the most part, are technically sophisticated and they understand that these helicopters are very complex machines requiring three hours of maintenance for every one hour of flight. They are also very complex machines to fly. Workers also understand that the demands on the skills of the pilots are very high in moderately severe or severe conditions, and that pilots in offshore flying have very little margin for error, especially when they are taking off from and landing on helidecks.

There is also anxiety on the part of workers over the probability of surviving a ditching or crash. All passengers are trained in escaping an overturned and fully immersed helicopter, but even with the best training and good sea conditions, there is a substantial risk to passengers of a downed helicopter. All of the above likely means at least a moderate state of anxiety for many passengers whenever they fly. I cannot see how it can be otherwise.

Nevertheless, in most cases, the perception of risk is not usually so great as to cause workers to discontinue offshore employment.

Survival skills, training, underwater breathing apparatus, seating within the helicopter and its cabin configuration are also causes for concern and anxiety. However, when the whole of survey results is taken into consideration, though workers have concerns, their perceptions of risk are understandable.

Cougar Personnel Survey

The survey was delivered to Cougar's heliport in St. John's on August 9, 2010. The security arrangements for storing the completed survey responses were found to be satisfactory.

On August 10, 2010, the General Manager of Cougar Helicopters gave all employees a notice that the survey was being conducted and a copy of the Commissioner's letter asking for their cooperation. The General Manager urged all personnel to respond to the survey.

From 113 employees came 67 individual responses, which was a 59-percent response rate. It must also be remembered that the survey was done in August, when a number of employees were on holiday.

Executive Summary: Cougar Personnel Survey

> This Report was requested in June 2010 by the Commissioner, Offshore Helicopter Safety Inquiry (OSHSI), Newfoundland and Labrador, Canada, the Honourable Robert Wells, Q.C. This Report presents the information and viewpoints gathered by means of a survey about helicopter safety matters from employees of Cougar Helicopters Inc. (Cougar). Cougar provides helicopter transportation services to the offshore oil installations in the Newfoundland and Labrador offshore area. This survey was issued at the request of the Commissioner as an extension to the passenger survey conducted in April and May 2010. The results of the Cougar employee survey are to be read in conjunction with this initial survey report.
>
> The survey was qualitative in nature and was given to employees of Cougar to complete voluntarily. Direct encouragement to participate was offered by the Commissioner in a letter which

accompanied each survey. Similarly, the General Manager of Cougar sent a message supporting employee participation to company employees. The survey was distributed over a three-day period at the Cougar heliport in St. John's, Newfoundland and Labrador. The survey attracted an excellent response rate which demonstrated a high level of interest of Cougar employees in participating in the Inquiry process.

It should be noted that slight modifications were made to the original survey issued to offshore oil workers so that it would be suitable for employees of a single aviation company. Most, if not all, Cougar employees who participated in the survey have a good working knowledge of aviation operations and safety management systems. This high level of aviation knowledge and experience provides the Inquiry with a different perspective from that of the passengers. The issues identified by Cougar employees were consistent with those identified by the workers in the passenger survey.

The results of the survey of the Cougar employees indicated that the employees viewed Cougar as a good employer that conducts safe operations. With that said, there is a level of concern with the current situation and the additional pressure of the circumstances that have followed the accident. The survey did not validate if these issues were real or perceived.

In addition to this, there was recognition by employees of Cougar that they work in a high risk environment as a result of factors such as difficult weather conditions, sea states and the hazards associated with night flying.

The open and informative responses in the questions with an open answer response field indicate an aviation organization that has a healthy and honest reporting culture. The reporting culture is a key element of an aviation safety management system. There is a useful level of detail in the suggested areas of improvement that provides the Inquiry with input from the perspective of the employees of the aviation provider.

Overall the results of the survey were consistent and extremely positive despite the awkwardness that these views could

potentially create in the customer-service provider relationship. The survey results are reflective of an organization with a mature safety culture.

Commissioner's Comment on Cougar Personnel Survey

The responses of Cougar employees are well dealt with in Aerosafe's Executive Summary. I need only comment that the responses were balanced and appropriate, in my opinion, and I express my thanks to all those who contributed to the survey.

Photographs and Illustrations

▲ Map depicting location of the Canada-Newfoundland and Labrador (C-NL) offshore

◀ Map depicting location of oil activity off the east and south coasts of Newfoundland and Labrador *(Exhibit 00155)*

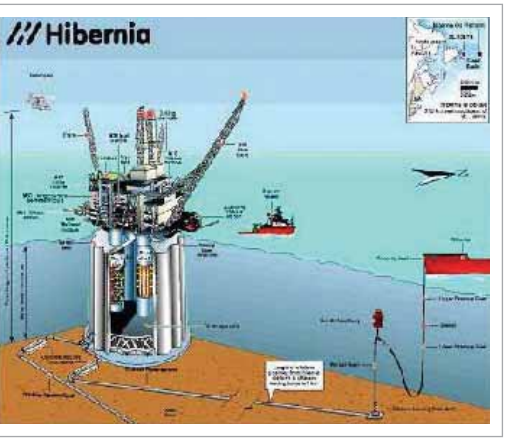


Diagram of the Hibernia gravity based structure (GBS) *(Exhibit 00130)*

The Hibernia GBS, operated by Hibernia Management and Development Corporation Ltd. (HMDC) *(Exhibit 00116)*

Diagram of the Terra Nova oil development site
(Exhibit 00138)

The Terra Nova Floating Production Storage Offloading (FPSO) vessel operated by Suncor Energy Inc. *(Exhibit 00116)*

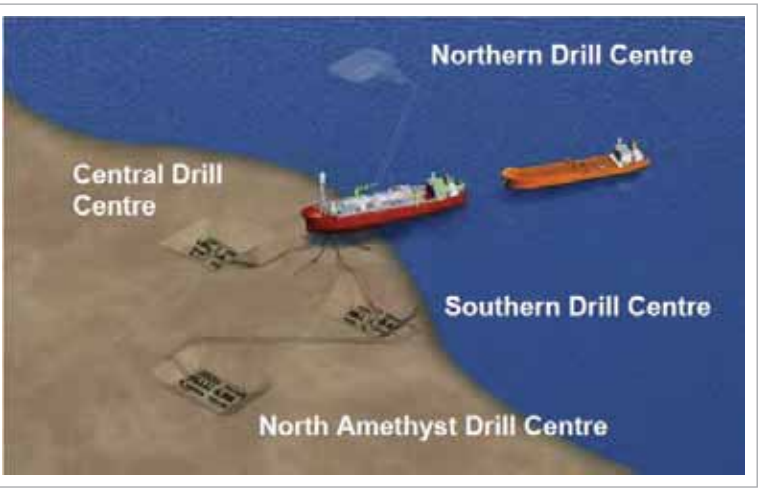


Diagram of the White Rose oil development site
(Exhibit 00146)

The SeaRose Floating Production Storage Offloading (FPSO) vessel, operated by Husky Oil Operations Limited
(Exhibit 00116)

Mobile Offshore Drilling Unit (MODU) GSF Grand Banks off the coast of Newfoundland and Labrador *(Exhibit 00146)*

Mobile Offshore Drilling Unit (MODU) Henry Goodrich off the coast of Newfoundland and Labrador *(Exhibit 00138)*

Cougar helicopter over the helideck of the Hibernia GBS
(Exhibit 00155)

Helicopter on the helideck of the SeaRose FPSO
(Exhibit 00146)

Cougar Helicopter being offloaded on the helideck of the Terra Nova FPSO *(Exhibit 00138)*

Supply vessel supporting the oil facilities in the C-NL offshore
(Exhibit 00146)

Supply vessel towing an iceberg away from the path of the C-NL offshore oil facilities
(Exhibit 00116)

Passengers boarding an S-92A helicopter at Cougar Helicopters heliport, St. John's, NL, for transport to the C-NL offshore *(Exhibit 00161)*

S-92A helicopter flying over St. John's harbour *(Exhibit 00155)*

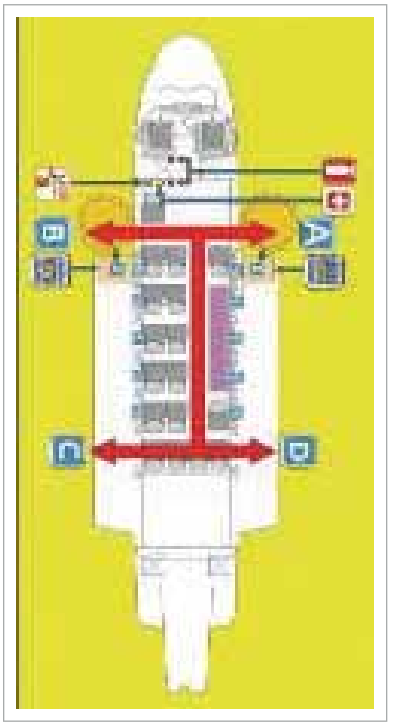


Chart depicting the interior layout of the S-92A with the location of the auxiliary fuel tank on the right side (marked in purple) *(Exhibit 00116)*

Interior of an S-92A, showing placement of seats and auxiliary fuel tank on the left side *(Exhibit 00018)*

Three of the emergency exits on the S-92A *(Exhibit 00018)*

The auxiliary fuel tank for the S-92A *(Exhibit 00164)*

▲ E-452 helicopter passenger transportation suit used in the C-NL offshore since 2007 and manufactured and serviced by Helly Hansen Canada Limited
(Exhibit 00116)

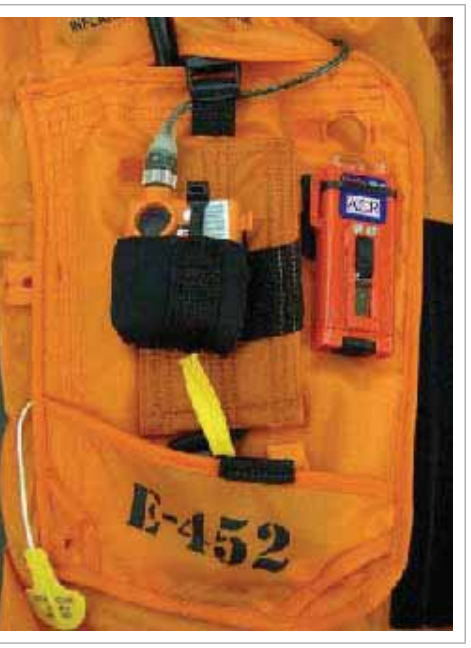
◀ Back view of the E-452 helicopter passenger transportation suit depicting the integrated inflatable lifejacket and air-vent valve in hood
(Exhibit 00225)

HTS-1 helicopter passenger transportation suit depicting a redesigned hood and face seal introduced in late 2009 in the C-NL offshore for passengers whom the E-452 suit did not fit well
(Exhibit 00222)

Back view of HTS-1 helicopter transportation suit depicting the back of the redesigned hood
(Exhibit 00223)

▲ Helicopter Underwater Escape Breathing Apparatus (HUEBA) and its components, introduced in the C-NL offshore in spring 2009 *(Exhibit 00084)*

HUEBA shown in the left ▸ pocket of the helicopter passenger transportation suit *(Exhibit 00116)*



Personal Locator Beacon (PLB) attached to the right side of the helicopter passenger transportation suit
(Exhibit 00116)

Goggles on the sleeve of the helicopter passenger transportation suit
(Exhibit 00155)

Helicopter passenger transportation suit used in Norway's offshore oil industry: integrated lifejacket, hood, and face seal
(http://www.hellyhansensurvival.com/immersion_suits/06_transportdrakt_sea-air.html)

Helicopter passenger transportation suit used in Norway's offshore oil industry: splash shield and gloves
(http://www.norskdesign.no/textile-and-clothing-design/helly-hansen- seaair-suit-for-helicopter-transport-offshore-article3014-407.html)

Helicopter passenger transportation suit used in the UK offshore oil industry: neck seal (hood is located in pocket over left knee)
(http://www.multifabs-survival.co.uk/ multifabs/products/civil-aviation/ index.html)

Helicopter passenger transportation suit used in the UK offshore oil industry: the re-breather (in red) and inflatable lifejacket (in black)
(http://www.sharkgroup.co.uk/survival_lifejacket.html)

Crewsaver (UK) immersion suit ▸
used for marine abandonment
(http://www.crewsaver.co.uk/Crewsaver/Industrial_Commercial_Products/index.html?catid=64)

◂ Fitzwright (CDN) immersion suit
used for marine abandonment
(http://www.baresports.com - Manufacturer)
(http://store.vernondeon.com/index.php?opt=detail&ID=108&PID=6274)

Human performance and manikin testing in the testing pool of National Research Council – Institute of Ocean Technology (NRC–IOT) *(Exhibit 00221)*

Testing of exertion with tubes at NRC–IOT
(Exhibit 00221)

Subject during testing in wind and waves in pool at NRC–IOT
(Exhibit 00221)

Subject during testing in calm water in pool at NRC–IOT
(Exhibit 00221)

▲ Helicopter Underwater Escape Trainer (HUET) during survival training at the Offshore Safety and Survival Centre (OSSC), Marine Institute, Memorial University, NL *(Exhibit 00018)*

▲ HUET rolling during training at OSSC *(Exhibit 00018)*

Trainee exiting door of HUET at OSSC ▸ *(Exhibit 00018)*

High-back seat and four-point harness in HUET with trainee in brace position
(Exhibit 00214)

Low-back seat in HUET
(Exhibit 00214)

▲
Trainee preparing to egress the HUET during training *(Exhibit 00018)*

Ditched helicopter
(Exhibit 00214)

Inverted helicopter *(Exhibit 00097)*

Ditched helicopter with life rafts alongside
(Exhibit 00018)

Passengers in water next to life raft and ditched helicopter
(image provided by Dr. S. R. K. Coleshaw)

Diagram depicting flotation equipment on S-92A in 2009
(Exhibit 00155)

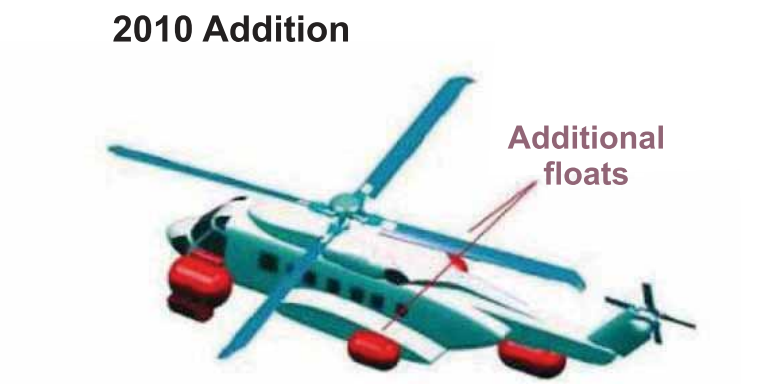


Diagram depicting additional flotation equipment installed on S-92A in summer of 2010
(Exhibit 00155)

◂ Yellow floats deployed on inverted helicopter
(Exhibit 00214)

▲ Floats on HUET on its side
(image provided by Dr. S. R. K. Coleshaw)

◂ Air pocket in interior of HUET with side flotation
(Exhibit 00214)

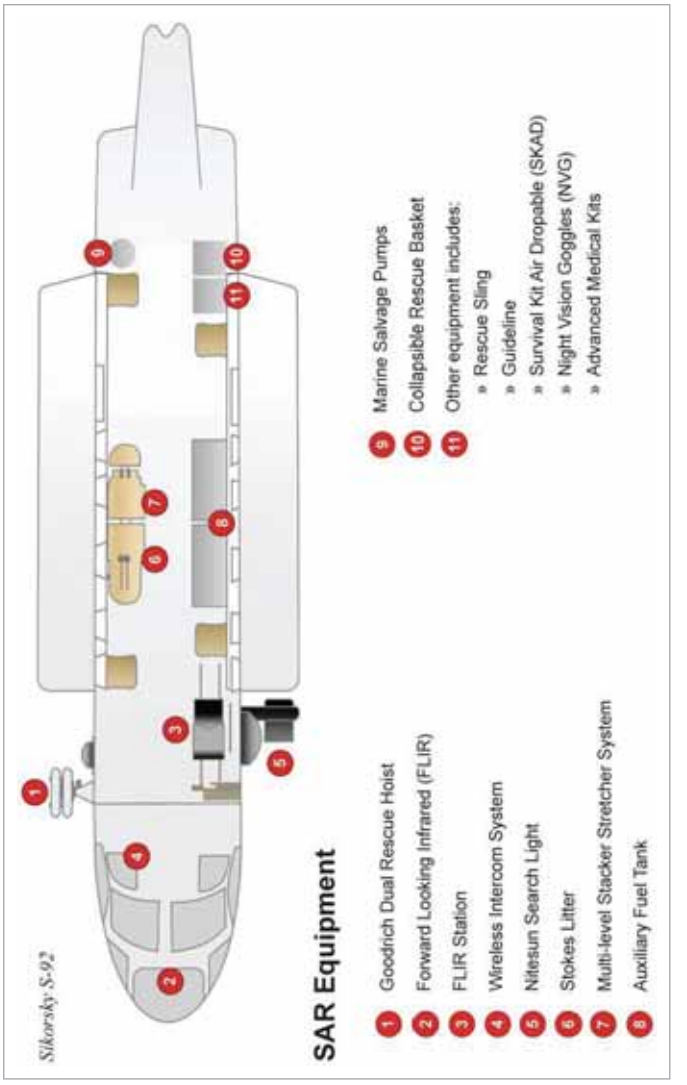
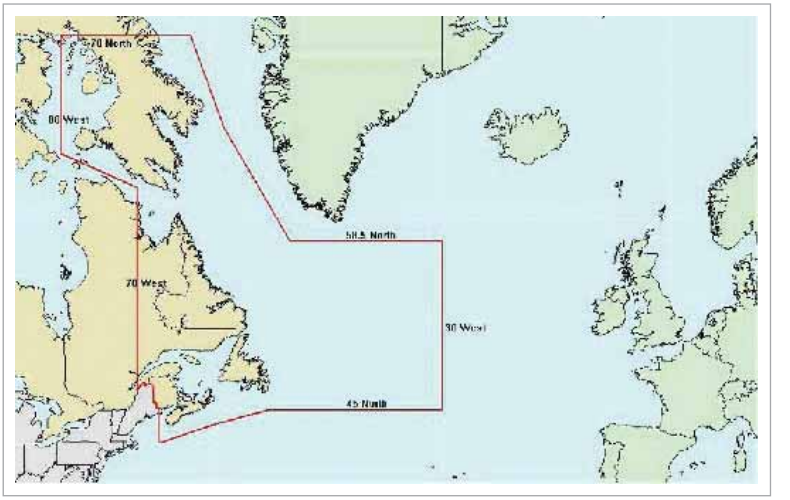


Chart depicting Cougar Helicopters' first-response configuration of an S-92A
(Exhibit 00155)

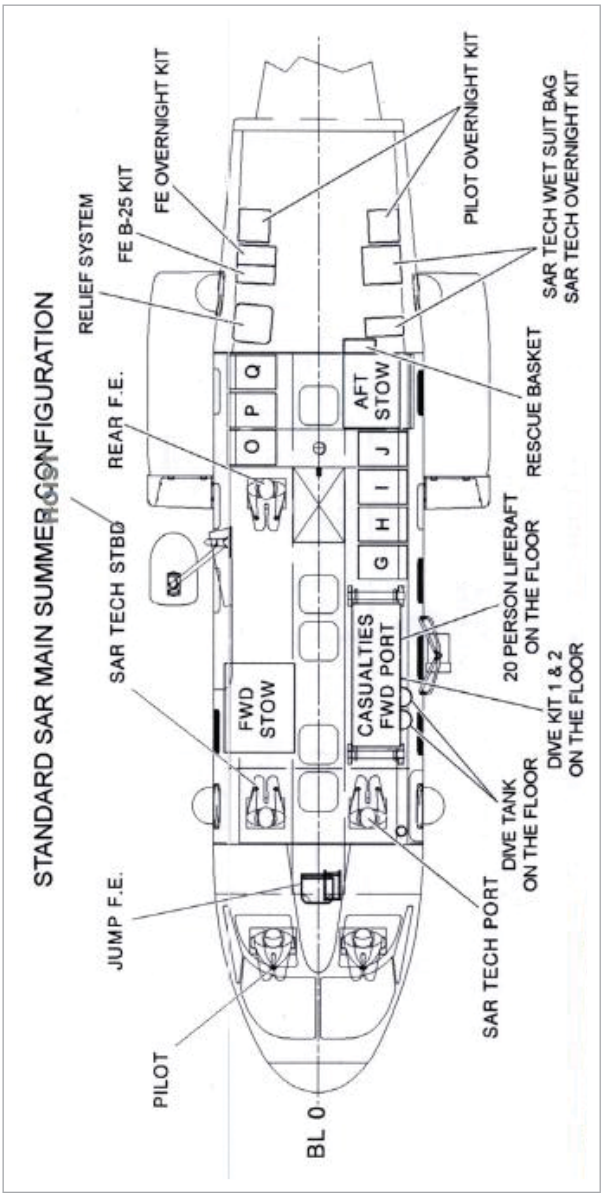
Cougar Helicopters' first-response training showing a rescue specialist being hoisted by an S-92A
(Exhibit 00168)

Cougar Helicopters' first-response training: hoisting a rescue specialist above a supply vessel
(Exhibit 00116)



Map depicting the Search and Rescue Region of the Joint Rescue Coordination Centre (JRCC) in Halifax
(Exhibit 000116)

Map depicting locations of Search and Rescue (SAR) units
(Exhibit 000154)



Standard SAR Summer Configuration of Cormorant used by Canadian Forces *(Exhibit 00154)*

Cormorant Helicopter used by the Canadian Forces for SAR missions
(Exhibit 00154)

Canadian Forces SAR Cormorant training over vessel
(Exhibit 00154)

Map of the North Sea *(©GraphicMaps.com)*
(http://www.worldatlas.com/aatlas/infopage/northsea.htm)

Chart depicting oil and gas wells and fields in the UK sector of the North Sea *(WorldOil.com)*
(http://www.acorn-ps.com/web/page/oilgas/nsfields/snsmap.htm)

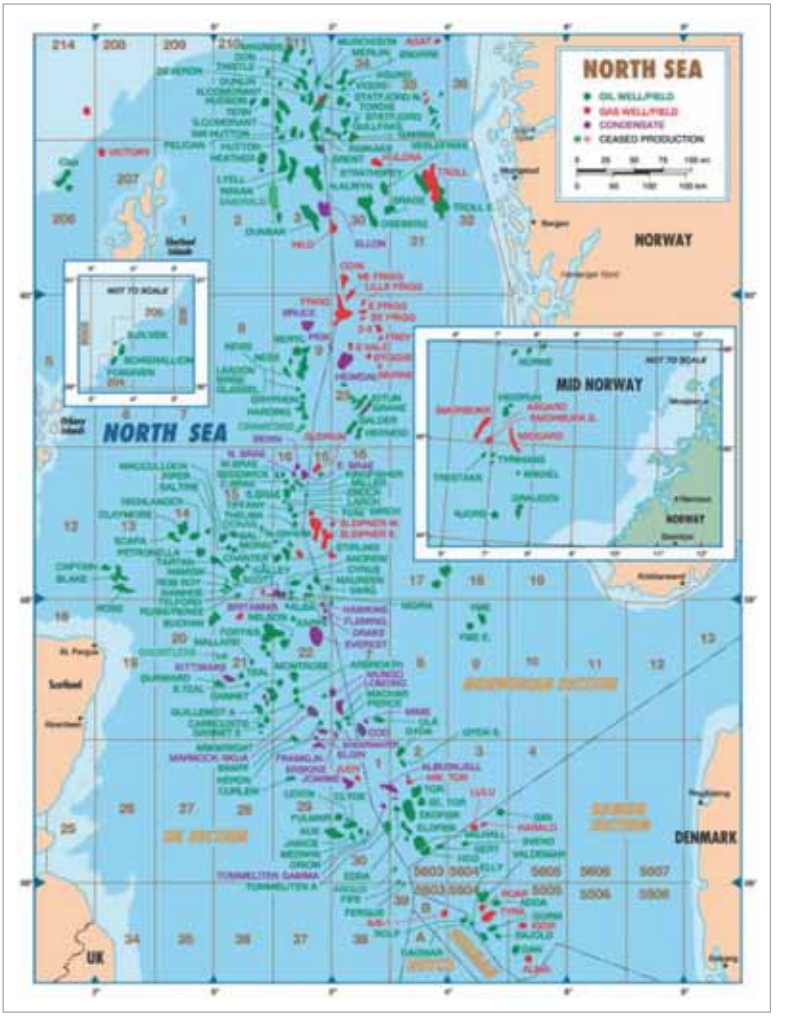


Chart depicting oil and gas wells and fields in the Norwegian sector of the North Sea *(WorldOil.com)*
(http://www.acorn-ps.com/web/page/oilgas/nsfields/nnsmap.htm)

Chapter Seven

Consideration of the Inquiry Issues

Consideration of the Inquiry Issues

There are two categories of Issues for my consideration – overarching Issues (numbered 1 to 5) and specific Issues (numbered 6 to 22).

The overarching Issues involve the various roles of the C-NLOPB, the oil operators, and the helicopter operator, and their relationships with one another, the workers, other suppliers and providers, and other regulators. The specific Issues, as that name implies, involve more narrow and focused questions. But there is some overlap in that four of the specific Issues arise naturally in the context of the discussion of the overarching Issues.

I will first deal with specific Issues 6 to 18, and then move on to the overarching Issues. Specific Issues 19 to 22 will also be covered in that later discussion. At the conclusion of the section on overarching Issues, I will make some general observations arising out of the Inquiry's work, followed by my recommendations.

It is important to remember that all Issues were collaboratively chosen by the Inquiry and the participants and represent a consensus among those involved.

Issue 6 - What is the appropriate standard of first-response search and rescue that the C-NLOPB should require of all operators in the Newfoundland and Labrador offshore?

In some respects, the first-response issue originated in the C-NL offshore with the Ocean Ranger Report and its recommendation for a full-time dedicated rescue helicopter, which I cite early in this Report. Over the years, a standby first-response system was developed but it was not as recommended and it did not include a dedicated helicopter. Thus, on March 12, 2009, the standby helicopter had to have its passenger seats removed, and hoists and other search and rescue equipment installed, before it could take off on the search and rescue mission. The time required to prepare the helicopter for takeoff was in total 45 minutes and takeoff did not occur until 50 minutes after the first report of oil pressure loss on Flight 491.

For the interested reader I will give the times of the most significant events in the search and rescue procedures on March 12, 2009. As best as Inquiry Counsel and I can determine, the correct search and rescue times appear to be as follows, as taken from Cougar's evidence:

9:40 a.m.	emergency declared by Flight 491
9:45 a.m.	Cougar dispatch issues search and rescue alert to maintenance department
10:34 a.m.	Cougar search and rescue helicopter takes off (49 minutes after reconfiguration alert, 54 minutes after emergency declared)
10:56 a.m.	Cougar helicopter arrived at accident scene (flight time was 22 minutes)
76 minutes	total time, declared emergency to arrival at scene

11:34 a.m.	second Cougar helicopter arrives at the accident scene, freeing first Cougar helicopter to leave for Health Sciences Centre, St. John's[1]
11:58 a.m.	two DND SAR helicopters arrive at the scene
12:04 p.m.	first Cougar helicopter arrives at Health Sciences Centre, St. John's
2 hrs. 24 min.	total time from declared emergency to delivery of survivor to hospital, 9:40 a.m. to 12:04 p.m.

It must be remembered that the Department of National Defence was and is the primary provider of search and rescue in Canada but its equipment and personnel are stationed in Gander, NL, which is about 100 air miles west of St. John's. St. John's is the point of land closest to the offshore oil installations. The oil operators knew that the DND response time (wheels up) was 30 minutes between 8:00 a.m. and 4:00 p.m. and 120 minutes at other times. To these times, should an offshore emergency arise, must be added the 30 to 45 minutes it would take for a DND helicopter to arrive over St. John's. At best an hour would then have passed and even as much as an hour and a half, depending on weather-related or other delays.

Even today, the S-92A, which is a fast helicopter, takes one and a half hours to go from St. John's to Hibernia. If a helicopter ditched at midpoint between St. John's and Hibernia, a helicopter from Gander would likely arrive on the scene in the following time frame: 30 minutes wheels up, plus 45 minutes to St. John's and a further 45 minutes to the scene of the ditching. In total the elapsed time between the incident or accident and the arrival of SAR from Gander would be about 120 minutes: two hours more or less, assuming things went as planned and the rescue area was found quickly. It is reasonable to be concerned that in two hours

[1] When the survivor, Robert Decker, was hoisted on board the first helicopter, it circled the scene for the protection of the rescue technician, who remained in the ocean until he was hoisted by a second helicopter. If the first helicopter had left the rescue technician in the water and returned to St. John's, a second life would have been at risk.

or longer, the occupants of a downed and overturned helicopter in our cold and hostile waters, even if they escaped the machine, would be in grave danger. It is obvious that the further offshore an accident occurred, the greater the response time would be. For a helicopter to arrive at Hibernia from St. John's, for example, would take more than two hours, not counting initial response time; and from Gander it could take three hours.

Clearly, the oil operators and the Regulator knew that they had to involve themselves in first-response helicopter search and rescue. In that connection I should briefly mention the concept of ship or boat rescue. A senior coast guard officer explained to me that the coast guard could be of effective help only if they happened to be in the immediate area of the crash or ditching; otherwise, they could not reach the rescue area in time.

If a coast guard vessel were to leave St. John's within thirty minutes of being dispatched, then depending on the distance to the accident scene, the vessel would not be in a position to effect a rescue in less than several hours, unless the downed helicopter was in the immediate vicinity of the coast. The other major factor is that Hibernia is the closest installation to land; some other installations are much further away. In 2010, an exploratory well was drilled at about 500 kilometres out, which places drilling at the edge of the continental shelf.

The oil operators in their current contract with Cougar Helicopters specified a response time of wheels up in one hour. The reason for that long interval before takeoff was that the rescue helicopter was a standby helicopter, not a dedicated helicopter. The word "dedicated," in this context, means "used or designed for one particular purpose only." The contract called for a normal passenger helicopter without rescue equipment and with passenger seats in place. It followed that before the helicopter could be used for search and rescue, the seats and a door had to be removed, a winch or hoist fitted and all the search and rescue equipment placed in position on board, with pilots and rescue technicians ready before it could depart. As the following figures demonstrate, if the Cougar search and rescue helicopter were, for example, 30 minutes from St. John's, it would not likely have time, after being reconfigured, to meet even the one-hour wheels-up time, because on March 12th it took 50 minutes to reconfigure the helicopter, which was on the ground when the

emergency call came in. (At the time of the crash, there was no dedicated standby helicopter. Cougar was contracted to use all its helicopters for transportation purposes. The requirement to have a first-response helicopter available was met as long as the next incoming flight was within 30 minutes of St. John's. When that passenger helicopter landed, it would become the standby helicopter. The import of this organizational choice was that 30 minutes could be added to the 50 minutes to reconfigure the helicopter, so that the total wheels-up time in such a circumstance could be as much as 30 minutes plus 50 minutes: total one hour and twenty minutes.)

In the case of the crash of Flight 491, from the time of the emergency call at 9:40 a.m. on March 12, 2009, it took 50 minutes for the rescue helicopter to be in the air and a further 22 minutes for it to reach the scene. In fact, even though the crash site was only 30 nautical miles from St. John's, the rescue of the lone survivor did not actually begin until 72 minutes had elapsed from the first call at 9:40 a.m. By the time the heroic rescue by Cougar's specialists had been accomplished, the survivor was near death because his core body temperature had fallen to 28°C. Considering all of the factors which delayed his rescue, it is miraculous that he survived.

In the course of the Inquiry hearings, after reviewing evidence and written materials made available to me on the subject of search and rescue, particularly in the North Sea, it became very clear that in the C-NL offshore our response times fell well below the standards applicable in other offshore oil operations. I will list some of the differences applicable to the North Sea:

(a) Search and rescue helicopters contracted by the oil operators and all public search and rescue helicopters are fully equipped and dedicated for search and rescue and nothing else. In addition, the distances to be flown from either a land-based or offshore-based helicopter site are shorter than ours in almost all cases.

(b) North Sea search and rescue helicopters are equipped with FLIR (forward-looking infrared radar) and auto-hover, which our first-response helicopters do not have.

(c) The wheels-up response time is 15 minutes for both UK and Norwegian search and rescue helicopters.

In the North Sea, a network of large, fast rescue craft, up to 80 feet long, has been developed so that rescue craft complement industry helicopter rescue. These rescue craft hang from each side of a mother ship and can be deployed very quickly. Also available is the response of public search and rescue helicopters, usually the Coast Guard. North Sea search and rescue is available from both the UK side and the Continental Europe side of the North Sea. In our offshore, air rescue can come only from the west, namely from Newfoundland or mainland Canada. Furthermore, the number of oil installations in the C-NL offshore is tiny compared with the number in the North Sea, where there are several hundred installations in a less hostile ocean environment. The net effect is that rescue efforts from England, Scotland, Norway, and the Netherlands, acting together when necessary and in constant liaison with one other, comprise far better rescue coverage than can ever be provided in the C-NL offshore.

Our offshore environment is as hostile as or more hostile than any other in the world. I believe that, of necessity, the level of helicopter search and rescue available to the C-NL offshore should be as good as we can provide and, ideally, as good as exists elsewhere in the world. I say that because our conditions are severe and our distances are great. In most instances, helicopter rescue from land would be the only hope, as there is not at present the capability to station a search and rescue helicopter on an offshore installation, as is done in certain areas of the North Sea. At the same time, I recognize that total coverage in our offshore cannot be as extensive as that in the North Sea, where industry and governments provide air and sea rescue the totality of which is massive. Circumstances therefore dictate that at the very least, our helicopter SAR response should be world-class, specifically because of our hostile offshore environment.

As the Inquiry progressed, I recognized the urgency of needed improvement, which was so great that I felt compelled to make interim recommendations on February 8, 2010. These recommendations allowed for improvement to begin at once, rather than awaiting a final Inquiry report. The two letters which I wrote on February 8, 2010, are as follows:

February 8, 2010

Mr. Max Ruelokke, P. Eng.
Chair and CEO
Canada-Newfoundland and Labrador Offshore Petroleum Board
Fifth Floor, TD Place
140 Water Street
St. John's, NL
A1C 6H6

Dear Mr. Ruelokke:

The issue about which I am now writing has for several weeks been a growing concern for me. However, the evidence which I have heard at the Inquiry during the past two weeks causes me to believe it is a matter requiring immediate attention. It concerns the adequacy of the first-response search and rescue capability located at St. John's.

You will remember Clause 9 of my Terms of Reference and in particular the last paragraph which says:

"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."

I have read about response capability in the North Sea oilfields and elsewhere in the offshore exploration and production world. Under many other regimes, the first response by fully dedicated helicopters varies from 15 minutes (wheels up) to as much as 30 minutes. There are no doubt longer response times but a window of 15 to 30 minutes is I believe an acceptable standard.

The speed of response is especially important in the Newfoundland and Labrador Offshore, because our distances are great and the North Atlantic over which we fly, is perhaps the most hostile offshore helicopter environment.

If a helicopter is forced to ditch in our waters, the life expectancy of survivors is limited, even with the best immersion or flotation suits and the best training.

It has emerged at the Inquiry that our present response time involves about 40 to 45 minutes to prepare the helicopter for a rescue mission. Assuming a midpoint distance between St. John's and the Hibernia platform, 158 kilometers, our first response would require 45 or 50 minutes to prepare the helicopter, plus about 30 minutes to fly to the ditching scene. The total time at best would be one hour and twenty minutes and in adverse conditions and allowing for a search for survivors, it could take an hour and a half or even longer. Our furthest installation is now 500 kilometers out and would likely pose longer time frames and greater difficulties in the event of a ditching.

It has become obvious at the Inquiry that our St. John's "wheels up" time frames can be and should be improved.

I turn now to issues of equipment and personnel at the St. John's base.

I have no doubts about the skills of Cougar's pilots and rescue specialists, however a fulltime, dedicated and fully equipped response helicopter ready to go in 15 or 20 minutes is what is needed in St. John's, and needed as quickly as possible. It should be equipped with a forward looking infrared camera mounted externally, which is an indispensible tool for detecting objects or persons in the water at night. It is effective from a distance of 4 or 5 kilometers, depending on conditions. It requires to be mounted on a fulltime dedicated helicopter which is also equipped with auto-hover and a double winch and ready to go in 15 to 20 minutes. Appropriate auto-hover for the S92 is expected to be approved by Transport Canada by July of this year, but that should not delay the imposition of quicker response time which I believe is crucial. The S61 can already use auto-hover according to my

information, and Cougar has one in St. John's according to their evidence.

It is quite feasible to equip a Sikorsky helicopter with the foregoing improvements and make it a fully dedicated first-response helicopter which can be "wheels up" in 15 or 20 minutes. That is I believe an essential priority which should be addressed forthwith, and implemented as quickly as possible.

I believe there is another factor which makes this even more important. I have been told that the S92 is believed in the industry to be a good machine. Nevertheless, the aviation advisories which have come to public attention in recent months have not improved the confidence of offshore workers, their families and the public generally.

I believe that going forward at once with a fully dedicated first-response helicopter and with substantially improved response times would reassure workers, their families and the public, that safety is being treated as the priority which it is. The present response from St. John's does not meet the highest standards.

I learned in the past week that Cougar has the ability to provide the kind of service which I have described and they are already providing that service in Alaska, the Northwest Territories and the Gulf of Mexico. They contracted only last week to provide it in Greenland. Other companies are providing comparable search and rescue responses in the North Sea, with wheels up in 15 minutes.

Another matter of concern is night flying. Night flying has been curtailed but not eliminated. I believe that night flying should be revisited and possibly be restricted to emergencies only, until a first-response rescue helicopter is in service equipped with auto-hover and the forward-looking infrared device, both of which are very important for night rescue.

In closing I should emphasize that I believe these matters are of such urgency that they warrant my bringing them to the attention of the Board, as provided in Clause 9.

Yours sincerely,

Honourable Robert Wells, Q.C.
Commissioner

February 8, 2010

Mr. Max Ruelokke, P. Eng.
Chair and CEO
Canada-Newfoundland and Labrador Offshore Petroleum Board
Fifth Floor, TD Place
140 Water Street
St. John's, NL
A1C 6H6

Dear Mr. Ruelokke:

This is further to my letter today and subsequent telephone conversation. I wish to confirm that I have not suggested to the Board that helicopter transport should be stopped or curtailed while first response is being improved.

My letter recommended in essence that the process of improvement should begin now rather than waiting for my report at the end of September or the Transportation Safety Board's report sometime in the fall.

The gist of my letter is that I think improvements to first response should be made. Improvements of course will take time and cannot be made in a day, or a month necessarily, but the process of improvement should begin.

Regarding auto-hover, the military has used the S61 with auto-hover. Though the military and paramilitary have used auto-hover on the S61, I have now been told that Transport Canada

will not certify auto-hover on the S61 for civilian use, but will certify auto-hover on the S92.

The S61, which Cougar brought to St. John's recently, was equipped with the forward looking infrared equipment, but the equipment was removed, but can be reinstalled on that S61 at any time.

A dedicated S92 can also use infrared and use auto-hover when it is certified by Transport Canada later this year. Auto-hover is needed for night rescue when visibility is limited, hence my concern about night flying.

Daytime rescue can be effected by an S92 or the S61; it is the response time which I see as the important focus and that requires a fully dedicated helicopter.

I trust this clarifies the matter.

Yours sincerely,

Honourable Robert Wells, Q.C.
Commissioner

cc: Mr. John Andrews
Legal and Lands Manager

I appreciate the speed of C-NLOPB in acceding to my recommendations and the efforts of the three oil operators in beginning action on these new requirements as quickly as possible.

In considering this issue, I think the course of future oil exploration and production in the C-NL offshore will be an important factor in determining what may be needed a few years from now. In the summer of 2010 there were three producing installations and two facilities doing exploratory drilling. Oil production peaked in 2006, after which there began a slow decline. That, I understand, is a normal occurrence because the most rapid production is usually in a well's early stages.

What I describe as a slow decline will be halted with the beginning of production from Hebron in 2017, but by 2020 its production will also have begun to decline. It is impossible to predict what further discoveries will be made, and when and whether they will be economically viable. It is also impossible to know for certain whether new installations will have to be built, or whether new producing wells can be accessed from existing installations, as Husky has been able to do with North Amethyst. All that being said, it would be imprudent of me to speculate on what may happen more than 10 years from now. I am confident, however, that for the next 10 years at least, the C-NL offshore will be producing significant quantities of oil and that the workforce will not decrease in size and will probably increase overall. This opinion does not take further exploration into account, or a movement into natural gas production.

In my opinion I should not make additional recommendations on first response at this time. I understand that a capable first-response S-92A helicopter, fully equipped with the most advanced rescue equipment and with fully trained and experienced pilots and rescue specialists, will be in service in the fall of 2010. This improvement, along with the service provided by the Department of National Defence, will constitute a significant safety advance.

I cannot overemphasize the necessity for speed in first response. A 15-minute wheels up in an S-92A, which is a very fast machine, can mean the difference between life and death for downed helicopter passengers who are still alive in a cold and stormy ocean. In a performance-based regime, every rescue component is vital to the optimal rescue capability.

In the next three to five years, the C-NLOPB, the oil operators, and the workers, in a joint committee structure, should consider whether the growth of the industry, the distances offshore, and the numbers involved justify stationing a first-response helicopter on an offshore platform, which is impossible at present but could be considered for a future platform. I make that statement as an observation, not as a recommendation. The reader will note that I have included the workers in that observation. I do that because I hope that in the future, offshore workers will play a greater role in offshore helicopter safety than they have in the past, and that stakeholders and the public will be part of such discussions. I will be

raising throughout this Report the concept of wider worker, stakeholder, and public participation in safety matters.

Issue 7 - Are there circumstances other than declared emergencies in which a rescue helicopter should be dispatched to assist a transport helicopter?

That issue arose during the public phase of the Inquiry. A person who had been a passenger on a normal offshore transport flight told the Inquiry that he became aware, as did all passengers onboard, that a warning light had come on in the cockpit and that the flight was being aborted and the helicopter had turned around to return to base. The warning light was announced by the pilot.

After the helicopter had turned, the passenger in question noticed that it was being followed by a Department of National Defence SAR helicopter, which was clearly visible and identifiable because of its colour and markings. The accompaniment by the SAR helicopter continued throughout the return flight. The passenger reported that the presence of the SAR helicopter was very comforting to him and no doubt to other passengers. Their immediate reasoning was that if they were forced to ditch, rescue capability would be close at hand.

The feelings of the passengers can be readily understood and that evidence later gave rise to a discussion which led to the inclusion of this topic for my consideration.

It is quite clear that if a transport helicopter pilot declares an emergency then the first-response search and rescue helicopter, if it is not on another emergency mission, should be in the air as quickly as possible and on its way to the emergency scene, whether that is a downed helicopter or an in-flight helicopter in jeopardy of crashing or ditching. If the helicopter in trouble goes down, rescue will be at hand, or at worst, closer than it would otherwise have been.

The issue of circumstances other than declared emergencies would, in my opinion, most likely involve a warning light of some kind, or an observed malfunction which could lead to a ditching if it worsened, or perhaps a concern that headwinds or other weather factors could force the helicopter to ditch with a fuel emergency or render it vulnerable in some other way.

In such a case a non-expert must be cautious in prescribing a detailed solution in advance; thus, I believe that the decision to seek airborne assistance should rest with the pilot of the problem helicopter, in consultation with the helicopter operator's dispatcher and other in-house experts. Those engaged in such a consultation will bear in mind weather and other factors which may also place the search and rescue helicopter and crew in danger. In all cases the pilot in command should have the authority to make the final decision on a request for help, but flying conditions may place the last word with the search and rescue response leaders, who are duty-bound to avoid catastrophic risk to their own search and rescue crew.

My final comments on the issue are that an accompanying search and rescue helicopter would be a comfort to the transport pilot and the passengers. If the transport pilot requests accompaniment, then it should be provided when it is safe to do so and doing so would not place other persons in serious jeopardy.

My recommendation to C-NLOPB is that it engage the oil operators, the helicopter operator, and the representatives of the offshore workers in a collaborative discussion to develop a set of useful guidelines or an acceptable protocol for such situations.

An illustration of what would have been available on March 12, 2009, had there been a 15-minute wheels-up response time, can be taken from the circumstances of Flight 491. Under the regime which I am proposing, when the aircraft reported a loss of oil pressure, the first-response helicopter would have been scrambled and departed in 15 to 20 minutes to meet Flight 491. We know now that Flight 491 flew for a further 10 minutes after oil pressure was lost. Under a 15-minute wheels-up requirement, the first-response helicopter would have been in the air and on its way within minutes of the crash and would have arrived at the crash site about an hour sooner than the one and a half hours which it took the reconfigured helicopter on March 12, 2009. That hour would not have made a difference to the passengers who died in their seats but it would certainly have made a difference to the condition of the survivor, Robert Decker, at the time of his rescue. If there had been several people alive in the water, as would likely have been the case had there been a ditching

instead of a crash, quick response would have made the difference between life and death, in all probability, for many of the passengers.

That scenario demonstrates the need for the immediate dispatch of a first-response helicopter when another helicopter is in difficulty. The knowledge that another helicopter is or will soon be on its way is a comfort and a reassurance that in my opinion pilots and passengers are entitled to receive. Should the first-response helicopter and crew not be needed after all, the dispatch of that helicopter would at the very least be a training mission in rapid deployment. Such training is necessary to search and rescue.

Issue 8 - Should there be a more formal protocol to identify the roles of the Department of National Defence and the helicopter operator regarding first response?

One of the major lessons I learned in my meetings with regulators, oil operators, helicopter operators, trainers, and union representatives, is that in both Norway and the United Kingdom a large number of organizations are involved in the discussions which lead to decision making. The foregoing involvement in decision making goes far beyond helicopter safety into safety matters of all kinds. The safety authorities in both Norway and the United Kingdom convene formal and recurring meetings with a wide variety of participants so that any entity with a safety role or contribution to make meets and consults with the regulator and the other entities or persons who also have safety roles. Earlier in this Report, there are references to those involved in such discussions in the North Sea.

The contrast between what happens in the North Sea in that regard and in the C-NL offshore is very marked. It emerged in the Inquiry hearings that many of the agencies with a role in offshore helicopter safety do not have formal mechanisms for discussion and the exchange of information and ideas with a broader group. The oil operators, the helicopter operator, Transport Canada, C-NLOPB, and the workers, just to name some of those involved, all have safety roles, duties, and responsibilities. Nevertheless, during the hearings I did not hear of formal and all-inclusive mechanisms for information sharing and cooperation in offshore helicopter safety issues. By reason of the JOHS committees, all have some knowledge of what the others do, but that knowledge is not nourished by close, organized, and frequent dialogue leading to consensus decisions. That is the case with the role of the Department of National Defence, which is the major provider of SAR services in Canada and internationally-specified oceanic areas off its coasts. In fact, it is ultimately in charge of all search and rescue operations in the country, yet there is not, as far as I know, any formal protocol concerning DND and oil-operator-contracted search and rescue.

In light of the lack of close involvement of important players in the C-NL offshore industry, I have come to believe that a protocol would be desirable and that its development should involve stakeholders, all of

whom would then be fully informed. The leadership role in organizing and convening the necessary meetings should come from the Regulator.

As an example, the lack of full understanding of the DND role was underscored during the public hearing portion of the Inquiry, when the oil operators asked me to invite DND to explain its role fully. I acquiesced in that request and DND made a very helpful presentation, which I am sure was appreciated by all parties with standing and by the general public. DND should be invited to participate in such Regulator-organized meetings to advise the participants, because of its high level of expertise in helicopter operations and, in particular, search and rescue.

Issue 9 - Are operational limitations on helicopter transport, in addition to those dictated by Transport Canada, required to ensure the standard of first-response search and rescue is able to be maintained at all times? (*Note: For example, operational sea states, night flight and low visibility.)*

This question is a difficult one. Search and rescue is vitally important but the lives and safety of SAR pilots and technicians should not be jeopardized by their being required to accept extreme challenges which are beyond the circumstances for which they are trained and with which they are equipped to deal.

Transport Canada's operational limits are the correct starting point but they may not cover every situation which can arise. Flight regulations are designed for helicopter flight, not necessarily for sea conditions which would jeopardize the lives of passengers and responders if a helicopter had to ditch. For example, we usually associate sea states directly with wind. However, wave action caused by storms hundreds of kilometres away can occur on the helicopter route. Sea conditions can be further exacerbated by cross winds and waves intersecting with other waves and make for extremely dangerous conditions for the passengers of a ditched helicopter. Fog can develop very quickly, and visibility, especially at sea level, can be virtually nil from one minute to another.

It would be unwise for me to attempt to prescribe measures to counter the foregoing dangers. I will be recommending that goals be set by the Regulator, to be followed by the oil operators' responses, and then by a full discussion among the Regulator, the oil operators, the helicopter operator(s), and worker representatives, possibly with the assistance of Transport Canada.

I have doubts about the prescription, by regulation, of conditions over and above those of Transport Canada. If Transport Canada regulations permit flight on any given day or night and a helicopter ditches, I believe that the decision to send a SAR helicopter must rest with dispatchers and experienced pilots with input from experienced weather observers and forecasters. The very essence of SAR is the assumption of certain risks for which SAR pilots and technicians are trained and which

they accept. It has in my opinion to be an operational decision, made with the best information available at the time in question.

The matter of operational limitations on transport helicopters is, I believe, 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. Again, the decision to go or not to go should be made by the same group of professionals which I listed above, with the caveat that if there is any doubt about the decision, the decision makers should err on the side of safety and the helicopter should not fly. Crews and passengers in transport helicopters should not be asked or permitted to fly into danger in order to keep to operational schedules of any kind, nor should passenger pressure influence such decisions.

It is obviously better not to be in the air in conditions which may endanger or frighten passengers, and, should things go wrong, endanger the lives and safety of SAR personnel also.

It is important to transport persons back and forth from offshore installations on schedule, but the schedule, no matter what the pressures, or from whom, should never override the safety of crews and passengers. I believe that the professionals who have input into flight decisions are fully aware of their responsibilities to safety. (Please note my comments regarding night flying in Issue 11.)

Issue 10 - Should the C-NLOPB impose additional operational requirements on operators to ensure that the risk from helicopter travel in the Newfoundland and Labrador offshore is as low as is reasonably practicable? ***(Note: For example, safety systems, auxiliary fuel tanks, location of and restrictions on seating, etc.)***

This Issue arose from expressed worker/passenger concerns.

It is quite clear that the presence of auxiliary fuel tanks in the passenger compartment of the helicopter is of serious concern to the offshore workers. The reasons for this concern are not what one might first expect, namely the presence of fuel in the passenger compartment. The reason is that an auxiliary tank occupies the space normally occupied by three window seats. The result is that three potential emergency exits are less accessible in the event of a ditching and capsize of the helicopter.

I should first point out for the benefit of the reader unfamiliar with the subject that the normal range of the S-92A is, depending on winds and weather, about 926 kilometres without auxiliary tanks. Therefore, to go to and return from, say, Hibernia (315 km) does not require an auxiliary fuel tank. For installations further out, for example at 500 km, the helicopter operator, in addition to allowing for distance, must allow for bad weather offshore which could prevent a landing and thus prevent refuelling. In such a case, the helicopter would "boomerang," as it is called, back to base in St. John's. It is possible that St. John's might also be unavailable because of weather and that other alternatives would have to be considered. Such problems may require even two auxiliary tanks to be installed.

It might be thought that once over land in its return to base, the helicopter could land almost anywhere. That may be true to a point, but landings in the rough can also be dangerous, and all possible efforts are made to land at a designated alternate site. For these reasons, journeys offshore in excess of certain distances require an auxiliary tank or even two tanks.

The weight of the fuel tank, or tanks, forms part of the safe and specified payload of the helicopter which under no circumstances can be exceeded. It follows that passenger payload is reduced by the fuel tanks and, because of the necessary positioning of the tanks, escape from a downed and inverted helicopter may be impeded for some passengers.

Impeded escape is always a consideration, because passengers usually sit side by side. In a ditching, the window passenger has the responsibility of knocking out the window by hitting it at a corner at the moment of impact and exiting through that window opening as soon as the helicopter fully overturns, before the person beside him or her can attempt to escape. If the window-seat occupant is dazed, disoriented, not properly prepared, or panic-stricken, the plight of the person in the aisle seat is perilous, because in an inverted underwater escape, time is of the essence and disorientation, immersion, cold, and darkness are the enemies.

Another potential problem, well known to passengers, arises from the four rear seats, which are in a row against the back wall of the helicopter. Escaping passengers would have to disengage themselves from their seat harnesses and, in the confusion of an inverted and immersed helicopter, and in some degree of darkness, make an escape. Even with an emergency breathing apparatus, which provides for about two extra minutes of breathing time, escape could turn out to be difficult for some and impossible for others.

It must also be remembered that the real-life ocean ditching is very different from the simulated ditching in the calm and warm waters of a pool. The real-world ditching or crash would be in frigid and often stormy waters. Escape in such circumstances is a daunting prospect even for young and well-trained military personnel, and much more so for workers who are of varying ages and states of physical fitness and whose careers are unrelated to escaping from overturned helicopters into the waters of the North Atlantic. Even though they have received training with updated refresher courses every three years, the severity of the problem is hard to overstate.

An Inquiry cannot be expected to prescribe detailed safety measures which should be taken to minimize risk to an acceptable degree. What I

can say is that steps should be taken to minimize such risks, i.e., that the issues of interior design and equipment and safety within the helicopter cabin should be addressed and solutions sought. This should be done in a collaborative way by the oil operators, helicopter operator(s), offshore workers' representatives, and training institutes, as well as the Regulator, Transport Canada, and perhaps other stakeholders, and with independent expert advice.

In what the reader will recognize as a recurring theme in my thinking, all of the players, and especially those at risk, who are for the most part the workers, should have a voice in the solutions or improvements, whatever they may turn out to be. That is the way a performance-based system functions best.

In my opinion, the correct approach to safety issues is inclusive and collaborative. I do not think it is sufficient to leave these matters to oil and helicopter operators to suggest contractual arrangements for C-NLOPB to approve, or otherwise. All of the players should be part of the solutions from the beginning to the end. That is the most important concept which I learned in the UK and Norway. The regulator's final approval is required, but the regulator and the oil operator would benefit from a widely inclusive group of stakeholders and experts, and from public discourse. If there is wide input into decision making on safety, and later an accident does occur, at least all involved will have done their best. For that reason I would hope that the oil and helicopter operators and C-NLOPB would welcome broadly-based input, together with a public component, all of which I will recommend.

Issue 11 - Can helicopter transport safety be affected by the capacity of the helicopter transport fleet and, if so, what role should the C-NLOPB play in the determination of fleet capacity?

From time to time in the course of the Inquiry, opinions were received from workers that the size of the helicopter fleet transporting workers to and from the offshore should be increased. It is not entirely clear whether a larger fleet would be addressing a safety issue or a convenience issue, or both.

It is certainly true that when weather conditions make safe flying impossible, a backlog of waiting passengers is created, both on the offshore installations and on shore at Cougar's heliport. That situation results in feelings of frustration for everyone, including the workers, Cougar, and the oil operators. That frustration can be readily understood.

Despite the foregoing, helicopters cannot and must not fly in weather which compromises the safety of passengers either in the air or in a possible ditching. No doubt the advantage of a larger fleet would be to clear backlogs of passengers more quickly. That may lessen the inconvenience, but I doubt that it would enhance safety, because both the present fleet and a larger fleet would still fly only in permissible weather.

What I do believe is that there should be a review of fleet size on the occasion of any increase in the number of passengers travelling to and from the offshore. The parties to the review should be the oil operators, helicopter operator(s), Regulator, worker representatives, and stakeholders, in a formal committee structure. After full disclosure and discussion of all relevant factors, a consensus should be reached. If there is no consensus, the Regulator as the ultimate arbiter of safety should have the power to make a decision, when safety has become an issue.

As an illustration of how quickly the passenger numbers can change, I note that when I undertook the Inquiry in 2009 I was told that 1,200 persons worked offshore. In the spring of 2010, by reason of increased activity, I was told that the number was 1,800. These numbers may rise and fall with the levels of offshore activity.

I think it would be rash to add one or more expensive helicopters and crews only to experience costly excess capacity because of fluctuating numbers. Unless safety can be demonstrated to be an overriding issue, I would expect the fleet size to be a matter for the operators and helicopter operator(s), in consultation with worker representatives and the Regulator.

There is one other issue which affects fleet size and that is night flying. As the operators have pointed out in their submission, weather, especially in late fall and winter, can cause flight delays of three or four days. The pressure to reduce the backload may be intense, especially from workers who have finished their normal 21 days of on-rig time and are anxious to return home. Night flights become an issue especially when the daylight hours are at their lowest, i.e., in November, December, January, and February. Statistics clearly show that night flying poses greater risks if a helicopter ditches. Mr. Michael Taber, Inquiry expert, told us that the crash/ditching survival rate at night is overall 39 percent as opposed to a survival rate of 70 percent in daylight hours. It follows that asking a passenger to fly at night is, in effect, asking him or her to accept a higher level of risk and, indeed, a much higher level of risk if the helicopter is forced to ditch.

The operators' information is that night flying is not necessary during long daylight months, but becomes necessary from time to time in the darkest months, to avoid backlogs.

In any consideration of this problem it must be remembered that offshore helicopter travel is the most dangerous part of an offshore worker's employment. That is especially so now, because in recent years, safety on offshore installations has been greatly improved. Asking passengers to fly at night adds considerable risk to that part of their work which is already the riskiest. Certainly, no person who objects to flying at night should be forced to do so as a condition of employment.

Night rescue, should it become necessary, poses greater risks for search and rescue personnel, which also must be a consideration. DND kindly offered me and Inquiry Counsel the opportunity to participate in training exercises, both in daylight and in darkness, over the ocean. Even with aids such as night-vision goggles and bright (night sun) search lights,

a rescue in darkness would be much more difficult, especially in bad sea conditions, wind, and fog. Almost every nighttime condition will contribute to risk, and the statistics from the North Sea bear out that assessment.

I know that there is night flying in the North Sea, but they have much greater rescue coverage there. In Brazil, where the offshore distances are comparable to ours, night flying is not allowed to be regularly scheduled. Their flights, as is the case with ours, are over open ocean with only one direction from which helicopter search and rescue can come.

For these reasons, I cannot recommend night flying though I know that some passengers do not object to it. To avoid night flights, an additional helicopter may or may not be required, if one could be obtained for a three- or four-month period each year. I recommend a safety-forum type of consultation among the Regulator, oil operators, helicopter operator(s), offshore workers, and other helicopter user stakeholders to see if an adequate protocol can be achieved to solve the problem. DND and Transport Canada may be prepared to assist in such discussions.

A further element of risk was brought forward at the public hearings of September 8 and 9, 2010.

With only one fully dedicated and equipped first-response helicopter stationed in St. John's, the system must rely for backup on DND SAR helicopter support from Gander, NL, and top cover, i.e., fixed-wing aircraft support from Greenwood, Nova Scotia. Gander SAR helicopters are wheels up in 30 minutes during the hours of 8:00 a.m. to 4:00 p.m., Monday to Friday inclusive. At all other times, including nighttime hours, the response time is 2 hours (wheels up). It follows that at night and on weekends the only speedy response would be from St. John's, by one helicopter only. Other help could only arrive in hours, not minutes, no matter where the ditching occurred. In fact, those who raised this issue argued that there should, therefore, be no weekend flying.

I cannot subscribe to the idea of no weekend flying. To give up weekend flying, taking into account probable bad weather on other days,

would virtually shut down the industry. Though this is my position on weekend flying, the lengthy secondary response time at night is a powerful argument in addition to the others which I have mentioned against night flying. In summary, I cannot endorse night flying.

As to weekend flying, the matter should be discussed by the Regulator, oil operators, helicopter operator(s), and worker representatives, and a consensus sought as to measures to lessen the effect of the more lengthy DND weekend response. A possibility may be using one of the four helicopters in the fleet as a standby response helicopter in addition to the fully dedicated, first-response helicopter.

Issue 12 - What are the appropriate standards of offshore helicopter safety training to ensure that the risk to passengers is as low as is reasonably practicable, during both training and helicopter transport?

It is important to realize that offshore helicopter transportation of workers involves at least two major safety components: helicopter operation and passenger training.

The first of these, which is crucial, involves the organizational structures of the helicopter operator as affected by Transport Canada requirements, the Regulator's requirements, and the oil operators' contractual requirements.

The efforts of all of these are to accomplish the transport of passengers in the safest possible way. This transport involves an appropriately designed helicopter capable of doing its job safely, a helicopter that is properly maintained and competently piloted, ensuring the appropriate standards to facilitate takeoff and landing, with communications support in the air, together with all of the facets of flight pre-planning and helideck design and maintenance. All this is required in order, as the sole survivor of the March 12, 2009, crash expressed it, to "keep the helicopters in the air."

If the helicopter always stayed in the air, there would be no need for passenger training, which is the second component of safety. Sadly, that is not the case; thus, it is when a helicopter crashes or ditches in the ocean that the second safety component, i.e., passenger training, becomes vitally important and can mean the difference between life and death for each individual onboard.

For purposes of evaluating training needs for passengers, I will deal mainly with what will likely be encountered in a controlled ditching. I have already written about the harsh conditions which almost always prevail in our offshore. Suffice it to say that in our sea states it is most likely that the helicopter will overturn because it is top-heavy. In calm water that may not happen, but we must assume that in our conditions it will happen and happen very quickly.

It follows that the helicopter will rapidly fill with frigid water, probably while the passengers are still harnessed in their seats — they will be immersed in water, upside down, and probably sinking, all at the same time.

The first and immediate hurdle is to stay alive for two or three minutes while fighting disorientation, releasing the seatbelt, exiting the helicopter and rising to the surface. The first two or three minutes therefore determine initial survival. It is then that a new and crucial challenge begins. It is being able to keep oneself alive until rescue arrives. Survival training is therefore absolutely necessary.

Michael Taber, in his report, articulates the training problem in three questions:

- How much HUET practice is needed to prepare an individual for a real-world ditching?
- How often do individuals need to refresh their HUET skill set?
- What level of training fidelity is needed to ensure transfer of task knowledge to a real-world situation?

It is a fact that there are variations in HUET training in the offshore helicopter world and no single standard exists. Nevertheless, the most widely used standard is that of the Offshore Petroleum Industry Training Organization (OPITO), a group formed in the UK which now has 49 HUET providers in 26 countries.

HUET training is conducted using a helicopter shell or mockup with seats and windows, mounted in a device that can lower it into the waters of a pool and overturn it after it drops into the pool. The task of trainees is to release themselves from their harnesses, exit through a window or door opening, and escape to the surface of the water.

Mr. Taber in his report cites the OPITO requirements:

> Helicopter Underwater Escape Trainers (HUETs), used for OPITO training must meet the following criteria:
>
> - That it can be lowered on to the surface of the water, and then subsequently lowered below the water.
> - In an emergency it can be rapidly retrieved to the surface and if necessary to the side of the pool with the delegates still inside.
> - That it has *realistic seatbelt/harness fastenings* and a system for releasing delegates in an emergency should the buckle fail to open.
> - That the body of the HUET rotates with the seats i.e. not just the seats rotating within a fixed body.
> - There is a means of stopping the rotation in an emergency (usually a brake).
> - The *exits should be of a similar size to those found on the common commercial helicopters used in the offshore industry*.
> - If the HUET is also used for the on-land evacuation exercise involving then [sic] *the exit operating mechanism should be similar to that on real helicopters*.
> - The *exit(s) used to conduct an evacuation on the water surface should be similar in operation to a real helicopter*.
> - The *HUET must be fitted with push out windows for operation by delegates*.
> - That there is sufficient room within the HUET for an instructor/assessor as well as the (4 max) delegates (http://www.opito.com/international/approvals-faq.html - italics added).

The report describes the different types of training simulators as ranging from a basic box with short plastic seats and non-representative lap belts to a scale model of an actual helicopter, complete with flight controls, electronic console panels, interior bulkheads, crashworthy seats, and five-point harnesses that are the exact make and model of those used in a particular helicopter.

The use of such detailed HUET simulators is one aspect of what is usually referred to as “fidelity.” I think it is generally believed in the

training industry that the greater the degree of fidelity to an actual helicopter, the more valuable the simulator is to the training process.

The real purpose of HUET training is to ensure that individuals understand what to do when a ditching is about to take place and what essential tasks need to be performed to escape successfully. Mr. Taber goes on to describe the division of these two types of knowledge. The whole of his discussion of these matters is available in his report, which is reproduced in full in Volume 2.

The difficulty facing the trainer is to find a balance, a level of training which does not expose the trainee to an unreasonable risk, but nevertheless equips him or her with the level of knowledge and skill which can save the trainee's life in these crucial moments after ditching and immersion.

The trainer's task is made more difficult by the fact that individuals have differing tolerances to stress and differing physical and psychological responses to stressful situations.

The most important factors appear to be:

(a) a suitable level of health and physical fitness
(b) a psychological ability to perform different tasks under extreme stress
(c) the ability to remember what to do in an attempt to save one's life

The other advantage of proper training is that it enables the helicopter passenger to have a plan of escape from an overturned helicopter, rather than trusting to blind luck without a plan, which would, in my opinion, invite death by drowning.

Stated simply, HUET training gives the passenger a degree of confidence because he or she will know what has to be accomplished if the worst should happen, and have a sense of being able to accomplish it. Without the HUET training, it would be almost impossible to survive.

Mr. Taber goes on, after considerable discussion, to propose HUET proficiency requirements:

> Based on the research and anecdotal evidence related to ditching survival rates presented to this point, a HUET standard that requires individuals to perform *one* underwater egress with an exit installed every 3 to 4 years is not sufficient to ensure that the skill will be recalled in the event of a real emergency. Although the offshore workforce may be *current* under the existing guidelines, they are not necessarily *proficient*. Kozey et al. (2006) clearly showed that nearly 20% of the individuals given only one egress training trial in which they had to remove the exit while in an inverted and submerged position could not perform the task six months later. It was further shown that 46% of those who had not had the same opportunity to jettison an exit underwater failed in their attempt to egress (Kozey et al., 2006). This suggests that nearly half of the individuals completing a HUET course that does not require the removal of an exit inverted underwater would not survive a ditching that resulted in a rapid capsizing, just six months after gaining certification. These results closely match the survival rates cited by previous research… and suggest that training may play as great a role in survival as structural crashworthiness factors.
>
> With this in mind, it is proposed that in addition to the standard protocol for offshore operational requirements (i.e. weather limitations, helideck and refueling standard procedures, flight following), HUET course providers and offshore operators should:
>
> 1. Identify what HUET skills are required to egress from the existing helicopter interior cabin configurations (i.e. do current AS332L and S92 configurations influence overall survival rates and if so can they be mitigated through training or repositioning of seats and auxiliary equipment such as fuel tanks).
>
> 2. Ensure that representative exits (same overall dimensions, operating mechanisms and forces required to open them), positioned in representative locations (same distance from seats and height from floor), for those types of helicopters

used in offshore operations be installed and used for training within the HUET simulator.

3. Ensure that representative seats (i.e. high-back, crashworthy, forward/rear facing, bench style) similar to those used in offshore helicopter operations be installed for training within the HUET simulator.

4. Identify the level of initial HUET proficiency that will not degrade to a point that becomes problematic before recurrent training.

Despite considerable effort to mitigate risks associated with a helicopter ditching/crash, changes to survival rates have not been realized and until underwater escape skill performance is fully understood, it is difficult to identify interventions that may aid in survival. For example, the addition of mandatory external flotation systems does not appear to have a significant affect on overall survival rates due primarily to the fact that floats may not have been deployed as a result of minimal warning or may be damaged during impact; therefore, they do not aid in keeping the helicopter upright on the surface (Taber & McCabe, 2007, see also CAA, 2005). Moreover, supplying EBS to passengers without training in the realistic conditions expected during a ditching may not by itself be the answer to increasing survival rates. Changing one aspect of a complex system rarely ameliorates all difficulties as was pointed out in the most recent ditching report of the Search and Rescue (SAR) Cormorant helicopter (Canadian Forces FSIR, 2008b). In their report, it was noted that all crew members survived the initial impact forces; however, several personnel did not use the EBS that was available due to an inability to find it on their vest and the speed with which they made their escape. It was also reported that two of the crew members in the cabin of the helicopter were able to use EBS, but were unable to escape due to disorientation, debris, loose equipment, and blocked exits, before depleting the supplementary air (Canadian Forces FSIR, 2008b). Based on the findings from the ditching report, it is apparent that a holistic approach, which includes a detailed investigation of human factors, environmental conditions, and available technology is needed before specific answers that address survival rates should be expected.

Dr. Susan Coleshaw, in her report, which appears in Volume 2, also deals with appropriate standards of helicopter safety training. She describes the situation of passengers inside a capsized helicopter:

> In-rushing water, disorientation and an inability to reach or open exits have all been cited as problems experienced when attempting to escape the helicopter (Rice and Greear, 1973), resulting in a recommendation for realistic underwater escape training. Ryack et al (1986) reviewed helicopter crashes at sea and reported data from the US Naval Safety Centre showing that 92% of those who had received training in the 'Dilbert Dunker' survived such crashes, compared to a 79% survival rate for those who were untrained. They considered that the training provided individuals with familiarity with the crash environment and confidence in their ability to cope with the emergency situation, recommending HUET training for all navy helicopter crew. Others have reported the benefits of HUET training. Hytten (1989) described one particular accident where HUET training was believed to have been critical to those who escaped. Training provided reflex conditioning, provided a behaviour pattern to follow, reduced confusion and reduced panic. The real situation was said to have been different to the training scenario but nonetheless, their training was considered to have been very important in their survival.
>
> Training has been said to develop a positive expectancy for future coping (Hytten, Jensen & Vaernes, 1989). Thus, individuals who cope well with training develop some confidence that they will be able to cope with a real emergency, gaining more confidence in helicopter transport. Hytten (1989) has also reported how individuals can adapt to stressful situations over time, stating "when fear is confronted and coped with at one intensity, it is probable that one will cope with a new fear-provoking situation of greater intensity". Thus, coping with a training situation allows the individual to develop coping mechanisms and thus manage a real life-threatening event more effectively.

In discussing the difficulties inherent in training, which is itself risky, Dr. Coleshaw writes vis-à-vis fidelity:

> There is much debate regarding the fidelity of training. This may be applied to the similarity of the environmental conditions, the similarity of equipment, and the similarity of tasks undertaken. For example, disorientation is known to be one of the most difficult factors that individuals must learn to cope with in an inverted helicopter. By experiencing disorientation in a controlled environment its impact in a real event can be diminished. However, in a real emergency it might be dark, there could be oil floating on the water, and there may well be damage to the helicopter structure in all but controlled landings on the water. It would therefore not be sensible or practical to recreate all aspects of this environment in training. Whilst some military and crew training takes place in the dark, this would be a much more difficult for training organisations to control, and the risks of training would increase. The stress of training would undoubtedly increase and this would be undesirable.
>
> When trying to achieve physical fidelity of equipment, success will depend on the number of different helicopter designs that trainees may be exposed to in reality. Different helicopters have different designs of exits and escape windows, and many different exit release mechanisms. Thus, if only one helicopter design were to be used by a particular occupational group it might be possible to achieve reasonable physical fidelity.

I would note, given the conclusion in the preceding paragraph, that only one helicopter type is used in the C-NL offshore and in the immediately foreseeable future it is unlikely that other helicopters will be substituted for it.

That being so, it seems to me that every effort should be made, in the preparation of training apparatus for our offshore, to incorporate as much as possible the configurations and particularly the type of seats, harnesses, and window sizes of the Sikorsky S-92A, which is now being used.

There is, however, no unanimity on the fidelity issue, and Dr. Coleshaw quotes in her report a study which argues that exact physical fidelity is unnecessary. I might note that the same position was advanced to me in a training centre in the UK. The argument, as I understand it, is that while fidelity may offer some advantages, it is not necessary. Some accident reports suggest, Dr. Coleshaw writes, that "even if a helicopter simulator bears little physical resemblance to the cabin of a real helicopter, the training will still have positive benefits when it comes to surviving a real accident."

Dr. Coleshaw continues:

> When considering the fidelity of escape procedures it is therefore important that each step in the escape process is covered by the practical training. Trainees need to be familiar with their personal protective equipment (PPE), and know what, if any, actions have to be taken to make the PPE ready for use in the event of an emergency (such as doing up zips or locating and donning hoods). Release of the seat harness must be experienced and practised, whether this be with a four-point or two point harness. With a two-point harness, confusion can be caused if direction of release is different to the commonly used car seat harness. Release of the less familiar four-point harness must be learnt, but there is less likelihood of confusion (and this will be practised under non-emergency conditions when flying offshore).

Dr. Coleshaw's report also deals with the numbers of delegates (trainees) to be trained in the HUET at the same time. The problem is that persons who are seated next to a window are better located than those located in the aisle seats. Location in an aisle seat requires a person to have a longer wait to exit the helicopter. The possibility of panic in the occupant of the aisle seat and the problems and/or injuries which could occur are serious issues for aisle passengers. There is also the possibility of panic and lack of ability to escape on the part of the occupant of the window seat. Dr. Coleshaw also raised the topic of emergency breathing systems (EBS), which reduce the time when breath-hold is necessary, and that of cross-cabin escape, which is difficult and time-consuming. Many of those difficulties, and perhaps all of them, would have to be faced by helicopter passengers in a real ditching; however, training for such

eventualities cannot be made too rigorous without risk to the trainees. That issue leads to a fine balancing act between adequate training and potentially dangerous training.

Only recently in UK training were trainee passengers required to knock out the window next to them in order to escape. This requirement is part of the training in the C-NL offshore and requires a sharp blow to the corner of the window just as the helicopter enters the water. The foregoing was required when I took the training at the Marine Institute. The knocking out of the window at that point made perfect sense to me, because to wait until the helicopter had submerged and inverted would, as I saw things, pose even greater difficulties in removing the window.

It was found in a 2006 study that participants who had pushed out the window during training had a much greater facility in doing so in a test six months later. Other tests have confirmed that window-pushing training improved with the number of times it was done.

Dr. Coleshaw, in a study done in 2006 and referred to in her report, found that in some individuals, training led to high levels of anticipatory stress, and that higher fidelity training, including the operation of emergency exits, caused more stress at the time, but the trainees became more confident afterwards as a result. The possibility of negative effects on health imposed by fidelity in training was also explored in the UK. It was found that some people did suffer negative effects caused by stress. Obviously, the trainers have to achieve a balance between fidelity and doing the least harm. That principle has been recognized.

Training frequency has also been and is an ongoing issue. In the North Sea, there exists a four-year interval between retraining requirements. The standard now required in the C-NL offshore is three years. Dr. F. Summers, who did an Australian study in 1996, concluded that even two years between training sessions was too long and that procedural skills that are practiced infrequently deteriorate rapidly.

Offshore workers in the UK tend to complain about training being too frequent. I can understand their reluctance, or the reluctance of

anyone, to do the HUET training; nevertheless it is absolutely necessary and could mean the difference between life and death after a ditching.

Dr. Coleshaw is quite clear that there should be a positive message about helicopter safety given to offshore workers. In other words, giving workers the facts will help them to understand and limit their fears about helicopter safety.

She wrote:

> Training needs to cover the different types of water impact that could occur, recognising that a controlled ditching is more likely to occur than a fly-in or uncontrolled impact. To cover the different scenarios that could be experienced, a number of different training scenarios are needed:
>
> - Evacuation from a floating helicopter, leaving the cabin in a controlled manner, using an emergency exit, and exiting into a liferaft.
> - Underwater escape from a submerged helicopter.
> - Underwater escape from a capsized/inverted helicopter.
>
> Within these exercises, a number of issues and essential procedures need to be covered within either the classroom or practical training:
>
> - Familiarisation with personal protective equipment that is likely to be worn;
> - Preparation for water impact;
> - The possible impact of in-rushing water;
> - Use and release of harness;
> - Importance of locating exits;
> - Awareness that it might be necessary to cross the cabin in a real accident;
> - Effects of buoyancy;
> - Liferaft deployment;
> - Actions to take once in the liferaft e.g. turn off PLB, find survival bag etc.;
> - Inflation of lifejacket (if used);

- Actions to take in the water whilst awaiting rescue.

In the UK and many other parts of the world, HUET training is conducted to the standards laid down by OPITO (2008). Their standards lay down learning objectives, a detailed and prescriptive training programme, competence assessments and optimum contact time with delegates.

Dr. Coleshaw's comments on training in real sea conditions merit repeating and likewise her comments on the Emergency Breathing System (EBS):

> It is understood that the Canadian offshore workforce complete some of their training under real sea conditions, in cold water. This has some merit as a process that will familiarise trainees with what might be expected in a real emergency, and perhaps reinforce the need to wear an immersion suit that is correctly fitted and sealed. However, this is a very uncontrolled environment in which to conduct training. The severe distracting effects of cold water are likely to limit the learning process. Procedures such as liferaft boarding are more likely to be learnt well if they are practised in a controlled pool environment. In the UK, pool training in water as cold as 20˚C, was stopped following action by the Unions (Spiller, 1997), with most training facilities now operating HUET training in water temperatures close to 25˚C. The disadvantage of this cool rather than cold water temperature is that some delegates can develop a misconception regarding just how cold water temperatures may be in the real environment.
>
> **4.6 EBS Training**
>
> In-water training is recommended for all types of EBS. Emergency deployment should be practised with the trainee in an aircraft seat with two or four-point harness as appropriate (both if both types could be encountered). Deployment should be attempted with both the left and right hands, as the best hand for deployment will depend on seating position and the location of the exit. Single-handed deployment is seen as the worst case scenario, and allows one hand to remain locating the exit.

> Users must be trained to breathe normally when using compressed air systems, to overcome the distraction of the exhalation bubbles and to learn that they must not hold their breath at any time with this type of device. With rebreather systems, some breathing resistance will be experienced, particularly when swimming face down. Most users should be able to rebreathe for more than a minute without feeling the effects of a rising carbon dioxide level.
>
> It is recommended that users learn to breathe from the EBS in a shallow water area, being given enough practise for each to breathe from the EBS with confidence. Only then should the EBS be used in a helicopter simulator.

Finally, offshore workers, knowing as they do that helicopter transportation is probably the most dangerous part of their employment, also have a personal responsibility for their own safety. Studies have shown that those who survive often do so through their own stamina and presence of mind. Robert Decker, who gave evidence to this Inquiry, described his sailing experience and how he was used to being submerged in cold water and thus did not panic after the crash of the helicopter.

Dr. Coleshaw writes:

> These comments support the view that confidence in water is likely to increase the chance of survival in a helicopter ditching. Those who are familiar with the sensation of being immersed in water and having the head underwater are more likely to cope well than those without this experience. Training every three to four years may not be sufficient to provide this familiarity with the water environment. The issue of exposure to cold water is problematic. Whilst exposure would increase familiarity with the environment, and could result in some habituation to cold shock if repeated on a regular basis, it would not be recommended for all. Older members of the workforce are more likely to have undetected cardiovascular disease, and sudden immersion in cold water, without the protection of an immersion suit, could put this group at some risk.

In the months that I have been engaged in this Inquiry, I have read extensively on the subject of survival in the ocean after a helicopter crash and learned what may be expected in our very hostile offshore waters.

I have the benefit of the expert reports on training and survivability. I have myself done HUET and HUEBA training; I have gone offshore, and I have watched training in Aberdeen and Stavanger. In addition, I have participated in day and night training exercises with DND 103 Squadron Search and Rescue from Gander, Newfoundland. I believe that the C-NL offshore is as hostile as any other offshore in the world, and our distances are as great as or greater than the distances of any offshore, with the possible exception of Brazil. All of the foregoing has confirmed my opinion that rigorous training is essential for C-NL offshore workers if they are to survive an offshore helicopter ditching.

My beliefs on the subject I will state in point form:

(a) HUET training is essential and should not be excused under any circumstances.

(b) Medical standards for offshore workers should be maintained and should be revised to include a requirement for a certain level of physical fitness.

(c) Absolute fidelity in training is not always practical; nevertheless, there should be fidelity in equipping the simulators with window openings and other features which are similar to those in the S-92A, or whatever helicopter is being used for offshore passenger transportation.

(d) HUET training intervals should be carefully examined by the Regulator, oil operators, worker representatives, and trainers, all of whom should have available medical, fitness, and other expert advice bearing on the required frequency of training in both HUET and EBS.

(e) Every effort should be used to seek a consensus among the groups that I have mentioned in (d). If a consensus cannot

be reached, the Regulator should, if necessary, decide the disputed issues and impose timelines for the introduction of changes.

(f) The Regulator should involve itself with studies and research on training improvements and with research in other countries and report on those matters at least yearly to the oil operators, workers, trainers, and significant stakeholders in order to make the development of training standards an ongoing process through a safety forum or committee structure.

(g) The deliberations of such committees and their recommendations, if any, should be made public.

My recommendations on these subjects will be along the lines of the foregoing comments.

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

It emerged in the hearings that the helicopter transportation suits were very important in the minds of passengers even before the crash of Flight 491 on March 12, 2009. An improved version of the suit has been brought into use since that time but many offshore workers still use the original version. The concern over suits was highlighted by the Passenger Survey, when passengers were asked to identify changes made since March 12, 2009. Improving suits was identified far more often than any other issue (new/better suit fit/fitted better: 237 respondents). The only other safety issues that were often noted were: no night flights (138 respondents), and HUEBA (Helicopter Underwater Escape Breathing Apparatus) implementation and associated training (137 respondents). As can be seen in the Passenger Survey Report, other issues were identified less frequently.

Another indicator arose from Question 19 – "Do you have any concern with your survival suit?" To that question, the 991 persons who responded said as follows:

(a)	Not concerned	140
(b)	Showing a slightly elevated concern	192
(c)	A median level of concern	258
(d)	A higher than median level of concern	185
(e)	Very concerned	194
(f)	Unanswered or invalid	22

The figures demonstrate that despite the improvements made since March 12, 2009, a clear majority of helicopter passengers are, as of April/May 2010, substantially concerned about the transportation suit.

Again, Question 35, which asked for additional information, was answered by 746 persons who identified at least one concern. Heading the list of concerns was "suits," identified by 204 persons. The next group was

helicopter maintenance/mechanical failure/equipment failure/ inspection/ reliability.

It is not difficult to understand the overall concern with suits. If a helicopter crashes, one cannot predict in advance what the results will be in respect of initial survival. It is when a helicopter ditches and a passenger escapes the aircraft into the hostile waters of our offshore that the sufficiency of the survival suit becomes critical.

All of my readings and consultations with experts lead me to believe that in a ditching there is at least a 75-percent chance that the helicopter will capsize and its occupants will very quickly find themselves upside down in a machine which has filled with frigid water. The first requirement of the suit is that it be buoyant enough to bring a passenger who escapes the helicopter to the surface, but not so buoyant as to pin him or her to the inverted floor which has become the ceiling of the helicopter. It is the efficiency of the suit which then becomes the difference between life and death, provided that rescue from the ocean is made with all possible speed.

If a passenger survives the first two or three minutes and escapes from the overturned and sinking helicopter, it is fundamental that his or her suit not leak to any significant degree. The suit currently used in the C-NL offshore is a variant of the Norwegian suit. It has tight wrist seals and does not use a neck seal; instead it has a hood which encases the head and is pulled tight by a zipper which closes in the area of the chin and the side of the face, forming an oval seal from above the chin to both sides of the face and the forehead just above the eyes.

If we assume that the wrist seals are watertight, which is very likely, the danger area for leaks is at the face seal, which, it seems to me, is more difficult to make water-tight than is a neck seal. In that connection, I have observed that the military suits and the helicopter pilots' suits in this offshore have neck seals and a separate hood or head covering.

These comments are not meant to decry the Norwegian type of suit. Norway has one of the best and most progressive offshore helicopter

safety programs in the world, and their safety regulator, workers, and other stakeholders clearly prefer that style of suit.

On the other hand, the UK offshore safety regulator and workers prefer their suit, which has a neck seal with a separate hood for the head. I should note also that the face seal of the suit currently used in the C-NL offshore restricts head and face movement and for that reason alone the suit is unsuitable for pilots, who cannot function with restricted movement. The oil operators said in the public hearings that prior to the March 12, 2009, crash, most if not all of the complaints about the suit were on issues of comfort.

For my own part, I agree that the suit is uncomfortable and cumbersome. I found it so when I did the HUET training and also when I went offshore, but I must add that when going offshore I obtained a better fitting suit and was, during a 90-minute flight, reasonably comfortable.

While in a training institute in the UK, I was permitted to try on a UK suit. The suit was lighter and made of a different material and much easier to put on and take off. It had the neck seal. Unlike our suit, which has built-in thermal protection, the UK suit requires up to three layers of separate thermal protection, to be used depending on prevailing water temperatures (i.e., the colder the water, the more layers of thermal protection worn under the suit).

Finally, when Inquiry Counsel and I participated in day and night simulated rescue exercises over water with DND Gander Search and Rescue, the suits we wore had neck seals, as did those of the pilots and SAR technicians. In my consideration of the efficiency of the current suit to save lives, I will lay the comfort issue aside and concentrate instead on life-saving characteristics.

I should, however, note a further fact before moving to the opinions of the experts. On March 12, 2009, Robert Decker survived the crash, escaped the sinking helicopter and spent approximately one and one-half hours in the ocean before being rescued. Mr. Decker was a seasoned offshore helicopter traveller and I have no doubt that he wore his suit properly, and closed the head/face opening properly, which he had time to

do. Nevertheless, his suit leaked to a significant degree in his opinion. In one and one-half hours, he suffered from severe hypothermia to the point that he was near death at the time of his rescue, because his core body temperature had dropped to 28°C. I have been told nothing to indicate that his suit was torn or punctured in the crash; therefore, without information to explain the water in his suit which was the main cause of hypothermia, I must proceed on the premise that the suit leaked. The Transportation Safety Board may further clarify that issue, but they have already stated that water ingress was "likely due in part" to his suit being too large for his body measurements. It is a fact that hypothermia in the human body does not set in until after the expiration of one half-hour. Even a small amount of cold water inside a survival suit which is already immersed in cold water will hasten hypothermia and, thus, hasten death.

In Robert Decker's case, he was in that frigid water for one and a half hours before his rescue and was already near death.

Dr. Susan Coleshaw, in her report, deals with personal protective equipment, including helicopter immersion suits, which are designed to protect the wearer from cold shock as well as hypothermia. Cold shock is a reflex response to a sudden decrease in skin temperature and is quite different from hypothermia. Cold shock causes a gasp reflex on immersion in cold water and can cause death in minutes.

To be effective, a suit must prevent rapid cooling of the skin (cold shock), and protect from hypothermia by insulating the wearer from the effects of cold water for a time which will allow rescue to take place. The thermal protection required in our waters must be sufficient to prevent the onset of hypothermia for at least two to three hours. When it is wet, the thermal insulation rapidly loses its effectiveness. Relative dryness is essential, because the air in the suit also provides insulation; if water enters the suit, the air is forced out. On the other hand, too much air can enhance buoyancy to the extent that escape from a submersed and inverted helicopter becomes more difficult because the passenger can be firmly pinned against the floor of the overturned helicopter which, in fact, has become the ceiling.

The fit of the suit is extremely important because a well-fitting suit will trap less air. Dr. Coleshaw recommends that every effort should be made to procure a properly fitting suit. The ideal, it seems to me, would be a personal suit, properly fitted to the individual, rather than a suit that is selected from a range of sizes and then handed to the passenger to wear. All suits of the same size will not achieve the same level of fit for an individual, and an individual may have to try two or more suits of the same size to achieve a proper fit. Dr. Coleshaw also points out that helicopter accidents can happen with little or no warning and may not allow time for the face seal to be properly zippered in time for the crash or ditching.

It was the consequences of faulty or unzipped suits in an accident which caused the UK to move to the neck-sealed transportation survival suit with a separate hood for the head. The only thing then required of the passengers in the event of an emergency is to put on the separate hood and not to have to zipper up the more cumbersome face seal. Studies indicate that the less a passenger has to remember to do while under extreme stress, the better the chances of survival.

It is quite clear from Dr. Coleshaw's report that there is no perfect offshore helicopter suit and that the choice of suits involves compromises. Suits must, of course, meet the Canadian standard, which I will discuss in reference to the National Research Council Report.

The choice of different strategies extends also to provision of extra buoyancy to support the head of the wearer in the water. The danger to the passenger in the water is further complicated by sea state, waves, and spray, which can also drown the person unless there is protection from these elements. The suit must cause the wearer to float on his or her back and not face down.

Dr. Coleshaw also discussed the emergency breathing system (EBS). The reader will remember that the EBS was recently instituted in the C-NL offshore. It is a compressed-air device of the type favored by the military, rather than the re-breather system used by Norway or the hybrid system used by the UK, which is a re-breather supplemented by minimal compressed air.

There are pros and cons with respect to all three systems, but any EBS system must be easily deployed by the passenger in order to be effective. It must not snag or otherwise impede the passenger's escape and the passenger must be trained in its deployment and use.

For my part, I believe the EBS is an important safety asset which would give downed helicopter passengers a sense of confidence that they could survive the first disorienting moments of an inverted helicopter. The minute or two of additional breathing time gives a considerable advantage to the passenger in those first moments of extreme peril.

Mr. Michael Taber also deals with personal protective equipment in his report (which appears in Volume 2) at Section 4. Lest any reader is of the opinion that personal protective equipment is not an absolute necessity, I will quote from Mr. Taber's introductory paragraph:

> Based on combined reports from the National Transportation Safety Board, Civil Aviation Authority, and various other sources, the international offshore community experienced 60 helicopter ditchings/crashes between January 2000 and December 2009 (Table 1). Of the 60 events, 29 (48%) involved fatalities and resulted in the death of 152 of the 294 (52%) individuals onboard. The information in Table 1 has not been divided into classifications such as a ***ditching*** (controlled/semi-controlled intentional emergency landing on water) or a ***crash*** (uncontrolled flight into terrain/water); however, the number of fatalities represents a survival rate well below that suggested by previous studies (Table 2).

Mr. Taber notes that though cold-water-related injury is well documented, Transport Canada's operating manual does not require the use of an immersion suit within 15 nautical miles offshore. However, because of the harshness of our offshore North Atlantic through most of the year, Transport Canada mandates that no person shall operate a helicopter over water of less than 10°C unless:

> (a) a helicopter transportation suit is provided for all persons onboard, and

(b) the pilot in command directs each person onboard to don and wear the suit system.

I need not describe the various technical requirements for the suits which are used in the C-NL offshore because these standards are reproduced in Mr. Taber's report, which appears in Volume 2.

It is sufficient to say that the suits used in the C-NL offshore meet the required standards; however there are concerns expressed in certain studies that tests conducted in controlled conditions, such as pools, may not represent the harsh conditions found in the offshore North Atlantic.

The suit worn by offshore helicopter pilots is quite different from the passenger suit. It is not prescribed by regulation but is a lighter-weight, Norwegian-made suit, designed to protect the wearer if immersed in cold water while at the same time allowing the pilot the freedom of movement which is essential for his or her work. The particular suit now in use was chosen by the pilots and Cougar Helicopters and, as I understand the evidence, it is satisfactory to both.

Additional studies recognize the need for hazard management, i.e., the risk of pilots being subjected to the "greenhouse effect" of sun streaming through cockpit windows, leading to overheating, which would raise the risk of impairment of the pilot's cognitive function.

Studies also indicate that aircrew may suffer from reduced cognitive function if they are subjected to long periods of exposure to high ambient temperatures, and that in ambient temperatures of above 18°C, aircrew wearing thermal protection may suffer from heat stress.

It is, in my opinion, obvious that pilots' protective clothing should, of necessity, differ from that of passengers; there is also the issue of supplementary equipment, which is not always mandated but could, nevertheless, pose dangers such as snagging on projections in the cockpit for a pilot attempting to operate the helicopter or to escape a downed helicopter.

In contrast to the passenger cabin, the helicopter cockpit has many projections and instruments, including the dash itself, which a pilot could strike with considerable force during a crash or ditching. The wearing of a helmet should substantially reduce the risk of pilot injury in such circumstances.

One of the responsibilities of the pilot is to assist and direct passengers in an emergency. Clearly, the prevention of injury to pilots will benefit not only the pilots themselves but also the passengers whose safety has been entrusted to them, and therefore I believe that pilots should be required to wear helmets.

It is not easy for those of us who have never experienced a ditching from a pilot's location to appreciate the violence of in-rushing water. In a report which I read, a US navy pilot who survived a ditching was quoted as saying, "the water hit my chest with the force of a fire hose."

Care must also be taken not to overload pilots' or passengers' suits with gadgets: however useful in other respects, these may lead to what has been described as the Christmas-tree effect, which can lead to snagging on objects inside the helicopter. This could potentially trap the occupant in the crucial two or three minutes during which he or she must escape or be drowned.

Mr. Taber concludes:

> Currently, the offshore workforce wears a strobe light, emergency breathing system, and personal locator beacon in addition to an approved immersion suit which incorporates at least one pull toggle for vest inflation, a buddy line, whistle, thermal protective mitts (usually stored in a pocket), splash guard, and nose clip. Without ensuring that all of these items work together as one integrated system that will not create snag hazards during egress, it is difficult to predict how one single item or the combination of items might affect survival rates. Therefore, a full underwater egress task analysis should be carried out in each of the existing helicopter interior configurations to ensure that snagging of equipment does not impede escape procedures.

I now turn to the report of the National Research Council (NRC). It is important for everyone involved in offshore helicopter safety to understand cold shock and hypothermia.

Cold shock is a reflexive response caused by a sudden cooling of the skin and is responsible for the majority of cold-water immersion deaths. Hypothermia begins after a half-hour, when one's core body temperature drops by 2°C, causing a variety of physiological responses to begin. These progress from shivering and loss of dexterity to significant muscle impairment, decreased mental performance, and muscle spasticity. A drop of 7° to 9° results in unconsciousness, and death occurs at a drop of 9°C. To meet the dangers of offshore cold water immersion, two suit systems have been developed:

(a) the immersion suit, which has been successfully worn by fishers and others who may be thrown or forced to jump into the sea, and

(b) the helicopter transportation suit, which is designed for survival when a helicopter crashes or ditches. When that happens, if the helicopter inverts, as is often the case, the passengers find themselves upside down in their seats and must, while underwater, release their seat belts, overcome their disorientation, and escape the helicopter through a door or window.

The major problem is that the helicopter suit must have a degree of buoyancy which will cause its wearer to float to the surface after escape, but it must not be as buoyant as an immersion suit, because if it were to be so buoyant, the wearer would rapidly float up to the floor of the capsized helicopter and may be unable to get down to the escape routes, which are the windows and doors. Finding the buoyancy balance has not been easy in any offshore jurisdiction where cold water mandates the wearing of such suits.

The helicopter transportation suit is required to be worn by all offshore helicopter passengers. Suits cannot be completely watertight, and even a small amount of water causes a steeper drop in core body

temperature. It has been documented that body temperatures drop more quickly in waves than in still water. Conditions in testing pools could be made more realistic. It is also noted that water in the torso area is more dangerous to the wearer than water in the arm and leg areas.

In summary, both in terms of human responses and environmental conditions, poor suits and poor policies result in poor performance in a real accident.

In essence, therefore, the testing objective of the NRC is to address the knowledge gap that exists between calm-water testing standards and real-world conditions. Stated simply, the tests so far conducted show that wind and waves cause greater threats than calm conditions. Wind and waves are very nearly a constant in the C-NL offshore, where conditions significantly increase the pressure on a helicopter transportation suit to perform as it must, to safeguard lives.

Wind and waves significantly increase the loss of body heat and also cause an increased lowering of the deep body or core temperature of the suit wearer.

The entire series of investigations appears in the NRC report in Volume 2 so I need not detail them here, but it is important to point out that the presence of only 500 ml of water in the suit, during a three-hour immersion with wind and wave action, had significant consequences for the individuals being subjected to the test.

At a water temperature of 8°C with an air temperature of 16°C, these significant effects were observed in many participants:

(a) intense shaking and shivering
(b) a blue tinge to their lips
(c) near hypothermia-level drops in deep body temperature
(d) a slowing of mental process – disorientation and slow responses
(e) inability to finish the three-hour immersions

It is not surprising, therefore, that survivor Robert Decker, whose suit allowed the entry of water, showed a drop of core body temperature from the normal 37°C to 28°C at the time of his rescue and was disoriented, slipping in and out of consciousness, and near death when rescued. A drop of 9°C usually results in death.

There should be more comprehensive standards for suits. Offshore workers, the C-NLOPB, trainers, oil operators and independent experts are involved with the Canadian General Standards Board in determining those standards. Comparisons of suits should be made in actual immersion conditions. Experts such as NRC should be involved in the selection of flotation and thermal suits. Fitting sessions for workers should be introduced at the Marine Institute's training centre, and consideration given to introducing a greater range of sizes. Such a group may well wish to re-examine the neck seal or face seal issue.

Every regular passenger should have a detailed suit size on file for use when going offshore. The better way would be to have the fitting done at a training centre, where the suit could be tested in a pool to assess ease of movement for the wearer and resistance to water entry. A passenger who has escaped the helicopter but whose movements are severely impeded by a cumbersome suit could be at a distinct disadvantage in trying to board a life raft, as an example.

It is a fact that some passengers are unable to be fitted safely into standard-sized suits. Such people must have custom-made suits and they do.

I am including a summary of the report of Inquiry Counsel on their meeting with the Working Group of the Canadian General Standards Board on reviewing standards for the Helicopter Passenger Transportation suit.

> The Working Group (WG), a subcommittee of the main CGSB Committee struck to deal with the review of the current suit standard, is tasked with facilitating the various research studies necessary to allow the main committee to make final decisions on the helicopter passenger transportation suit standard.

The main committee comprises all major stakeholders with an interest in the outcome of the suit standard, and the Working Group is chosen from those members who are able to dedicate additional time to the details.

On July 19, 2010, Inquiry Counsel met with the Working Group to receive an update on their activities. The objectives in their priority areas for research and development are:

Maximum Escape Buoyancy – to evaluate the feasibility of including in the standard a range of maximum escape buoyancy limits related directly to human size.

Hand Dexterity in Cold Water – to evaluate the time needed to complete survival tasks in cold water without hand protection and to validate hand protection requirements for the standard.

Stability – to validate the calm water test method.

Water Ingress Test Methodology – to revise the text method to reflect more realistic conditions and suit performance expectation, to evaluate whether leakage is linear over time, and to develop a duration for the 'swim' component of the test and formula.

Thermal Performance – to verify the performance of a .75 Clo (thermal insular value) suit over six hours in realistic conditions.

Research on each of these five issues has been contracted to an independent consultant who will provide an expert opinion to the Working Group. It is interesting to note that the NRC-IOT facility in St. John's, which gave expert evidence to the Inquiry, is working on one of those issues.

The Working Group is also reviewing all of the other requirements and test methodologies within the existing standard, as well as reviewing other standards, not only within Canada but worldwide, in an effort to find the best overall standard for the transportation suit.

> The Working Group is expected to report to the main committee with its finding and conclusions in the fall of 2010, with the possibility of a new standard being established as early as the end of this year.

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.

I endorse the efforts of the Working Group and the National Research Council and will recommend that when the CGSB reports, the Regulator should take the report to a safety forum or similar consultative body, to consider the report and recommendations, if any. Such a forum should include representation from the Canadian General Standards Board, oil operators, worker representatives, trainers, and suit manufacturers. Transport Canada may wish to be involved in such a process. All conclusions and/or directives by the Regulator should be placed on a public website.

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

Changes are needed: the answer to the question posed by Issue 14 is the same as the answers to most of the questions which involve C-NLOPB.

Changes to maximize worker and pilot participation are implicit in the new and expanded safety role which I will propose for C-NLOPB to move it forward into the more developed ranks of regulators who are leading the way in the new thinking about performance- or goal-related safety regimes.

Throughout this Report I have commented on what I regard as an imperative, which is improving and maximizing worker participation in developing and advancing safety. If the industry is to move more in the direction of performance-based regulation, worker participation becomes even more important and should be implemented at the highest levels. That is the lesson from Norway, which has a highly developed system of safety regulation in which worker input is major. Though operating under a somewhat different system, the UK also relies heavily on worker participation. Examples of what is done in Norway and the UK appear earlier in the chapter entitled "Governance Models."

I am not suggesting that the C-NL offshore should slavishly follow either the Norwegian or UK models. Our system, led by the Regulator, should formulate systems suited to our requirements but whatever form those systems take, they should have mandatory worker representation up to the highest level of collaborative decision making. This concept, if adopted, will place a high onus not only upon the Regulator, oil operators, and helicopter operator(s), but on the workers themselves, as individuals and through their representatives. Safety should stand as high as production and must override production decisions when necessary. The Regulator, guided by legislation and regulations, would set the performance goals. The oil operators would suggest how these goals could be met. Discussions among the Regulator, oil operators, worker

representatives, and stakeholders would determine the way forward and keep the public informed.

Through their participation, workers must be prepared to accept the effort, commitment and responsibility which go with that role. They must adopt and foster a strong safety culture which reports dangers and unsatisfactory safety practices without fear or hesitancy. Without such an attitude to safety, the initiatives which I will recommend will not succeed.

As to the second part of Issue 14, helicopter safety initiatives cannot succeed without the cooperation and input of pilots. They are at the sharp edge of the system. They make safety decisions hour by hour while preparing to fly and while in the air. In addition to their challenging responsibilities as pilots, they should also accept a role as imparters of knowledge to their passengers. Pilots who see themselves in a flying role only may find an expanded role difficult, but passengers are in my opinion entitled to briefings and flight information, including expected flight conditions. They also should be given accurate and authoritative information by way of debriefing after flights, if anything unusual has occurred.

I realize that giving briefings and educational information to passengers may not come easily to some pilots, just as it may not seem important to some passengers. But having acknowledged that fact, I still believe that pilots or persons equally knowledgeable should give briefings. As well, I believe there is an obligation on passengers to be as fully informed as it is possible for them to be. A half-hearted commitment to helicopter safety on anyone's part is not a commitment at all.

My recommendations on these subjects will be a reflection of the matters which I have discussed here.

Issue 15 - Should offshore workers have a level of personal accountability for their own safety in helicopter transport? ***(Note: For example, clothing to be worn under the suit, fitness training and reporting.)***

My answer to Issue 15 is: yes. Safety is not just the responsibility of the oil operators, helicopter operator(s), and the Regulator. Safety responsibility extends to every person working offshore and onshore for the oil industry, in every capacity.

There are things workers can do for their own safety. Early in my work in this Inquiry, I was given a three-hour talk on offshore safety by a consultant who had spent her working life in the marine environment, in a safety role. She said on the subject of thermal protection, "I would never go offshore without wearing thermal protection under the suit." Far too many go offshore wearing, let us say, jeans and a tee-shirt, both of which would offer little to no additional protection in cold water, should the helicopter have to ditch. The same goes for care and attention in the water survival training courses. I am sure the trainers would appreciate the desire on the part of trainees to get it right and learn everything they could about the subject matter.

(A cautionary note is necessary here. Too much thermal protection worn underneath the present suit could increase its buoyancy and impede escape from an overturned helicopter. The proper degree of undergarment thermal protection would have to be evaluated with expert advice and direction provided.)

One of the things which I believe contributed to Robert Decker's survival on March 12, 2009, was his familiarity with being immersed in sea water. The reader may remember that he has spent years as a sailing instructor in small boats and was no stranger to being underneath an overturned dinghy. What I think he had acquired by experience was a confidence that he could handle himself when suddenly immersed in sea water and thus he did not panic when the worst happened on that March 12th. It may seem to be beyond the call of duty for a worker on his or her own time to practice in a pool or off a beach, but one's personal safety is never beyond the call of duty. The duty is to oneself and to the other

passengers in the helicopter who will implicitly be relying on the skills of all to control panic, so that no one impedes the escape or rescue of others.

In my view, it would also be an advantage in any such emergency to be physically fit. Most work in our modern world tends to be sedentary. The numbers of sedentary as compared to physical jobs in the offshore I do not know, but I suspect that technology means more sedentary jobs and fewer physical ones. In any event, though a crash or ditching of a helicopter into the ocean is unlikely, it is wise to prepare for it physically as well as mentally, so that if the worst happens one can better cope with the escape from the helicopter. I believe that physical fitness and the confidence that it engenders would be a plus in surviving a ditching.

There is also another plus which offshore workers should consider and that is increased knowledge. It could be knowledge about helicopters and how they operate. It could be knowledge as to how the human body reacts to cold sea water, i.e., cold shock and hypothermia, which we heard about at the public hearings. I mention only the foregoing subjects, but there are other areas where I think knowledge would enhance offshore workers' confidence and safety preparedness.

The life of an offshore oil worker is not for everyone, but in the employment world it offers certain advantages. If a person, in consultation with his or her family, decides after weighing all the factors to work offshore, being prepared physically and mentally would, in my opinion, offer distinct advantages if ever a catastrophic accident did happen.

Lastly, no offshore worker should ever forget the necessity of reporting situations great or small which, if not attended to or corrected, could lead to an accident.

I understand the concern some workers have that reporting unsafe acts, or potentially unsafe acts or conditions, could lead the employer to regard them as trouble- makers or overzealous worriers. The other concern could be that reporting unsafe conditions could stand in the way of promotion. I would urge every offshore worker to place such thoughts aside at all times, including during helicopter travel time. The last thing

offshore oil operators want to see happen is an accident, nor do they wish to be seen as taking safety lightly or without concern.

An operator cannot rectify concerns which are not brought to management's attention. Communication, therefore, is vital to the safe workplace, wherever it is, and that includes helicopter transportation, as well as the offshore installations.

By way of illustration I will refer to the Challenger disaster of 1986. I have a book entitled *One Small Step*: *The Inside Story of Space Exploration* (Quercus 2009), by David Whitehouse, and during the writing of this Report I revisited its account of the Challenger disaster, which draws attention to numerous problems that would, in retrospect, be seen as warnings:

> On 28 January 1986 the Space Shuttle Challenger, designated mission number STS-51L, blasted off from Cape Kennedy. For those watching, it appeared initially to be another exhilarating, yet almost routine, lift-off... But just over a minute into the Shuttle's flight, the unthinkable occurred...
>
> **Danger Signs**
> In the two years before the *Challenger* accident there had been 15 missions, 12 in the previous year alone.... The robot arm worked impressively. There were also myriad experiments performed on the mid-deck and in the payload bay. But the high flight rate was straining the system in terms of engineering manpower and spare parts. There were specific warning signs for those who knew how to recognize their significance.
>
> Between *Challenger's* fourth flight – the STS-41B mission in February 1984 – and its final flight (its tenth) in January 1986, there were 15 successful Shuttle missions. In only three of those missions was there no visible damage to the SRB O-rings; in nine of the missions the burn-through was serious. One mission, 51C, was launched after a bitterly cold January night at Cape Kennedy. When the recovered SRBs were inspected, the O-rings were found to be severely damaged. The Shuttle fleet should have been grounded. Sooner or later its luck would run out.
>
> (Whitehouse pp. 182-184)

The tragic circumstances of the accident are described in the final paragraph of the account:

> The subsequent Rogers Commission that looked into the cause of the accident discovered that engineers' worries about the O-rings were not passed on to NASA managers at HQ in Washington, the astronauts in Houston or the launch director at Cape Canaveral on that fateful day. Afterwards one astronaut said that every new NASA administrator should be taken on the Shuttle. Then they would know what it was all about after they had been scared 'witless'. In the aftermath of the *Challenger* disaster there was a hiatus in Shuttle flight for 33 months.
>
> (Whitehouse p. 185)

What is known is that immediately before the explosion, an O-ring in the right-hand solid rocket booster had failed, and flame was visible through the wall. The damaged booster then pulled away from the external tank, causing it to fragment.

If I interpret the facts correctly, inadequate communications were a proximate cause of the tragedy, as they were in the Piper Alpha disaster in the North Sea, when inadequate giving or receiving of information on the removal of an auxiliary pump led to one of the largest losses of life in the offshore oil world.

These are lessons which we must not forget and so often they involve failure to report and failure to communicate effectively. I will make recommendations on these issues.

Issue 16 - Does the C-NLOPB exercise sufficient oversight of the oil operators, aviation contractors, and other contractors to ensure that the risk to workers from helicopter transport is as low as reasonably practicable?

The answer to the oversight question, as to most of the questions involving C-NLOPB, is that C-NLOPB does what is required of it in its legislative mandate, but much more is required of a regulator under the new performance/goal-based regulatory system.

What is needed is a new and expanded proactive mandate which would raise the profile, standing, influence, and leadership role of C-NLOPB in the safety regime of the C-NL offshore. Such an expanded and strengthened regulator would, with a new mandate more suited to today's thinking, exercise a more powerful and expanded role. It would, as I envisage it and will describe later in this Report, become truly a leader in offshore safety. It would set performance goals and in a collaborative process ensure that they are met in the most effective way. The public should be made aware of the process and the outcome.

The oversight I envision would be a proactive leadership well beyond reacting to oil operator proposals and auditing. As I have written in other parts of this Report, leadership, if properly structured, would lead to a lowered risk; that kind of effective leadership can only be achieved through the full participation in the safety process of all concerned entities, including the workers themselves. I will deal with these concepts more extensively in the overarching Issues.

Issue 17 - Should the C-NLOPB and oil operators' safety aviation audits include reviews of past responses to declared emergencies and emergency preparedness exercises?

At the heart of this question is the value of historical knowledge. Audits in the industrial/aviation sector are methods of measuring the degree of compliance with what is required, by either agreement or regulatory mandate. It seems to me that a record of operators' responses to previous audits would be of considerable benefit to a current audit.

The question is: was the same problem found in previous audits? If so, what steps have been taken to rectify any shortcomings and prevent the recurrence of the problem? If emergency preparedness exercises were conducted, a report of what was done, as well as any conclusions, would be useful in the overall auditing context.

It is, of course, for the oil operators and C-NLOPB to decide how often they will audit, but I would comment that the depth of the audit and the level of expertise of the auditor are important. 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.

Issue 18 - What information from the helicopter operator about flight operations should the C-NLOPB require the oil operators to provide to offshore workers? ***(Note: For example, alert service bulletins, airworthiness directives, incident reports, information regarding departures from normal flight times and routines, and the reasons.)***

I strongly believe that passengers travelling offshore by helicopter should be given as much factual information as is readily available.

I believe that fears a passenger may have about the helicopter's ability to stay in the air are magnified by the fact that offshore flights are a minimum of 315 kilometres in length and one and one-half hours in duration. Most of all, they are magnified by the fact that all flights are over a lonely and hostile ocean. I need not, in that connection, repeat my previous comments on the danger to survival, should the helicopter crash or have to ditch.

Some passengers may not wish to have details about near misses, malfunctions, or other dangerous circumstances which may be encountered, but I believe that the majority would welcome as much clear and understandable information as can be provided. One of the complaints of offshore passengers is that such information is not provided and if provided is not given in a timely manner. Doubts and concerns may be exaggerated and be communicated to families and friends and lead to widespread misconceptions and worries throughout the industry.

There is a sharp contrast between the amount of information given to passengers in the C-NL offshore and the amount given in the North Sea.

Drawing on North Sea practice and what I think is reasonable, I now list the following measures which, in my opinion, should be implemented:

(a) Either the pilot or co-pilot should provide a briefing to the passengers in the departure lounge who are checked in and ready for departure.

(b) The briefing should cover the expected wind and weather conditions, wind speeds, precipitation expected, headwinds or tail winds which could affect the duration of the flight, expected turbulence if any, or if appropriate the expectation of a smooth flight. A further elaboration may be necessary if the flight will make more than one stop. An explanation of any weight and balance information which could affect the flight or cause concerns to the passengers should also be given.

Specific reference could be made to safety checks, especially to areas of the helicopter perceived by the passengers as vulnerable. Specifically, I am referring to the previously identified mounting cracks in the S-92A, as well as gearbox problems. Past problems may cause concerns in the minds of passengers. A briefing session is not a time or place for argument with the pilot in the pre-flight moments, when his or her concentration is on the upcoming flight. Briefings such as I have described take place in the North Sea.

Just as important is a briefing, if possible by a pilot or other informed person, on arrival at a destination, particularly at home base, if there has been any event which may have caused concern to the passengers, for example a warning light activation or a difficult landing. If the flight was uneventful, there is no need for a briefing. However, I have heard of many passenger worries brought on by fog, high winds, or turbulence. Passengers may at times have overblown perceptions, but they nevertheless deserve truthful explanations as to what happened. More detailed explanations of why something happened may have to be provided later. It is much better for passengers to be briefed immediately after a difficult flight as to what occurred and why than to be left in doubt.

None of these processes would take a great deal of time but they would, I hope, lead to greater understanding and confidence.

If weather or some other cause prevents or delays a flight, a full explanation should also be given, but not necessarily by a pilot.

The matter of revealing airworthiness directives is somewhat more difficult, but I still believe openness is the best policy.

As an example, when I went offshore, my return was delayed by bad weather in St. John's and at other alternate landing sites. On my second day on the installation I read the equivalent of a small newspaper which carried the news of the day. The first story was about a directive given by a European agency about the O-rings in the gearbox of the S-92A. I was interested and asked the Offshore Installation Manager (OIM) about the item. He told me that the directive had been issued four or five days earlier and Cougar had already acted upon it and replaced the O-ring.

My question becomes: could not that information have formed part of a pre-flight briefing for passengers? I think it is much better to learn things directly and accurately from the helicopter operator than to hear of them through the media. In matters involving offshore helicopter safety and information, the families and extended families of the workers should also be considered.

I have been told that some pilots would dread having to give an oral briefing; they would find that level of public speaking to be unduly worrisome. The multiple factors involved in flight preparation by pilots require total focus and concentration, which could be lost in the process of giving briefings. These factors should also be taken into consideration when decisions are made about who should give which briefings, and perhaps persons other than pilots should give them. If that is the case, such persons should have all the pre-flight knowledge available to the pilots.

As I mentioned earlier, it must also be borne in mind that the briefing process could lead some passengers to argue with the person doing the briefing. If the briefing person is a pilot, a dispute could cause a pilot to be stressed to the point where pilot error could become a possibility. Offshore flight and safety issues are so complex that opinions can be sharply divided, but argumentative behaviour by passengers toward pilots must not be tolerated.

I believe that passengers should be fully informed. The more knowledge a passenger has, the better, even if the knowledge causes a person to decide not to work offshore. Lack of knowledge makes for poor mental preparation and decision making.

I have discussed some of these issues in an earlier segment of this Report and my recommendations will follow my expressed thinking.

Overarching Issues

I will deal with all overarching Issues as well as specific Issues 19 to 22 in a general discussion of the concepts, rather than by addressing them separately and in sequence.

Overarching Issues:

1. Should there be a degree of separation within the C-NLOPB between offshore helicopter regulation and other offshore industry regulation?

2. Are the risk management systems of oil operators and the helicopter operator sufficient and adequate to ensure the risks of helicopter transport are as low as reasonably practicable in the Newfoundland and Labrador offshore?

3. What is the role of organizational safety culture in offshore helicopter transport?

4. What are the most appropriate practices, standards, and forms of interaction between the C-NLOPB and the following:

    (a) industry (including suppliers and providers)
    (b) industry associations
    (c) regulators of associated services
    (d) other domestic and foreign oil and gas regulators and
    (e) worker representatives

    and are these interactions sufficient to ensure requirements that are understood, timely, achievable, and enforceable?

5. Does the C-NLOPB use best practices in relation to its regulatory role in helicopter transport safety?

19. Does the C-NLOPB have sufficient resources and expertise, including access to independent aviation expertise, to evaluate whether a proposal or plan for helicopter transport from industry ensures that the risks of helicopter transport are as low as reasonably practicable?

20. Should the C-NLOPB more directly involve itself in studies and research in Newfoundland and Labrador, and in other jurisdictions, to improve safety where the offshore oil industry uses helicopter transport? *(Note: For example, North Sea studies on preventing inversion of ditched helicopters and enhancement of passengers' ability to escape.)*

21. Should there be safety conferences for all parties involved in offshore helicopter transport, and if so, how often should they be held?

22. How often should the C-NLOPB review its regulations, guidelines, and standards with respect to offshore helicopter transport?

Separating Safety from Operations in a Regulatory Context

Regulations in industry serve a variety of purposes which are required for the safety of workers and the safety of the environment and the community generally. They express the intent of federal and provincial Governments, depending on the jurisdiction of each. Regulators carry out the mandates given them by Parliament and legislatures, and ensure that safety policies and decisions are arrived at in accordance with these mandates.

It follows that regulators themselves must have the skills and knowledge to understand the industry which they are regulating and the

expertise to advise industry and governments as to what the required goals should be. Expertise in the subject matter should guide the Regulator in knowing what constitutes compliance or failure to comply with the specified goals. I believe that meeting these goals should involve collaborative discussions among the Regulator, oil operators, workforce, and other stakeholders, with information being made available to the public. In my opinion a regulator must have, or have available to it, high levels of expertise to use in evaluating oil operator proposals for Safety Plans under performance-based regimes. I agree with CAPP in its submission that industry has the expertise, but I also believe that the Regulator should have high-level expert advice. In a complex industry, a regulator needs high-level and independent advice, together with stakeholder, worker, and public input, in order properly to exercise its regulatory role.

Thus, I believe that a regulator should have, or be able to engage, expert advice on all aspects of offshore activities, including aviation. The safety issues of helicopter aviation are different from those of other offshore oil activities, though workplace culture and many safety principles are common to both. Although the oil industry is an extensive user of aviation services, aviation as an industry is very separate from the science, engineering, geology, and technology of oil exploration and extraction from the seabeds of the offshore. That is not to say that there are not common factors: there are. Nevertheless, the differences between the oil industry and the helicopter industry are significant and each requires entirely different skill sets.

The question is not really what degree of separation there should be between offshore helicopter regulation and other offshore industry regulation. There will be, in fact, various degrees of separation. The real issue in my opinion is: should offshore helicopter safety regulation and other oil industry regulation both be combined within one regulator, or should there be a separate safety regulator, as there is in Norway, the United Kingdom, and Australia, and as is being developed in the United States? Some participants argue that the powers of the Chief Safety Officer constitute the necessary degree of separation, but I do not agree with that argument.

The offshore oil industry is directed to production and marketing, with the resultant employment, profits, and contribution to tax revenues. Offshore helicopter transportation in the C-NL offshore is the movement of passengers over long distances of hostile ocean. The helicopter transportation business must be as viable and safe as it can be made, but oil production and helicopter transport both have a degree of risk, with helicopter transportation having the higher level of risk to the individual. In the event of failures, the results are likely to be catastrophic. In both cases, the safety of human life must be paramount, followed closely by concern for the environment. These factors, together with the concern over an inherent tension or conflict of interest, are at the heart of the argument for the separation of safety regulation from oil exploration and production regulation.

With safety being an issue of extreme importance, the question becomes: should helicopter safety be regulated by the same body that regulates oil exploration and development? It is a difficult question, but my learning curve in conducting this Inquiry has led me to the conclusion that there should be a clear separation between safety and production. I believe the major safety development of the past 20 years has been the realization that safety regulation should be separate from production aspects of the oil industry in order to avoid the conflicts which could arise when both activities are presided over by a single regulator. The concept of separating safety from other aspects of regulation did not originate with industry or regulators; it arose out of the analysis of catastrophic accidents and loss of human lives and was driven by independent minds without vested interests. The first recognition and recommendation for a separate safety authority came in the UK from Lord Cullen's report on the Piper Alpha disaster—not from either the industry or the regulator but from government, as was also the case in Norway.

The three oil operators in the C-NL offshore have risk-management systems, as does the helicopter operator. All four are very confident in their systems. There is no doubt in my mind that safety is extremely important to all four companies. I have before me the details of the oil operators' and the helicopter operator's safety systems and an account of their safety cultures. I believe that they are sound, well thought out, and

carefully applied. Nevertheless, their quality does not dispense with the necessity for knowledgeable regulation that is completely independent and aided by input from experts, workers, other stakeholders, and the public.

In that connection I should elaborate on a point which I have already mentioned. Accidents, whether minor or major, are anathema to responsible operators in inherently dangerous industries. In such industries, serious accidents tend to be rare, but they can be catastrophic when they occur. The reputations of the companies involved are adversely affected, likewise their finances. In the past 27 years, the C-NL offshore has experienced two catastrophic disasters with a combined loss of 101 lives, with huge fallout. 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, but the question posed by this Inquiry is: is it possible to improve both the process by which safety systems are developed and the methods by which they are monitored and audited? Audits are important and have their place, but they are not a substitute for high-level multi-party input into how safety is developed.

Helicopter safety is an important component of the entire offshore safety system. To compartmentalize helicopter safety and try to deal with it while ignoring offshore safety as a whole would be to fail in my duty. Public inquiries into oil offshore safety issues are not everyday occurrences. If I failed to discuss important safety considerations and bring them to the attention of Governments, the Regulator, oil operators, workers, other stakeholders, and most important, the public, I would consider that what I have learned in the last 18 months would be, to a large extent, wasted.

The matter of improving particular risk-management systems is difficult to address without a detailed risk-management assessment which would require the fullest cooperation from all four companies. This Inquiry has the power to inquire into safety, but not the power to order risk assessments of the oil operators and the helicopter operator. The Regulator, however, has power to so order and it will be one of my recommendations that the Regulator carry out full and comprehensive risk-management assessments of the oil operators and the helicopter

operator, and that the results of these assessments be made public. It is only then that workers, the operators, the other stakeholders, the public, and governments will be in a position to know fully that the risks of helicopter transport are as low as reasonably practicable in the C-NL offshore. I use the words "reasonably practicable" here, because these are the words used in my Terms of Reference. "Practicable" is defined as "able to be done successfully." I know that some who appeared before the Inquiry do not like the term "reasonably practicable," and, presumably, would prefer a more absolute standard. Unfortunately, there is no absolute safety standard. In my opening remarks to the public hearings, I used the words "sensible and achievable" as describing the recommendations which I hoped would come from the Inquiry. As I see it, the two phrases are not contradictory.

Safety Culture

The role of an organizational safety culture is vital not only to offshore helicopter transport but to every aspect of offshore safety. In that regard I would refer the reader to the report of Aerosafe Risk Management, which is included in Volume 2 of this Report. The term "safety culture" has an amorphous quality about it until one begins to understand that the building of a strong safety culture can be the strongest of all influences in developing the best and safest working environment.

In *Managing the Risks of Organizational Accidents* (Ashgate 1997), James Reason writes:

> **The Components of a Safety Culture**
>
> The main elements of a safety culture and their various interactions are previewed below. Each subcomponent will be discussed more fully in succeeding sections.
>
> - As indicated in Chapter 6, an ideal safety culture is the engine that continues to propel the system towards the goal of maximum safety health, regardless of the leadership's personality or current commercial concerns. Such an ideal is hard to achieve in the real world, but it is nonetheless a goal worth striving for.

- The power of this engine relies heavily upon a continuing respect for the many entities that can penetrate and breach the defences. In short, its power is derived from not forgetting to be afraid.
- In the absence of bad outcomes, the best way—perhaps the only way—to sustain a state of intelligent and respectful wariness is to gather the right kinds of data. This means creating a safety information system that collects, analyses and disseminates information from incidents and near-misses as well as from regular proactive checks on the system's vital signs (see Chapter 7). All of these activities can be said to make up an *informed culture*—one in which those who manage and operate the system have current knowledge about the human, technical, organizational and environmental factors that determine the safety of the system as a whole. In most important respects, an informed culture *is* a safety culture.
- Any safety information system depends crucially on the willing participation of the workforce, the people in direct contact with the hazards. To achieve this, it is necessary to engineer a *reporting culture*—an organizational climate in which people are prepared to report their errors and near-misses.
- An effective reporting culture depends, in turn, on how the organization handles blame and punishment. A 'no-blame' culture is neither feasible nor desirable. A small portion of human unsafe acts are egregious (for example, substance abuse, reckless non-compliance, sabotage and so on) and warrant sanctions, severe ones in some cases. A blanket amnesty on all unsafe acts would lack credibility in the eyes of the workforce. More importantly, it would be seen to oppose natural justice. What is needed is a *just culture*, an atmosphere of trust in which people are encouraged, even rewarded, for providing essential safety-related information—but in which they are also clear about where the line must be drawn between acceptable and unacceptable behavior.
- The evidence shows that high-reliability organizations —domain leaders in health, safety and environmental

> issues—possess the ability to reconfigure themselves in the face of high-tempo operations or certain kinds of danger. A *flexible culture* takes a number of forms, but in many cases it involves shifting from the conventional hierarchical mode to a flatter professional structure, where control passes to task experts on the spot, and then reverts back to the traditional bureaucratic mode once the emergency has passed. Such adaptability is an essential feature of the crisis-prepared organization and, as before, depends crucially on respect—in this case, respect for the skills, experience and abilities of the workforce and, most particularly, the first-line supervisors. But respect must be earned, and this requires a major training investment on the part of the organization.
>
> - Finally, an organization must possess a *learning culture*—the willingness and the competence to draw the right conclusions from its safety information system, and the will to implement major reforms when their need is indicated.
>
> (Reason 195-196)

It would be difficult to find a clearer explanation of safety culture.

The Role of the Regulator

I am convinced that C-NLOPB needs to have a broader, more detailed, and more proactive safety role than was given to it by the Accord Implementation legislation of 25 years ago. C-NLOPB has followed its mandate over these intervening years but it has not been a proactive mandate. The oil operators developed the helicopter contracts, which were reviewed by C-NLOPB. Nevertheless, the prime movers were the oil operators, and the contracts were essentially theirs. It is noteworthy that the oil operators had access to aviation expertise, but to the best of my knowledge the Regulator has never had aviation expertise, either in-house or by contract if and when required.

The newly consolidated *Newfoundland Offshore Petroleum Drilling and Production Regulations* and *Drilling and Production Guidelines* of

2009 and 2010 implicitly demand the expanded regulatory role which I envisage for the C-NL offshore and which I will describe and recommend.

I envisage a new and strong leadership role for the Regulator, leading the way toward a more inclusive safety culture. In doing so it should directly involve more of the industry, including suppliers and providers; industry associations such as CAPP; other regulators, both domestic and foreign; research organizations which conduct safety research here and in other parts of the world; and, especially, workers. To see that approach, the reader need only return to the earlier part of this Report, in which I described the roles of the Norwegian and UK safety regulators (Chapter 4: Governance Models) . I also refer to the new C-NL Regulations and Guidelines which came into force on January 1, 2010. Canada's offshore oil industry is as yet small by comparison with others, but it is carried on in one of the most hostile offshore environments. We should be important players in the offshore oil world of safety research and development in dangerous environments, not because of our size, but because of the degree of danger which our offshore presents.

I believe that unless a leadership role for the Regulator is instituted and developed, we will not achieve the safety systems of which we are capable. Safety is too important for it to be adversarial. Safety involves everyone. Nothing demonstrates better the face and inclusiveness of helicopter safety than being a passenger on an offshore transport helicopter. Every passenger has done a certain level of training, every passenger wears the same survival suit, all obey the instructions of the ground crew, all listen to and watch the video briefing and all walk out in single file to board the helicopter. All are equal in that process and all equally dependent on the safety of the helicopter and the skills of its pilots, maintenance engineers, dispatchers, radio operators, and weather forecasters. No passenger has rank or privilege; all depend equally on the system and all have assumed the passenger's role and risks. Safety depends on culture, trust, collaboration, training, and strong leadership. These are the concepts which the Regulator should foster. They are the concepts which should guide the overarching role of C-NLOPB. To achieve that role, C-NLOPB requires the resources, expertise, and mandate to lead the way.

It is often said that the oil operators are responsible for the safety of their workers. They are indeed, but that responsibility does not stop at their door. A wider group of participants should also be engaged. The submission on behalf of the families of the deceased passengers made what I regard as a profound observation when it spoke of the expectation of the offshore workforce that "all stakeholders, including the regulator(s), Government and industry would provide a safe working environment." I would note that the workers also have a strong role and responsibility to contribute to that safe working environment. They, too, are important stakeholders.

The regulator's safety role has traditionally been difficult and often thankless, as James Reason has explained. Over the past 30 years the search for the causes of a major catastrophe has spread steadily outwards in scope, and backward in time, to uncover increasingly remote contributions. Frequently featured in this extended causal fallout are the decisions and actions of the regulatory authority.

When Things Go Wrong

The problems that can arise are illustrated by James Reason in an analysis of five well-known and highly-documented catastrophic events:

- the Challenger spacecraft explosion (January 28, 1986)
- the King's Cross Underground fire (November 18, 1987)
- the Piper Alpha platform explosion (July 6, 1988)
- the Fokker-28 crash at Dryden, Ontario (March 10, 1989)
- the Piper Chieftain crash at Young, New South Wales (June 11, 1993)

I will not burden the reader with the analysis of all five, so I have chosen the King's Cross Underground station fire in London, England, as a primer on where regulation can unintentionally go wrong. I deliberately chose an industry other than helicopter transportation or the oil industry, because the principles illustrated are common to so many organizational settings.

James Reason describes the King's Cross accident succinctly:

> Just after the evening rush hour, a lighted match or cigarette passed through a crack in a wooden escalator and set light to an accumulated heap of greasy fluff and waste beneath. Twenty minutes later, flames shot up the escalator shaft and hit the ceiling of the ticket hall, killing 31 people.
>
> (Reason p. 160)

Reason cites the report of the subsequent Inquiry:

> In my view the Railway Inspectorate was mistaken in its interpretation of the law in believing, if London Underground discharged its duty to have due regard to the safety of operations, it had discharged all its statutory duties for the health and safety of passengers… Even making allowances for the Railway Inspectorate's misunderstanding of their responsibilities [under the law], it is my view that the level of resources and degree of vigour they applied to enforcement …were insufficient. It was in this climate that poor housekeeping and potentially dangerous conditions in underground stations were allowed to persist.
>
> (Reason p. 160)

It turned out that in the years prior to the disaster, small fires had occurred with some frequency in the London Underground but had been extinguished and not taken particularly seriously. The responsibility for these "trivial" events was thought to be covered adequately by the London Fire Brigade, and the Railway Inspectorate decided three years before the King's Cross disaster that it no longer wanted to receive copies of reports on small fires from the Fire Brigade.

The regulator had, in respect of two escalator fires in 1973, written the Chief Operating Manager of the (then) London Transport Executive, suggesting a drive to clear away accumulated rubbish. That action did not mention any possible risk to passengers and "[n]either the Chief Inspector nor his staff, had '...ever conceived the possibility of an escalator fire rapidly developing and endangering life'." He could be excused for this on two grounds: (1) "the 'flashover' that wreaked such havoc in the ticket

hall was a relatively new phenomenon," and (2) the main risk to passengers was seen in the context of moving trains, rather than static railway and underground stations (Reason 161).

That inquiry Commissioner concluded that the Railway Inspectorate's role in the disaster was "that it had made insufficient use of its powers and had not devoted enough attention to London Underground '...to create the tension necessary to ensure safety'. He was also critical of the Inspectorate's 'cosy' relationship with London Underground and its lack of vigour in checking upon the implementation of agreed safety improvements" (Reason 161).

It is a recurring theme in most of those disasters that there is usually no single cause, but that contributing factors had not been identified and corrected before they became significant. Shortcomings on the part of regulators were, on occasion, found to be the cause.

The multiple responsibilities of the regulator are demonstrated by the investigation into the New South Wales commuter aircraft crash, where the following factors were found (Reason 165-6):

- conflicting goals
- poor division of responsibility
- poor planning
- inadequate resources
- ineffective communications
- poor operating providers

Under the heading "Damned if They Do and Damned if They Don't," Reason noted that regulatory bodies worldwide seem to be trapped in a mesh of double binds:

- Workload has increased as resources have been slashed.
- Regulators are regularly accused of lax oversight and overly collusive relationships with their clients, while the clients themselves often regard the regulators as intrusive, obstructive, threatening, rigid, out-of-date, ignorant and generally unsympathetic to their commercial pressures.

- Accident inquiries find regulators guilty of not being fully acquainted with all the details of their clients' operations and of missing important contributing factors, but the only means they have of obtaining this information is from the operators themselves or from periodic inspections and follow-ups. After an accident, these omissions take on a sinister significance, but for regulators, armed only with foresight, they are but one of many possible contributions to a future accident. As stated earlier, warnings are only truly warnings if we know what kind of an event the organization will suffer.
- Front-line regulators are generally technical specialists, yet major accidents arise from the unforeseen—and often unforeseeable—interactions of human and organizational factors whose role is only now being acknowledged by health and safety legislators, and then in the most general terms.

In short, regulators are in an impossible position. They are being asked to prevent organizational accidents in high-technology domains when the aetiology of these rare and complex events is still little understood—as this book has tried to make plain.

But it was not always the case. Some of the most dramatic reductions in accident rates—usually involving individuals facing clearly defined hazards in particular situations—have been brought about by the introduction of safety-related legislation combined with effective regulation and enforcement.

(Reason p. 171)

There have also, over the years, been many legislative and regulatory successes that we now take for granted but which, when introduced, were seen as new, ground-breaking, and, sometimes, unnecessary. Examples are highway speed limits and compulsory seat belts and crash helmets, to name but three. These regulatory measures have saved countless lives, but obviously require rigorous enforcement to be fully effective. Enforcement always makes for challenges, as in, for

example, the growing prohibitions on the use of hand-held cell phones while driving, which are difficult to enforce.

In an increasingly complex organizational world, the regulator's role becomes more difficult, as summed up by Reason:

> Regulators for their part, attempt to penetrate the boundaries of the regulated organizations by requesting certain kinds of information and by making periodic site visits. But these strategies can only provide isolated glimpses of the organization's activities. Size, complexity, the peculiarities of organizational jargon (as at NASA, for example), the rapid development of technology and, on occasions, deliberate obfuscation all combine to make it difficult for the regulator to gain a comprehensive and in-depth view of the way in which an organization really conducts its business. And, being themselves members of an autonomous organization with its own agenda, individual regulators confronting these difficulties are likely to give their immediate supervisors the impression that they know more about the regulated organization than is actually the case. To confess that they cannot penetrate to the heart of their assigned organization's dealings is to admit that they lack the necessary investigative skills, or are not doing the job diligently enough, or both. Regulators, too, have careers.
>
> In an effort to work around these obstacles, regulators tend to become dependent upon the regulated organizations to help them acquire and interpret information. Such interdependence can undermine the regulatory process in various ways. The regulator's knowledge of the nature and severity of a safety problem can be manipulated by what the regulated organization chooses to communicate and how this material is presented. Regulators, being human beings, tend to establish personal relationships with the regulated—they get to like the people they oversee and come to sympathize with their problems on a personal level—and this sometimes compromises their ability to identify, report or sanction violations.
>
> Bad relations consume limited resources, take up valuable time and are unpleasant and often counterproductive—particularly when the internal sources of information dry up. As a

> result, both the regulator and the regulated generally try to avoid adversarial encounters, favouring negotiation and bargaining over conflict and confrontation.
>
> (Reason p. 174)

In his report on the Piper Alpha disaster in the North Sea, with the loss of 167 lives, Lord Cullen said:

> I am satisfied that operators of installations … should be required to carry out a formal safety assessment of major hazards, the purpose of which would be to demonstrate that the potential major hazards of the installation and the risks to the personnel thereon have been identified and appropriate controls provided. This is to assure the operators that their operations are safe. However it is also a legitimate expectation of the workforce and the public that operators should be required to demonstrate this to the regulatory body. The presentation of the formal safety assessment should take the form of a Safety Case, which would be updated at regular intervals and on the occurrence of a major change of circumstances.
>
> The Cullen Report recommended that the regulation of offshore safety should be carried out by 'a discrete division of the HSE which is exclusively devoted to offshore safety'. It also proposed that the HSE should employ a specialist inspectorate that had 'a clear identity and strong influence in HSE', and that it should be headed by a chief executive who reported directly to the Director General.
>
> (Reason p.179)

It is, as the reader may have noted, a continuing theme of my Report arising out of the catastrophe of March 12, 2009, that our offshore Regulator should be strengthened, be provided with greater resources, and acquire in-house or by contract a higher degree of expertise, particularly in helicopter aviation and cold-water rescue.

The Remaining Specific Issues

I have decided that I can deal with Issues 19, 20, 21, and 22 together because they refer to the roles of C-NLOPB as they now are and whether these roles should or could be expanded.

The four Issues are:

19. Does the C-NLOPB have sufficient resources and expertise, including access to independent aviation expertise, to evaluate whether a proposal or plan for helicopter transport from industry ensures that the risks of helicopter transport are as low as reasonably practicable?

20. Should the C-NLOPB more directly involve itself in studies and research in Newfoundland and Labrador, and in other jurisdictions, to improve safety where the offshore oil industry uses helicopter transport? *(Note: For example, North Sea studies on preventing inversion of ditched helicopters and enhancement of passengers' ability to escape.)*

21. Should there be safety conferences for all parties involved in offshore helicopter transport, and if so, how often should they be held?

22. How often should C-NLOPB review its regulations, guidelines, and standards with respect to offshore helicopter transport?

It is apparent on a review of the Atlantic Accord and the implementation legislation that very little direction was given to C-NLOPB vis-à-vis the safety issues which arise or could arise in helicopter transportation. I have referred to that legislation earlier in this Report. There are limited references to helicopter transportation safety such as, for example, the requirement that helicopter passengers must wear a transportation suit, but very little in the way of specific requirements on

the methodology of establishing and maintaining safety systems and a safety culture. In fairness I should note that the thinking and practice of today was, in the 1980s, either undeveloped or in its infancy.

The legislated emphasis in C-NLOPB's mandate was on careful and safety- conscious exploration and development of the oil resources under the seabed. It may have been that C-NLOPB, which so far as I know has been without aviation expertise, regarded helicopter transportation safety issues as being within the expertise and regulatory powers of Transport Canada. The other expertise would be in the helicopter operator under contracts with the oil operators, who of course did have aviation expertise.

The oil operators contracted with the helicopter company, and the contracts were reviewed by C-NLOPB as was required, but I have not heard of any rigorous regulatory development in respect of helicopter transportation.

As I have already noted, audits address only what is required by law or contract. They do not either address the strengths or weaknesses in aviation contracts, or inquire into the processes leading up to contracts. In summary, therefore, in my opinion, C-NLOPB does not have the resources and expertise which it needs in aviation matters. I believe that C-NLOPB should be strengthened in aviation, and I will elaborate on that matter in my recommendations for an enhanced safety role for the Regulator, which it clearly needs under the new regime of performance-based regulation. Unless there is a strong and proactive regulator, performance regulation, as set forth in the new Regulations and Guidelines, could result in passing what I regard as unfettered power to the operators.

On Issue 20, I strongly believe that C-NLOPB should actively involve itself in studies and research in other countries on helicopter aviation safety. An example of research which I think is important is the concept of the side-floating helicopter. Its advantage would be to avoid the disorientation which is bound to affect some or all of those in the helicopter, should it capsize and invert. Escape from an upside-down helicopter is obviously more difficult than it would be from a side-floating helicopter, in which disorientation would not occur. There are also other research projects in which it may be useful to seek a participatory status.

From my discussions in the North Sea, I believe that the C-NL offshore Regulator would be welcomed into the groups which are undertaking such research in the UK and Norway and indeed in other countries. I also think the Regulator should be actively involved in the National Research Council's research into cold water immersion, which is based here in St. John's.

A strengthened Regulator should take the lead in organizing safety conferences on helicopter transport, as do the regulators in the North Sea. A strengthened and more proactive role for our Regulator could be one of the most beneficial enhancements to safety in the C-NL offshore.

Chapter Eight

Observations on the Role of Offshore Helicopter Safety

Observations on the Role of Offshore Helicopter Safety

I would be remiss if I did not make some observations about offshore helicopter safety which C-NLOPB and Governments as the ultimate authorities may wish to consider in safety regulation of the C-NL offshore. Changes to the Regulator's mandate must come from the federal and provincial Governments, which delegate their powers and rely on the Regulator for advice and the sound administration of safety.

The thinking and practices of industrial safety have undergone very large changes in the past 20 years. The Accord Implementation Acts are quite detailed on the regulation of exploration and production, but less detailed on the subject of safety. The new performance-based regulations and guidelines of 2010 have fundamentally changed the regulatory system, but as yet given little if any direction to C-NLOPB as to how it should regulate under the new regime.

The original legislation expected safety to be regulated on the basis of prescriptive rules imposed on the oil operators and in turn imposed by the oil operators on their helicopter contractor and its operations. Communications with stakeholders and the public, and the role of organizational culture in safety were not mentioned.

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.

At the risk of repeating myself I will enumerate the conditions again; they are:

- bitterly cold water
- high winds
- sea ice
- fog
- severe sea states
- long helicopter flights over hostile waters

I mention the above factors only to demonstrate that the strongest and most proactive regulatory processes are required from the Regulator for helicopter travel in the C-NL offshore. Strong and proactive regulation is the counterbalance to the extensive powers which performance-based regulation grants to the oil operators.

The prescriptive safety environment in which our offshore has operated since its inception has now been changed. That trend to performance-based regulation was recognized and followed by the

National Energy Board in its amended regulations for Arctic exploratory drilling in 2008. It must be clearly understood and expressed that performance-based regulation must go hand in hand with an inclusive and proactive regulatory approach which sets the goals and makes sure that they are met by oil operators. Multiple participants should be involved in the discussion and evaluation of the operator's proposals about ways in which these goals should be met. The multiple participants are the stakeholders, which include workers, engaged experts and governmental agencies, the oil and helicopter operators, the Regulator and, last but not least, the public. I see the process as being evaluative, educative, and open. The Regulator must first set the performance goals, which should be made public. That system has worked in the United Kingdom and Norway, where performance-based regulation began.

I must emphasize that adopting a performance-based safety regime never implies that the regime should be passed over to the oil operators. Goals must be decided by the Regulator, and the methods of meeting them must be approved by the Regulator and should be made public. The oil operators' suggested methods of meeting these goals should be followed by full debate and discussion, organized by the Regulator among workers and other stakeholders. That process also should be made public.

Performance-oriented regulation was born out of catastrophic safety failures, particularly from the Piper Alpha disaster in the North Sea. Such failures of safety have changed both the thinking and practice of organizational safety. The safety culture of an industry becomes much more important when a performance-based regulatory system is adopted. To explain safety culture effectively I will quote from the report on Organizational and Safety Culture which appears in Volume 2 and was prepared by Inquiry consultant Aerosafe Risk Management.

> **3. Defining Safety Culture - What is a Safety Culture?**
>
> It is difficult to find a specific starting date for the field of "safety culture" in the aviation or other high-risk industries. It can be argued that as organizations have always had a culture, safety culture per se has always been present. However as previously discussed, there is a close link between safety management and safety culture; safety culture is an intrinsic part of safety

management and there can't be effective modern safety management without a culture which addresses safety. It is generally accepted that the science of safety culture evolved from the aftermath of a series of disasters, mainly in Europe. Safety cases grew from the Flixborough accident in 1974. This was followed by the Seveso incident in 1976, and the Piper Alpha disaster of 1988. The Piper Alpha inquiry, conducted by Lord Cullen, identified the requirement for systematic safety management with safety cases used to prove the effectiveness of the system.

In the mid-eighties the oil and gas industries started to implement systems and address cultural issues by realising safety was of prime importance and that it was not just a matter of individual personal responsibility. They developed a set of eleven principles of enhanced safety management based largely on the experience of the industry leader DuPont. This occurred in a generally top-down, prescriptive regulatory environment which could at times be contrary to common sense or even sound engineering practice.

Piper Alpha can be identified as a turning point. Lord Cullen proposed extending a goal-setting regime which meant that society sets overall goals and organizations find their own way of achieving these goals. He also referred to the ISO 9000 and BS5750 standards and the use of safety cases as living documents to prove that the systems were working. This approach is used in the Norwegian Petroleum Directorate's (NPD) legislative basis (Hudson, 2001:p 2).

This evolution has been characterised as having four phases. The first is generally considered the "technical period" during which there were rapid technological developments and accidents were viewed as having mechanical causes. The second phase was the "human error" period where the limitations of humans were identified as being the major cause of breakdowns. The third phase is referred to as the "sociotechnical" period where the negative impact of ergonomics and poor design were seen as a cause of human error. The final stage is often called the "safety culture" period, which recognises that operators are not performing their duties or interacting with technology in isolation, but are

> rather working as coordinated teams within an organizational culture (Wiegmann et al, 2007: p1-12).

One concern which emerged in the public hearings of this Inquiry was the lack of consultation with and input from some of those whose input is needed in offshore helicopter issues. I will give an example: while in Norway I learned that workers there at one time wore a helicopter transportation suit similar to the E-452 Helly Hansen suit. The E-452 has been modified and the new version is now called the HTS-1; both are being used in the C-NL offshore. There had been complaints from Norwegian workers about the face seal, zippers, gloves, and huge boots. At the same time as the Norway suit was being substantially improved, the E-452 suit was being introduced in the C-NL offshore. Had C-NLOPB had access to survival suit expertise and been part of the ongoing research and development in Norway, we might have had an improved suit earlier than 2010, and even now I think we have much more work to do to develop a better suit.

When information on suits was being given to the Inquiry in the fall of 2009 and winter of 2010, the suit that was demonstrated was the original E-452 model. It was explained that improvements were being made and that the new model would be called the HTS-1 suit. At the June 2010 hearings, at my request, the new HTS-1 suit was shown to the Inquiry and its improvements explained.

The survival suits were the greatest single cause of concern to the 991 respondents in our survey of helicopter passengers. The suits were chosen apparently without input from the workers, without input from the Marine Institute (which trains helicopter passengers in survival), without independent input from experts engaged by the Regulator, and without any input from the National Research Council in St. John's, NL, which has for some years been conducting important research into the effects of cold water immersion, including sea state and wind and wave impact, on the chances of survival in a hostile ocean environment.

I should note that after they heard the evidence given by Inquiry experts, the Working Group of the Canadian General Standards Board contacted Inquiry Counsel saying that they wished to participate. Some

months earlier, the CGSB had been asked by Inquiry Counsel whether it wished to contribute information about suits to the Inquiry. At that time the CGSB was unsure, but ultimately a meeting was held that included Inquiry Counsel, the Working Group, and the Chair of the suit committee of the CGSB. A summary of the discussion was prepared and submitted to the counsel for parties with standing, and I have included it in Volume 3 of this Report. For my part, I was very pleased to learn of the existence of the Working Group, which was formed by members of the CGSB's Committee on Immersion Suits at a meeting held in November 2009, and that they have begun work on a new and improved suit. The Working Group consists of representatives of the CORD Group (survival suit testers), Mustang (suit manufacturers), ExxonMobil, Helly Hansen (suit manufacturer), C-NLOPB, and CAPP. The full committee has even broader stakeholder membership.

In respect of all new developments, the important players and stakeholders should be involved in committees which the Regulator should set up for discussion purposes. All should be able to bring opinions to the committees, and the Regulator itself should have expertise. There should be a collaborative effort to reach consensus. That is the new and, in my opinion, necessary way to approach performance-oriented safety.

The way the helicopter transportation suits were chosen and approved was not the foregoing way. The people who were being trained often found that the suits leaked. In the one true test, the suit worn by the sole survivor of Flight 491 leaked for some reason that may have involved the lack of a proper fitting process. The entry of more than 500 millilitres of water into a suit in frigid conditions dramatically heightens the danger of hypothermia to the wearer. We know that the lone survivor's core body temperature dropped from a normal 37° C to 28° C in approximately one and a half hours. He was losing consciousness and near death when rescued. I do not believe that the suit performed as it should have, which issue may be addressed by the Transportation Safety Board. My suggested approach to the matter of choosing suits may be subject to debate, but the fact that his suit did not measure up, for whatever reason, in its real test is not.

When I first began work on this Inquiry into offshore helicopter safety, my concept of my task was that I should search out safety deficiencies or have them brought to my attention, so that I could recommend specific improvements. Over the months I have read books, articles, and reports on research and accidents, talked to consultants, conducted public hearings, received reports on a number of issues, and involved myself in practical discussions with experts and members of the public and directly with safety activities.

During these months I have learned the differences between prescriptive regulation and performance-based regulation, and between reactive safety regulation and proactive regulation. Most of all, I have learned what is being done in some other countries with much larger offshore oil industries than ours. As a result of that daily learning involvement, my understanding of my task has changed: I now see that improving safety means more than addressing specific shortcomings—real improvement rests on real change, on a new and different regulatory regime that can coordinate input from a variety of stakeholders into identifying goals that must be met and determining whether they are being achieved. Performance-based regulation requires regulator expertise as well as oil operator expertise and, as well, perspectives and opinions from a wider group which should include workers, other stakeholders, and members of the public.

I have come to believe that regulation to be effective must encompass more than a list of do's and don'ts. It must set in place and lead an inclusive regime of many players, some very important, others less so. All the available knowledge, skills, and wisdom of all participants should be harnessed in the safety cause.

I will begin by examining the words "proactive" and "reactive." Proactive means creating or controlling a situation rather than merely responding to it. To react is to respond to something and reaction is something done or experienced as a result of an event or situation.

The concept of industrial safety and safety generally has broadened and changed from a prescriptive and punitive one that involves the laying of blame on someone for unsafe acts or omissions to an organic one in

which organizational safety culture reaches from top to bottom in an organization. The tradition of "the regulator" prescribing do's and don'ts has metamorphosed into a more complex system of leadership and showing the way, determining the goals and ensuring that they are being realized.

When offshore oil exploration and development began, it was in shallow water sea beds close to shore. The endless demand for oil has pushed drilling and production far offshore and into deeper and ever more hostile and dangerous waters. The dangers are to human life and safety, and to the environment. When and if a substitute for oil will be found I do not know, but I believe that in the short and medium terms, oil exploration and production will continue to be conducted in ever more hostile environments. The question then becomes: how should these activities be regulated, by what kind of regulator, and using what safety concepts? Choosing the right course may mean, on any day, the difference between safety and disaster.

It is necessary and inevitable that the vast majority of offshore workers will continue to travel to and from the offshore by helicopter, because no other means of transportation combines speed and flexibility of service in the same measure as does the passenger helicopter. We must accept the fact that there is a level of risk in offshore helicopter transportation, that the risks increase over hostile waters, and that in the event of a crash or a controlled ditching, the chances of survival decrease sharply at night.

When offshore drilling and production first began, the regulation of safety, drilling, and production was almost always combined in one authority. However, as a result of catastrophic events with serious losses of lives, the concept of separate safety regulation was introduced and developed. Separate safety regulation began in the United Kingdom after being recommended by the Cullen Commission in a report published in November 1990, following the Piper Alpha disaster.

In 2001 Norway adopted the concept of a separate safety regulator and Australia did the same a few years later. The rationale behind these changes, which imposed separate safety regulators on the industry, was

that there may be inherent conflicts within a single regulator which on the one hand regulates exploration and production and at the same time is being required to make the hard decisions which a safety regulator must make. I have been told that in both the United Kingdom and Norway the impetus for the changes came not from the industry or the regulators, but from government. The changes are now fully accepted and working. It was independent minds outside the industry which perceived the inherent conflict between exploration and production on the one hand and safety on the other, when both are under the control of a single regulator.

Another factor against the continuance of a single regulator is called "regulatory capture." 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.

The Inquiry has received no evidence of regulatory capture in the C-NL offshore. We are a relatively new and small offshore, and the personal integrity of the people within C-NLOPB is such that I would not expect regulatory capture to occur. Nevertheless, every effort should be made to ensure that it never happens.

A Safety Authority, which I believe should be formed, should be completely separate from exploration and production, be separately funded and its leadership given considerable security of tenure. It should be completely autonomous in safety regulation and decision making, with an infrastructure which has in-house or readily available expertise in all facets of the industry. The Safety Authority's decisions, when invoked, should override all other decision making. Furthermore, the Safety Authority's autonomy would enable it to enlist the help and cooperation of a wide variety of players and stakeholders in the offshore, never forgetting the public's interest in safety and its right to be informed. Public participation is essential. At the same time there should be a liaison between the Safety

Authority and the exploration and production Regulator, to keep each other informed of important developments.

By comparison with such a system, the C-NLOPB has a Chief Safety Officer and eight safety inspectors. It is amazing that such a small working group can even monitor and audit all aspects of safety in offshore exploration and production, including offshore aviation. What they are unable to do under the present minimal system is take the broader leadership role, the more proactive role, which I am advocating, because they are neither organized nor mandated to pursue these wider roles, nor do they have the resources to do so. However safety was dealt with in the past, the wider role has become essential under the 2010 Regulations and Guidelines.

The Accord Implementation legislation permits the Chief Safety Officer to override production decisions when safety demands it, and he has done so in the past. Nevertheless, the Chief Safety Officer is an employee of C-NLOPB; his is a lonely position that has not been given the stature or organizational strength necessary for the future. We are now entering an offshore oil era which is facing ever greater dangers and is in need of new, stronger and proactive safety leadership.

I have described the Chief Safety Officer's position as being a lonely one. It is only he in our offshore who can if necessary shut down a multimillion-dollar production facility. Such power can lead to isolation when it vests in a single individual.

The literature on the subject of isolation in a particular role says that it can lead to feelings of vulnerability and depleted personal resources. It makes it harder to take leave, including sick leave, or even attend training or refresher courses. Few human beings perform at their best when the pressure on them is constant.

What I will be outlining is what I will call a "Safety Authority," led by a Chief Executive Officer, with high-level executives each responsible for a particular facet of the Authority's work. The whole should be supported by an advisory board of independent persons with widely differing backgrounds. The power to demand a result or order a shutdown

should not be imposed on one person, but on a group which is representative of the power of the Safety Authority. The Deepwater Horizon disaster of 2010, in the Gulf of Mexico, very quickly caused the President of the United States to realize and decide on the necessity for a separate and autonomous safety authority. As with Piper Alpha, a disaster either human or environmental, or both, causes minds to focus more sharply on safety issues and infrastructures. I believe that in the coming years, most offshore safety regulators will function separately from exploration and production regulation.

The reader is by now aware that I endorse safety regulation by a separate and autonomous Safety Authority, but I am also aware of Canadian factors which may require such a Safety Authority in the C-NL offshore to be confined to this jurisdiction, at least for now.

The United Kingdom and Norway are unitary states with parliaments which can more readily legislate for these countries as a whole. Furthermore, compared with Canada, both countries have relatively small land masses and their offshores are discrete oil-producing areas within the adjacent North Sea. Canada, on the other hand, is a huge and geographically diverse federal state. In the C-NL offshore, both the federal and provincial Governments have distinct roles and together have the responsibility for what are called "fundamental decisions" and for regulations. At the moment, offshore oil and gas production is limited to the Canadian east coast, but in the future it may be in the Arctic, or off other provinces or regions. It may be difficult to create a separate Safety Authority for the whole country.

Taking into consideration all the factors which affect the creation of an expanded safety regime for the C-NL offshore, I think an acceptable solution at this time would be to have either matching amendments to our legislation or regulations, or an MOU to create a separate and autonomous Safety Division, with a separate budget, within the overall umbrella of C-NLOPB, but completely independent in safety matters. The Chief Executive Officer of this Division should for information purposes report yearly, or at other designated times, to each of the appropriate federal and provincial ministers and to the Chair and Chief Executive Officer of C-NLOPB, so that all can be equally informed.

A separate and larger budget would allow the Safety Division to fund its own or shared research projects, to engage expert advice as required, to arrange for committees, safety forums, and special safety study projects, and to regulate and bring a leadership role to offshore safety. The Safety Division would be able to encourage safety and to ensure that workers have free and untrammeled input into offshore safety matters, including helicopter operations. The expanded and enhanced role of safety should be recognized in the formal title and authority of its Chief Executive. Its organizational model would reflect the overriding importance of the Safety Division itself.

In addition to a Chief Executive, the Safety Division should have a small group of high-level executives, e.g., Directors, each of whom would have responsibility for specific safety areas such as aviation, exploration and production, research, meetings, conferences and safety forums, the dissemination of public information, and perhaps other areas of operations.

The Safety Division must have leadership whose rank and authority cause it to be regarded as equal to all other offshore regulatory functions and in safety matters higher than other functions. Rank and authority are integral aspects of forceful and proactive leadership. That concept has been known worldwide for many years.

In his book called *The Making of the Atomic Bomb* (Simon and Schuster 1986), Richard Rhodes describes how responsibility for the direction of that project was offered to a brilliant engineer and administrator named Leslie Richard Groves, then a Colonel and Deputy Chief of Construction for the entire US Army. He wrote of Colonel Groves as follows:

> He crossed the Potomac to the Pentagon office of Somervell's chief of staff, Brigadier General Wilhelm D. Styer, for a briefing. Styer implied the job was well along and ought to be easy. The two officers worked up an order for Somervell to sign authorizing Groves "to take complete charge of the entire … project." Groves discovered he would be promoted to brigadier—for authority and in compensation—in a matter of days. He proposed to delay official appointment until the promotion came through. "I thought

> that there might be some problems in dealing with the many academic scientists involved in the project," he remembers of his initial innocence, "and I felt that my position would be stronger if they thought of me from the first as a general instead of as a promoted colonel." Styer agreed.
>
> (Rhodes p. 425)

General Groves was right. He realized that authority comes from many sources and one of these sources is organizational rank. The Chief Executive Officer of a Safety Division, its senior executives, and other staff would bring status, knowledge, professional qualifications, influence, power, and rank to their positions and to the Safety Division.

Most important, the Safety Division should be supplemented and supported by an Advisory Board of mature citizens who are unconnected with the oil industry or its contractors. The members of such a Board would be part-time federal and provincial appointees, but in my opinion need not be experts in aviation or other oil industry activities. Experts in specific fields could and should be employed in-house, or by consulting contracts as needed. The strength and value of the Advisory Board would be the maturity and independence of its members. Their advice and support for the leaders of the Safety Division would be a major strength and reassurance for its entire management and staff. That reassurance would extend also to federal and provincial Governments, who have the final responsibility to the public for offshore safety.

The oil industry has submitted that we already have the best system of regulation and that it need not be changed. They say also that it is they who have the highest levels of expertise and that the Regulator does not need that degree of expertise. Perhaps not, but the Regulator should have sufficient expertise and organizational strength to deal with the oil operators as on a level playing field.

The implicit message of the industry is: we will get it right, because we have the knowledge and expertise. It implies that the Regulator should approve what the industry brings forth without rigorous debate, stakeholder input, and public scrutiny. The oil operators indeed have world-class expertise and a world-wide reach. However, the

Canadian public is entitled to the assurance that the standard of their operations is determined, monitored, and verified by Canadian institutions which clearly have power and are deserving of the public's confidence.

Let us look for a moment not at what the industry says but at what it did in the case of the Emergency Breathing System (EBS).

By the year 2000, the compressed-gas breathing apparatus had already been used by the military for some years. The oil industry in the North Sea was working toward introducing a breathing device which later turned out to be a re-breather and later a hybrid device (a re-breather aided by compressed gas).

The industry here, represented by the Canadian Association of Petroleum Producers, took nine years to implement the EBS following the C-NLOPB's request that it be done, and final implementation only came a month after March 12, 2009. The industry did explain to C-NLOPB what they at one point were doing, but there was little significant engagement. It did not act on the request for nine years, despite letters from C-NLOPB on two or three occasions, one being a letter from the Chair. There was no consultation with or real explanation to the Regulator over the period of nine years, insofar as I have been told, as to why the breathing device had not yet been placed in use. As the oil operators have admitted, the process took too long.

We should look for a moment at the issue of a dedicated helicopter recommended by the Ocean Ranger Commission in its report dated August 1984. To me it is inconceivable that C-NLOPB and the industry did not know about the recommendation for a dedicated search and rescue helicopter based in St. John's. "Dedicated" means: "used or designed for one particular purpose only" *(Oxford English Dictionary)*.

To my knowledge, no one argued against the Ocean Ranger Commission recommendation. It was simply ignored. The dedicated helicopter issue was not acted upon until I raised it in an interim recommendation to the C-NLOPB in February 2010.

The matter of wheels-up response time of 15 minutes first came to my attention from reports of search and rescue in the North Sea. To my surprise, I was told at the public hearings that response times elsewhere in Canada and in the Gulf of Mexico were also 15 to 20 minutes wheels up, depending on available facilities. Our response time of one hour, necessitated by reconfiguration of the helicopter, was two to four times as long as times elsewhere. The industry for years had ignored the improved response times in other jurisdictions, and C-NLOPB did not insist that they step up to the plate. Surely it was realized before 2010 that there was no fully dedicated helicopter in place and that the response time of one hour was seriously out of step with other response times, both inside and outside Canada.

I would like to refer to how I see the scope and rationale of offshore regulation. The oil resource off our shores is a Canada-Newfoundland and Labrador resource, not an oil industry resource. It is, in fact, a public resource of great value which provides significant revenues to Canada and Newfoundland and Labrador, and provides significant profits for those who extract and market it.

Persons from this province comprise a very high percentage of the offshore workforce. The industry operates in dangerous and remote waters. It is generally agreed in the literature, and confirmed by statistics, that helicopter transportation is the most dangerous part of working offshore.

My point is that the two Governments, through their Regulator, must insist upon the most rigorous safety regulation, because with greater distances our offshore waters become deeper, more hostile, and more dangerous.

There has been much discussion at the Inquiry on the best mode of regulation, i.e., whether by a single regulator, or with a safety regulator separate and independent from exploration and production. My reading and consultations with other jurisdictions and experts have confirmed me in the opinion that a separate safety regulator is the best route. Safety regulators have to make hard decisions which are not always popular with industry, and regulators must place safety ahead of production.

Though I favour a completely separate Safety Authority, I am recommending as a first step that the present safety structure within C-NLOPB be discontinued and replaced with an independent division which I would call a Safety Division, as a separate and independent pillar of C-NLOPB, with its own budget, senior leadership independence, and decision-making authority. The system of a Chief Safety Officer and safety inspectors may have been suitable in the past, but much more is needed under performance-based regulation. What is required beyond the present function is high-level leadership by high-level personnel with high-level responsibilities and access to high-level expertise. There are fine lines to be drawn in the new regime, because performance regulation does not exclude prescriptive elements. I wholeheartedly support the new performance-based regulation and it works in the North Sea. Nevertheless, performance-based regulation does not mean passing safety over to the industry. First and foremost, the Regulator must set the goals and ensure that they are met, after full discussion, debate, and public information. I do not see how proper goals can be set unless the Regulator has a significant depth of knowledge and expertise. The expertise need not be in-house but can easily be obtained worldwide. Independence of expert advice is a key factor. When goals have been set for the oil operators and they have considered a response, their response should undergo a review process which should include stakeholders, worker representatives, and the public. Most important, this review process should be organized and chaired by the Regulator with its own input and expertise and ultimate decision-making authority as to whether the goals will be adequately met by the operators' Safety Plan. It is important that the review process should be public. Safety is a public concern and the offshore draws on the public for its workers. They are important to the safety process. If this Inquiry has done nothing else, it has given the public a glimpse into the world of offshore regulation and the public interest in the process has been high. There may be those who do not support public participation, but I am not one of them. The bright light of public scrutiny is the best way to ensure that in this jurisdiction we get safety right, while at the same time understanding that it is an ongoing journey which never ends at a final destination.

I am aware of the intention to pass Occupational Health and Safety Legislation. That is a welcome initiative. How a Safety Division would

mesh with the new Occupational Health and Safety measures would have to be worked out by those who are involved, but I think the OHS legislation is an important step forward. I particularly like the concept of an Advisory Board for Occupational Health and Safety, but I do not favour a single Advisory Board for a Safety Division and Occupational Health and Safety leadership. Their two roles are different, with OHS doing what its name implies, while a Safety Division would occupy a new leadership role for offshore safety up to the highest level of participation, all the way down through the system to verifying, auditing, and ensuring compliance.

I wish to emphasize that the occupational health and safety regime is not a substitute for the Safety Division. What I am advocating would be a separate and independent division of C-NLOPB. That separate division would have the obligation to be a leader in safety: to lead in developing goals, in the evaluation of systems by all stakeholders and the public, in liaison with regulators in other parts of the world, and in being part of research, local and international, into all aspects of offshore safety, including aviation.

I believe that the recommendation which I am making on this subject is by far the most important recommendation to come out of this Inquiry process.

The revenues from oil and gas are not, and will not be, inconsequential in the near and medium term. In September 2010, the Canadian Association of Petroleum Producers stated the following on their website:

> **How much oil and gas does Newfoundland and Labrador produce?**
>
> Newfoundland and Labrador produces about 270,000 barrels of crude oil per day representing 10 percent of Canada's total crude oil production. There is currently no natural gas production in the province.
>
> There are three producing offshore oil projects: Hibernia, Terra Nova and White Rose. The Canada-Newfoundland and Labrador

Offshore Petroleum Board estimates oil reserves for each of the major producing discoveries at

- Hibernia: 1.24 billion barrels discovered
- Terra Nova: 419 million barrels discovered
- White Rose: 283 million barrels discovered; North Amethyst, a White Rose satellite expansion project which began producing in 2010, contains an additional 68 million barrels of oil

About 1.14 billion barrels of this oil has already been produced. The Hebron project, estimated to contain 400-700 million barrels of recoverable oil, will be Newfoundland and Labrador's fourth major development with oil production expected to begin before the end of 2017.

How much oil and natural gas has been discovered in Newfoundland and Labrador?

Based on a recent estimate by the Canada-Newfoundland and Labrador Offshore Petroleum Board, the Newfoundland and Labrador offshore contains 2.9 billion barrels of oil, 479 million barrels of natural gas liquids and 10.86 trillion cubic feet of natural gas. One trillion cubic feet of natural gas will heat all gas-heated homes in Canada – 5.5 million – for a year and a half.

How do people in Newfoundland and Labrador benefit from offshore oil and natural gas production?

The offshore oil and gas industry creates jobs, opportunities for local businesses and spending on research and development, education, training, and infrastructure. The people of the province also benefit significantly from the royalties and taxes the industry pays to governments; these revenues support social and other programs throughout the province. In addition, oil and gas activity leads to spin-off benefits for the retail and construction industries.

The statement also provided the following statistics:

$1.8 billion	oil royalties paid to the Government of Newfoundland and Labrador in the 2009-10 fiscal year
$5.5 billion	oil royalties paid to the Government of Newfoundland and Labrador to date
31	per cent of provincial government revenues from the oil and gas industry in 2009-2010
$17 billion	capital spending by the industry in Newfoundland and Labrador since 1995
34	per cent of Newfoundland and Labrador's nominal GDP attributed to the oil and gas industry between 2004 and 2009

The strengthening of the Regulator will have a financial cost, but it should be not be begrudged. Oil and gas will be sought from ever more dangerous waters, and I think that will happen both here and worldwide. The Canadian public, including the public of this Province, will accept nothing less than the highest levels of safety in every aspect of the offshore. The public will demand strong and proactive safety regulation, and I believe that the public will be prepared, along with the industry, to bear the financial costs that will be associated with it. What I am suggesting is that the Canada-Newfoundland and Labrador Safety Regulator be given the stature and resources to stand tall in a new safety regime.

Chapter Nine

Recommendations

Recommendations

These recommendations arose from a list of Issues chosen in collaborative meetings which included the Commissioner, Inquiry Counsel, and all of the participants with standing, represented by either counsel or other delegates. They arose out of the totality of the information and argument from the public hearings, together with information from many sources, including published documents, presentations, and submissions, virtually all of which sources are either identified in my Report or already displayed on the Inquiry website.

My actual recommendations will be lacking context if the reader fails to read my analysis of the various Issues in the body of the Report. The consideration of the Issues begins with the specific Issues and concludes with the overarching Issues (Chapter 7). Also at the heart of the recommendations are my Observations (Chapter 8), which explain my thinking on the regulatory role and governance.

If the reader is unclear about the reasons for my recommendations, a reading of the foregoing chapters should provide the necessary clarification: the explanatory chapters of my Report are also intended to be amplifications of these Chapter 9 recommendations.

I have decided not to add extensive commentary to the recommendations, but instead to refer the reader to those chapters of the Report in which I have given my reasons or discussed the subject matter of the recommendation.

First Response

1. **In my letter of February 8, 2010, to C-NLOPB, I recommended a dedicated first-response helicopter, fully equipped, with an improved wheels-up time of 15-20 minutes. That recommendation was accepted and is being acted upon.**

2. **It is recommended that the Regulator begin work and consultations to establish performance-based goals for first response and that, when goals have been established, operators'**

responses should be discussed with the appropriate stakeholders, including workers. The final statement of goals and how they are to be achieved should be made public.[1]

3. **It is recommended that the Regulator require the helicopter operator(s)**[2] **to develop, in consultation with the oil operators and worker representatives, a protocol to cover the following situation: when a passenger transport helicopter is in flight, and there is an indication of a malfunction of the helicopter which does not constitute an immediate emergency but which the pilot considers to be potentially serious, the first-response helicopter should be dispatched to meet the transport helicopter and accompany it to its chosen destination. The purpose of the accompanying helicopter is to be present and available to assist, should an emergency be declared. The final decision to deploy the first-response helicopter should be made by (a) the helicopter operator's dispatcher on duty, (b) the chief pilot or a designate, and c) the pilot of the first-response helicopter.**[3]

Explanatory Note for Recommendation 4:

The Department of National Defence (SAR services) and the helicopter transport operator have understandings as to what should happen in the case of a declared emergency, but have not entered into a formal protocol.

4. **It is recommended that, with the agreement of DND, a formal protocol be entered into between DND and the helicopter operator(s) so that each will know what the other's aviation resources are, know how response efforts will be deployed and in what circumstances, and clarify their respective roles. The Regulator, the oil operators, the helicopter operator(s), and worker representatives should be informed of the protocol.**

[1] Discussion of first response: Chapter 7, Issue 6.
[2] At present there is only one helicopter operator in the C-NL offshore. In the future, it is possible that more than one company may offer that service.
[3] Discussion of dispatch considerations: Chapter 7, Issue 7.

Knowledge and Personal Accountability

Explanatory Notes for Recommendations 5 and 6:

Safety is everyone's responsibility, and many of my recommendations include worker involvement. To be effective, the worker must be knowledgeable. Accountability flows from knowledge. While personal accountability cannot be enforced in the same manner as, for example, training, or the mandatory wearing of a transportation suit, personal accountability should be emphasized to helicopter passengers.

Accountability may include: encouraging workers to familiarize themselves with helicopter transportation safety issues; requiring a level of physical fitness; requiring a measurement of physical fitness to be included in the medical examination protocol; requiring an appropriate level of thermal protection to be worn under the suit; and encouraging incident reporting through the oil operators, worker representatives, and the Regulator.

5. It is recommended that the Regulator require the oil operators to develop procedures whereby workers should be required to familiarize themselves with the non-technical aspects of helicopter transportation and safety. Worker knowledge cannot be compelled, but should be clearly and publicly advocated by the Regulator, the oil operators, and the helicopter operator(s). Workers should make every effort to learn about helicopter flight issues and respond positively to any opportunities to achieve greater knowledge.

6. It is recommended that the Regulator pursue and promote the matter of personal accountability with the worker representatives, oil operators, and any other appropriate stakeholder(s).

Explanatory Note for Recommendation 7:

The evidence showed that a significant number of offshore passengers would prefer to be informed of operational issues by the helicopter operator, rather than learning about them days later in the media. Some passengers will have no interest in such knowledge, but many will, and the information should be made available.

7. 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 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.

Explanatory Note for Recommendation 8:

The purpose of briefings is to make passengers aware of flight expectations or issues, so as to avoid surprises, undue anxiety, and the possible spread of misinformation. The issue of briefings by pilots causes concern for the helicopter operator and some of the pilots, who are unaccustomed to the stresses which may be created by giving briefings to passengers. Nevertheless, I believe that passengers who fly offshore are entitled to briefings about conditions which may be encountered in flight and to some explanation afterwards, if anything out of the ordinary occurs during a flight.[4]

8. It is recommended that either the pilot or co-pilot should be required to give a short briefing to passengers before the offshore flight begins. Briefings should deal with expected flying conditions, planned landings en route, and any other information as to the conditions which may be encountered, so as to lessen the anxiety of passengers.

[4] Discussion of flight briefings: Chapter 7, Issues 14 and 18.

It is further recommended that if any unexpected event occurs during a flight, a pilot or other designated person with the necessary knowledge should brief the passengers immediately on arrival as to what occurred. Matters which require further investigation should be explained on an appropriate website after the investigation is complete.

If giving an oral briefing is too stressful for an individual pilot, the briefing should be given by someone else with the necessary knowledge, such as a dispatcher or another pilot.

Briefings should be exactly as the name implies and are not to be used as an opportunity for passengers to challenge or argue with the pilot.

Operational Limitations on Helicopter Transport

Explanatory Note for Recommendation 9:

The helicopter operator has already adopted certain operational limitations which are in addition to those of Transport Canada. Such limitations are permissible if they do not conflict with any aspect of Transport Canada directives.

9. 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.

Operational Requirements Regarding On-Board Facilities and Passenger Safety

Explanatory Note for Recommendation 10:

This refers to safety systems or features which may affect on-board safety, such as auxiliary tanks, seating arrangements, and safety screening.

10. It is recommended that the Regulator, oil operators, helicopter operator(s), and worker representatives, with the assistance of Transport Canada if it is available, explore on-board safety and equipment issues for passengers, with a view to reaching a consensus on improvements. The Regulator should state the appropriate goals, and the oil operators be asked to respond as to how they could be met, after which there should be further discussion with the foregoing stakeholders. In the absence of consensus, the Regulator should decide the issue(s).

Helicopter Fleet Size

11. It is recommended that helicopter fleet size should continue to be decided by the oil operators. The Regulator should monitor the fleet size to ensure that it is sufficiently large at all times to maintain helicopter safety.

Night Flights

Explanatory Note for Recommendation 12:

Night flights pose increased risks:

(a) for pilots and passengers in takeoffs and landings on offshore installations

(b) for pilots and passengers in the case of ditching or crashing in darkness

(c) for pilots and search and rescue personnel who must try to effect rescue in darkness

12. In my letter of February 8, 2010, to C-NLOPB, I cautioned against night flights and they were curtailed. I cannot recommend a return to scheduled night flying. I recognize that circumstances may arise when night flights may be an imperative. In such cases, the decision to fly should be made by a committee composed of a representative from each of the Regulator, helicopter operator(s), oil operators, and workers. The committee should assess all known risk factors. If there is unanimity that the night flight(s) be allowed, a passenger

should nevertheless be entitled to refuse to take a night flight without penalty of any kind.[5]

Helicopter Safety Training and Survival

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.**[6]

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.**

Personal Protective Equipment

Explanatory Note for Recommendation 15:

Helmets can prevent death or serious injury to pilots in the event of a crash or ditching.

15. **It is recommended that the wearing of pilot helmets be made compulsory.**

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**

[5] Discussion of night flights: Chapter 7, Issue 11.
[6] Discussion of training: Chapter 7, Issue 12.

operators, helicopter operator(s), trainers, manufacturers and suppliers of personal protective equipment, and worker representatives.

Risk Management

Explanatory Note for Recommendation 17:

The Inquiry initiated a voluntary risk-management study of the oil operators' and the helicopter operator's risk-management practices. After considerable preliminary work had been done, it was decided that the preliminary work be turned over to the Regulator, and that the Regulator order the risk assessment to be done after the transmittal of the Commissioner's Report.

17. It is recommended that the Regulator order a risk-management assessment of the oil operators' and the helicopter operator's risk-management practices.

18. It is recommended that the Regulator continue to verify the risk-management practices of the oil operators and the helicopter operator(s) on an ongoing basis.

19. It is recommended that the Regulator at all times be aware of and evaluate the safety cultures of the oil operators and the helicopter operator(s).

Inclusiveness

20. It is recommended that the Regulator develop procedures to involve workers and pilots in the development, implementation, and monitoring of all helicopter safety issues on an ongoing basis.

Stakeholder Relationships

21. It is recommended that the Regulator review its relationship with CAPP, and that the oil operators define CAPP's authority so that stakeholders understand that authority.

Regulatory Oversight

22. It is recommended that the Regulator acquire sufficient aviation expertise, either in-house or by contract, to allow it to assess fully the oil operators' plans and proposals for helicopter safety.

23. It is recommended that the Regulator, assisted by independent aviation advice, establish appropriate areas of oversight for helicopter transportation and in that process that the Regulator consult with the oil operators, the helicopter operator(s), worker representatives, trainers, and, as appropriate, other stakeholders.

Explanatory Note for Recommendation 24:

It is difficult, especially under a goal-oriented regulatory regime, for an auditor without aviation expertise to audit helicopter operations.

24. (a) It is recommended that auditors of helicopter operations have a prescribed level of aviation expertise, or be assisted by a person with aviation expertise, in conducting their audits.

(b) It is recommended that the Regulator's and oil operators' safety aviation audits of the helicopter operator(s) include reviews of past responses to declared emergencies and emergency preparedness exercises.

(c) It is recommended that auditors have access to reports as to what actions were taken to correct deficiencies, if any, found in previous audits.

Regulatory Engagement

25. It is recommended that the Regulator hold Safety Forums at least three times a year. Forums should involve the Regulator, oil operators, helicopter operator(s), supplier(s) of personal protective equipment, weather observers, trainers, worker representatives, and any other appropriate participants. All issues of concern to any of the above should be raised and receive full discussion. Ongoing improvements in helicopter safety should be monitored. The results of Safety Forum deliberations and any recommendations should be made public and should be taken into consideration by the Regulator in setting goals.

26. It is recommended that the Regulator be funded and equipped to initiate high-level safety conferences with the oil operators, the helicopter operator(s), worker representatives, and stakeholders at least every two or three years. The Regulator should engage experts to advise on the most up-to-date safety initiatives and should invite the participation of regulators and researchers from other jurisdictions.

27. It is recommended that the Regulator be funded to involve itself directly in studies and research on offshore helicopter safety locally and in other jurisdictions as well as to initiate its own studies and research.

28. It is recommended that the Regulator review on an ongoing basis its regulations, guidelines, and standards regarding offshore helicopter transportation; that formal reviews be undertaken at least every three years; and that input be invited from oil operators, workers, helicopter operator(s), and other stakeholders.

Safety Under the New Regime

Explanatory Note for Recommendation 29:

I believe that the recommendation which follows this explanatory note will be the most important in this entire Report.

Until the end of 2009, the C-NL offshore operated under a primarily prescriptive regime which established the requirements under which the oil operators filed their Safety Plans, received authorizations, and conducted their exploration and production. The essential task of the Regulator was to ensure that the oil operators adhered to what was required of them. This was called the prescriptive system of regulation.

At the end of 2009, the federal and provincial Governments made regulations which completely changed the offshore regulatory regime. These regulations instituted a performance/goal-based regime, whereby the regulations specify and the Regulator sets goals, and the oil operators respond by saying how they will achieve these goals. It follows that the Regulator must have the knowledge and expertise which will enable it to set goals and properly assess what the oil operators propose. The Regulator must have the authority to be able to say yes or no, and, if necessary, require further proposals.

Safety is an essential component of the above regulatory process. I believe that the Safety Regulator should be separate and independent from all other components of offshore regulation and should stand alone, with safety being its only regulatory task. All of this I have explained in various parts of the Report and in particular in the Observations chapter. Independent and stand-alone safety regulators are now in place in Norway, the United Kingdom, and Australia, and the same concept is, I understand, being developed in the United States for the Gulf of Mexico.

The new C-NL offshore goal-oriented regulatory regime was introduced by regulation on January 1, 2010. There were, as far as I know, no changes made at that time to the regulatory body (C-NLOPB) to strengthen it and prepare it for the new and much more demanding regime. I believe the Safety Regulator should be powerful, independent,

knowledgeable, and equipped with expert advice, hence my following recommendations to C-NLOPB.

29. (a) It is recommended that a new, independent, and stand-alone Safety Regulator be established to regulate safety in the C-NL offshore. Such a Safety Regulator would have to be established, mandated, and funded by both Governments by way of legislative amendment, regulation, or memorandum of understanding, or other means.

(b) It is further recommended that if, for any reason, it may not be feasible at this time to do as recommended in 29(a) above, both Governments consider the enactment of regulations, or a memorandum of understanding, or such other mechanism as may be suitable, to do as follows:

(i) create a separate and autonomous Safety Division of C-NLOPB, with a separate budget, separate leadership, and an organizational structure designed to deal only with safety matters. A suggested design for such a Division is to be found in the Observations chapter of this Report.

(ii) establish, to support the full-time leadership and staff of the Safety Division, an Advisory Board composed of mature and experienced persons fully representative of the community and who are unconnected with the oil industry. The Advisory Board would not be expected to contribute expertise in aviation or other specialized fields. Its role would be to give mature and balanced advice and support to the leadership of the Safety Division, its officers and staff.

(iii) ensure that the Safety Division would have the mandate and ability to engage, either on staff or as consultants, expert advisors to assist it in its regulatory tasks.

(iv) ensure that the powers, duties, and responsibilities of the Chief Safety Officer be transferred to and incorporated in the new Safety Division.

(c) Under my Terms of Reference, I cannot recommend directly to Governments and so this Recommendation 29 is being made to C-NLOPB, which has as part of its role the delegated responsibility to advise both federal and provincial Governments on offshore safety governance. My recommendation is therefore that C-NLOPB itself recommend to both Governments the changes to the regulatory regime which I have recommended.

My Final Observation

Offshore oil jurisdictions and regulators differ in the amount of information about safety which they give to the public. 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 may be required in the cases of security and sensitive proprietary information, but exceptions should be kept to a minimum.

As I have said earlier in this Report, offshore oil developments are developments of a public resource. Members of the public become workers in all aspects of offshore exploration and production. 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. After catastrophic disasters over the years, the most recent being the Deepwater Horizon tragedy in the Gulf of Mexico in 2010, we are beginning to understand that we are all stakeholders now.

Abbreviations

BST	Basic Survival Training
BST-R	Basic Survival Training-Recurrent
CAA	Civil Aviation Authority (UK)
CAPP	Canadian Association of Petroleum Producers
CEP	Communication, 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
EASA	European Aviation Safety Agency
EBS	Emergency Breathing System
E-452	Passenger helicopter transportation suit model
FPSO	Floating Production and Storage Offloading unit
HMDC	Hibernia Management and Development Company Ltd.

HOTF	Helicopter Operations Task Force
HSE	Health and Safety Executive (UK regulator)
HTS-1	Helicopter transportation 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.
JOHS	Joint Occupational Health and Safety
MHA	Member of the House of Assembly of Newfoundland and Labrador
MP	Member of Parliament of Canada
NL	Newfoundland and Labrador
NS	Nova Scotia
OHS	Occupational Health and Safety
OLF	Norwegian oil industry association
OPITO	Offshore Petroleum Industry Training Organization
OSHSI/OHSI	Offshore Helicopter Safety Inquiry

PSA	Petroleum Safety Authority (Norway)
PLB	Personal Locator Beacon
SAR	Search and Rescue
S-92A	a model of Sikorsky helicopter
TC	Transport Canada
TSB	Transportation Safety Board

Phase I

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