



**Helicopter Operations Task Force  
S-92A Return to Service Assessment**

**Final Report**

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**ABBREVIATIONS AND ACRONYMS**

AD – Airworthiness Directive  
ALARP – As low as reasonably practicable  
AME – Aircraft Maintenance Engineer  
APU – Auxiliary Power Unit  
ASB – Alert Service Bulletin  
ASR – Aviation Safety Review  
ATC – Air Traffic Control  
CAPP – Canadian Association of Petroleum Producers  
CEP – Communications, Energy and Paper workers Union  
CGSB – Canadian General Standards Board  
CHI – Cougar Helicopters Inc.  
CME – Chief Medical Examiner  
C-NLOPB – Canada-Newfoundland Offshore Petroleum Board  
CSL – Customer Service Letter  
CSN – Customer Service Notice  
DFO – Director of Flight Operations  
DOM – Director of Maintenance  
ECL – Emergency Checklist  
ELT – Emergency Locator Transmitter  
FAA – Federal Aviation Administration  
FDR – Flight Data Recorder  
FSI – Flight Safety International  
GBO – Grand Banks Operators  
HMDC – Hibernia Management and Development Company  
HOTF – Helicopter Operations Task Force.  
HSI – Helicopter Support Inc.  
HUEBA – Helicopter Underwater Emergency Breathing Apparatus  
HUET – Helicopter Underwater Escape Training  
HUMS – Helicopter Usage and Monitoring System  
ICC – Incident Command Centre  
JOHSC – Joint Occupational Health and Safety Committee  
JRCC – Joint Rescue Coordination Centre  
MEL – Minimum Equipment List  
MFDR – Multifunction Data Recorder  
MGB – Main Gearbox  
MOC – Management of Change  
NTSB – National Transportation Safety Board (US)  
OCC – Operational Control Centre  
OIM – Offshore Installation Manager  
ORI – Overhaul and Repair Instruction  
OSSC – Offshore Safety and Survival Centre  
PC – Petro-Canada  
PLB – Personal Locator Beacon  
PLS – Personnel Logistics System

PM – Preventative Maintenance  
PTS – Personnel Transportation and Tracking System  
QA – Quality Assurance  
QHSE – Quality, Health, Safety and Environment  
QRA – Quantitative Risk Assessment  
RCMP – Royal Canadian Mounted Police  
RFM – Rotorcraft Flight Manual  
RIPS – Rotor Ice Protection System  
RTS – Return to Service  
SAR – Search and Rescue  
SMS – Safety Management System  
SSA – Sikorsky Safety Advisory  
ST – Steering Team  
TC – Transport Canada  
TSB – Transportation Safety Board of Canada  
TQC – Training and Qualification committee of CAPP  
VCR – Voice Cockpit Recorder

### DEFINITIONS

**Cougar Helicopters Inc. (Cougar)** A helicopter service company contracted by the GBO companies to transport personnel to offshore facilities.

**Federal Aviation Administration. (FAA)** A body of the U.S. Department of Transportation responsible for regulating civil aviation. The FAA issued the type certificate for the S-92A.

**Grand Banks Operators. (GBO).** The oil and gas companies operating offshore facilities serviced by Cougar Helicopters Inc.

**Helicopter Operations Task Force. (HOTF)** A joint industry team consisting of employees of the operating companies charged with the responsibility of leading industry efforts to return to helicopter transfer of personnel to Grand Banks offshore facilities.

**Sikorsky Aircraft Corporation. (SAC)** The manufacturer of the S-92A helicopter.

**Steering Team. (ST)** A joint industry team consisting of senior leadership in each of the GBO companies, together with representation from ExxonMobil, StatoilHydro and the Canadian Association of Petroleum Producers (CAPP).

**Transport Canada. (TC)** The federal department responsible for most of the transportation policies, programs and goals of the Government of Canada. Their mission statement is “to develop and administer policies and regulations for the safest civil aviation system for Canada and Canadians using a systems approach to managing risks.”

**Transportation Safety Board. (TSB)** An independent agency of the Government of Canada created to advance transportation safety through the investigation of occurrences in the marine, pipeline, rail and air modes of transportation.

### EXECUTIVE SUMMARY

The findings contained in this report support the conclusion that Cougar and the GBO are ready to safely resume passenger service using the S-92A helicopter.

On March 12, 2009, a Cougar S-92A helicopter with sixteen (16) passengers and two (2) crew members onboard ditched into the Atlantic Ocean after the pilots declared an onboard emergency. Seventeen people lost their lives. Only one person survived the accident. The Cougar managers immediately and voluntarily grounded the fleet of Sikorsky S-92A aircraft.

In response to this event, the Grand Banks Operators (GBO) formed a steering team to ensure a process was in place to confirm that S-92A flight operations could safely resume. Subsequently, the Steering Team constituted a Helicopter Operations Task Force (HOTF) to develop a roadmap for return to service (HOTF Roadmap). The HOTF Charter can be seen in Appendix 1.

The HOTF Roadmap (attached as Appendix 3) outlines activities which assessed Cougar as the operator of the S-92A helicopter. Helicopter safety systems, training, and policies related to helicopter operations also underwent assessment. Questions raised by stakeholders were solicited and responses prepared as part of an engagement process with the helicopter passengers.

The HOTF drew upon information from work completed by regulatory bodies and industry, including the Transportation Safety Board, Transport Canada, the Federal Aviation Administration, Royal Canadian Mounted Police and Chief Medical Examiner's office. The GBO and HOTF created an Aviation Safety Review (ASR) team, to ensure appropriate aviation industry expertise was utilized. The ASR team carried out a review of Cougar's facilities, equipment, and training and safety programs from both an operations and maintenance perspective.

The following is a summary of the findings:

- TC certification of Cougar remains in place after TC's post-accident Special Purpose Regulatory Inspection, and TC has determined that Cougar meets all applicable legislative requirements and is able to conduct operations in accordance with the conditions of their Air Operator Certificate and maintain an acceptable level of aviation safety.
- Based on their safety review, the ASR team opinion is that Cougar is ready to safely return to service.
- Cougar has completed its own return to service program including Airworthiness Directive compliance, additional maintenance inspections and test flights. Cougar considers the S-92A ready to return to service.
- The TSB identified a validated significant finding (broken studs on the main gear box oil filter bowl assembly) in their preliminary investigation. Cougar addressed

the issue of the TSB preliminary findings as directed by an FAA Airworthiness Directive.

- The TSB held discussions with TC, the FAA and Sikorsky regarding potential improvements to the RFM and emergency checklists. Cougar has taken measures, in consultation with TC, to address these improvements.
- Based on an assessment completed by Cougar in consultation with the equipment suppliers, it was determined that the Personal Locator Beacons (PLBs) used by offshore passengers functioned as designed. Additionally, it was confirmed that there is no requirement to change existing procedures.
- The combined flight / immersion suits have been confirmed to meet the existing relevant standards. Transport Canada, the offshore petroleum boards, the suit manufacturer, and the Grand Banks Operators have agreed to fund and participate in a review of the current CGSB standard beginning later this year.
- Industry survival training and orientation materials were reviewed and are considered compliant with current requirements.

The HOTF worked with all parties to prepare appropriate responses to the questions posed by stakeholders. These responses are included in Appendix 4.

The HOTF recommends that each Grand Banks operator take the following actions as part of their return to service with Cougar.

- Require Cougar to have a functional helicopter remain on the ground at base for first response duties until an inbound helicopter has returned and landed.
- Ensure Helly Hansen is at the heliport to give refresher briefings to passengers on features and use of survival suits
- Ensure Cougar and offshore helicopter operations flight crews check to confirm passenger seat belts are properly fastened prior to each flight departure.
- Ensure Cougar immediately communicates with passengers when incidents and delays happen in order to allay concerns and fears.
- Allow individuals currently offshore to have the option to return to shore via supply vessel.

It is important to note that the TSB investigation and Cougar's investigation into the accident on March 12 is continuing and a process should be established by each operator to monitor ongoing and/or final findings for Cougar's and GBO consideration and action as applicable.

### 1.0 INTRODUCTION

Cougar provides helicopter transportation services to Husky Energy, Hibernia Management and Development Company, Petro-Canada, and StatoilHydro (together referred to as the Grand Banks Operators or GBO in this report) from St. Johns, Newfoundland Airport to the Grand Banks offshore installations. Personnel transport, search and rescue and medical evacuation (medevac) are included in the services provided by Cougar.

On March 12, 2009, a Cougar S-92A helicopter with sixteen (16) passengers and two (2) crew members onboard ditched into the Atlantic Ocean after the pilots declared an onboard emergency. Seventeen people lost their lives. Only one person survived the accident. The Cougar managers immediately and voluntarily grounded the fleet of Sikorsky S-92A aircraft.

In response to this event, the Grand Banks Operators (GBO) formed a steering committee to ensure a process was in place to confirm that S-92A flight operations could safely resume. Subsequently, the Steering Team constituted a Helicopter Operations Task Force (HOTF) to develop a roadmap for return to service (HOTF Roadmap).

Many questions and issues regarding safety, people, processes and equipment associated with helicopter transportation were raised by Cougar passengers as a result of the accident. As part of the stakeholder communications component of the HOTF Roadmap, it was considered essential to address these issues. A complete list of questions and answers were compiled (see Appendix 4).

In the course of the HOTF Roadmap assessment questions raised by the workforce which were unrelated to the HOTF Roadmap scope were considered for future action recommendations. Refer to Section 6 of this report.

### 2.0 PURPOSE

The purpose of this document is to provide the basis for a decision to be made on the safe resumption of passenger service using the S-92A helicopter. This is achieved through confirmation that all elements of the HOTF Roadmap have been satisfactorily completed.

### 3.0 SCOPE

The Helicopter Operations Task Force (HOTF) was established to lead industry efforts to safely resume personnel transportation by helicopter to the Grand Banks offshore installations including the following tasks:

- Make recommendation on readiness of Cougar to safely resume passenger service using the S-92A helicopter.

- Define the issues to be addressed prior to the resumption of helicopter operations and confirm their resolution.
- Develop and execute a roadmap for the resumption of helicopter operations.
- Develop and roll out a stakeholder communication plan for industry.
- Monitor the findings emerging from the TSB and Cougar incident investigations and ensure they are addressed promptly.
- Monitor Cougar's return to operations activities.
- Coordinate an independent assessment of Cougar's St. John's operations to be issued to each GBO company for their review and consideration.
- Develop contingency plans in the event either Cougar or the S-92A is grounded by the regulator.

Refer to the HOTF team charter in Appendix 1 for further information.

#### 4.0 ROLES AND RESPONSIBILITIES

**Steering Team:** Provide guidance and direction to the HOTF on all aspects of its scope; provision of resources to the HOTF to accomplish objectives; approval of communications materials; delivery of JOHS committee and workforce briefings; and approval of the HOTF recommendations for return to service of the S-92A and recommendations for future actions for the GBO.

**Helicopter Operations Task Force:** Lead industry efforts to safely resume personnel transportation using the S-92A helicopter to the Grand Banks offshore facilities.

**Aviation Safety Review Team:** Provide to the HOTF and management of the Grand Banks Operators (GBO) companies, a recommendation regarding the readiness of Cougar Helicopters Inc. to resume air transportation services to the Grand Banks offshore facilities using the S-92A helicopter.

**Quality, Health, Safety and Environment Team:** Review and verify fitness for service of combined flight/immersion suits and personal locator beacons; review helicopter safety training and orientation materials for possible revision requirements; conduct 'lessons learned' exercises for incident emergency response and report on status of HUEBA implementation plans.

**Communications Team:** Develop a communications strategy; final preparation of presentation materials; and coordination of workforce information sessions.

**Logistics and Operations Team:** Re-establish SAR/Medevac capability utilizing the S61, coordinate personnel transport by vessel, manage day-to-day logistics, and consult on S-92A return to service issues.

### 5.0 S-92A RETURN TO SERVICE ASSESSMENT

#### 5.1 Roadmap for Return to Service

The Steering Team and the HOTF jointly developed a Return to Service Roadmap of actions required to be completed prior to the GBO approval to resume passenger service using the S-92A (See Appendix 3). The HOTF Roadmap used a traffic light system to visually indicate status of each activity during the course of the assessment. "Green Light" status indicates the HOTF had sufficient information to consider the activity successfully addressed from a Return to Service perspective.

The actions required for closure of items on the Roadmap were assigned to supporting groups coordinated by the HOTF. The supporting groups included the ASR team, a Quality, Health, Safety and Environment team (QHSE), a Logistics team and a Communications team.

#### 5.2 Incident Investigation (Findings and Actions)

Refer to 'Return to Service Roadmap Back-up Documentation' binder (Tab 1).

##### 5.2.1 TSB Preliminary Report

The Transportation Safety Board (TSB) is conducting an investigation into the crash of Cougar Flight 491. This investigation is still ongoing. In the interim, in accordance with its normal processes, the TSB has committed to sharing any validated significant findings which may have an immediate impact on safety and require action.

The TSB issued two communiqués (TSB #AO1/2009 on March 20 and TSB #AO2/2009 on March 24, 2009) to inform Transport Canada, the National Transportation Safety Board (NTSB) and the Federal Aviation Administration (FAA) that they had found two broken main gearbox filter bowl assembly mounting studs, which they considered a "significant finding." After review, the FAA issued an Airworthiness Directive (AD2009-07-53) to have the studs replaced as described in an existing Sikorsky Alert Service Bulletin (ASB92.63.014 Rev. A) before further flight.

Representatives of the GBO attended a "non observer briefing" on April 16, 2009 at TSB's Engineering Branch offices in Ottawa where additional information from the investigation was provided. No further return to service actions were identified based on this information. Notes from the meeting are included in the Attachment 1 (Tab 2).

##### 5.2.2 Chief Medical Examiner Information

The Chief Medical Examiner provided a preliminary report pending completion of other investigative reports. The CME determined that:

**REDACTED**

Extract from CME's preliminary report  
not intended for general or public release.

The CME stated that information provided in his preliminary report is *not* intended for general or public release.

#### 5.2.3 Cougar Internal Investigation

Cougar has undertaken an accident investigation with assistance from a third-party contractor, R.J. Waldron & Co. A preliminary report from Cougar, included in the ASR report (Appendix 2), confirms it has taken action on its own finding and the TSB's preliminary finding.

Cougar has completed a return to service program of its own, ensuring all ASBs, ADs and ORIs related to the main gearbox were completed, including those not yet due for completion. Cougar has completed an enhancement to the Cougar S-92A Cockpit Emergency Checklist to incorporate a reorganization to improve readability. A note was also added to the checklist to further clarify possible oil pressure and oil temperature indications in the event of a MGB malfunction. The changes were reviewed by Transport Canada and the ASR team.

Cougar Flight Operations met with all aircrew to discuss the accident investigation, and communicate the HOTF Roadmap, maintenance and inspection routines that were completed, a technical refresher review of the aircraft drive systems and specifically MGB systems, and a review of the modifications to the Main Gearbox Oil System Failure Emergency Checklist.

Refer to Attachment 1 (Tab 3).

#### **5.3 Sikorsky S-92A Helicopter Readiness**

A series of actions were identified by Cougar in their Return to Service program which were required by a FAA Airworthiness Directive (AD), or deemed prudent to ensure that all steps possible had been taken to verify helicopter readiness for flight. These

activities were incorporated into the Roadmap under the heading "Helicopter Readiness." Refer to Attachment 1 (Tab 4).

### 5.3.1 Cougar Return to Service Plan – Equipment

As part of Cougar's Return to Service program, a series of inspections, maintenance activities, and a flight test program were undertaken. Furthermore, all gearbox related inspections contained within the 1250 hour maintenance inspection were carried out. This procedure will be repeated at the actual 1250 hour mark (i.e. they did not re-baseline the maintenance schedule as a result of this additional inspection.) Refer to Attachment 1 (Tab 11).

The helicopter with the GSCH registration had a gearbox without some of the more recent upgrades. Cougar has replaced that main gear box with one that has the upgrades incorporated. Refer to Attachment 1 (Tab 12).

Flight tests and follow-up inspections were carried out following completion of ASB work. Flight tests have been completed and inspections signed off for three helicopters. Refer to Attachment 1 (Tab 13).

### 5.3.2 Alert Service Bulletins

The ASB related to the filter bowl stud replacement is described in the ASR team report (Appendix 2).

The Aviation Safety Review team reviewed Cougar's process for handling Alert Service Bulletins. They have also reviewed all other S-92A related ASBs, how they were managed by Cougar and have confirmed they have been dealt with appropriately. See ASR team report (Appendix 2) and refer to Attachment 1 (Tabs 5 & 6).

All outstanding ASBs have either been addressed or are included in Cougar's preventive maintenance system for implementation as per established ASB timelines. All ASBs related to the main gearbox on the S-92A Helicopter have been completed. The Aviation Safety Review Team confirmed that Cougar consistently meets timelines for addressing ASBs.

Sikorsky has provided technical information to the HOTF and Cougar on issues related to helicopter readiness for service. Information supplied by Sikorsky can be seen in the Attachment 1 (Tab 7).

### 5.3.3 Other S-92A Equipment Issues

Some concern was expressed by members of the JOHS committees regarding the **auxiliary fuel tank** and its potential to create a hazard for passengers. The auxiliary fuel tank is required to provide enough fuel to meet range requirements for some installations. The tank design, installation, maintenance and operation are specifically

approved by both the FAA and Transport Canada. After the accident the tank was seen by Cougar to be intact and fastened to the deck of the aircraft.

### 5.3.4 Helicopter Maintenance Program Development

Based on the information provided by Sikorsky, the ASR team's review of Cougar's maintenance and quality assurance practices and procedures, and the degree of oversight provided by the FAA and Transport Canada regulatory agencies, the HOTF is of the opinion that there was no further maintenance program assessment required prior to a return to service of the S-92A helicopter.

Helicopter design and maintenance are regulated by the FAA and TC in compliance with U.S. Federal/Canadian Aviation Regulations. Sikorsky provided an overview of the S-92A's maintenance program development in a teleconference with the HOTF during which Sikorsky advised that the S-92A maintenance inspection program development used methodology that addressed critical components.

Sikorsky advised that planned maintenance inspection program development also incorporates experience based on feedback sent from S-92A operators to Sikorsky. A Maintenance Steering Group (MSG) reviews operator experience with the helicopters on a regular basis and provides feedback to maintenance program continuous improvement.

Refer to Attachment 1 (Tab 8).

### 5.3.5 S-92A Safety Performance Statistics And History

As of February 2009 Sikorsky had delivered 89 S-92A aircraft to operators in 20 countries. The fleet time had surpassed 145,000 flight hours as of March 2009. The highest single airframe hours are currently 6500. Three major operators account for 33,000-plus hours each (Cougar has 10,000 hours). The Oil and Gas industry accounts for 84 per cent of S-92A fleet hours.

The HOTF reviewed several studies on offshore helicopter safety to determine if there were any significant learnings that may be applicable to the GBO. A number of initiatives have taken place in recent years in the Norwegian and UK continental shelf operating areas which have improved the fatal accident rate significantly since 1976. The S-92A incorporates the learnings from these initiatives such as HUMS, improved aircraft crash worthiness, and improved operator QA/QM systems.

Refer to Attachment 1 (Tab 26).

### 5.3.6 S-92A Main Gearbox History

The worldwide S-92A fleet has experienced several main gearbox related events. In 2005 and again in 2008 two separate S-92A operators experienced lube oil pump failures caused by a Vespel spline adaptor failure (the Vespel spline is a small "polymer" fitting that connects the gearbox pump drive to the oil pump).

In July 2008, an S-92A in Australia suffered a major oil loss from the main gearbox and landed safely. The investigation determined that prior to the day of the flight, while removing the filter bowl for maintenance, the nut on one stud seized due to thread damage resulting in a fractured stud. Since no repair was available locally to replace the stud, the Australian aircraft operator improvised a temporary repair with a thinner nut. This stud later failed in flight and a second stud failed shortly thereafter.

In January 2008 in Brunei, another S-92A made an immediate landing due to excess oil in an input module. The excess oil acted as a medium for friction rather than as a lubricant. This created high temperatures and allowed a small quantity of smoke to enter the cabin.

Over time there have been ongoing modifications to the gearbox casing design, resulting in a series of product improvements (mounting feet, gussets, coatings and casing geometry). These are communicated to operators through SSAs, ASBs and ORIs and are addressed as described in the ASR team report.

Refer to Attachment 1 (Tab 9).

### 5.3.7 Maintenance Personnel and Facilities

The ASR Team is of the opinion that the Cougar Aircraft Maintenance Engineers are well-trained and well-qualified.

The ASR Team reviewed the Cougar Training Program for Aircraft Maintenance Engineers (AMEs) and is of the opinion it exceeds regulatory requirements and industry norms.

The ASR Team is of the opinion the Maintenance training records are comprehensive and well organized.

Cougar employees regularly engage with Sikorsky on a wide variety of topics related to the S-92A, making them significant contributors to the product improvement feedback cycle.

Refer to the ASR team report in Appendix 2 for further details. Reference also Attachment 1 (Tab 10).

### 5.4 Cougar Flight Operations Readiness (People and Processes)

Refer to ASR team report Appendix 2 and Attachment 1 (Tab 17).

#### 5.4.1 Transport Canada Post-Accident Regulatory Compliance Audit

Transport Canada completed a Special Purpose Regulatory Inspection on March 24-25, 2009. The purpose of the inspection was to ensure that legislative requirements are met and that, going forward, Cougar Helicopters is able to conduct operations in accordance with the conditions of its air operator's certificate and maintain an acceptable level of aviation safety.

Transport Canada reported two (2) administrative findings related to flight operations. However, neither of the findings resulted in certificate action. Furthermore, in the opinion of the ASR Team, the findings did not have any detrimental effect on Operational Safety.

Refer to the TC report contained in ASR team report (Appendix 2) and Attachment 1 (Tabs 14 and 15).

As part of a review of previous audits, a Transport Canada Regulatory Audit from 2002 was reviewed by the ASR team. They advise there are no outstanding actions resulting from that audit.

Refer to Attachment 1 (Tab 16).

#### 5.4.2 Industry Audit Reports

Both HMDC and Husky Energy completed separate audits of Cougar in the 4<sup>th</sup> Quarter of 2008. The HMDC and Husky Energy auditors report all findings have been satisfactorily resolved. Refer to Attachment 1 (Tab 18).

#### 5.4.3 Management of Change

A formalized Management of Change process is included in the Cougar January 2009 Draft Safety Management System Manual, but has not yet been officially implemented. The Management of Change plans for the S-61N reactivation for SAR in St. John's and the S-92 return to service were also reviewed by the ASR Team and were found to be satisfactory. Refer to Attachment 1 (Tab 19).

#### 5.4.4 Review of Operating Procedures

The ASR Team reviewed the Cougar Standard Operating Procedures (SOP) and is of the opinion they exceed regulatory requirements and industry norms. Refer to Attachment 1 (Tab 20).

#### 5.4.5 Review Emergency Procedures

As a segment of their accident investigation, the Transportation Safety Board (TSB) is reviewing the Emergency Procedures Checklist related to the loss of main gearbox oil pressure.

The ASR Team reviewed the Cougar 15 April 2008 Emergency Procedures Checklist contained within the Standard Operating Procedures (SOP) that is related to the loss of main gearbox oil pressure and is of the opinion that it was consistent with the Sikorsky Rotorcraft Flight Manual requirement for an Immediate Landing in the event of a primary indication of the loss of oil pressure, followed by a secondary indication that a gearbox failure may be pending.

The ASR Team reviewed the 28 March 2009 revised Cougar S-92A Cockpit Emergency Procedures Checklist related to the loss of main gearbox oil pressure, and is of the opinion the revised procedures provide the flight crew an enhanced cockpit document that should, in the event of both primary and secondary indications, lead more expeditiously to the instructions land immediately by increasing their prominence.

Refer to Attachment 1 (Tab 21).

#### 5.4.6 Review Staffing Qualification, Certification and Training Management System

The ASR Team reviewed the Cougar Pilot Training Program and is of the opinion the amount and quality of training exceeds regulatory requirements and industry norms, particularly in the area of full flight simulator training.

The ASR Team reviewed the Cougar CRM Training Program and is of the opinion it exceeds regulatory requirements and industry norms.

The ASR Team reviewed the Cougar General Emergency Procedures Training Program and is of the opinion it meets regulatory requirements and industry norms.

The ASR Team reviewed a random sampling of ten (10) pilot training files and is of the opinion they exceed regulatory requirements and industry norms. In their opinion, the pilot training records were comprehensive, very well organized, and in excellent condition. Refer to Attachment 1 (Tab 22).

The HOTF Roadmap required confirmation that staff at Cougar received equivalent counseling services to those offered by the GBO to its own employees to assist with the

emotional aspects of the accident. Cougar provided feedback on their EAP program and “return to work” schedule for staff demonstrating this had been done. Refer to Attachment 1 (Tab 23).

### 5.4.7 Return to Service Plan

Cougar completed a return to service plan incorporating all activities it felt were required to satisfy themselves and their customers that the S-92As were ready to recommence passenger service. The ASR team reviewed Cougar’s Return to Service report and Return to Service Management of Change checklist and QA validation. They are of the opinion that Cougar has addressed the issues and are ready to return to service.

Refer to Attachment 1 (Tab 24) and ASR team report Appendix 2.

### 5.4.8 SAR/Medevac Capability

Cougar will complete a transition of SAR/Medevac posture from the S-61 to the S-92A as part of the HOTF Roadmap process. The S-92A is deemed ready to assume SAR/Medevac posture. Actual transition will follow GBO acceptance of the HOTF Roadmap completion. The C-NLOPB must be given notice of a change when SAR/Medevac posture reverts to the S-92A.

Refer to Attachment 1 (Tab 25).

## **5.5 Passenger Safety (Non helicopter safety equipment)**

Helicopter safety systems, training, and policies related to helicopter operations also underwent assessment as part of the HOTF Roadmap. This included flight/immersion suits, personnel locator beacons (PLB), survival training and orientation and lessons learned from emergency response.

### 5.5.1 Flight /Immersion Suit Fitness For Service

All personnel travelling offshore are equipped with the Helly Hansen E-452 Survival Suit System, which is certified by Transport Canada (Marine and Aviation divisions) as compliant with the current Canadian General Standards Board (CGSB) standards. The standards reflect the operating conditions of the offshore Atlantic Canadian environment. Transport Canada, the offshore petroleum boards, the suit manufacturer, and the Grand Banks Operators have agreed to fund and participate in a review of the current CGSB standard beginning later this year.

The TSB has advised that passenger suits will be assessed regarding egress and survivability as part of their accident investigation.

Upon return to service, Helly Hansen and Cougar have agreed to brief all personnel on appropriate donning of the suit system and will ensure personnel have the correct suit.

There are seven suit sizes approved for use (XS, S, M, L, XL, XXL, XXXL). An additional size of XXS may be developed for certification with Helly Hansen. When deemed appropriate, based on individual requirements, customized suit systems may be supplied. These customized suit systems require additional testing and the C-NLOPB will require compliance certification to the standard, which may take some time.

QHSE groups within the GBO organizations will monitor the effectiveness of programs in place to resolve helicopter suit sizing issues.

Transport Canada requires that flight crew suits provide adequate hypothermic protection. Cougar advises the crew suits meet this requirement. They wear a Viking Life-saving Equipment Pilot Suit model PS4177. It is a dry type immersion suit that provides improved flexibility over the passenger flight suits.

Refer to Attachment 1 (Tab 27).

### 5.5.2 Personal Locator Beacons

Cougar search and rescue confirmed that the PLBs attached to the suits of those retrieved at the surface functioned properly. All personnel traveling offshore NL are equipped with a Personal Locator Beacon (PLB) attached to their flight suit which is automatically activated on contact with water. PLBs transmit a distress signal on a standard VHF radio frequency for a total duration of 20-30 hours. Emergency response vessels and aircraft are equipped with base unit receivers that locate PLB signals, facilitating rescue of personnel on the water surface.

Cougar helicopters and helicopter life rafts are equipped with additional emergency locator transmitters (ELTs). These devices broadcast location data on 406, 121.5 and 243 MHz frequencies. Following the ditching of a helicopter in the North Sea in February 2009, a preliminary investigation by the Air Accidents Investigation Branch (AAIB) revealed that when the PLBs worn by the passengers were automatically activated during the ditching, they interfered with the long range rescue beacons fitted to the helicopter and life rafts. This interference resulted in these main aircraft beacons being shut down, which could have hampered search and rescue operations if the incident had occurred at night or out of view of the offshore platform.

As a result of the AAIB findings, the Civil Aviation Authority (CAA) instructed helicopter operators in the UK that all PLBs had to be switched off for the duration of offshore flights because of the risk of inadvertent activation and subsequent risks of interference with aircraft safety systems. Cougar, in consultation with the PLB suppliers, has determined that the U.K. North Sea issue regarding possible PLB interference does not impact their operations. A copy of their report is included in the Attachment 1 (Tab 28). No directions have been issued from Canadian Authorities with respect to this issue.

The ASR team advised that ADELTS (Automatic Deployable Emergency Locator Transmitter) were available. These ADELTS detach from the helicopter on impact and

could provide a more reliable transmission source than those fitted to the helicopter in the event of a helicopter sinking.

### 5.5.3 HUEBA Implementation Plan Status

The Helicopter Underwater Emergency Breathing Apparatus (HUEBA) is an additional personal protection device which allows the user to breathe for a limited time while underwater during escape from a submerged or partially submerged helicopter. The HUEBA was already scheduled for introduction in Q2/Q3 2009 and this timeline has not changed. Operators are in the process of finalizing the detailed training and communication plan with the Marine Institute and Cougar. The introduction of HUEBA to the flight suits is not considered a prerequisite for return to service. Refer to Attachment 1 (Tab 29).

### 5.5.4 Safety Training and Orientation

Training and orientation materials are considered compliant with current requirements.

The CAPP Training and Qualification Committee (TQC) consists of representatives of the C-NLOPB, offshore safety training institutions, and oil and gas industry. The TQC determines required training and content of all required training courses for the offshore workforce. Basic Survival Training (BST) for offshore workers is designed to ensure that workers are prepared to respond to an incident that may occur offshore. BST is renewed every three years. Major components of BST include escape from a helicopter and open ocean survival.

Helicopter safety videos are viewed by all passengers prior to in-bound and out-bound helicopter flights. Safety videos are updated when changes are made to equipment or procedures. Training facilities were recently reviewed by an independent consultant reporting to the CAPP TQC and a report is pending.

As part of an ongoing process (not for return to service) GBO QHSE personnel are working within the TQC to review equipment and facilities used in BST to identify opportunities for improvement.

The correct fitting of the 4-point harness seatbelt is important for both passenger protection in a hard landing and for release mechanism operation. The HOTF has received information that passengers do not always fit the seatbelt correctly and therefore will require additional verification of correct fit by Cougar and the offshore helideck teams.

Refer to Attachment 1 (Tab 30).

### 5.5.5 Helicopter Seating and Egress

The S-92A seating arrangement is certified by the FAA and meets regulatory certification standards. Sikorsky advises the S-92A is considered best-in-class as it pertains to cabin volume per passenger.

While some passengers have asked if seats should be rear-facing, industry practice is based on the premise that the main impact for helicopters is in a downward vertical motion. The forces on hard landing are primarily from below, and seats are designed to absorb impact to the extent practicable.

All egress arrangements on the S-92A helicopter meet regulatory requirements. Primary egress is intended to be through emergency exits (3) and the main entrance door. Windows may also be used for egress. Jettisonable windows are arranged to align with each row of seats and are designed for ease of push out (only helicopter in its class to have the seat/window alignment.)

The auxiliary fuel tank installation inside the passenger compartment has been approved by the regulatory authorities with consideration of egress.

Refer to Attachment 1 (Tab 30).

### 5.5.6 Emergency Response Processes

#### SAR Capability

Under the various agreements reached between the GBO Companies, government agencies and Cougar, all Grand Banks Operators are required to have a helicopter available on standby for potential SAR duties. National Defense/JRCC Search and Rescue is responsible for coordination of airborne and marine SAR operations. Cougar supplies a First Response capability on a contractual 24-hr basis.

The contractual requirement for Cougar is a one hour "wheels-up" response to a request for assistance. This includes time to configure the aircraft for SAR duties and call-out of personnel. It has been shown via the timelines published that on March 12th that a fully equipped Cougar SAR helicopter was airborne from St. John's to the crash site within an hour.

The GBO has reviewed the practice for SAR separation which allows for the last remaining outbound helicopter to depart the Cougar terminal once an inbound helicopter is less than 30 minutes from arrival. In future, the GBO has agreed to having a functional helicopter remain at base until an inbound helicopter has returned and landed.

Cougar Helicopters are equipped with rescue specialists with diverse backgrounds from military, civilian SAR and flight paramedicine.

The JRCC Halifax responsibility covers an approximate area of 4.7 million square kilometers; 80% of the region is covered by water. Rescue resources are located at the following locations:

- 3 CH149 Cormorant Helicopters – 103 Rescue Unit, 9 Wing Gander, Gander, Newfoundland
- 4 CH149 Cormorant Helicopters & 1 CC-130 Hercules Aircraft – 413 Transport and Rescue Squadron, 14 Wing Greenwood, Greenwood, Nova Scotia
- 3 CH146 Griffon Helicopters (land) – 444 Squadron, 5 Wing Goose Bay, Goose Bay, Labrador

The DND 'wheels up response time' is 30 minutes during working hours and two hours after normal business hours. When a Cormorant helicopter is required to travel more than 50 NM offshore, a Hercules or an Aurora aircraft from 14 Wing Greenwood is deployed to provide communications, mission and safety support for the Cormorant. These aircraft are equipped with SKAD kits (comprised of life rafts and survival equipment) which can be dropped to survivors in the water.

Refer to Attachment 1 (Tab 32).

### Onshore Emergency Response

'Lessons Learned' sessions regarding the operations of the Emergency Response Centres on the date of the accident were conducted by each of the GBO companies' organizations and action items have been created to carry out for continuous improvement of emergency response procedures.

Refer to Attachment 1 (Tab 33).

## **5.6 Stakeholder Engagement**

### 5.6.1 Aviation Industry Overview

As part of the stakeholder communications plan, a brief overview of the industry regulatory framework was developed. The S-92A helicopter was manufactured by Sikorsky Aircraft Corporation in the United States in accordance with FAA regulations. Certification of the aircraft in Canada is in accordance with Transport Canada Regulations. The TSB and NTSB are independent federal government bodies, in Canada and the US respectively, charged with investigation of aviation accidents. The following figure illustrates a simplified version of their interrelationships.

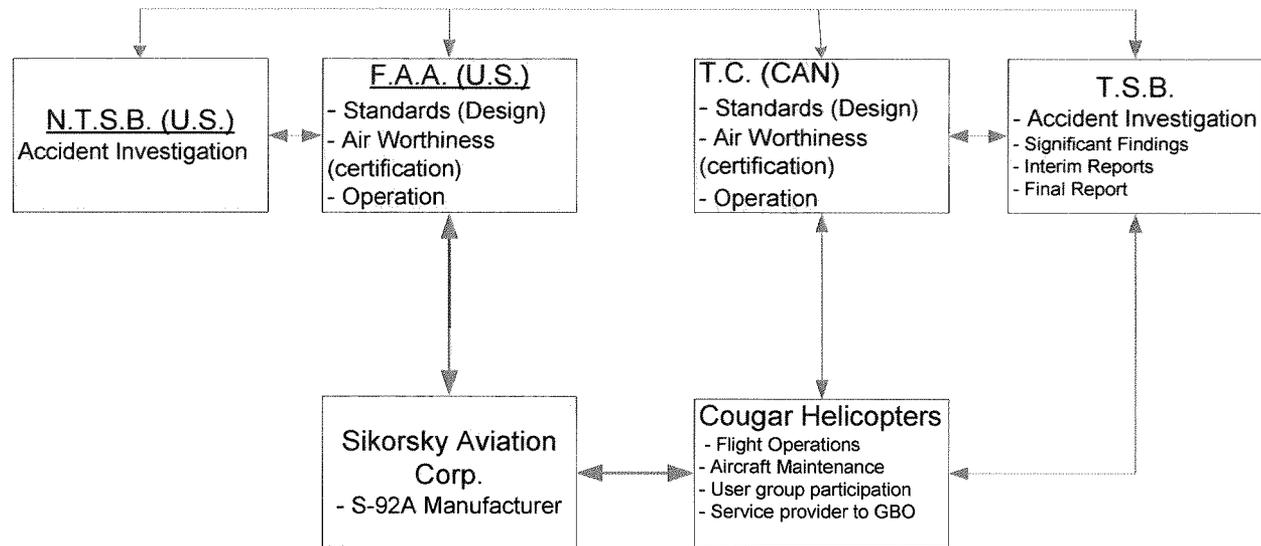


Figure 1. Aviation Industry Overview

Refer to Attachment 1 (Tab 35).

### 5.6.2 Marine versus Helicopter Transportation

Transportation by helicopter is the primary means of transport to and from Grand Banks offshore facilities. Only when helicopters are unavailable is vessel transfer used. GB Operators have conducted quantified risk assessments (QRAs) and have concluded that helicopters remain the preferred means of transportation.

### 5.6.3 JOHSC feedback

The JOHS Committees were asked for comments on worker concerns with respect to resumption of helicopter operations. A large volume of questions were received. These questions were grouped into themes and responses researched, reviewed and prepared for distribution over the assessment period. Additionally, update meetings were held with JOHS committees by the GBO managers. A record of the questions and responses are in Appendix 4 and in Attachment 1 Tabs (34 and 37).

### 5.6.4 Communications Plan

All the GBO companies had periodic updates with employees and, in greater detail, with JOHS committees throughout the HOTF Roadmap assessment period. At planned town hall briefings, there is an intention to include members of senior leadership, the Helicopter Operations Task Force, Cougar and others who should be able to address most issues and questions.

The C-NLOPB was provided with an overview of the HOTF Roadmap and was given periodic updates on progress. Refer to Attachment 1 (Tab 38).

GBO logistics personnel will work with Cougar to identify measures to improve communications with employees and passengers, ensuring future feedback is reasonable and timely.

Cougar and the GBO companies have Employee Assistance Programs in place which are available to both employees and family members.

Employees, contractors, families and other service providers will be invited to presentations to be delivered in a town hall format. In addition, the Steering Team will brief regulators and the government on return to service plans.

### 6.0 RECOMMENDATIONS

As a result of the HOTF Roadmap assessment, the HOTF identified a number of recommendations for future consideration by each operator (not required for return to service).

- Monitor the ongoing TSB and Cougar internal investigations for further learnings and actions.
- Support and monitor Cougar's rollout of its new Safety Management System incorporating their management of change process (scheduled for 3Q 2009).
- Consider revisiting the current sea state limitations imposed on flights to ensure helicopter risk is ALARP.
- Consider, in consultation with Cougar helicopters, the installation of additional flotation on the S-92A fleet to sea state 6 capability. See information in Attachment 1, (Tab 31).
- Participate through CAPP on the Canadian General Standards Board (CGSB) evaluation of survival suit standards (scheduled to begin later this year).
- Consider adding additional standard immersion suit sizes, especially an XXS size.
- Evaluate adoption of immersion suit zipper enhancements currently being tested by Helly Hansen.
- Review current immersion suit gloves for ease of use and practicality. Consider having passengers wear a thin glove with adequate dexterity for seatbelt release, and thermal protection during initial immersion, until suit gloves can be donned.
- Develop an information database for Cougar and Helly Hansen that specifies the approved suit size for each passenger, so that it no longer is up to the passenger to select their preferred size.
- Develop guidelines for technical emergencies requiring use of the SAR helicopter. The standby crew currently responds and this affects availability of SAR/Medevac.

- Re-evaluate the current SAR arrangement the GBO have with Cougar, recognizing that the last formal assessment was done in 1997. Consideration should be given to response time and night time capabilities.
- Develop criteria and approval process guidelines for scheduling night flights.
- Follow up with Cougar and offshore facilities to ensure the correct usage of passenger seatbelts is reinforced. A safety alert based on FAA Safety Brochure AM-400-90/2 has been provided to Cougar's Passenger Movements Coordinator for guidance. See information in Attachment 1, (Tab 30).
- Implement training program and introduce the Helicopter Underwater Escape Breathing Apparatus (HUEBA).
- Re-evaluate the current setup of the S-92A Emergency Locator Transmitter (ELT) and consider the procurement of an ADELTA (Automatic Deployable Emergency Locator Transmitter) which can detach from the aircraft.
- Work with the Marine Institute to better align survival training equipment and programs with S-92 characteristics, including the following items:
  - consider 4-Point seat belts in the HUET,
  - consider reconfiguring the HUET with S-92A window size,
  - HUET capsule to allow for a configuration change to simulate the addition of an Auxiliary Fuel Tank as per configuration of the S-92A,
  - resume HUET training with two persons sitting side-by-side to simulate sitting in S-92A double seats,
  - use both flight and Marine suits for sea day, and
  - update training to reflect any changes in type of gloves, and goggles.
- Review use, type, and location of goggles in the helicopter as well as the potential effects the goggle strap may have on the suit hood air vent.
- Share the results of Cougar's PLB functionality assessment with each JOHS committee.

## 7.0 CONCLUSION

Based on the information in the ASR team report, and the findings outlined above, it is the conclusion of the HOTF members that Cougar and the GBO are ready to safely resume passenger service using the S-92A helicopter

## 8.0 APPENDICES

**Appendix 1: HOTF Charter**

**Appendix 2: Aviation Safety Review (ASR) Team Report**

**Appendix 3: HOTF Roadmap**

**Appendix 4: Joint Occupational Safety and Health Committee (JOSHC) Q&A**

**9.0 Attachments**

**Attachment 1 – Helicopter Return To Service Roadmap Back-Up Documentation**