Hibernia Husky Energy PETRO-CANADA

Helicopter Operations Task Force (HOTF)
S-92 Return to Service Assessment

Appendix 2:

Aviation Safety Review (ASR) Team Report

Hibernia

PETRO-CANADA

Husky Energy

Aviation Safety Review Team Report on the Readiness of Cougar Helicopters Inc. to Return To Service

Report Date: 26 April 2009

Submitted By:

Aviation Safety Review Team

Aviation Safety Review Team Report

on the Readiness of Cougar Helicopters Inc.

to Return To Service

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Husky Energy

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Hibernia Management and Development Company

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Petro-Canada

Aviation Safety Review
Cougar Helicopters Inc.

Executive Summary

Cougar Helicopters Inc. (Cougar) provides helicopter transportation services to Husky Energy, Hibernia Management and Development Company, and Petro-Canada (Grand Banks Operators, GBO) from St. Johns, Newfoundland Airport to the Newfoundland offshore area. Personnel transport, search and rescue, and medical evacuation (medevac) are tasks included in this service.

On 12 March 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. The Cougar managers immediately and voluntarily grounded the fleet of Sikorsky S-92A aircraft. Subsequently, the GBO constituted a Helicopter Operations Task Force (HOTF) to address the various elements related to the return to service.

As one segment of the plan to determine Cougar's readiness to return to service, the HOTF formed an Aviation Safety Review (ASR) Team to conduct a detailed Safety Review with respect to the aviation aspects of Cougar returning to operational service. The ASR Team charter is attached.

Based upon our Safety Review, it is the opinion of the ASR Team that Cougar is ready to return to service.

List of Acronyms

ACRO	Meaning
(A)SB	(Alert) Service Bulletin
(E)GPWS	(Enhanced) Ground Proximity Warning System
AD	Airworthiness Directive
ADELT	Automatic Deployable ELT
ADF	Automatic Direction Finder
ADI	Attitude Deviation Indicator
ADM	Aeronautical (Pilot) Decision Making
AE	Accountable Executive
AFCS	Automatic (Augmented) Flight Control System
AFM	Airplane Flight Manual
AME	Aircraft Maintenance Engineer
ANO	Air Navigation Order
AOC	Air Operator Certificate
AOG	Aircraft On Ground
ARA	Airborne Radar Approach
ASL	Above Sea Level
ATC	Air Traffic Control
ATP(L)	Airline Transport Pilot License (TPL)
BU	Business Unit
CAA	Civil Aviation Authority
CARs	Canadian Aviation Regulations
CFIT	Controlled Flight Into Terrain (Water)
CG	Center of Gravity
COM	Company Operations Manual
CPL	Commercial Pilot License
CRM	Cockpit Resource Management
CTA	Canadian Transportation Agency
CVR	Cockpit Voice Recorder
DG	Dangerous Goods
DH	Decision Height
DME	Distance Measuring Equipment
DSQ	Director of Safety and Quality
EAP	Emergency Action Plan
EASA	European Aviation Safety Agency
ELT	Electronic Locator Transmitter
EPIRB	Emergency Position Indicating Radio Beacon
ERP	Emergency Response Plan
FAA	Federal Aviation Administration (USA)
FDR	Flight Data Recorder
FOD	Foreign Object Damage
FOIMS	Flight Operations Information Management System
FSI	Flight Safety International
GPS	Global Positioning System
HF	High Frequency
HUMS	Health and Usage Monitoring System
IAF	Initial Approach Fix
IAW	In Accordance With

ACRO	Meaning
ICA	Instruction for Continuing Airworthiness
ICAO	International Civil Aviation Organization
ICUS	In Command Under Supervision
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IVSI	Instantaneous Vertical Speed Indicator
KPI	Key Performance Indicator
LAE	Licensed Aircraft Engineer
LAHSO	Land And Hold Short Operations
LAME	Licensed Aircraft Maintenance Engineer
MAP	Missed Approach Point
MAUW	Maximum All Up Weight
MCAI	Mandatory Continuing Airworthiness Information
MCM	Maintenance Control Manual
MDA	Minimum Descent Altitude
MEL	Minimum Equipment List
MMEL	Master Minimum Equipment List
MOM	Maintenance Operations Manual
MPM	Maintenance Procedures Manual
NOTAM	Notices To Airmen
OCC	Operational Control Centre
OEI	One Engine Inoperative
OFP	Operational Flight Plan
PED	Personal Electronic Device
PFD	Personal Floatation Device (life jacket)
PIC	Pilot In Command
POH	Pilot Operating Handbook
PPC	Pilot Proficiency Check
QA	Quality Assurance
RFM	Rotorcraft Flight Manual
RFO	Restricted Flying Order
SART	Search And Rescue Transponder
SFO	Stop Flying Order
SIC	Second In Command
STC	Supplemental Type Certificate
STOL	Short Take Off and Landing
TAWS	Terrain Awareness and Warning System
TBO	Time Between Overhaul
TC	Transport Canada
TCAD	Traffic Collision Avoidance Device
TCAS	Traffic Collision Avoidance System
TCDS	Technical Certificate Data Sheet
TSB	Transportation Safety Board of Canada
TSO	Technical Standard Order
UPS	Uninterruptible Power Supply
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions

OVERVIEW

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

Expanded Discussion

COMPANY NAME	Cougar Helicopters Inc. - a division of VIH Aviation Group		
Address:	**Cougar Helicopters Inc.**	Telephone:	**(709) 758-4800**
	St. John's International Airport	Fax:	**(709) 758-4850**
	P.O. Box 21300 **St. John's, Newfoundland A1A 5G6**	Email:	[redacted]

COUGAR HELICOPTERS MANAGERIAL STAFF	
Name	Title
Ken Norie	President/Accountable Executive and Owner of the VIH Group of Companies (resides in Victoria)
Rick Burt	General Manager (resides in Victoria)
Hank Williams	Business and Operations Manager
J.J. Gerber	Director of Flight Operations
Ronnie Moores	Chief Pilot
Paul Carter	Chief Pilot S-92A and Flight Standards Coordinator
[redacted]	Senior Check Pilot (resides in Halifax)
Rick Banks	Director of Safety and Quality
Dan Pinsent	Chief Dispatcher
Mike Whittle	Passenger Movements Coordinator
Bob Pardy	Director of Maintenance
Bruce Lundrigan	Maintenance Quality Assurance Manager
[redacted]	Maintenance Training Coordinator
Scott McCarthy	Chief Engineer S-92A
[redacted]	Chief Engineer S-61N
[redacted]	Avionics Manager
[redacted]	Stores Manager

Transport Canada Air Operator Approval

- *Cougar Helicopters continues to hold all of the necessary Transport Canada approvals to provide Canadian Aviation Regulations (CARs) 702 (Aerial Work – No passengers) and CARs 704 (Commuter Passenger) Helicopter Transport service.*

The following matrix was printed from the Transport Canada website, and lists the approvals that Cougar Helicopters held prior to the accident and continue to hold at the time this report was prepared. This matrix was compared to the actual Air Operator Certificate (AOC). Refer to Supporting Documents for a copy of a portion of the AOC.

Note: Passengers are not permitted in CARs 702 operations, crewmembers only.

CONTACT INFORMATION

File Number:	004791
Company Region:	ATLANTIC
Legal Name:	COUGAR HELICOPTERS INC.
Trade Name(s):	
Address:	40 Craig Dobbin's Way St. John's , NEWFOUNDLAND AND LABRADOR (CANADA) A1A 4Y3
Phone:	(709) 758-4800
Fax:	(709) 758-4850
Telex:	
Cellular:	
Internet:	www.cougar.ca

DETAILS

Float Operator:	NO	**Air Operator Certificate Status:**	APPROVED
Dangerous Goods:	YES	**Preferred Language:**	ENGLISH

Aircraft Type	Max. Weight (lbs) (lbs)	Aircraft Rule	VFR OTT	VFR NIGHT	IFR	Passenger	Cargo
AS332 PUMA	19,000	702	✓	✓	✓	X	X
AS332 PUMA	19,000	704	✓	✓	✓	✓	✓
SIKORSKY 61	22,000	704	✓	✓	✓	✓	✓
SIKORSKY 61	22,000	702	✓	✓	✓	X	X
SIKORSKY 92	26,150	704	✓	✓	✓	✓	✓
SIKORSKY 92	26,150	702	✓	✓	✓	X	X

Cougar Helicopters hold the following Regulatory Approvals:

Canadian Transportation Agency (CTA) Licences:

- CTA # 972112 Domestic Licence
- CTA # 977176 Non-Scheduled International Licence

Transport Canada

- Air Operator Certificate (AOC) # 6127

Cougar Helicopters also holds Transport Canada approval for the following Operations Specifications (Ops Specs):

- Day Visual Flight Rules (VFR) Flight, Minimum Flight Visibility Uncontrolled Airspace
- Take-Off in Instrument Meteorological Conditions – Weather Below Landing Minima
- Take-Off Minima – Reported Visibility Runway Visual Range (RVR) 600'
- No Alternate Aerodrome, Instrument Flight Rules (IFR)
- Special Helicopter Procedures Offshore Non-Directional Beacon/Airborne Radar Approaches (NDB/ARA)
- Specific Instrument Approach Procedures
- Category I Instrument Landing System (IFR) Approaches to a Decision Height (DH) of 100 feet
- Restricted Instrument Procedures (RIP)
- IFR Instrument Approaches – Global Positioning System (GPS)
- Hibernia Helicopter Procedures Offshore – GPS Airborne Radar Approaches (GPS/ARA)
- Helicopter Only Restricted Instrument Procedures (RIP)
- Lower Than Standard (LTS) Decision Height – RVR 600 / DH 100 feet

Special Purpose Regulatory Inspection – Flight Operations

- *Transport Canada conducted a Special Purpose Regulatory Inspection on 24 and 25 March 2009 as the direct result of the 12 March 2009 Cougar Helicopters accident. Transport Canada reported two (2) administrative findings related to flight operations. However, none of the findings resulted in certificate action. Furthermore, in the opinion of the ASR Team, the findings did not have an effect on Operational Safety.*

The inspection team was comprised of the following individuals:

Name	Position
Arthur Allan	Regional Director, Civil Aviation, Atlantic Region, and Convening Authority *Note: He did not attend the on-site inspection of Cougar.*
Ross MacKay	Regional Superintendent Helicopter Ops, Atlantic Region Manager and Operations Team Leader
[redacted]	Operations Team Member
[redacted]	Maintenance and Manufacturing Team Leader
[redacted]	Maintenance and Manufacturing Team Member

Following the Transport Canada inspection, one of the Aviation Safety Review (ASR) Team members had the opportunity to discuss the review of the Flight Operations Department with Ross MacKay. The verbal debriefing included the following information, which was later included in the Transport Canada report as follows:

> *"Two areas which should be recognized are Flight Crew Training Records and Operational Control. The quality of the training records maintained by the Flight Operations staff reflects an extremely high level of professionalism and attention to detail and deserves special mention. Cougar Helicopters Inc. also voluntarily operates the only Type-B Operational Control system in use by a Canadian Helicopter Air Operator and the co-dispatch system provides extremely effective operational control for local and international operations alike."*

Charter Air Carriers have thirty (30) working days to respond to Transport Canada regarding the rectification of inspection findings. Cougar has completed their response to the two above noted findings and will be submitting it to Transport Canada within the next few days.

NOTE: Refer to Supporting Documents for the specifics regarding the Transport Canada flight operations findings and the Cougar response to the Flight Operations findings.

Cougar Preliminary Internal Accident Investigation Report

- *At the time of this writing, it is the opinion of the ASR Team that nothing in the Cougar preliminary accident investigation report issued 3 April 2009 would prevent a return to service.*

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Cougar Preliminary Return to Service Report

- *The ASR Team reviewed the Cougar Return to Service report and the Cougar Return to Service Management of Chage [sic Change] Checklist and QA Validation. When viewed together, the ASR Team is of the opinion that Cougar have addressed the issues and are ready to return to service with the S-92A aircraft.*

The ASR Team received a Return to Service report (28 March 2009) signed by the Director of Flight Operations (DFO) that documented primarily the issues identified within the flight operations department and subsequent actions taken. After review, the ASR Team was of the opinion that there were others areas and action items missing from the report that needed addressing by Cougar.

Following communication of this viewpoint, Cougar managers agreed to revisit their effort. On 4 April 2009, Cougar managers delivered to the ASR Team another document, Return to Service Management of Chage [sic Change] Checklist and QA Validation.

The 4 April 2009 report indicated helicopters GVCH and GQCH were ready for service. Helicopter GSCH was still undergoing maintenance, but has since returned to service. Helicopter GMCH is in the final stages of being prepared for service. Once all four helicopters are back in service, Cougar will supply an updated and signed report to the GBO operators.

NOTE: Refer to Supporting Documents for the aforementioned reports.

COUGAR FLIGHT OPERATIONS DEPARTMENT

Operational Personnel - Pilots

- *The ASR Team is of the opinion the Cougar Pilots are well-trained and well-qualified.*

According to data supplied by Cougar Helicopters:

Cougar Helicopter employs a total of seventy-six (76) pilots, which are equally divided into thirty-eight (38) Captains and thirty-eight (38) Co-Pilots.

Sixteen (16) Captains have acquired more than 9,000 hours of helicopter experience (high time Captain has 18,700 hours).

Seventeen (17) pilots have acquired more that five-hundred (500) hours on the S-92A helicopter; nine (9) have acquired more than nine-hundred (900) of the S-92A; three pilots have acquired more than one thousand four hundred (1,400) hours on the S-92A.

The highest time S-92A pilot has acquired 1,734 hours on the S-92A.

Forty-eight (48) pilots have acquired more that one thousand (1,000) hours of the offshore flight experience (several have 3,000 or 4,000 or 5,000 hours of offshore experience, with the high-time pilot having acquired 11,800 offshore experience).

All of the S-92A pilots attend full-motion simulator training at Flight Safety International (FSI) for Initial Training. Those pilots serving regularly on the S-92A attend Recurrent Training annually at FSI.

Pilot Training Program

- *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.*

Initial Pilot Training

Initial General Ground Training for all newly hired pilots for either the Sikorsky S-61N or S-92A commences with one (1) week of Ground School Classroom Training, followed by one week of Basic Survival Training (BST) at the Marine Institute in St. John's.

The carrier is currently exploring the possibility of converting the majority of their General Ground Training to interactive on-line training, and therefore has retained Bluedrop Performance Learning in St. John's to develop these new courses. To date, Bluedrop has developed a draft module of the General Emergency Procedures Training. The module has been reviewed by Cougar for content and will commence beta testing shortly.

Sikorsky S-61N Initial Ground Training consists of twelve (12) days of formal classroom Ground School conducted in either St. John's, NL or Halifax, NS (based upon Ground School Instructor location and crew position requirements). Courses are instructed by either an instructor based in Halifax or an instructor based in St. John's.

Sikorsky S-92A Initial Ground Training is conducted at Flight Safety International in either West Palm Beach, Florida or Farnborough, England. It consists of ten (10) days of classroom training; approximately eight (8) hours per day (Monday through Friday for two weeks).

S-92A Initial Ground Training is followed by sixteen (16) hours of non-motion Cockpit Procedures Training (CPT) with a Cougar Training Pilot. These training sessions are utilized to focus on the Cougar Helicopters Standard Operating Procedures (SOP's) and Crew Resource Management (CRM) Procedures.

Initial Flight Training for both types of helicopters is conducted in a full-motion flight simulator, which exceeds regulatory requirements and industry norms.

> *NOTE: The Transport Canada Commercial Air Services Standard (CASS 724.115) encourages helicopter operators to conduct training on a simulator, or to use a combination of training in a Flight Training Device and helicopter, but does not mandate same.*

Sikorsky S-61N Initial Flight Training is conducted in a Level "B" flight simulator at CHC Helikopter Service in Stavanger, Norway. Training consists of forty (40) hours (10 sessions x 4 hours each), followed by a Transport Canada authorized Pilot Proficiency

Check (PPC) in the Simulator. Upon returning to St. John's or the Gulf of Mexico, the pilots undergo additional Flight Training in the actual aircraft; at least one (1) hour for pilots with previous heavy helicopter experience or a minimum of two (2) hours for pilots without previous heavy helicopter experience.

Sikorsky S-92A Initial Flight Training is conducted in a Level "D" flight simulator at Flight Safety International in either West Palm Beach, Florida or in Farnborough, England. Training consists of forty (40) hours (10 sessions x 4 hours each), followed by a Transport Canada authorized Pilot Proficiency Check (PPC) in the Simulator. The Level "D" simulator certification allows the carrier to complete ALL training in the Simulator.

The final S-92A Simulator training session consists of a Line Orientated Flight Training (LOFT) flight from St. John's to an Offshore Drilling Rig 30 miles offshore and return. The pilots are expected to perform all of the normal tasks associated with this type of flight.

Initial Flight Training is followed by several days of Line Indoctrination Flying (Line Indoc) with a Company Training Pilot. Pilots must also complete SAR Hoist Training in the actual aircraft in St. John's or the Gulf of Mexico.

The carrier's Initial Training Program requires approximately three (3) months to complete; from the date of initial hire to the date of the first unsupervised revenue flight.

Recurrent Pilot Training

On an annual basis, the Sikorsky S-61N pilots attend an extensive Recurrent Ground School in St. John's, Halifax, Gulf of Mexico or Norway; depending on the location of the flight crew. It includes a computer based Training program with PowerPoint presentations and Company designed manuals. Training that is conducted in Norway takes place in a classroom supplied by CHC Helikopter Services.

The Sikorsky S-92A pilots attend annual Recurrent Ground School at FSI in either West Palm Beach, Florida or in Farnborough, England. The FSI Farnborough facility only recently opened, and therefore the carrier has utilized this facility on only a few occasions. Cougar will likely utilize FSI Farnborough more often in the future.

The carrier maintains an extensive Microsoft Access database that contains several hundred exam questions. Upon completion of the Ground Training course, the pilots receive randomly generated exams that they must successfully complete (each pilot receives a different exam). Training Captains correct the exams and review any missed questions with the pilot.

All Sikorsky S-92A Recurrent Flight Training is conducted in the FSI flight simulator at either West Palm Beach, Florida (currently about 70%) or Farnborough, England (currently about 30%). The S-92A Recurrent Simulator program consists of twelve (12) hours (3 sessions x 4 hours each), plus the PPC check ride. Two Cougar pilots are paired together for each training session; therefore each pilot receives 6 hours as Pilot Flying and 6 hours as Pilot-Not-Flying.

The Sikorsky S-61N pilots travel to Stavanger, Norway, where they complete Level "B" full-motion Recurrent Flight Simulator Training with CHC Helikopter Service. Two Cougar pilots are paired together for the training sessions; along with a Cougar Training Pilot who operates the simulator.

Eleven (11) of the Cougar pilots fly both the S-61N and S-92A. For these pilots, the S-92A is the primary training aircraft and the S-61N is the secondary training aircraft. These pilots receive 12.0 hours of training in the S-92A simulator and 5.0 hours in the Sikorsky S-61N simulator.

The extra hours allocated for the S-92A simulator are utilized to practice all of the procedures that are not helicopter specific, such as heli-deck landings, GPS Approaches, Low Visibility Approaches, RVR 600. The lesser time allocated to the S-61N simulator training is still sufficient to cover all of the aircraft specific items.

An Approved Company Check Pilot conducts Route Checks (RC) four (4) to eight (8) months after every PPC (i.e. sequence of PPC-RC-PPC-RC-PPC etc.).

Crew Resource Management (CRM) Training

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

CRM can be described as a management system which makes optimum use of all available resources - equipment, procedures and people - to promote safety and enhance the efficiency of flight operations.

Cirrus Aviation Safety Services conducted a two-day CRM course during the weekend of 15 November 2008. Forty-seven (47) Cougar pilots attended. While in St. John's, the instructor also instructed three (3) line pilots with a Train-The-Trainers course. The instructor will mentor and monitor their progress until they are qualified to instruct this course (in-house course approximately 75% complete).

There continues to be a strong focus on CRM training during the annual simulator training sessions (all simulator sessions are flown with two Cougar pilots).

Emergency Procedures Training – Helicopter Type Specific

During simulator training, instructors interject various emergencies continuously into the training scenarios. These training scenarios are predicated on all of the possible failures modes that both the manufacturer and FSI could anticipate. The following is the list of items covered during both Initial and Recurrent Simulator Training:

Briefings
Crew & Pass Evac Proc
Crew Co-op, Command & Co-ord
Effects of Icing/Anti-Ice Oper
Pre-Flight
Take-off Data Calculations
Interior and Exterior Inspection
Use of Check Lists
Passenger Briefing
Start-up Procedures
Ground/Air Taxi
Use of Brakes
Instrument Checks
Pre-takeoff Checks & Brief
Hover
Take-off and Landing
Hover Manoeuvring
Take-Off (as applicable)
Normal Departure
Cushion Departure
No-Hover Departure
Vertical Departure
Cat A
Cat B
Performance Limited
Low Visibility Take-off
Air Work
Climbs, Turns, Descents
Steep Turns/Unusual Attitudes(initial)
Approach and Landing
Approach to Hover
No-Hover Approach/Landing
Cushion Landing
Vertical Landing
Run on Landing
Instrument Flight
Departure, enroute, holding arrival
ILS Approach
Localizer Back Course Approach
NDB Approach
GPS Approach

Aerial Work
Class B&C Loads
Confined Areas
Shutdown
Checks
Securing Aircraft
EMERGENCY & MALFUNCTIONS
Autorotations
Hover OGE/IGE
Cruise VMC
Cruise IMC
One Engine Inoperative
Hover
Before CDP (Cat A & Cat B)
After CDP (Cat A)
Before/After LDP
Cruise
Engine Malfunctions
Fire
Engine Fire on Ground
Engine Fire in Air
Cabin/Cargo
Tail Rotor Malfunctions
Low Pitch
High Pitch
TR drive fail in Cruise/Hover
Flight Control Systems
Electrical Failures
Hydraulics
AFCS/ Flight Director
Landing Gear Failures
MGB Malfunctions
TGB/IGB Malfunctions
Instrument Failures
Communication Equip Failures
Navigation Equip Failures
Pilot Incapacitation
Controlled Flight Into Terrain

Emergency Procedures Training - General

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

Most training in general emergency procedures items is conducted annually. However, hands-on emergency procedures training is conducted every three (3) years, as per Transport Canada regulations. Hands-on fire extinguisher training is conducted through the local airport fire hall or a recognized outside agency.

The pilots must also complete Basic Survival Training (water) and Helicopter Underwater Egress Training every three (3) years.

Pilot Training Files

- *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 our opinion, the pilot training records were comprehensive, very well organized, and in excellent condition.*

Individual three-ring binders are maintained for each pilot. Each binder is sub-divided into Sections A thru Z, with a fold-out laminated Index in the back of each file. The Operations Assistant maintains the training files.

The Operations Assistant utilizes a computer program entitled Flight Operations Information Management System (FOIMS) to track all expiration and due dates. Every Monday morning, a training projection for the next 45 days is printed. The report automatically indicates upcoming items (which are circled), or expired items (which are shaded). If any items lapse, the pilot is automatically issued either a Stop Flying Order (SFO) or a Restricted Flying Order (RFO) by FOIMS. The Operations Assistant and the Dispatch Department are both responsible for monitoring the SFOs and RFOs, which can only be cleared once a completed training report has been submitted to the office of the Director of Flight Operations. This process is integral to maintaining Operational Control.

FOIMS is also utilized to record the number of night landings, heli-deck landings, and instrument approaches that each pilot has conducted.

Company Operations Manual (COM)

✈ *The ASR Team reviewed the Cougar Company Operations Manual (COM) and is of the opinion it exceeds regulatory requirements and industry norms.*

Cougar Helicopters maintains an extensive and comprehensive Company Operations Manual (COM). It currently contains Revision #27, which was approved by Transport Canada on 12 September 2008.

NOTE: Refer to Supporting Documents for a list of topics and introduction.

Standard Operating Procedures (SOP) – S-92A

✈ *The ASR Team reviewed the Cougar Standard Operating Procedures (SOP) and is of the opinion they exceed regulatory requirements and industry norms.*

The S-92A Chief Pilot and Flight Standards Coordinator recently completed an amendment to the S-92A SOPs. The version of the SOPs that were reviewed by the ASR Team was dated 28 March 2009. The cover page indicates they were reviewed by Transport Canada on 30 March 2009.

NOTE: Refer to Supporting Documents for a list of topics and introduction.

Minimum Equipment List (MEL) – S-92A

✈ *The ASR Team reviewed the Cougar S-92A Minimum Equipment List (MEL) Manual and is of the opinion it meets regulatory requirements and industry norms.*

Cougar Helicopters maintains a detailed Minimum Equipment List (MEL) Manual. It currently contains Revision #2, which was approved by Transport Canada on 15 April 2008.

Flight Operations Publications

✈ *The ASR Team inspected the Flight Operations Library and is of the opinion the contents meet regulatory requirements and industry norms.*

Flight Operations Libraries are maintained in the Director of Flight Operations office; in the Flight Planning area; and in Dispatch.

Dispatch and Flight Planning Department

- *The ASR Team interviewed the Dispatch Manager and reviewed a random sampling of completed Flight Release documentation. The ASR Team is of the opinion the Dispatch Department is a well-run and effective division of the Company that exceeds regulatory requirements and industry norms.*

- *Cougar Helicopters is the first and only helicopter operator in Canada to operate a formal Type "B" Dispatch System, which received Transport Canada approval in July 2007. This system enhances operational control by requiring that a licensed Dispatcher prepare the flight plan and the Pilot in Command agree and accept the plan.*

Prior to all flights, Flight Plans are filed with Nav Canada. The vast majority of the Flight Plans are filed in accordance with Instrument Flight Rules (IFR), with a few filed in accordance with Visual Flight Rules (VFR).

The primary component of their Type "B" Dispatch System is a 24/7 Operational Control Centre (OCC). Four (4) adjacent work stations are staffed by a Dispatcher, Radio Operator, and two (2) Traffic Agents. Two (2) work stations located immediately behind the aforementioned stations are staffed by the Dispatch Manager and the Passenger Movements Coordinator.

Prior to joining Cougar in 2005, the Dispatch Manager was a licensed Dispatcher with Air Canada Jazz for sixteen (16) years. The Dispatch Manager has since recruited and trained three (3) other individuals to become Licensed Dispatchers. A fourth (4^{th}) individual is currently undergoing training to become a Licensed Dispatcher.

Flight Following

- *The ASR Team is of the opinion the Cougar Flight Following System exceeds regulatory requirements and industry norms.*

Company Flight Following is provided 24/7 via a GPS/Satellite Tracking System entitled BlueSky. This system automatically provides an updated aircraft position every three (3) minutes when operating below 2,000 feet and every five (5) minutes when operating above 2,000 feet. It also has an emergency alert feature that transmits position reports every fifteen (15) seconds and provides an alert in the OCC, when activated by the flight crew.

Cougar is also tracking client marine vessels with the same system. A large ceiling mounted display located in the OCC is utilized to display the helicopters and vessels. The Dispatchers can also display (on their desktop screens only) either the BlueSky generated display or a combined overlay with an Internet-based program entitled Flight Explorer.

The flight position information displayed in the OCC also supplies data to a system entitled Flight Information Display System (FIDS); which provides departure and arrival information for passenger screens located in the passenger waiting areas.

All of the helicopters are equipped with satellite telephones that are hard-wired into the helicopter audio panels. Each helicopter has a discreet telephone number for inbound calls.

For outbound flights; once airborne, the pilots provide a VHF radio call to the Dispatcher (130.275 MHz). If the BlueSky System is providing a proper display the Dispatcher announces Satellite Tracking to the pilot, and no further voice communication is required.

A similar system is utilized for inbound flights, except the initial call when departing the offshore location is relayed via the Radio Operator offshore to the Cougar Dispatchers. In like manner, the satellite tracking confirmation call is relayed to the flight crew.

For inbound flights; the pilots must also contact Air Traffic Control (ATC) as soon as possible and obtain a discreet transponder code. ATC also provides an IFR clearance to enter controlled airspace, which commences 60 nautical miles from St. John's.

NOTAMS and Weather Briefings

- *The ASR Team is of the opinion the method to provide flight crews with weather and NOTAMs (Nav Canada Notice-To-Airmen) exceeds regulatory requirements and industry norms.*

The Dispatchers continually update weather and NOTAM's (Nav Canada Notice-To-Airmen) from either SkyPlan in Calgary or the Nav Canada Internet site. In addition, marine weather and weather from the offshore facilities is available through computer, fax, and telephone.

Prior to each flight, the Dispatchers provide the flight crew with a NOTAM and weather briefing package that contains hard-copy print-outs of all of the required information.

Passenger Manifests

✈ *The ASR Team is of the opinion the procedures utilized to control and generate passenger manifests exceeds regulatory requirements and industry norms.*

Passenger manifests are strictly controlled. A computer software program designed by X-Wave (an Aliant/Bell Canada company) and entitled Personnel Logistics System (PLS) is utilized by both Husky and Petro-Canada to track passengers. Hibernia utilizes a program entitled PTS.

The Passenger Movements Coordinator (PMC) is responsible for all passenger movements. The PMC is assisted by two full-time employees who staff the Traffic Office, plus additional ground handlers.

Once all of the passengers, baggage, and freight have been loaded the pilots are handed a hard-copy final Load Control Form.

Weight and Balance

✈ *The ASR Team is of the opinion the procedures utilized to control weight and balance meets regulatory requirements and industry norms.*

The Ground Handlers and Check-In Staff weigh everything that is transported onboard (i.e. all of the passengers and all of the freight).

The pilots are provided with the actual weights, which are recorded on the Operational Flight Plan (OFP). They have the option of using either a detailed Weight and Balance Calculation Form; a computer calculated form; or representative sample Loads that indicate the most forward limit and most aft limit, from minimum fuel to maximum fuel.

The sample load charts consist of the different configurations for each helicopter (i.e. 7 for the S-92A), which are plotted on individual centre of gravity graphs. The graphs are retained onboard with the helicopter documentation, and are also available in Dispatch.

The carrier recently developed standardized helicopter configurations. All configurations are similar, with odd numbers being assigned to configurations with auxiliary fuel tanks and even numbers for no auxiliary fuel tanks.

Monitoring of Flight Crew Duty Times

✈ *The ASR Team is of the opinion the procedures utilized for monitoring their pilot flight and duty times exceed regulatory requirements and industry norms.*

The FOIMS computer program is utilized to track the flight times and flight duty times (OPS Form 60 Report). The pilots enter their times in the FOIMS database after each flight. At month end, an electronically generated form is displayed. The pilot verifies the times, and if correct, electronically submits the form.

The submitted forms are reviewed by both the Training Coordinator and the Operations Assistant, and if correct, are printed and placed in the pilot training record binders.

The Dispatchers are also responsible for monitoring the accumulated pilot times and then scheduling the flight crew in a manner not to exceed any limitations. If any flight or duty time is exceeded, the Director of Flight Operations and the Chief Pilot receive automatically generated emails. Also, at the same time, a Stop Flying Order (SFO) is automatically generated.

The Dispatch Department is responsible for ensuring that pilots with SFOs or RFOs are correctly assigned to flights. Currently, in order to achieve this goal, a whiteboard near the briefing area lists all of the pilots. Red SFO and Blue RFO magnetic dots are placed beside the pilot's name, with corresponding colored text denoting the reason for the SFO or RFO. This manual system will however be replaced shortly with a web-based electronic system. This new system will provide the managerial staff access to this information when away from St. John's Head Office.

Flight Duty Times are not normally a concern for Cougar Helicopters due to the fact the majority of pilots work two weeks on and two weeks off with duty days scheduled not to exceed 12 hours per day.

Passenger Briefings

✈ *The ASR Team is of the opinion that Cougar's passenger briefing procedures meet regulatory requirements and industry norms.*

A separate briefing video is utilized for each type of helicopter. All passengers are required to view the video prior to boarding the helicopter. In addition, the pilot also conducts a short briefing in the helicopter, after the rotors are turning.

Earmuff hearing protectors and disposable earplugs are provided to the passengers.

Transportation of Dangerous Goods (TDG) Training

✈ *The ASR Team is of the opinion that Cougar's Transportation Dangerous Goods (TDG) Training exceeds regulatory requirements and industry norms. The carrier has elected to complete annual TDG training, which exceeds the Transport Canada mandated two-year interval.*

Three (3) times per year, a half-day duration Dangerous Goods Course is instructed by the carrier's former Halifax Stores Manager. Staff members are required to attend one of these courses annually, which exceeds the Transport Canada mandated two-year interval.

Training is followed by a John French Consultants prepared written exam.

Emergency Response Plan (ERP) Manual

✈ *The ASR Team is of the opinion the Emergency Response Plan (ERP) Manual exceeds regulatory requirements and industry norms.*

The carrier maintains a detailed Emergency Response Plan (ERP) Manual. It was last amended 15 January 2009 with Amendment #15. During interview, the Dispatch Manager stated that the manual was an effective tool during the recent emergency.

Pre-Flight Risk Assessment

- *The ASR Team reviewed the pre-flight Risk Assessment Matrix (RAM) and is of the opinion it is an effective mitigation tool.*

As a Cougar safety initiative, the Flight Operations Department developed a pre-flight Risk Assessment Matrix (RAM). The RAM was developed to attempt to identify the factors crews should be aware of prior to each offshore flight. It was designed to quantify the 'relative risk' associated with each and every flight prior to being given formal dispatch release.

The RAM was designed to help improve crew awareness of the listed factors (i.e. crew experience level, environment, time of day, day/night, fatigue, complexity, personal) and how they could influence the flight. It is to be completed by the crew and highlights the areas where risks may need to be reduced or mitigated prior to flight. The completed table is to be handed to dispatch before the flight.

Pilots are also required to advise the Chief Pilot or Director of Flight Operations of any score of 8 and over. The system was not designed as a GO-NO-GO tool or to undermine the crew's role in the decision to fly or not to fly, but to help them assess the various factors that may influence the safe outcome of each flight and to address these factors prior to dispatch.

Drug and Alcohol Program

- *The ASR Team is of the opinion the Cougar Drug and Alcohol (D and A) Program exceeds regulatory requirements and industry norms (no requirements from Transport Canada, other than an eight hour prohibition on the consumption of alcohol and the use of any drugs that might impair your ability).*

The Cougar Human Resources (HR) Department holds the D and A Policy and provides it to all employees during initial hire and company introduction. The policy is detailed within fourteen (14) pages of the HSE Manual, which is available at the various base locations. The policy includes the following testing:

- Pre-employment for all new hires.
- Testing For Cause.
- Post Incident, if there is a reason to believe that drugs or alcohol might have been a contributing factor.

Commencing 01 April 2009, Cougar introduced random testing for all safety-sensitive positions. The initial plan is to test ten percent (10%) of the employees per year.

Testing is controlled by HR with the Director of Safety and Quality ultimately responsible. Atlantic Offshore Medical Services (AOMS) is the local laboratory utilized for the actual testing.

As a direct result of a recent client review finding, the Safety Department distributed the most recent policy to all staff members and requested they sign the last page acknowledgement form. All of the completed acknowledgement forms were returned to HR for filing.

First Aid and CPR Training

- *The ASR Team is of the opinion the Cougar First Aid and CPR Training Program exceeds regulatory requirements and industry norms.*

First aid and CPR training is completed through St. John Ambulance. The carrier also employs a First Response individual who can provide first aid training, as required.

FOIMS automatically flags any pilot when their first aid certification expires and automatically issues a Restricted Flying Order (RFO). Whenever this occurs, the individual must be paired with another pilot who holds a valid certificate; until the pilot with the RFO receives training again.

COUGAR SAFETY PROGRAM

Cougar Safety Program

- *The ASR Team is of the opinion that Cougar's Safety Programs exceed regulatory requirements and industry norms.*

- *Cougar currently maintains two safety programs: a HSE Management Program and an Aviation Safety Management Program. In anticipation of forthcoming changes, which Transport Canada will make mandatory, Cougar is already transitioning their current programs into a combined Safety Management System (SMS).*

- *The ASR Team is of the opinion that many of the key SMS elements are already firmly in-place.*

- *Until Cougar Helicopters experienced their S-92A accident on 12 March 2009, they had flown approximately 50,000 accident-free flying hours from their St. John's base, which included 10,000 accident-free hours on the Sikorsky S-92A.*

The President and CEO of both Cougar Helicopters and VIH Aviation Group, is the Accountable Executive (AE). The AE has endorsed individual SMS, HSE, and Quality policies that are prominently displayed on-site and incorporated in key manuals.

The Director of Safety and Quality (DSQ) reports to the General Manager, with a dotted-line reporting to the Accountable Executive. The DSQ also liaises closely with the Maintenance Quality Assurance Manager.

The DSQ has completed several safety related courses, including SMS Training from the University of Southern California. A full-time Safety Coordinator reports to the DSQ. The DSQ can also call upon the support of managers and specialists within the company. There is one Base Aviation Safety Officer (BASO) appointed at each location. In St. John's, the Maintenance Training Coordinator is the BASO (has held this position for 8 years).

On 15 January 2009, Cougar published a draft Safety Management System (SMS) Manual. This manual is a work-in-progress, with the goal of replacing the two existing manuals.

One component of the safety program is a Hazard Reporting System that utilizes Cougar Event Forms. Any staff member can complete and submit the form either hard-copy or electronically on-line. Once submitted and/or entered into the computer system, it is automatically assigned to the DSQ via email.

The DSQ reviews the initial report and then assigns it to one of the appropriate Department Managers, who are notified with an automatically generated email. Action taken and the review periods are all automatically tracked by computer, and if necessary, the responsible person receives an email reminder of pending action. Once remedial action has been completed, the DSQ is the only person who can close the report.

The ASR Team reviewed a random sampling of aviation and HSE related Cougar Event Forms that were filed in 2008. Cougar appears to recognize the importance of increasing the level of safety reporting in order to enact preventive improvements. The independent investigations into several safety reports were reviewed by the ASR Team. The ASR Team found those particular investigations to be adequate.

Cougar utilizes Risk Assessments as part of an informal Management of Change process, which consists of completing a blank Excel spreadsheet with any areas of concern. A formalized Management of Change process is included in the January 2009 Draft SMS Manual, but has not yet been officially implemented. The ASR Team reviewed two previously completed Risk Assessments (Tuktoyaktuk base operation and SAR coverage in the Gulf of Mexico). 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. The ASR Team found those particular plans to be adequate.

Flight Operations Memos normally written by the Chief Pilot, and Flight Operations Directives normally written by the Director of Flight Operations, are utilized to convey safety information to the staff. The Directives are intended for more critical safety information and/or for items that require mandatory compliance. These memos are controlled by the FOIMS program. Whenever a pilot logs into FOIMS, they must electronically acknowledge they have read all new memos.

Cougar's SMS Committee, which evolved from an earlier HSE committee, is comprised of representatives from the various company departments. The Committee meets on a monthly basis. They also conduct a monthly hangar facility inspection prior to each meeting (completed by one of the Co-Chairman and one committee member).

The Safety Department utilizes the Q5 AIMS web-based software program to manage their Safety Audits. Using the Q5 Audit program, the safety staff can compile customized checklists and later enter information into a shared database for future review and reference. The program generates automated e-mail warnings whenever target completion dates become overdue.

COUGAR MAINTENANCE DEPARTMENT

Maintenance Authorizations

✈ *The ASR Team examined the Transport Canada maintenance authorizations and is of the opinion that Cougar is appropriately licensed for the work performed.*

Cougar Helicopters is a Transport Canada Approved Maintenance Organization (AMO); authorizations include the Sikorsky S-92A and S-61N helicopters. Approvals include avionics, and repair and modification of composite and sheet metal structures.

The Avionics Repair Shop employs nine avionics engineers and endeavors to have two avionics technicians on shift each night.

Special Purpose Regulatory Inspection - Maintenance

✈ *Transport Canada conducted a Special Purpose Regulatory Inspection, post accident, of the Cougar Maintenance Department. Transport Canada reported two (2) maintenance related findings that in the opinion of the ASR Team did not have an effect on operational safety.*

The Special Purpose Regulatory Inspection was conducted 24 and 25 March 2009 by a team comprised of the Convening Authority and four (4) on-site Inspectors, which included two (2) Flight Operations Inspectors and two (2) Airworthiness Inspectors.

NOTE: Refer to Supporting Documents for the specifics regarding the maintenance findings.

Operational Personnel - Maintenance

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

The Key members of the Maintenance Department were interviewed. The Director of Maintenance (DOM) reports to the General Manager. Originally, there was only one Chief Engineer who reported to the DOM, however as Cougar expanded they appointed two (2) Chief Engineers. The S-92A Chief Engineer is responsible for supervising the maintenance of the S-92A helicopters. The S-61N Chief Engineer is responsible for supervising the maintenance of the S-61N helicopters. This provides a closer focus on the unique aspects with each fleet.

The Crew Chiefs, who are the supervisors at St. John's and at each sub-base, report to the Chief Engineers. The Avionics Manager and the Stores Manager report to the DOM.

The Maintenance Quality Assurance (QA) Manager reports directly to the DOM, with a dotted-line to Senior Management. The QA Manager is an Aircraft Maintenance Engineer and has been employed with Cougar of the past fifteen (15) years. The QA Manager was previously their HUMS/Maintenance Planning Coordinator. One (1) Quality Assurance Inspector assists the QA Manager.

Cougar Helicopters allocates four and one half (4.5) line maintenance personnel for each helicopter. Approximately two-thirds of the maintenance personnel are Transport Canada Licensed Aircraft Maintenance Engineers (AME) who also hold Aircraft Certification Authority (ACA); required to certify any maintenance completed. The remainder hold Transport Canada Maintenance Engineer Licenses, but have not been issued with an ACA for the S-92A.

The work schedule for the maintenance staff is four (4) days on and four (4) days off.

Maintenance Policy and Procedures Manuals

- *Three separate manuals outline the Cougar policies and procedures for maintenance. The ASR Team reviewed these manuals and is of the opinion they meet regulatory requirements and industry norms.*

The Maintenance Control Manual (MCM) contains Revision # 2 dated 28 February 2008. Approved by Transport Canada, it contains information and instruction pertaining to the manner in which Cougar controls the maintenance of the aircraft.

The Maintenance Policy Manual (MPM) contains Revision # 3 dated 28 February 2008. Approved by Transport Canada, it contains information and instruction pertaining to the manner in which Cougar conducts the actual helicopter maintenance. It also documents the Quality Assurance Procedures.

A more detailed Company Maintenance Procedures Manual (CMPM) supplements the two above-noted manuals that are approved by Transport Canada. The CMPM contains Revision 1 dated 03 April 2008. Transport Canada reviews, and as appropriate, accepts this manual. Cougar is currently enhancing the CMPM by adding more explicit instructions for some tasks and processes.

NOTE: Refer to Supporting Documents for a list of MCM/MPM/CMPM topics and introduction.

Maintenance Quality Assurance (QA) Program

- *ASR Team interviewed Quality Assurance personnel and examined the QA Program. The ASR Team is of the opinion the Cougar QA Program is effective. For 2009, twenty-one (21) audits are scheduled for their five operating locations (St. John's, Halifax, Gulf of Mexico, Australia, and summer base Tuktoyaktuk), with four (4) audits already under way.*

The QA Manager is responsible for scheduling and conducting the Quality Assurance Audits. During Year 2008, the department conducted thirteen (13) internal maintenance audits. These consisted of auditing aircraft, reviewing technical records, spare parts inventory, and the maintenance activity at St. John's Head Office and sub-bases in Australia, Angola, and Gulf of Mexico (Angola base since closed). The QA Department is also responsible for external supplier audits.

Cougar introduced the Q5 AIMS web-based software program to more effectively manage their Quality Assurance Audits. Using the Q5 Audit program, the QA Inspector can compile customized checklists and later enter information into a shared database for action, future review and reference. The program generates automated e-mail warnings whenever target completion dates become overdue. If not remedied, it escalates these particular findings to senior managers for resolution.

Initial / Recurrent Training

- *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.*

The Maintenance Training Coordinator provides company indoctrination training in a classroom setting. The curriculum includes the MCM, MPM and CMPM. Additionally, all Engineers must complete Human Factors Training. Following the classroom sessions, the new employees are assigned to work with a mentor on a normal night shift.

Engineers attend S-92A Type Training at Flight Safety International (FSI) in Florida, which is the only training facility approved by Sikorsky. They attend engine training at General Electric Corporation.

Maintenance staff track completed or due training in an efficient database entitled Maintenance Management System (MMS) that was designed within the company. Maintenance training records are retained in three-ring binders, one per person. Each file contains a summary sheet that MMS generates.

According to regulation, each Engineer must receive twenty-four (24) hours of training in a three-year period, with at least eight (8) hours of training per year. Random sampling of the maintenance training records revealed Cougar exceeds these regulatory requirements. For example, during the past 36 months, the number of training hours for several engineers ranges from more than 75 hours to a high of 415 hours.

Aircraft Maintenance

- *The ASR Team reviewed Cougar's method and means of maintaining the S-92A helicopters, and is of the opinion that the maintenance conducted meets the manufacturers' recommendations, regulatory requirements and industry norms.*
- *The ASR Team is of the opinion that maintenance records are completed appropriately and in accordance with Cougar procedures and regulatory requirements.*
- *The ASR Team is of the opinion Cougar has an effective process for the review of HUMS data and response to any anomalies.*
- *The ASR Team is of the opinion that Cougar regularly engages with Sikorsky on a wide variety of topics related to the S-92A.*

Cougar conducts maintenance in accordance with the Sikorsky maintenance instructions and schedule except as follows. For inspections up to 1,250 flying hours, Cougar took the initiative to create a Progressive Maintenance Schedule approved by Transport Canada. It functions by breaking the inspection into twenty-three (23) packages of work that takes no longer than one weekend each to complete. This eliminates having a sustained down time of about fourteen (14) days every 1,250 flying hours. Cougar does not participate in any component Time Before Overhaul (TBO) extension programs, which exceeds regulatory requirements and industry norms.

Cougar bases its Maintenance Schedule Approval (MSA) for the S-92A upon the Sikorsky program, makes modifications as changes occur, and reviews it at least once per annum. Cougar uses the AirSoft AS400 Computer System (developed by Vector Aerospace/Heli-One) which operates from a main server located at the VIH Aviation Group in Victoria, BC, and accessed in St. John's via the Internet. Maintenance supervisory personnel and the Technical Records Clerks have full authorization to change AirSoft items. However, all other maintenance personnel have read-only access.

Staff members print Aircraft Status Reports weekly. These reports list all items that require maintenance action within the next 100 flight hours and/or next 30 days, and are used by the Crew Chiefs to plan their work. Approximately one week prior to items becoming due, they use the AirSoft System to print Work Specification Cards (Work Specs). These delineate the tasks that the engineers must accomplish and the method of accomplishment. There is a separate Work Spec printed for each task.

The ASR Team sampled aircraft technical records including the Aircraft Journey Log and the associated Work Specs.

Cougar is authorized to utilize a Transport Canada approved Minimum Equipment List (MEL). A sampling of Aircraft Journey Logs indicated engineers sometimes defer maintenance temporarily in accordance with the MEL. The instruction includes a time for rectification and cross references any placard, maintenance or operational procedures that personnel must apply. There is a procedure in the MCM for review of recurring defects. Maintenance personnel also enter technical data into AirSoft, an electronic maintenance records system, which they use to generate reliability data.

Engineers conduct Independent Control Checks (ICC) of critical tasks. In these cases, an individual, appropriately approved, checks the work of the engineer who conducted the task before releasing it to service. Both individuals sign in the Work Spec attesting that the checks are complete.

Modifications to the aircraft, such as the installation of Forward Looking Infra-Red (FLIR), satellite tracking systems, internal auxiliary fuel tanks, etc. are all appropriately approved under a Supplemental Type Certificate (STC), or other equivalent means acceptable to Transport Canada.

The Cougar S-92A aircraft are fitted with a Health and Usage Monitoring System (HUMS) that gathers vibration and performance data routinely in flight. The data is down-loaded to a server via a data card upon return to St. John's. From the server both line engineers and a full time HUMS Coordinator assess the data for any abnormal readings. The data is also transferred to Sikorsky where the maintenance centre reviews the data again and compares the data across the global fleet. On the S-61N aircraft, Cougar has installed the VXP vibration health monitoring equipment and is planning to install a basic flight data monitoring system.

Cougar employees are actively involved with the manufacturer as is evidenced by their participation in the Sikorsky Maintenance Steering Group for the S-92A. They also participate regularly in the weekly S-92A maintenance web cast organized by Sikorsky for aircraft operators.

Mandatory Continuing Airworthiness Information (MCAI)

- *It is the opinion of the ASR Team that Cougar has established an effective process for the evaluation of MCAI and Airworthiness Directive (AD) and executes these well within the allowable compliance time(s).*

- *Cougar treat all Sikorsky Alert Service Bulletins (ASB) marked as compliance essential in the same way as Service Bulletins covered by an AD.*

The Cougar staff must complete the inspections or modifications in accordance with the instructions specified and within the allotted compliance time limit. The engineers record completion in the appropriate Aircraft Technical Record. Technical staff then update the electronic records in the AirSoft system.

As part of the continuing airworthiness process, manufacturers of aircraft are required to provide ongoing instructions on actions to maintain aircraft in an airworthy condition. Typically, these instructions take the form of a manufacturer's maintenance manual together with a schedule of inspection(s) and component replacement times.

Additionally the manufacturer may issue Alert Service Bulletins, Service Bulletins and other publications to deal with product improvements or unforeseen events. Typically, these instructions fall under the international nomenclature Mandatory Continuing Airworthiness Information (MCAI). The manufacturer publishes them as required. These instructions will usually include compliance times, either by flight hour, component hours, calendar, cycles, or a combination of these. It is incumbent on each aircraft owner / operator to comply with the MCAI within the allowable compliance time.

Occasionally, a regulator (i.e. Transport Canada, FAA, EASA) may issue an Airworthiness Directive (AD) against an aircraft or aeronautical product. In such case, the AD is an instruction to aircraft owners / operators of that equipment to comply with the instruction(s) of the AD. An AD may or may not refer to a MCAI as a means of compliance.

Refer to Supporting Documents for the process Cougar uses to evaluate and implement MCAI and AD.

On 7 April 2009, the ASR Team reviewed this area of compliance at Cougar with results as follows.

- Reviewed the AD and Sikorsky ASB status provided by Cougar and examined the items still to be completed from that list
- Sampled the Technical Document Confirmation Form (TDCF) used by Cougar
- Reviewed the technical records for C-GVCH for AD / ASB recording
- Sampled Sikorsky compliance times

Status of Alert Service Bulletin (ASB)

There are no ASB outstanding that exceed the compliance time permitted by Sikorsky. There are however two ASB where the compliance time is 'x days' from receipt of parts. This is because the components are rotated through Sikorsky's repair maintenance facility to be upgraded, and each old unit is required back for modification and issue to another S-92A aircraft operator under the Total Assurance Program. Hence, the time periods for compliance are relatively low, to keep the modifications flowing through the facility.

ASB92-22-001 – Automatic Flight Controls System (AFCS) Panel
An improved design was introduced to reduce the risk of electrical shorts. The ASB was dated 10 Dec 2008, requiring compliance within 15 days of receiving the parts. Cougar ordered parts 16 Dec 2008. Sikorsky reports two were shipped 2 April 2009, and Cougar confirm receipt of one on 5 April 2009.

ASB 92-67-001 – Main servos
This ASB addresses replacement of a seal to prevent weeping of hydraulic fluid from a servo. The worst case failure is loss of hydraulic system redundancy, not loss of function. The ASB was dated 22 Oct 2008, requiring compliance within 10 days of receiving the parts. Cougar ordered parts 19 Nov 2008. Two sets have been delivered. One was fitted to C-GMCH and the other was rejected due to transit damage noted on receipt. Cougar await three more sets.

Status of Airworthiness Directive (AD)

One AD remains that affects two engines, one each on two aircraft:

AD2008-26-02 – CT7-8A Engines

This AD, issued 22 Dec 2008 for certain engine serial numbers, introduced a requirement within 6,200 cycles-since-new the engine is removed, the front frame flushed, and the No. 3 bearing replaced. The FAA issued this AD to prevent failure of the No. 3 bearing due to contamination by aluminum oxide, which could possibly lead to an In Flight Shut Down (IFSD) and a subsequent return to base. Cougar has two such engines that are scheduled for compliance with this AD. They have introduced this limit into their maintenance records and planning software to ensure timely compliance.

Technical Document Confirmation Form (TDCF)

Each ASB is assessed for its impact using a Cougar TDCF. Cougar apply all that are applicable to their fleet. Several forms were sampled; all were acceptable.

Recording of ASB / AD Compliance

The ASR Team reviewed the aircraft technical records and did not identify any discrepancies upon review of sample aircraft C-GVCH.

Compliance Times

The ASR Team made a random sample of ASB to examine what sort of typical compliance times Sikorsky uses (FH = flying hours, D = days, Y = years):

92-18-001A	One time inspection of active vibration system mounting, 10FH
92-20-002A	Inspect and reposition anti-ice harnesses, 21D or 180D, dependent on criteria
92-22-001	Modification to AFCS Panel, 15D from receipt of parts
92-24-001	Modification of AC generator, 120D
92-25-003	Modification of life raft ELT, 60D
92-30-001	Replacement of tail rotor de-ice slip ring cable, 90D
92-49-001	APU duct modification, 60D
92-52-007	Air stair door handrail inspection, 60D
92-52-001	Cockpit window modification, 60D
92-62-002	Main rotor pitch rod torque check, 50FH
92-63-002	MGB mounting bolt torque check, 500FH
92-63-005B	Oil pump replacement, 100FH
92-63-013	Oil pump modification, 30D
92-67-001	Main servo modification, 10D from receipt of parts
92-63-014	One time replacement of mounting studs (1250FH or 1Y)

From this short survey, Sikorsky provided a long period for compliance with ASB 92-63-014 (1250FH or 1Y). When reissued as ASB 92-63-014A this became the first ASB pertaining to the S-92 with a compliance limit of before-next-flight.

Overhaul and Repair

Cougar does not overhaul components or repair engines. It out-sources this work to external, approved third-party maintenance organizations such as Sikorsky/Helicopter Support Inc. (HSI) and General Electric.

Technical Library

The Technical Records Clerks report to the Quality Assurance Manager, and control the Technical Library System. They maintain a master hard copy of the majority of publications. However, all of the S-92A publications are electronic, and are readily accessible via the company intranet. Whenever copies are printed, they are marked as uncontrolled.

Hangar / Workshops Maintenance Areas

- *The ASR Team is of the opinion the hangar and workshop areas are maintained in good condition and can readily support the aircraft routinely based in St John's.*

Employees working in the hangar use safe work practices; safety glasses, trip and fall prevention, and lock out / tag out to name a few.

Cougar has placed fire proof cabinets along the hangar walls for storage of hazardous and flammable goods. The ASR Team did not observe any such goods lying around the hangar that were not in use.

Cougar has suitable ground support equipment and maintains it in good condition. There are small avionics, sheet metal, and SAR equipment workshops. There is a line maintenance office adjacent to the hangar floor as are the stores.

Cougar provides all tools and keeps ones requiring periodic calibration secure. The carrier introduced a Tool Control Program in 2005 to ensure a tool is not inadvertently left in an aircraft where it can cause damage. Engineers are not permitted to use personal tool boxes. Cougar purchased four large rolling tool boxes, one for each hangar work area, which were identically equipped with all required tools.

At the commencement of each shift, the Crew Chief unlocks and inventories the tool box; signing it open. At the end of each shift, the Crew Chief once again inventories the tool box, determines all items are in place, signs it closed and locks it.

The Cougar Tool Control Program exceeds regulatory requirements and industry norms.

Spare Parts

- *Stores personnel inspect all spare parts and materials upon receipt. The ASR Team found them properly stored, segregated, identified and quarantined (if necessary).*

The Stores Manager and assistants retain and file the appropriate Authorized Release Certificates for each part. They hold in quarantine any part that has paper work problems or evident damage. Using the AirSoft system the staff has established stock control limits for high turn-over parts, such as O-rings, fasteners, etc. This ensures a good supply is on-site without stocking too much. They source the majority of these parts from Sikorsky subsidiary HSI.

Cougar participates in the Sikorsky Total Assurance Program (TAP). This program supplies major components and parts as required, the cost of which the aircraft operator pays as the aircraft flies.

Aircraft Fuel Services

Irving Fuels provides fuel onshore. Cougar QA personnel conduct quality audits on the Irving installation and equipment. Cougar personnel supervise final quality checks.

SIKORSKY S-92A HELICOPTER

Sikorsky S-92A Certification of the Main Gearbox

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

Emergency Procedures Check Lists for Gearbox Malfunctions

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

REDACTED

Not within OHSI's Terms of Reference.
Within exclusive jurisdiction of TSB.

RECOMMENDATION

Based upon our Safety Review, it is the opinion of the ASR Team that Cougar is ready to return to service.


Walter McKeown – Hibernia Management Development Corporation

Andy Evans - Petro-Canada

Brian Van Humbeck - Husky

SUPPORTING DOCUMENTS

1. Aviation Safety Review (ASR) Team Charter
2. Bios - ASR Team Members
3. Cougar Helicopters Transport Canada Air Operator Certificate (AOC) - extract of 7 pages
4. Transport Canada Special Purpose Regulatory Inspection Mar 2009
5. Cougar's Preliminary Internal Accident Investigation Report
6. Cougar's Preliminary Return to Service Plan
7. Introduction to Company Operations Manual (COM) - extract of 2 pages
8. Introduction to S-92 Standard Operating Procedures (SOP) - extract of 2 pages
9. Transport Canada Approved Maintenance Organization (AMO) Approval
10. Maintenance Control Manual (MCM) - extract of 3 pages
11. Maintenance Policy Manual (MPM) – extract of 3 pages
12. Company Maintenance Procedures Manual (CMPM) – extract of 4 pages
13. Airworthiness Directives and Service Publications
14. Sikorsky S-92A Type Certificate Data Sheet
15. Sikorsky All Operators Letter (AOL) CCS-92-AOL-09-0010 (S-92A Certification)
16. Sikorsky Safety Advisory SSA-S92-08-007 (Stud Failure Notice)
17. Original Sikorsky Alert Service Bulletin 92-63-014 (Stud Replacement – 2 pages)
18. Revised Sikorsky Alert Service Bulletin 92-63-014A (Stud Replacement – 10 pages)
19. FAA Emergency Airworthiness Directive 2009-07-53 (Stud Replacement – 2 pages)
20. Emergency Procedures Check Lists - Gearbox Malfunctions