Advice provided by the C-NLOPB's Offshore Helicopter Safety Inquiry (OHSI) Implementation Team to the C-NLOPB Board

Advising Document

OHSI Phase I, Recommendations 17 & 18

Regarding assessment and continuing verification of the risk-management practices of the oil operators and the helicopter operator(s)

In November 2010, the Honourable Robert Wells, QC, submitted the Report for Phase I of the OHSI to the C-NLOPB, containing 29 recommendations for enhancing the safety of helicopter travel offshore. Each Advising Document contains the text of the recommendation for which the advice is offered.

The Team's advice for Recommendations 17 and 18 was accepted in principle by the C-NLOPB Board at their meeting on August 25, 2011. As proposed, Recommendation 17 was closed; and the C-NLOPB took responsibility for developing its strategy to implement Recommendation 18.

The OHSI Reports, other Advising Documents, C-NLOPB OHSI Action Plans, and more can be found on the C-NLOPB website: **http://www.cnlopb.nl.ca/ohsi_main.shtml**

Advice to the C-NLOPB: Recommendations 17 and 18

Executive Summary

On behalf of the OHSI Implementation Team, an independent working group conducted an evaluation of Cougar Helicopters' SMS, and a high-level overview of the Operators' risk management practices relating to helicopter transport. As a result, the requirements of Recommendation 17 are complete, and the C-NLOPB OHSI Implementation Team suggests that Recommendation 17 be closed.

The working group verified the Commissioner's conclusion that the Helicopter Service Provider and the Operators have good risk management systems. However, they concluded that their risk management processes do not employ a system safety approach that takes adequate account of the role of human factors and organizational factors.

Consequently, the Implementation Team is recommending to the Board that the C-NLOPB lead the development of:

- A multi-tiered risk-management and oversight program that actively involves the helicopter service provider(s), the Operators and the C-NLOPB. The roles and responsibilities of each should be clearly defined, and include internal and external oversight of risk management practices as they relate to helicopter transport in the C-NL Offshore Area;
- Common criteria for managing and monitoring risk that take appropriate account of human and organizational factors in complex systems, that enables the identification of system safety deficiencies, and that contains common definitions and risk-based reporting criteria
- A common set of factors that enables all stakeholder groups to proactively measure safety performance. In this way, they will be able to explicitly demonstrate, in tangible terms, the priorities they have set and the achievements they have made in actively managing helicopter safety risks to a level as low as reasonably practicable.

Introduction

One of the overarching issues Commissioner Wells examined during the Offshore Helicopter Safety Inquiry (OHSI) was whether "… the risk management systems of oil operators and the helicopter operator [are] sufficient and adequate to ensure the risks of helicopter transport are as low as reasonably practicable in the Newfoundland and Labrador offshore" (Volume 1, page 248). Subsequent deliberations resulted in two recommendations:

- That the Regulator order a risk-management assessment of the oil operators' and the helicopter operator's risk-management practices (Recommendation 17); and
- That the Regulator continue to verify the risk-management practices of the oil operators and the helicopter operator(s) on an ongoing basis (Recommendation 18).

The OHSI Implementation Team confirmed that Recommendations 17 and 18 were intended to focus on risk management practices specifically relating to helicopter transport.

Method

To address Recommendation 17, the OHSI Implementation Team formed a small working group using members of the Implementation Team who were not employees of the Operators or of Cougar, and thus were independent from the C-NL Offshore Industry. Their expertise in safety-risk management and in evaluating the safety performance of organizations enabled them to impartially conduct the assessment of the risk management practices of Cougar Helicopters, Hibernia Management and Development Company (HMDC), Suncor Energy, and Husky Energy.

The working group presented the results of the evaluations to the full Implementation Team, so that the Team could achieve consensus on the strengths and weaknesses in the current management of helicopter transport safety-risks. This information became the foundation for the Team's proposal to the Board for implementing Recommendation 18, presented later in this document.

System Safety Deficiency (SSD)

As a result of the activities related to Recommendation 17, the OHSI Implementation Team determined that the overarching system safety deficiency is:

> Risk management practices in the C-NL Offshore Area do not employ a system safety approach that takes adequate account of the role of human factors and organizational factors in helicopter safety-risk management and safety performance.

Background

Before discussing the activities of the working group, it is necessary to briefly examine three terms: Human Factors, Complex Systems, and Organizational Factors.

Human Factors is the examination of the interface between humans and machines, so that equipment, processes and environments can be designed for people to work effectively and safely. By applying Human Factors in the workplace, the likelihood of error is reduced, and safety is improved.

"Complex Systems" describes operations that involve many components: many people, many types of equipment, and many processes; often in different parts of one or more organizations. All work together to produce services or products. The important point about complex systems is that it is unlikely that most persons are able to understand the dynamic and changing interaction between all the components completely, particularly because many of them (both people and equipment) do not always act or react in predictable ways. As a consequence, companies must manage the results of complexity; putting in place processes that ensure small problems are identified, analyzed, and fixed; and remedial measures are monitored to ensure that the underlying problem is addressed. Additionally, they must seek and analyze "patterns" of problems - amongst individual components and functions, and across the system. For complex systems to function safely, the "small" problems need to be addressed and then examined

to identify indicators of systemic vulnerability. In such companies, system safety is a high priority, and underlying problems are actively sought, identified, and addressed.

Organizational Factors dictate how effectively human factors and system safety practices work. In most commercial operations, there is continuous tension to produce. Budgets, resources and time are constrained. Companies that operate in safety-critical industries like aviation or oil and gas must manage this tension, and put in place processes and practices to continuously verify that the appropriate relationship between safety and production is achieved in an ever-changing, complex and dynamic environment.

Consequently, the working group sought evidence that human and organizational factors are integrated with the system-wide risk management approaches that the Helicopter Service Provider and the Operators employ to manage safety risks.

With this in mind, the working group employed a performance-based evaluation technique that has been designed for civil aviation regulators to complete a systematic, performance-based evaluation of a safety management system (SMS). The evaluation protocol measures five functions that together enable an organization to manage aviation safety-risks to a level as low as reasonably practicable. The five functions are:

1. Proactive and comprehensive safety management;
2. Consistent and reliable performance from managers and staff, equipment, and the organization's functions;
3. Explicit safety-risk management;
4. Positive safety culture; and
5. Comprehensive and proactive safety measurement.

The working group was cognizant that SMS's are a new phenomenon in aviation world-wide and that very few (if any) are fully performance-based. It also recognized that an SMS cannot be "inserted" into an organization with the expectation that it will be fully functional immediately; it takes time for the processes to mature so that optimum performance can be achieved.[1] [2] The functionality of a company's SMS will grow as the SMS matures.

[1] See for instance B. Frohlich 'Performance Measurement of Safety Management Systems' in *Safety Performance Measurement*, ed. J van Steen, European Process Safety Centre, Institute of Chemical Engineers, Rugby, UK, 1996; and SMS Aviation Safety Guidelines for Evaluating a Safety Management System, SMS Report NO. 0303, prepared for the International Business Aviation Council, Geneva Switzerland and Montreal Canada, 2003.

[2] For instance, in the initial years of an SMS, a fully documented process for proactive hazard reporting or management of change will normally yield only limited improvements in proactive safety management. With time, employees and managers gain confidence that information from a non-punitive reporting program is validated, respected and employed. In such organizations, the hazard reporting program becomes a valued mechanism to improve safety performance. But it takes time and dedicated effort to make an SMS truly effective. Similarly, the quality of proactive hazard analyses improves as the skills of safety staff improve. Processes to "design safety" into changes within the organization become better integrated with existing procedures for project management, and new efficiencies result. When this occurs in a maturing SMS, ongoing use of the processes is reinforced, and mechanisms for improving safety performance are sustained.

Cougar Helicopters is responsible for the day-to-day management of safety-risks relating to helicopter transport in the C-NL Offshore Area. For this reason, the working group paid particular attention to evaluating the company's SMS, which Cougar started to implement in 2009[3].

The working group conducted interviews with Cougar line and management personnel (including those responsible for maintaining the company's SMS), and reviewed:

- Cougar's SMS Manual;
- The results of risk assessments, change management reports, and event investigations; and
- Completed event and hazard reports and subsequent analyses.

The information obtained from the evaluation guided the working group in the subsequent high-level overview of each Operator's risk management practices.

The Operators have a responsibility for ensuring that the risks to passengers[4] are managed effectively[5]. This depends on compatible policies and processes that support the Operators' and Cougar's operations. It requires integrated aviation safety-risk management that bridges the boundaries between the Operator and Cougar to complement their collective safety performance.

The high-level assessment of the Operators' risk management practices included – but was not limited to – interviewing managers, aviation advisors, and logistics and safety personnel; and reviewing:

- Documents that support the Operators' management systems;
- The results of quantitative and qualitative helicopter risk assessments; and
- Helicopter Operations Manuals.

Discussion - Recommendation 17

a) Summary of current risk management of helicopter transport safety-risks

Cougar Helicopters has primary responsibility for managing the safety-risks relating to the services it provides to the C-NL Offshore Industry. Cougar is issued an Operating Certificate (OC) by Transport Canada (TC), and TC inspectors periodically conduct audits to verify that Cougar is meeting the requirements of its OC. The Canadian Aviation Regulations (CARs) that govern commercial helicopter operations in Canada are principally prescribed rather than performance-based requirements, and are considered by TC to be a minimum national standard. It is expected that helicopter operators will exceed the minimum standards so that they can effectively manage the risks related to their specific operating conditions. As noted earlier, TC does not require Cougar Helicopters to operate an SMS.

The conditions of the Operators' contracts with Cougar supplement the safety requirements of the CARs, particularly as they apply to offshore helicopter transport. Many of the contracted requirements

[3] Transport Canada has not yet introduced a requirement for Cougar or other commercial helicopter operators to have an SMS.
[4] Passengers are normally employees of the Operators, or of companies that have been contracted by the Operators.
[5] As noted earlier, aviation risk management is in most cases conducted by Cougar Helicopters, and their performance is overseen by the Operators. However, there are some circumstances in which the Operators are directly responsible for aviation safety-risk management (e.g., aviation marking and lighting on offshore facilities).

come from detailed industry guidance, such as those contained in the OGP guidelines[6]. Each Operator has published a Helicopter Operations Manual that provides detailed direction and guidance on subjects ranging from minimum experience and training to procedures related to offshore helicopter fuelling. Each Operator employs one or more very experienced aviation advisors to provide periodic feedback on Cougar's performance[7], and to advise managers on significant technical or operational matters. Each Operator has a requirement to conduct annual audits of Cougar[8]. In 2010, the Operators' aviation advisors conducted a coordinated audit for the first time, with considerable success. Plans are afoot to make this the standard method by which audits are conducted in future. There is frequent (sometimes daily) communication between Cougar and the Operators' logistical staff, and regular meetings between the managers of all the organizations.

b) Results of the Evaluation of Cougar Helicopters

The working group noted universal agreement by the Operators, their aviation advisors, various third-party experts, and many of Cougar's operational and technical employees that Cougar Helicopters is a high-performing aviation company. Against this backdrop, the working group noted that Cougar continues to experience significant change in the size and nature of its operations, which in turn has resulted in changes in the roles and responsibilities of managers and staff, and in the company culture. Cougar managers have generally responded appropriately to these changes. For example, many practices and procedures are being rationalized and consolidated into technical and operational documents, and the management structure has been modified to deal with the large influx of new personnel.

Because Cougar has only recently introduced an SMS, the working group did not expect that it would observe total and effective proactive safety management throughout the company. Despite this, the success that Cougar has achieved in just a few years of operating its SMS is remarkable. The working group identified a number of strengths in the performance of the SMS:

- Many of the processes for a functional SMS are found in Cougar's SMS Manual;
- Senior leadership is dedicated to improving safety, and has embraced the SMS as a tool to drive improvement in the company's safety performance;
- Senior managers are increasingly employing hazard analyses and risk assessments as part of their *Management of Change* process. This commitment to proactive safety management is imperative in light of the change that Cougar is undergoing; and
- Senior managers are sensitive to the need for a positive safety culture, and those who the working group interviewed were aware of the important role they play in shaping that culture.

[6] International Association of Oil and Gas Producers, OGP: Air transportation – Recommended practices for contracted air operations, Report No. 410, June 2008, London, U.K.

[7] The advisors reside in Alberta and Texas, and (to varying degrees) communicate regularly with the management and logistics staff of the Operators, and (to a lesser degree) with the managers of Cougar. Although the responsibilities of the aviation advisors are similar, the activities vary from Operator to Operator, and range from analyzing events and incidents (at Cougar, in Canada, and internationally); to conducting qualitative risk assessments of planned operational or technical changes; to liaison with aircraft manufacturers on behalf of the Operators.

[8] The audits or safety reviews are conducted by the aviation advisors.

In addition to these areas of strength, the working group found a number of indications that Cougar's formal risk management practices had only recently been introduced and were not functioning optimally. The working group's high-level observations for improvements fall under functions 1 (proactive and comprehensive safety management), 3 (explicit safety-risk management), and 5 (comprehensive, proactive safety measurement), as listed on page 3. The observations were that:

- Most information currently being collected from the reporting program derives from events, and consequently is reactive rather than proactive;
- Cougar does not extract data from its many operational and technical databases to analyze safety-related trends and identify company-wide deficiencies in safety management;
- Cougar does not consistently apply human and organizational factors in their safety-risk management;
- Many of Cougar's activities to improve its management of risk focus on corrective actions to address non-conformance with prescribed requirements, rather than deficiencies in observed performance (these actions are not assigned levels of "safety significance"); and
- Cougar does not proactively measure system safety performance, and therefore is unable to make risk-based decisions to achieve – or demonstrate the achievement of – its goal of reducing risk to a level as low as reasonably practicable.

c) Summary of the results of the evaluation of the Operators' risk management practices related to offshore helicopter transport

As noted earlier, the Operators are in most regards not responsible for the direct, hands-on risk management of helicopter transport[9]. Rather, they oversee Cougar Helicopters' safety performance, and provide feedback to Cougar on its management of safety-risk. It is for this reason that the working group focused on the Operators' oversight of Cougar Helicopters' safety-risk management.

The results of the working group's high-level assessment of the Operators' risk management practices have been aggregated for this report. The key strengths and weaknesses are described below. It should be noted that the working group identified considerable variation in the potential performance of the risk management and oversight practices of the individual Operators.

The strengths in the Operators' risk management and safety oversight include:

- A strong commitment to provide safe helicopter transportation;
- A strong commitment to manage the unique environmental and operational conditions that potentially increase risks relating to helicopter transport in the C-NL Offshore Area;
- Comprehensive management systems that include processes for (among other things) risk assessments, management of change, and event reporting;
- Access to very experienced aviation advisors with extensive backgrounds in aviation (maintenance, flight operations, or both);

[9] They are *accountable* for the effective management of safety risks to which their employees are exposed when they are passengers on Cougar's helicopters.

- Frequent communication between the Operators, their aviation advisors, and Cougar managers; and
- Considerable support for safety initiatives proposed by Cougar, even when these initiatives exceed the conditions of existing contracts.

The working group noted that much of the day-to-day safety management conducted by the Operators is based on an accident causation model that links single causes linearly to single effects[10], rather than a System Safety framework that systematically accounts for the complexity inherent in real-world systems[11]. Therefore, the existing processes do not assign appropriate importance to key elements of proactive safety management (elements such as the predictable effects of human and organizational factors on risk management and safety performance), nor do they enable the proactive measurement of system safety performance. As noted earlier, each Operator has a responsibility to provide feedback to Cougar on its ongoing management of helicopter safety-risks. The feedback needs to be purposeful and effectively communicated to Cougar if it is to aid - and not hinder - Cougar's management of aviation safety-risks.

Many of the following Observations find their roots in this over-arching observation.

The working group observed that:

- The Operators have not effectively integrated human and organizational factors into their risk management processes. Therefore, the risk management structure does not accurately reflect human and system performance, and does not enable the consistent identification and management of system safety deficiencies[12]. This directly influences their oversight of Cougar's risk management processes and safety performance;

- The Operators' oversight of aviation safety-risks is not systematic, and it is not based on the explicit measurement of Cougar's safety performance. Scheduled audits generally measure compliance with safety and other contracted requirements. Not all Operators categorize audit findings based on their safety significance to Cougar or to themselves;

- Because the Operators' oversight is based on compliance rather than performance, safety analyses and proactive measures of safety performance focus on trends in the administration of "closing actions", rather than the analysis of indicators of effective safety management and safety performance (e.g., identifying and addressing system safety deficiencies). The status quo is depicted in Figure 1, below;

[10] These frameworks are the basis for many occupational safety programs, which identify a hazard that can lead to a loss, "fix" it, monitor the mitigating measure until it is implemented, then close the file. It is often characterized by a one-to-one relationship (i.e., one hazard; one fix).

[11] A system safety framework recognizes that safety performance is more than the sum of the parts, and that addressing singular hazards without assessing the antecedent conditions and the systemic consequence of a single failure (or, ironically, the mitigation of a single hazard) will lead to systemic vulnerabilities that may go undetected, and therefore unmanaged until there is a significant loss.

[12] Please refer to the working definition of a 'system safety deficiency' in footnote 4. It will be recalled that SSDs often result from mitigation that is not appropriate, or not effective. For this reason, SSDs are usually rooted in the 'organizational factor', and the hazards they "cause" are often identified by repetitive instances of human error.

- There are inconsistencies in the safety-related information that Cougar is required to report to individual Operators. Most information relates to events and, as such, are reactive indicators of safety performance; and

- Most aviation advisors do not have access to or employ performance-based tools that would enable them to measure the effectiveness of Cougar's safety-risk management in explicit and repeatable ways. Aviation advisors often provide valuable advice, but it is *ad hoc.* Examples of advice that the working group examined generally highlighted "safety issues" of the day, or concerns that were particular to that advisor, and not others. It did not result in a systematic approach to exchanging safety-related information that would consistently enhance Cougar's safety performance.

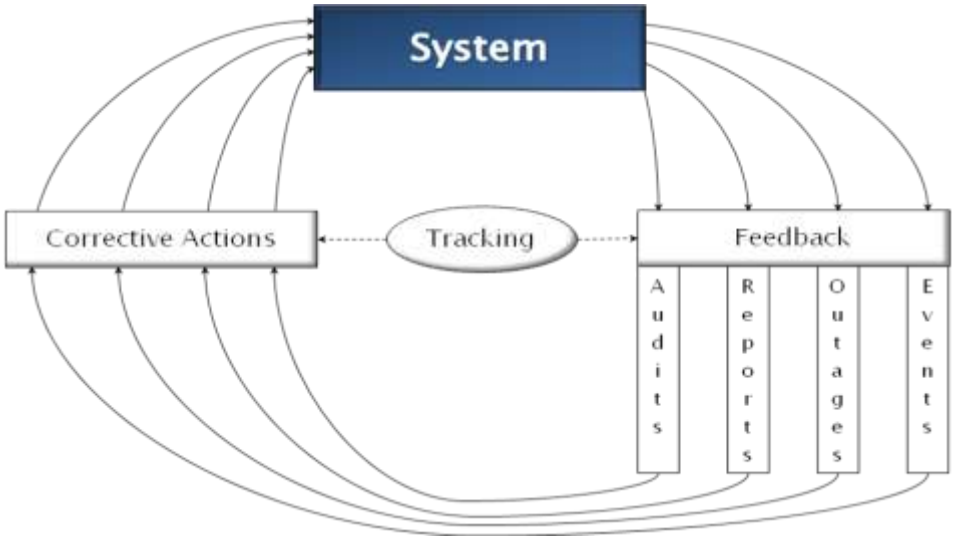

Figure 1: Measuring Conformance

The working group's observations in many cases aligned with the performance deficiencies identified in Cougar's safety management. The working group noted that one of the Operators had identified that Cougar's safety management:

- Is not systematically proactive and comprehensive;
- In many cases is neither explicitly risk-based nor integrated with other operational, technical, or other management systems; and
- Measures and performance are not proactive and comprehensive.

This means that the Operators' feedback to Cougar does not systematically help Cougar improve its management of safety-risks.

After reviewing these observations with the working group, the full OHSI Implementation Team concluded that these systemic weaknesses in the oversight of Cougar's safety management and safety performance impede the effective management of helicopter transport safety-risks in the C-NL Offshore Area.

There was consensus within the Team that it would not be effective to try to resolve these high-level performance deficiencies by individual fixes, applied in a piecemeal or non-integrated manner[13]. Rather, a holistic approach to manage aviation safety risks is required for the C-NL Offshore Area. The approach would purposely and explicitly manage safety-risks to a level as low as reasonably practicable, by measuring the components and totality of system safety performance, and by understanding and applying human and organizational factors in the risk management processes. A flow chart for such an approach that could be employed by a Helicopter Service Provider, the Operators, or the C-NLOPB is depicted in Figure 2:

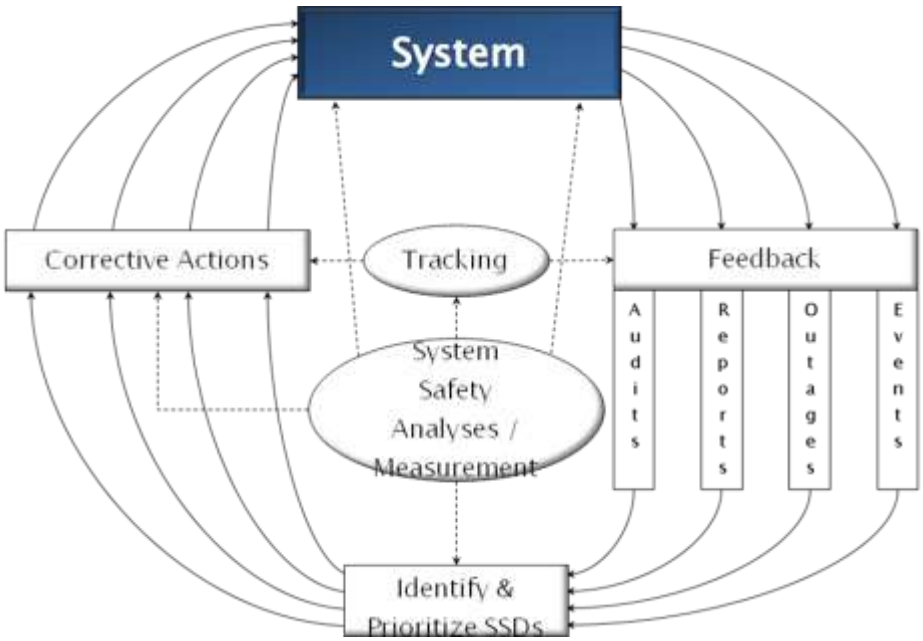

Figure 2: Measuring Safety Performance

Discussion - Recommendation 18

Recommendation 18 calls for the ongoing verification by the Regulator of the risk management practices of the Operators and the Helicopter Service Provider(s). The C-NLOPB OHSI Implementation Team agrees that for risk management practices in the C-NL Offshore Area to be effective, they need to be assessed on an ongoing basis.

The Team feels strongly that each of the three major stakeholder groups – the Helicopter Service Provider(s), the Operators, and the C-NLOPB – has an important and complementary role in ensuring that helicopter safety-risks are managed effectively. The focus should not just be on the Regulator, as indicated in the Recommendation.

In light of the numerous system safety deficiencies in the current risk-management practices relating to helicopter safety, the Team proposes that the C-NL Offshore Industry develop a performance-based,

[13] For instance, a new requirement by the Operators for Cougar to report hazards and not just events would only address one of the symptoms of the overarching system safety deficiency.

multi-tiered program to oversee the management of helicopter safety-risks to a level as low as reasonably practicable. The roles and responsibilities of the participants in the program are described below:

1. The Helicopter Service Provider(s) must manage safety-risks, measure the results, take steps to address system safety deficiencies in their organization(s), and assess the effectiveness of their own risk management practices. This will explicitly demonstrate the capability to proactively manage aviation safety-risks (tactically and strategically). Transport Canada audits the conditions of Cougar's Operating Certificate, contributing to Cougar's success in managing the risks related to its operation.

2. To complement this, the Operators must assess the effectiveness of the Helicopter Service Provider's safety management and communicate the system safety deficiencies it identifies in the aviation company's ongoing risk management. Each Operator needs to seek and address system safety deficiencies in its own safety oversight activities, and periodically evaluate how effectively aviation safety-risk management is integrated with its *other* management systems.

3. The C-NLOPB – the regulator to which the recommendation was addressed – must ensure that the activities undertaken by the Helicopter Service Provider(s), Transport Canada, and the Operators are effectively managing helicopter safety-risks in the C-NL Offshore Area. These activities would likely involve examining indicators of effective safety management, hence proactive safety performance. Additionally, the C-NLOPB needs to periodically assess its own risk management oversight activities, and, where necessary, revise its processes or refocus its priorities.

The Team believes the program requires the following high-level features:

- Clearly articulated roles and responsibilities for Helicopter Service Providers, Operators, and the C-NLOPB (see above);
- Common criteria for managing and monitoring risk that take appropriate account of human and organizational factors in complex systems, that enables the identification of system safety deficiencies, and that contains common definitions and risk-based reporting criteria[14];
- A common set of factors that enables all stakeholder groups to proactively measure safety performance, hence to demonstrate successes in managing aviation safety-risks to a level as low as reasonably practicable.

The Team recognizes the far-reaching consequences of its recommendation. To make this shift, the industry will require:

- A regulatory philosophy that enables — and then sustains — the change in safety-risk management activities throughout the C-NL Offshore Industry;
- People who can practically apply human and organizational factors in a system safety context;
- New techniques and skills to conduct performance-based evaluations;

[14] The Team recognizes that each of the Operators in the C-NL Offshore Area are required to operate integrated management systems that in many cases have been developed by other parts of a globally operating company. Therefore, the framework would need to meet the requirements of the C-NL Offshore Industry while being compatible with these global management systems. This may be no small challenge.

- Modified databases and revised analytical techniques; and
- A safety culture that spans the industry, and that encourages the sharing of safety-related information as stakeholders develop new ways to manage and measure safety performance.

Despite these challenges, the Team notes the unprecedented changes that are already being implemented, many as the result of the Offshore Helicopter Safety Inquiry. The Team believes that Recommendation 18 could serve as the "blueprint and master plan" to integrate many of these initiatives.

Furthermore, these changes coincide with a recent initiative to move from a prescriptive- to a performance-based regulatory program. An effective performance-based program will be better suited for identifying and managing human and organizational factors.

For all these reasons, the Team recommends that a plan for the continuous verification of risk-management practices be developed and implemented by an Executive Stakeholder Group (ESG) chaired by the CEO of the C-NLOPB and comprised of the senior leadership of the three primary Operators and Cougar Helicopters.

The Implementation Team has concluded that the recommendation needs to be implemented carefully and purposefully. The C-NLOPB is in the best position to steward a strategic plan to ensure that the correct activities are coordinated, sequenced, and implemented across the industry. It is envisaged that the mandate of the ESG would expire once the initiative is implemented. Meanwhile, the activities assigned by the ESG would involve each of the Operators, Cougar Helicopters, and the Board itself. To illustrate, some of the activities that would likely be considered are briefly discussed below:

1. Some — perhaps much — of the functionality of the proposed program likely exists in the management systems of Cougar, the Operators, and the C-NLOPB. Organizations that undertake such performance-oriented changes can benefit from a "gap analysis" to determine areas of existing or deficient performance, so that an effective strategy can be developed to integrate new functionality with existing processes.

2. There needs to be an effective communications strategy (which could include an awareness and education program) to motivate and develop the necessary skills for managers and specialist staff from Cougar, the Operators and the C-NLOPB. This could 'dovetail' with work in progress as a result of a number of the OHSI recommendations.

3. There will be a need to acquire and employ performance-based evaluation tools that measure risk management appropriate for the C-NL Offshore Industry. Common tools should be encouraged, as they will employ common definitions to collect common data that will be analyzed, understood, and applied in similar ways throughout the industry. This will immeasurably enhance the measurement of "system performance".

4. The safety culture throughout the industry will need to transition from a personal-based to a systems-based focus – a change that could be enhanced by activities proposed in the Advising Document for Recommendation 19, dealing with safety culture.

5. Similarly, the C-NLOPB could consider themes for future safety conferences (Recommendation 26) such as proactive safety management, system safety, safety performance measurement, and the integration of human and organizational factors with risk management frameworks and activities.

All these activities would yield information that could be published in the reference document for helicopter operations, proposed as part of the implementation strategy for Recommendation 28.

Conclusion - Recommendation 17

Cougar's safety management system was evaluated, and the risk management practices employed by HMDC, Husky Energy, and Suncor Energy were assessed. Therefore, the Team recommends that Recommendation 17 be closed.

Conclusion - Recommendation 18

Commissioner Wells remarked that "the oil and helicopter operators are very aware of the consequences of the failure of safety … ". He went on to comment that "… all four have good risk-management systems …" (Vol. 1, p. 252). The C-NLOPB OHSI Implementation Team verified that there are many strengths in the current risk management systems. Furthermore, the Team identified a strong commitment to provide safe helicopter transport.

Nevertheless, the Commissioner believed it important that those responsible for risk management in the C-NL Offshore Industry challenge themselves "to improve the process by which safety systems are developed and the methods by which they are monitored and audited". The Team concluded that there are a number of important ways that the Commissioner's call for improvement can be met. However, it is important that the changes be coordinated so that they collectively improve aviation safety-risk management – and safety performance – in the C-NL Offshore Industry. In this context, and in light of the overarching system safety deficiency, the Team recommends that the C-NLOPB take a leadership role in requiring the development and coordinated implementation of:

- A multi-tiered risk-management and oversight program that actively involves the Helicopter Service Provider(s), the Operators, and the C-NLOPB. The roles and responsibilities of each will be clearly defined, and include internal and external oversight of risk-management practices as they relate to helicopter transport in the C-NL Offshore Area;
- Common criteria for managing and monitoring risk that take appropriate account of human and organizational factors in complex systems, that enables the identification of system safety deficiencies, and that contains common definitions and risk-based reporting criteria
- A common set of factors that enables all stakeholder groups to proactively measure safety performance. In this way, they will be able to explicitly demonstrate, in tangible terms, the priorities they have set and the achievements they have made in actively managing helicopter safety risks to a level as low as reasonably practicable.

This will be the basis for the ongoing assessment of risk management practices that was proposed by Commissioner Wells in Recommendation 18.