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

**Advising Document**

**OHSI Phase I, Recommendation 19**

**Regarding safety culture**

CANADA-NEWFOUNDLAND
and LABRADOR
OFFSHORE
PETROLEUM
BOARD

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 Recommendation 19 was accepted in principle by the C-NLOPB Board at their meeting on June 24, 2011. At that time, the C-NLOPB took responsibility for developing its strategy to implement the recommendation.

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**

## Recommendation

It is recommended that the Regulator at all times be aware of and evaluate the safety cultures of the oil operators and the helicopter operator(s).

## Method

A working group of the C-NLOPB's OHSI Implementation Team reviewed the recommendation, identified the system safety deficiency, and developed an implementation plan. The working group reviewed the approaches employed by regulators to oversee safety culture in other offshore oil jurisdictions and the nuclear industry. Furthermore, the working group:

- Reviewed the C-NLOPB's experience with monitoring safety culture
- Researched whether other industries and regulators measure safety culture and, if so, the tools they used;
- Researched safety culture definitions; and
- Used third party expertise to assist in understanding measurement methods for safety culture.

## System Safety Deficiency (SSD)

The C-NLOPB has not defined, promoted, evaluated, or set expectations for safety culture for the C-NL Offshore Area.

## Background

In the OHSI Inquiry Report, Recommendation 19 is grouped with Recommendations 17 and 18, due to the fact that all three pertain to the management of risk in the C-NL Offshore Area. The Team's implementation strategy for Recommendation 18 is being prepared, and will recommend to the Board the manners and mechanisms to oversee risk management in general.

This document, for Recommendation 19, focuses specifically on the C-NLOPB's role with respect to safety culture.

**Definition of Safety Culture and its Importance**

James Reason (1997) says of safety culture:

> A safety culture is not something that springs up ready-made from the organizational equivalent of a near-death experience, rather it emerges gradually from the persistent and successful application of practical and down to earth measures … It is made up of a number of interacting elements, or ways of doing, thinking and managing that have enhanced safety, health as their natural byproduct (p. 192).

# Advice to the C-NLOPB: Recommendation 19

The term "safety culture" was introduced during the investigation of the Chernobyl accident in 1986 and, since then, many definitions have been created. One widely accepted definition of safety culture is used by the UK Advisory Committee on the Safety of Nuclear Installations (ACSNI):

> The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures. (ACSNI, 1993, p. 23)

Current research shows that there is a strong consensus throughout industry and academia that fostering a strong safety culture is important to reducing the risk of major accidents and to improving overall safety performance. Reports on offshore accidents (e.g., the Ocean Ranger, Piper Alpha, and Deepwater Horizon disasters) and accidents in other industries (e.g., the space shuttle Challenger explosion, BP Texas City Refinery explosion, British Royal Air Force Nimrod MR2 crash) all make reference to weak safety culture as a causal factor[1]. A weak safety culture can lead to failures in the barriers and defences that are put in place to manage safety-risks: if a strong safety culture is not present (proper behaviours, attitudes, values, etc.) within an organization, then procedures may be ignored, operating limits exceeded and safety systems bypassed, which will likely lead to declining safety performance and serious safety problems.

**Nuclear Industry**

Since research on safety culture first started following the Chernobyl incident, there has been significant progress in defining safety culture, understanding ways to establish strong safety cultures, and monitoring and measuring safety culture. It has become clear that a regulatory body can be a positive influence by promoting and evaluating safety culture.

From reviewing developments in safety culture since the late 90s, the Team learned a great deal about the evolution of safety culture thinking.

In 1998, the Organization for Economic Co-operation and Development's Nuclear Energy Agency (NEA) studied how a regulatory organization should address safety performance problems that arise from a weak safety culture. The task group outlined some important considerations with respect to the role of the regulator (OECD, 2009, pp. 17-21):

- In promoting safety culture, a regulatory body should set a good example by its own performance.

- The operator's priorities are influenced by those matters regarded as important by the regulatory body. Thus, safety culture can be promoted by being placed high on the regulator's agenda.

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[1] Although the term "safety culture" was not yet widely used at the time of some of these incidents, investigation reports refer to organizational issues analogous with what is now called a weak safety culture.

- It is not feasible for a regulator to quantitatively measure safety culture. The regulator can evaluate the outputs of a safety culture. Weak safety culture conditions, in addition to signs of declining safety performance, indicate that further regulatory attention is needed.

- The regulator has to find the proper balance between intervening too early or too late when signs of either a weak safety culture or actual declining performance are observed.

In 2003, informed representatives of the nuclear industry met at an International Atomic Energy Agency (IAEA) Technical Meeting to discuss "The Role of Governments and Regulators in Fostering a Strong Nuclear Safety Culture". They identified the need for guidance to regulators on how to monitor a licensee's safety culture and identified the need to develop criteria and indicators for safety culture evaluation.

In 2007, a NEA/IAEA workshop was held to discuss regulatory oversight of safety culture. The workshop included participation from 50 representatives of nuclear regulatory bodies from 20 countries. The following high-level recommendations (NEA/CSNI, 2008, pp. 7-8) arose from the discussions and are issues that nuclear regulators should consider when developing their strategic positions on safety culture:

1. Consider establishing a clearly defined position concerning the approach to maintaining oversight of licensee safety culture. This position needs to be communicated to stakeholders, including licensees, other regulators and the public.

2. Note that different types of safety culture information may be gathered at different times depending on the regulator's established approach. The data may be gathered in a number of different ways, using a range of different methods. The strengths and weaknesses of these approaches should be considered when choosing a suitable data gathering method.

3. Note the strong consensus of the workshop that site/resident inspectors have a key role in gathering safety culture information, and consider how best to integrate the capture of safety culture data into the Inspectors' routine activities.

4. Consider putting in place the processes and resources needed to implement oversight of licensee safety culture. These processes need to be supported by training and competence development of regulatory staff and others working on their behalf.

5. Acknowledge the powerful influence of licensee Directors and senior managers on the safety culture of their organization. Regulatory interactions should seek to understand and influence these individuals in order to bring maximum leverage to bear.

The Team also reviewed the approaches that two nuclear regulators have applied: the UK Office for Nuclear Regulation (ONR) and the Canadian Nuclear Safety Commission (CNSC).

The ONR (formerly the UK Health and Safety Executive's [HSE] Nuclear Installation Inspectorate) is developing two broad approaches to oversee safety culture. One approach is a targeted inspection, whereby Safety Inspectors and Human and Organizational Factors Specialists use structured interviews, plant tours, and examination of documents/processes to provide insight into safety culture in specific areas, rather than gathering quantitative data covering all aspects of safety culture at an organization.

The ONR also uses interaction with the licensee to influence behaviours and actions. They probe senior management commitment to and understanding of safety culture, with a focus on supporting and encouraging continued licensee safety culture improvement. The ONR uses safety culture data to work together with the licensee, focusing on senior management, with the aim of raising awareness and influencing those who shape licensee safety culture. (HSE, 2007)

In Canada, the CNSC regulates the use of nuclear energy and materials to protect the health, safety and security of Canadians and the environment. The CNSC has been actively supporting the development of a scientific method to measure safety culture since the 1990s. The CNSC takes on three roles in regards to the safety culture of its licensees: promoting safety culture, monitoring the state of safety culture, and intervening when safety performance appears to have declined. The CNSC ensures that licensees have the appropriate processes in place to manage safety and safety culture, and the tools to self-assess it. The CNSC expects licensees to "foster" (i.e., create, monitor, and improve) the safety culture of their organizations. (CNSC, answers to Team's questions, April 2011)

**Offshore Oil and Gas Industry**

Some research related to safety culture has been conducted in collaboration with the C-NL Offshore Industry. In 2007, Petroleum Research Atlantic Canada (PR-AC) funded a research project to develop a set of objective safety culture indicators to enable Atlantic Canadian oil and gas operators to assess safety culture without conducting an employee perception survey. The project was carried out by Dr. Mark Fleming of Saint Mary's University. The project produced a validated safety culture improvement tool based on objective indicators that could be used by Operators to assess the systems they had in place to promote a positive safety culture.

In 2008, the Operations and Safety Department within the C-NLOPB carried out work to determine if the audit tool presented in the PR-AC research paper by Dr. Mark Fleming could be integrated into routine audit activities. The intent was to use the safety culture audit tool to gather safety culture information that would provide insight and give context to any non-conformance issues identified by Safety Officers during regulatory audits. It was determined that the audit tool required a fairly substantial level of effort and understanding to be used effectively  and that more work was required to prepare Safety Officers to use the tool.

The HSE in the UK, the Petroleum Safety Authority (PSA) in Norway, and, more recently, the National Offshore Petroleum Safety Authority (NOPSA) in Australia, have established a framework for overseeing safety culture.

Since 2002, PSA regulation and guidance has required that Operators encourage a sound safety culture during all phases and activities of their work. The wording of the regulation and guidance was changed in 2011 in response to critiques from trade unions, researchers, and some of the PSA's own regulatory experts.

It appears that the new regulation and guidance better reflects that a strong safety culture is a shared responsibility between all levels of employees, including senior management. It also makes a stronger link between safety culture and risk reduction, emphasizing the importance of safety culture for improving both occupational health and safety and preventing major accidents. The 2011 revised regulation states:

A sound health, safety and environment culture that includes all phases and activity areas shall be encouraged through continuous work to reduce risk and improve health, safety and the environment (PSA Framework Regulations, Section 15).

There has been considerable work done in the UK by the 'Step Change in Safety' initiative on the topic of safety culture, although there is no specific reference to safety culture in regulation. The Step Change program has made a strong link between worker involvement and safety culture. They have also asserted that having a good safety culture not only prevents minor occupational injuries, but is essential in preventing catastrophic incidents.

In Australia, there is no specific reference to safety culture in regulation. However, the regulatory agency is drafting legislation related to safety culture. NOPSA has placed considerable emphasis on evaluating safety culture in the past two years (for example, in 2009-10 they conducted a pilot survey to assess the safety culture of nine offshore facilities).

## Discussion

The Team spent a considerable amount of time discussing safety culture: what it is and what it is not; the status of safety culture in the C-NL Offshore Area; indicators of a good or positive safety culture; and responsibilities and accountabilities of workers, supervisors, management, etc. The Team determined that there is a great deal of information regarding safety culture, and they focused on the intent of the recommendation: the regulatory approach to oversee safety culture.

The Team discussed the potential role of the C-NLOPB in safety culture, which included but was not limited to:

1. Defining safety culture;
2. Selecting a safety culture model;
3. Evaluating safety culture; and
4. Setting expectations for safety culture.

**Definition of Safety Culture in the C-NL Offshore Area**

As discussed in the previous section, there are numerous safety culture definitions used by different industries and organizations. The Team determined that the first step in establishing regulatory oversight must be to define safety culture for the industry. The Team agreed that a definition of safety culture should be easily understood by all stakeholders.

"Safety culture" has mistakenly, to some, become synonymous with behaviour-based safety and focused on occupational health and safety. This narrow focus could result in inadequate focus on the types of organizational factors that lead to major disasters such as Deepwater Horizon[2]. As such, the definition should encourage thinking and action in the appropriate area: preventing major accident hazards.

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[2] The nuclear industry faced a similar problem, leading many jurisdictions to emphasise "nuclear safety culture" instead of "safety culture", in an effort to focus people on the major hazards associated with nuclear power generation.

The Team reviewed many safety culture definitions. The Team favoured definitions that are short, easy to understand, and concise. Of the definitions reviewed, the Team prefers (as cited in Wiegmann, Zhang, von Thaden, Sharma, and Mitchell, 2002):

> Safety culture is defined as the attitudes, values, norms and beliefs which a particular group of people share with respect to risk and safety (Mearns, Flin, Gordon, and Fleming, 1998).

The Team determined that it is essential that the definition reflect the shared responsibility of every employee in the organization: from high-level manager to the offshore worker. A simple, succinct definition such as the above should be the basis for developing a safety culture definition to meet the needs of the C-NL Offshore Area.

**Selection of a Safety Culture Model for the C-NL Offshore Area**

The Team determined that once safety culture is defined, stakeholders should have an understanding of what a strong safety culture looks like, in a practical sense. Dr. Mark Fleming suggested that the Team review safety culture models. One such model is the IAEA model of safety culture (Figure 1), which is based on characteristics and attributes that make up a strong safety culture (adapted from IAEA, 2006, pp. 9-11).

**Figure 1.** IAEA Safety Culture Characteristics



The model suggests that a strong safety culture depends on five key characteristics. Each of these characteristics can be further broken down into 37 attributes (Appendix A). Establishing a framework such as the IAEA model would enable the C-NLOPB to map out what it views as the important characteristics and attributes of a strong safety culture, and could form the basis for the promotion and evaluation of safety culture. In turn, the Operators would become aware of the C-NLOPB's expectations,

in terms of safety culture, and would be able to work towards demonstrating and improving their performance against each characteristic.


**Evaluating Safety Culture in the C-NL Offshore Area**

The focus of the Commissioner's recommendation is the Regulator's evaluation of the safety cultures of the Operators and the helicopter service provider(s). The Team determined that the C-NLOPB should develop processes to evaluate safety culture.

As noted above, a safety culture model can be used to form the basis of the C-NLOPB's evaluation process. The model works on the premise that the regulator develops objective performance indicators to evaluate whether the characteristics and attributes of a strong safety culture are present. During the evaluation process, data on the performance indicators would be collected by the regulator. The IAEA gives some examples of performance indicators (not tied directly to any one characteristic or attribute) (adapted from IAEA, 2002):

- Quality of procedural documents and document control processes;
- Quality of incident investigation and corrective action plans;
- Corrective actions backlog;
- Number of repeat events;
- Timeliness with which employee concerns are addressed;
- Quality of reporting (hazards, near misses, and incidents); and
- Housekeeping standards.

The question of how a regulator collects safety culture data is complex. It is essential that the information that the regulator obtains is sufficiently in-depth that managers at the C-NLOPB know when action needs to be taken. This need must be balanced with the fact that gathering in-depth information on safety culture is time-intensive, expensive, and intrusive. Additionally, the regulator must always be cognizant of the perception of responsibility for safety culture, and must never be seen to be taking on the responsibility for safety culture – a responsibility that rests squarely with the regulated organization.

The Team believes that the C-NLOPB could address these concerns by mandating that the Operators conduct safety culture self-assessments on a regular basis, and by setting the expectation that the Operators would share the results of their self-assessments with the C-NLOPB. To support the Operators in this work, the C-NLOPB could consider developing a safety culture evaluation tool that could be used by the Operators.

The Team also believes that the C-NLOPB could supplement this information on an ongoing basis when conducting inspections and evaluations, or participating in meetings. In the nuclear industry, there is strong consensus that safety inspectors have a key role in gathering safety culture information, and that regulators should consider how best to integrate the collection of safety culture data into the inspectors' routine activities (NEA/CSNI, 2008, p.7). To achieve this, the C-NLOPB's inspectors (e.g., Safety Officers, Environmental Compliance Officers) would require training in safety culture and safety culture measurement.

A third source of safety culture information is meetings that take place between the Operators' senior management and the C-NLOPB. By training C-NLOPB senior managers in safety culture, the Board would

be able to gather information from the higher levels of each Operator's management: a group that is a crucial component to any strong safety culture.

The Team also considered it necessary that a safety culture evaluation method be developed that could be used throughout the life cycle of a regulatory authorization. Depending on the phase of the authorization, different levels/methods of evaluation could be conducted. For example, evaluation could be conducted during the approval phase, during the operations phase, and at the renewal phase of an authorization.

**Setting the C-NLOPB's Expectations**

Finally, the Team agreed that the C-NLOPB should outline its expectations regarding safety culture. The Team believes that it is reasonable for the C-NLOPB to expect companies operating in the C-NL Offshore Area to promote, measure, and continually improve safety culture within their organizations. The Team identified other possible expectations by the C-NLOPB of the Operators, some of which included:

- Demonstrate activities to promote, measure and continually improve safety culture;
- Conduct self-assessments of safety culture and identify areas for improvement;
- Implement safety culture improvement programs; and
- Provide the Regulator with reports of self-assessment and progress related to improvements in safety culture.

The Team discussed ways by which the C-NLOPB should achieve these expectations. The C-NLOPB could create a new regulation to reflect its expectations, or use an alternate regulatory tool such as a standard, code of practice, or guideline. Regardless of the means chosen, the Team believes that the C-NLOPB should develop a guidance document for the industry to clearly outline its expectations and approach to safety culture oversight. The guidance document would benefit all stakeholders and serve as a mechanism to promote understanding and growth of a positive safety culture. The Team discussed the potential topics in the guidance document, including:

- A definition of safety culture for the C-NL Offshore area;
- An explanation of the importance of safety culture;
- A clear definition of the different roles of the C-NLOPB and the Operators;
- An explanation of the C-NLOPB's approach to overseeing safety culture;
- The Board's expectations for safety culture;
- A description of the C-NLOPB's model for safety culture;
- The C-NLOPB's evaluation methodology; and
- Encouragement to continually improve safety culture.

# Conclusion

The C-NLOPB OHSI Implementation Team concluded that Recommendation 19 is sound and appropriate: the C-NLOPB should develop a role to oversee safety culture in the C-NL Offshore Area.

# Advice to the C-NLOPB: Recommendation 19

The C-NLOPB role must be clearly defined and communicated to stakeholders, including licensees, other regulators, and the public. Additionally, the Team concluded that the C-NLOPB needs to:

- Clearly communicate a common definition of safety culture that focuses on the organizational factors that can lead to major losses and the shared nature of culture; not focusing on personal safety or individual behaviour;

- Adopt a model of safety culture that is performance-based, and is based on attributes and characteristics of a positive safety culture, and which would form the basis for promoting and evaluating safety culture in the C-NL Offshore Area;

- Develop performance indicators for which data could be supplied by the Operator as the result of self-assessment processes, and collected by the Regulator during audits, evaluations and meetings;

- Develop and promote the use of a safety culture evaluation tool that is consistent with the C-NLOPB safety culture model, and that can be applied throughout the life cycle of a regulatory authorization;

- Determine the most appropriate method to enshrine the role of the C-NLOPB and the roles of individual Operators in improving and sustaining a positive safety culture; and

- Develop guidance material for use by the industry and by the Board.

# APPENDIX A

## IAEA Safety Culture Characteristics and Attributes (IAEA, 2006 pp. 9-11)

**Safety is a clearly recognized value:**
• The high priority given to safety is shown in documentation, communications and decision making.
• Safety is a primary consideration in the allocation of resources.
• The strategic business importance of safety is reflected in the business plan.
• Individuals are convinced that safety and production go hand in hand.
• A proactive and long term approach to safety issues is shown in decision making.
• Safety conscious behaviour is socially accepted and supported (both formally and informally).

**Leadership for safety is clear:**
• Senior management is clearly committed to safety.
• Commitment to safety is evident at all levels of management.
• There is visible leadership showing the involvement of management in safety related activities.
• Leadership skills are systematically developed.
• Management ensures that there are sufficient competent individuals.
• Management seeks the active involvement of individuals in improving safety.
• Safety implications are considered in change management processes.
• Management shows a continual effort to strive for openness and good communication throughout the organization.
• Management has the ability to resolve conflicts as necessary.
• Relationships between managers and individuals are built on trust.

**Accountability for safety is clear:**
• An appropriate relationship with the regulatory body exists that ensures that the accountability for safety remains with the licensee.
• Roles and responsibilities are clearly defined and understood.
• There is a high level of compliance with regulations and procedures.
• Management delegates responsibility with appropriate authority to enable clear accountabilities to be established.
• 'Ownership' for safety is evident at all organizational levels and for all individuals.

**Safety is integrated into all activities:**
• Trust permeates the organization.
• Consideration of all types of safety, including industrial safety and environmental safety, and of security is evident.
• The quality of documentation and procedures is good.
• The quality of processes, from planning to implementation and review, is good.
• Individuals have the necessary knowledge and understanding of the work processes.
• Factors affecting work motivation and job satisfaction are considered.
• Good working conditions exist with regard to time pressures, workload and stress.
• There is cross-functional and interdisciplinary cooperation and teamwork.
• Housekeeping and material conditions reflect commitment to excellence.

**Safety is learning driven:**
• A questioning attitude prevails at all organizational levels.

• Open reporting of deviations and errors is encouraged.

• Internal and external assessments, including self-assessments, are used.

• Organizational experience and operating experience (both internal and external to the facility) are used.

• Learning is facilitated through the ability to recognize and diagnose deviations, to formulate and implement solutions and to monitor the effects of corrective actions.

• Safety performance indicators are tracked, trended, evaluated and acted upon.

• There is systematic development of individual competences.

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