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**CMD : 23-M32**

**Date signed/Signé le : OCTOBER 10-2023**

Accept Regulatory Document

Approuver le document d'application  
de la réglementation

**REGDOC-2.2.1, Human  
Performance, Version 2**

**REGDOC-2.2.1,  
Performance humaine,  
version 2**

Public Meeting

Réunion publique

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November 2, 2023

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Submitted by:  
Canadian Nuclear Safety Commission  
(CNSC) Staff

Soumis par :  
Le personnel de la Commission  
canadienne de sûreté nucléaire  
(CCSN)

**Summary**

This Commission Member Document (CMD) pertains to a request for a decision regarding:

- draft regulatory document REGDOC-2.2.1, *Human Performance*, Version 2

The following action is requested of the Commission:

- accept draft REGDOC-2.2.1, *Human Performance*, Version 2

The following items are attached:

- draft REGDOC-2.2.1, *Human Performance*, Version 2
- comments dispositioning table

**Résumé**

Ce document à l'intention des commissaires (CMD) concerne une demande de décision au sujet de :

- l'ébauche du document d'application de la réglementation REGDOC-2.2.1, Performance humaine, version 2

La Commission pourrait considérer prendre la mesure suivante :

- approuver l'ébauche du REGDOC-2.2.1, Performance humaine, version 2

Les pièces suivantes sont jointes :

- l'ébauche du REGDOC-2.2.1, Human Performance, Version 2
- le tableau des réponses aux commentaires reçus

**Signed/signé le**

Octobre 10, 2023/10 octobre 2023

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Dana Beaton

**Director General**

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## EXECUTIVE SUMMARY

REGDOC-2.2.1, *Human Performance*, Version 2, clarifies requirements and provides guidance on how applicants and licensees of Class I nuclear facilities and uranium mines and mills can understand and manage the factors related to the humans, technology and organization (HTO) associated with their human performance program.

The CNSC conducted its public consultation and feedback period from August to December 2022. The CNSC received written comments from stakeholders and held several meetings with the stakeholders during the development of REGDOC-2.2.1 to ensure feedback was understood and being duly considered in the revision process.

The introduction of these requirements is not expected to have any significant financial or administrative impact on the nuclear industry.

# 1 OVERVIEW

## 1.1 Background

The CNSC's current regulatory guidance on human performance management has been in place for approximately 20 years. This solid foundation has served the CNSC and licensees well, although CNSC staff have noted variations in the emphasis, approach, scope and content of licensees' human performance programs. As this domain has developed and matured, international bodies such as the International Atomic Energy Agency (IAEA) and Nuclear Energy Agency, as well as some regulators, including those in Finland, Sweden, Switzerland, France and the United Kingdom, have updated their guidance related to human performance management.

In 2017, the CNSC updated its *Class I Nuclear Facilities Regulations*, which included new provisions for a human performance program. However, the CNSC has not issued any formal guidance on the application of these provisions.

## 1.2 Highlights

REGDOC-2.2.1, *Human Performance*, Version 2, clarifies requirements and provides guidance associated with the human performance program. This includes understanding and managing the factors associated with humans, technology and organization (HTO) to achieve safe and effective human performance.

REGDOC-2.2.1, Version 2, identifies four requirements:

1. **Document:** document the strategy and practices for managing the human performance program
2. **Implement:** implement a systemic approach to managing the human performance program
3. **Lead:** identify a senior manager who is responsible for the human performance program
4. **Learn:** continuously improve based on the systemic analysis and understanding of human performance

These requirements were developed by CNSC staff as a result of literature reviews, benchmarking and regulatory oversight activities. The requirements were developed to enable shared understanding between the CNSC and licensees of the processes and approaches for managing human performance, as a basis for ongoing discussions concerning human performance in their businesses.

The REGDOC is intended to apply to applicants and licensees of Class I nuclear facilities and of uranium mines and mills and to serve as guidance for all other applicants and licensees.

The impact on applicants or licensees will depend on their facility type:

- For Class I facilities, this document provides clarification on the existing requirements for a human performance program outlined in *Class I Nuclear*

*Facilities Regulations*, so existing approaches and documents can be used to meet the requirements.

- For uranium mines and mills, which primarily consider training programs under human performance management, the CNSC will ensure that the implementation of any new requirements is communicated clearly and rolled out gradually.

CNSC staff met with stakeholders throughout analysis and development to ensure that the intent of the requirements and guidance in the REGDOC was clear. Where concerns were expressed, CNSC staff revised the text or provided a rationale for leaving the text unchanged.

## 2 CONSULTATION

The CNSC posted the REGDOC for public consultation from August 23 to November 21, 2022, for 91 days. This was followed by the feedback period, from November 22 to December 7, 2022, for 14 days.

The CNSC received 36 written comments during the public consultation from 7 representatives of the nuclear industry, including the Canadian Nuclear Association, Canadian Nuclear Laboratories, Ontario Power Generation, Bruce Power, New Brunswick Power, Cameco Corporation and Prodigy Clean Energy. No further comments were received during the feedback period.

During development, CNSC staff met with specialists from the CANDU Owner's Group (COG) Safety Culture and Human and Organizational Factors Peer Group on August 30, 2022 and March 17, 2023 to discuss the draft document. CNSC staff also met with COG regulatory affairs representatives on April 14, 2023 for a similar discussion.

The following topics were raised during public consultation and discussed during meetings and resulted in some minor changes to the draft document:

### **Theme 1: Human performance program**

Commenters expressed concerns about the perceived need to have a discrete entity called the "Human Performance Program", which could lead to misinterpretations about the form or contents of the program.

#### **CNSC staff response:**

- In revisions to the content, CNSC staff clarified that the human performance program is a group of management system elements, such as policies, processes and procedures, which are related to human performance and are implemented and managed in a coordinated way. The REGDOC further clarifies that the program may be documented through a roadmap, in an overview or a stand-alone document.

### **Theme 2: Just culture**

Commenters expressed the view that the term “just culture” would be better suited to REGDOC 2.1.2, *Safety Culture*.

**CNSC staff response:**

- CNSC staff removed the term from the draft and will consider including it elsewhere in the regulatory framework.

**Theme 3: Graded, risk-based approach**

Commenters expressed concerns about a “one-size-fits-all” model to manage human performance.

**CNSC staff response:**

- CNSC staff clarified, through content revisions and discussions, that a graded, risk-based approach can be applied. Staff highlighted the flexibility afforded through the roadmap approach of documenting the human performance program.

**Theme 4: systemic approach**

Commenters requested more information about the concept of HTO and the systemic analysis of human performance.

**CNSC staff response:**

- CNSC staff added more contextual information and references to the document to explain how licensees could apply the systemic approach to human performance management. Note that while the HTO framework is used by the IAEA and various nations, REGDOC-2.2.1 allows for other frameworks to be used for a systemic approach.

**Theme 5: Role of implementation**

Commenters sought more information throughout the consultation period about how the CNSC would implement the requirements of the REGDOC.

**CNSC staff response:**

- CNSC staff used workshops as an opportunity to share information about the proposed implementation approach and to gather feedback from industry. More details are included in the following section.

### **3 IMPLEMENTATION**

If published, REGDOC-2.2.1, Version 2, will supersede REGDOC-2.2.1, *Human Factors*, which was a rebranded policy document originally published in 2000. The original document clarified that the CNSC considers factors that influence human performance in its regulatory activities but did not outline any specific requirements for applicants or licensees.



CNSC staff held internal meetings and met with industry representatives to discuss the proposed implementation approach. The key features of implementation are as follows:

- Promote awareness among CNSC inspectors and licensees:
  - cover key concepts associated with HTO factors, particularly on various approaches licensees can take to achieve a systemic understanding of human performance.
  - provide information on ways licensees can meet the requirements in REGDOC-2.2.1
  - supports will be available on demand to new staff who need access to this information, post-implementation.
- Periodic meetings with licensee groups and individual licensees, with a focus on implementation during initial meetings.
- Should the Commission accept publication of REGDOC-2.2.1 Version 2, CNSC staff will request the appropriate licensees submit an implementation plan.

## **4 OVERALL CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Overall Conclusions**

Draft REGDOC-2.2.1, *Human Performance*, Version 2 was developed through consultation with stakeholders, who have expressed their support for the document, and is essential to communicating and formalizing the CNSC's requirements and guidance related to human performance management.

CNSC staff conclude that REGDOC-2.2.1, *Human Performance*, Version 2 is ready for acceptance by the Commission for publication.

### **4.2 Overall Recommendations**

CNSC staff recommend that the Commission accepts REGDOC-2.2.1, *Human Performance*, Version 2.

**APPENDIX A: REGDOC-2.2.1, *HUMAN PERFORMANCE*,  
VERSION 2**



# Human performance management

# **Human Performance**

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REGDOC-2.2.1, Version 2

Month 2023



## **Human Performance**

Regulatory document REGDOC-2.2.1, Version 2

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### **Document availability**

This document can be viewed on the [CNSC website](#). To request a copy of the document in English or French, please contact:

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Twitter: [@CNSC\\_CCSN](https://twitter.com/CNSC_CCSN)

LinkedIn: [linkedin.com/company/cnscccsn](https://linkedin.com/company/cnscccsn)

### **Publishing history**

October 2000, *P-119, Policy on Human Factors*

March 2019, REGDOC-2.2.1, *Human Factors*

## Preface

This regulatory document is part of the CNSC’s Human Performance Management series, which also covers personnel training, personnel certification, fitness for duty and minimum staff complement. The full list of regulatory document series is included at the end of this document and can also be found on the [CNSC’s website](#).

Regulatory document REGDOC-2.2.1, *Human Performance*, clarifies requirements and provides guidance for understanding and managing considerations related to the humans, technology and organization (HTO) within a business, with the aim of achieving safe and effective human performance.

This document is the second version and supersedes REGDOC-2.2.1, *Human Factors*, published in March 2019.

A graded approach, commensurate with risk, may be defined and used when applying the requirements and guidance contained in this regulatory document. The use of a graded approach is not a relaxation of requirements. With a graded approach, requirements are applied in proportion to risks and particular characteristics of the facility or licensed activity.

For information on the implementation of regulatory documents and on the graded approach, see REGDOC-3.5.3, *Regulatory Fundamentals* [1].

The words “shall” and “must” are used to express requirements to be satisfied by the licensee or licence applicant. “Should” is used to express guidance or that which is advised. “May” is used to express an option or that which is permissible within the limits of this regulatory document. “Can” is used to express possibility or capability.

Nothing contained in this document is to be construed as relieving any licensee from any other pertinent requirements. It is the licensee’s responsibility to identify and comply with all applicable regulations and licence conditions.

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# Human Performance

## 1. Introduction

### 1.1 Purpose

This regulatory document (REGDOC) is part of the CNSC's Human Performance Management series. It clarifies requirements and provides guidance and context on how to meet the requirements associated with a licensee's human performance program.

### 1.2 Scope

This REGDOC contains requirements and guidance for all applicants and licensees of Class I nuclear facilities and uranium mines and mills. For all other applicants and licensees, this document serves as guidance.

Note: Licensee is used after this to refer to both applicants and licensees.

### 1.3 Relevant legislation

The requirements and guidance outlined in this regulatory document are associated with the [\*Nuclear Safety and Control Act\*](#) and its regulations, including the [\*General Nuclear Safety and Control Regulations\*](#), [\*Class I Nuclear Facilities Regulations\*](#) and [\*Uranium Mines and Mills Regulations\*](#).

### 1.4 National and international standards

The International Atomic Energy Agency (IAEA) has identified the need for regulators and licensees to address considerations related to the humans, technology and organization (HTO) in a systemic way. This regulatory document has incorporated requirements and concepts from the following IAEA standards and guidance:

- IAEA Safety Standards Series No. SF-1, *Fundamental Safety Principles* [2]
- IAEA Safety Standards Series No. GSR Part 2, *Leadership and Management for Safety* [3]
- IAEA Safety Standards Series No. GSR Part 3, *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* [4]
- IAEA Safety Standards Series No. GS-G-3.5, *The Management System for Nuclear Installations* [5]
- IAEA TECDOC No.1846, *Regulatory Oversight of Human and Organizational Factors for Safety of Nuclear Installations* [6]

Other important standards that are relevant to this regulatory document include:

- CSA Group, N286, *Management system requirements for nuclear facilities* [7]
- ISO International Standard 27500:16 *The human-centred organization – Rationale and general principles* [8]
- ISO International Standard 27501:2019 *The human-centred organization – Guidance for managers* [9]

## 2. Context

### 2.1 Human performance program

Human performance relates to the work activities carried out by people and teams, as well as their results [6, 21]. These work activities represent the work as it is actually performed, unlike tasks, which are generic descriptions of the work [11, 21]. Improvements can be made by examining the details of the work activities themselves—that is, the practical application of a given task in the real world [10, 19].

Human performance programs are broad in scope and are meant to foster a human-centric view of work activities, which in turn allows the business to form a better understanding of the work and its context and enable learning and continual improvement [8, 9, 20]. A well-designed human performance program strengthens the business' ability to achieve and sustain desired outcomes by considering the integration of work activities and how people are supported to carry out their work.

Within a business, a human performance program provides an overarching view of the factors that influence human performance, including how they are co-ordinated across the business to support workers and teams in carrying out their work safely and successfully [4]. This includes defining and implementing practices that contribute to excellence in worker performance [7].

By using the safety and control area framework, CNSC staff already consider various discrete factors individually, such as training, human factors in design and fitness for duty. The human performance program does not replace this consideration, but rather complements it by looking at the connections and relationships between the factors that influence work activities.

### 2.2 Understanding the influences on human performance

To form a complete picture of human performance, licensees need to take a broad view, known as the systemic<sup>1</sup> approach. The systemic approach helps to establish and make explicit the interactions between the humans, technology and organization (HTO) of the business, and is key to understanding, supporting and improving human performance [2, 20, 21]. The HTO concept was established in the nuclear power industry to emphasize the relationships and interdependencies between three elements:

- the human (H) sub-system includes a combination of physical, physiological, cognitive and social aspects related to people carrying out work activities
- the technology (T) sub-system relates to the technology itself and how technology systems transform inputs to outputs
- the organization (O) sub-system relates to the formal organizing arrangements and processes of the business, which are continually coordinated to achieve the business' goals, as well as the informal and social aspects of the work activities

The systemic approach provides a framework for understanding the different perspectives and influences on work activities, which can be explored to increasing degrees of complexity. The

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<sup>1</sup> Systemic refers to something that is system-wide, affecting or relating to a group or system as a whole, instead of its individual members or parts (not to be confused with systematic, which means methodical).



sub-systems can be used to describe, analyze and understand work as a dynamic system by looking at what they do and how they interact, to reveal useful information about human performance within the context of the work as it is performed.

Looking at the business at different levels can be useful in building a picture of the systems of work, for example [19, 21]:

- At an **individual level**, how a worker, in a given environment, with specific equipment, training, procedures, protective equipment, etc., carries out work activities safely and to the desired standards of performance. This level considers the activity.
- At the **group level**, how teams/departments plan, organize, supervise and resource the work, how they interpret policies and priorities, and how they interface and communicate within their group and with other groups in the business. This level considers the process.
- At the **business level**, how the priorities and policies promoted by management guide and influence organizational culture within groups and among individuals. This level considers the strategy.

By understanding the HTO interactions across these levels, licensees are better positioned to move towards an approach to safety where people within a business are supported and empowered to make things go right, rather than simply preventing them from going wrong [11].

Continually learning about the factors that influence human performance is one of the fundamental purposes of a human performance program. By collecting information about people's work activities, and their ability to achieve desired outcomes, as well as the licensee's performance as a whole, the human performance program can provide a comprehensive, integrated view of how the licensee is achieving or failing to meet its goals related to safety and performance. This approach acknowledges that people are fundamental to safety because their inherent adaptability and flexibility creates resilience, in particular where aspects of the organization and technology are rigid [12, 21]. A key part of a human performance program is recognizing where this human adaptability and flexibility can be leveraged to strengthen safety [10].

### 2.3 Managing human performance to strengthen safety

Analysis of events sometimes stops at the performer—that is, at the individual or team who are seen to be responsible for errors. This stopping point does not allow for effective organizational learning since errors, once analyzed using the systemic approach, are almost always found to be a symptom of deeper issues [12, 19]. The factors that contribute to errors are usually found in multiple places, at multiple levels and across various areas of the business, from design, planning or maintenance to management's supervision or decision-making [13].

Licensees can enhance robustness by developing a strong foundation across the HTO system to prevent errors from propagating into problems, at all levels of the business. It starts with understanding error as a human characteristic within a situational context and considering "What happened and why?" rather than "Who caused the problem?" [14, 20].

In a work environment characterized by openness, trust and fairness, where provisions have been made to support the work effectively, people can provide a constant detection and correction function, which is a form of resilience [12]. Another way to introduce resilience within the system is to learn from successful daily work activities, which leaves the business better prepared to deal with the unexpected [16].

## 2.4 Organizational learning

Safe and successful work can be supported by making it easy for people to do the right thing and difficult for them to do the wrong thing [19]. Actively understanding, learning and putting measures in place to enable work to go well enhances safety. This includes having processes and methods to learn from both success and failure in the business, to understand the work as it is actually done and the system within which the work happens. Supporting the day-to-day work by seeking out and addressing known factors that can disrupt the work and increase workload provides workers with the increased capacity to identify and respond to any abnormal conditions, unusual factors or disruptions. The people who perform the work are often in the best position to offer suggestions for improving safety and performance, as well as to provide insight into how the work is carried out [13, 19].

Building capacity for safety throughout the business needs to be driven by management as a strategic and intentional priority that is active and visible [10]. Management directly supports human performance by providing workers with all that they need to carry out their work activities— such as resources, training and equipment. Management should promote the importance of organizational learning as an ever-present part of the business, as opposed to being a one-off initiative or response to an event.

A good practice is to review a given situation with honest enquiry, accept the reality of what is found and in turn to use the understanding gained to learn and improve. A strong foundation for continual learning is created when management fosters an environment where workers are encouraged to report concerns or suggestions for improvement and feel acknowledged when voicing issues, without fear of reprisal [12, 14, 19]. Openness and sharing of information regarding failures or problems is necessary in order to learn and improve.

## 3. Requirements and Guidance

### 3.1 Documenting the program's strategy and practices

The licensee shall document the strategy and practices of their systemic approach for managing human performance by describing:

- a. the goals and scope of the human performance program
- b. how the licensee implements a systemic approach to human performance
- c. how the licensee supports workers in day-to-day work
- d. how the licensee supports and prepares workers to respond during accidents and emergencies
- e. the ways in which the business learns about and seeks continual improvement of human performance
- f. the ways in which the human performance program is monitored and evaluated for effectiveness

### Guidance

Documenting the human performance program can be done through:

- a roadmap
- an overview that references and describes how management system documents, such as policies, processes, procedures or other documents, relate to human performance

- a stand-alone document

Licensees are not required to designate a formal human performance program in their management system. However, they should be able to identify the documents within their management system that relate to their human performance measures and which they consider as part of their human performance program. The approach taken should demonstrate that the licensee is addressing the cross-cutting scope and integration of human performance considerations across the business. This information only needs to be presented once.

The goals and scope of the human performance program should specify the departments, processes and/or procedures to which the program applies, and where it applies to contractors and vendors. This can also include the rationale for the program, which explains why a human performance program is important to the licensee's goals, as well as any risk management framework that has been applied to guide implementation of the program. The application of a risk-informed graded approach is described in REGDOC-3.5.3 [1].

To document the licensee's systemic approach to human performance, licensees may describe how the collection of elements is taken into account as a whole, including their relationships and influences, such as:

- describing any systemic analyses across the business, such as self-assessments, event analyses or audits
- identifying any performance indicators and associated data, which should be periodically analyzed
- specifying any roles or responsibilities for oversight of human performance across the business

Licensees can demonstrate that they support workers in day-to-day work through training, procedures, supervision, tools, usable equipment, etc.

Note that the term workers indicates to anyone in the business who performs work that is referred to in a licence [17], such as knowledge workers, supervisors, managers, front-end workers and contractors.

### **3.2 Implementing a systemic approach**

The licensee shall implement a systemic approach to managing the human performance program that supports safe and effective work for all workers.

#### **Guidance**

The systemic approach considers human performance within the context in which people work, viewing the business as a system [12, 15, 19, 20, 21]. Licensees should use a systemic approach when analyzing, recording and evaluating the HTO factors associated with:

- events and problems
- work that is known to be difficult or challenging
- work that went well (cases of performance excellence)
- feedback and suggestions for improvement from a range of sources
- proposed changes to be made

- outcomes of the changes made

Examples of how this can be accomplished include:

- establishing a team, made up of a diverse representation of key functions of the business, that is tasked with reviewing events, opportunities for improvement and things that went well from a systemic perspective
- creating systems maps to model and illustrate the interconnections in the system
- conducting periodic assessments of human performance by analyzing key work activities to understand the gaps between tasks and activities
- analyzing the goals, workflows, demands, pressures, conflicts, resources or uncertainties within the system [15]

### **3.3 Identifying responsibility for human performance**

The licensee shall identify a member of senior management who is responsible for the human performance program and define and document their associated roles, responsibilities and authorities.

#### **Guidance**

Roles and responsibilities for the human performance program should include:

- establishing and communicating the goals, vision and core values related to human performance
- establishing and maintaining the measures to support the desired human performance, such as policies and processes that enable personnel to raise safety concerns freely
- encouraging feedback and suggestions for improvements from across the workforce
- establishing the business requirements for the identification and systemic analysis of factors related to human performance in events [3]

### **3.4 Developing and sustaining continual improvement**

The licensee shall implement processes to enable the business to understand and learn about factors that influence human performance and to ensure they are considered in continual improvement.

#### **Guidance**

As part of the business' learning, the licensee should consider goals, such as:

- to develop knowledge and understanding of work activities and the provisions that support them, using a systemic approach
- to identify and share results and knowledge across the business so that the systemic nature of work is understood and leveraged
- to enable improved work activities to achieve the desired results

When analyzing past performance in order to learn and improve, licensees should consider work as it was done in practice (activities) alongside work as prescribed in procedures (tasks). This can be accomplished through interviews, workers' feedback, procedure walkdowns or supervisor/manager observations in the field, for example. Another good practice is to analyze the

context of prospective changes in the business during their development using the systemic approach to understand the factors that influence human performance [20].

Licenseses' processes for learning related to human performance and safety should include:

- ways to collect feedback and data on the processes and factors supporting the desired human performance
- leadership training on supporting and improving human performance across the business
- training for all workers on the aims of learning and improving their work and what this means for their roles
- a description of how an environment of openness and trust is fostered to encourage workers to report concerns and problems
- event analyses that identify the context of work activities and that are used to understand the specific drivers of human performance
- mechanisms for leveraging the knowledge and experience of workers to gain a deep understanding of a given work activity, such as through the learning team approach [18]
- evaluation of changes after implementation to measure their impact

## Glossary

For definitions of terms used in this document, see [REGDOC-3.6, \*Glossary of CNSC Terminology\*](#), which includes terms and definitions used in the [Nuclear Safety and Control Act](#) and the regulations made under it, and in CNSC regulatory documents and other publications. REGDOC-3.6 is provided for reference and information.

The following terms are either new terms being defined or include revisions to the current definition for that term. Following public consultation, the final terms and definitions will be submitted for inclusion in the next version of REGDOC-3.6, *Glossary of CNSC Terminology*.

**(new)**

**activity** (*activité*)

With respect to human performance, the actual work carried out by people and teams in a work environment. Also called work as done.

**(add)**

**business** (*entreprise*)

an organizational entity with accountability to implement all or some of the requirements of CSA-N286-12, *Management system requirements for nuclear facilities*. (Source: CSA-N286-12, *Management system requirements for nuclear facilities*).

**(modify)**

**human factors (HF)** (*facteurs humains [FH]*)

Factors that influence human performance as it relates to the safety of a nuclear facility or licensed activities over all phases, including design, construction, commissioning, operation, maintenance and decommissioning. Some examples are organizational and management structures; policies and programs; allocation of functions to humans and machines; the design of user interfaces; staffing provisions; job-design features; work schedules; design of procedures; training; and the physical work environment. See HTO and systemic approach.

**(modify)**

**human performance** (*performance humaine*)

Human activities carried out in a work setting and the results of these activities. See activity and task.

**(additional acronym)**

**HTO** (*HTO*)

Humans, technology and organization

**(new)**

**human performance program** (*programme de performance humaine*)

A group of management system elements, such as policies, processes and procedures, that are related to human performance and that are implemented and managed in a coordinated way.

**(new)**

**systemic approach** (*approche systémique*)

An approach in which an entity is considered to have the properties of a system, such as interdependency and connectedness. Note: An example of a systemic approach is where the interactions across the human, technology and organizational aspects of a business are considered at various levels of abstraction to understand, learn and improve performance.

**(additional entry)**

**task** (*tâche*)

With respect to human performance, a description of work to be done. Also called work as prescribed.

## References

The CNSC may include references to information on best practices and standards such as those published by CSA Group. With permission of the publisher, CSA Group, all nuclear-related CSA standards may be viewed at no cost through the CNSC Web page “[How to gain free access to all nuclear-related CSA standards](#)”.

1. CNSC, REGDOC-3.5.3, *Regulatory Fundamentals*, Ottawa, Canada, 2023.
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**APPENDIX B: REGDOC-2.2.1, *PERFORMANCE HUMAINE*,  
VERSION 2**



# Gestion de la performance humaine

## **Performance humaine**

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REGDOC-2.2.1, version 2

Mois 2023



## **Performance humaine**

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*Also available in English under the title: REGDOC-2.2.1, Human Performance, version 2*

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Mars 2019, REGDOC-2.2.1, *Facteurs humains*

## Préface

Ce document d'application de la réglementation fait partie de la série de documents de la Commission canadienne de sûreté nucléaire (CCSN) intitulée Gestion de la performance humaine, qui porte également sur la formation du personnel, l'accréditation du personnel, l'aptitude au travail et l'effectif minimal. La liste complète des séries de REGDOC figure à la fin du présent document; elle peut également être consultée sur le [site Web de la CCSN](#).

Le document d'application de la réglementation REGDOC-2.2.1, *Performance humaine*, précise les exigences et fournit l'orientation permettant de comprendre et de gérer les considérations liées aux humains, à la technologie et à l'organisation au sein d'une entreprise, dans le but d'assurer une performance humaine sûre et efficace.

Il s'agit de la deuxième version de ce document et elle remplace le REGDOC-2.2.1, *Facteurs humains*, publié en mars 2019.

Une approche graduelle et proportionnelle au risque peut être définie et utilisée dans l'application des exigences et de l'orientation du présent document d'application de la réglementation. L'utilisation d'une approche graduelle ne constitue pas un assouplissement des exigences. Dans le cadre d'une approche graduelle, les exigences sont appliquées de façon proportionnelle aux risques et aux caractéristiques particulières de l'installation ou de l'activité autorisée.

Pour en savoir plus sur la mise en œuvre des documents d'application de la réglementation et sur l'approche graduelle, consultez le REGDOC-3.5.3, *Principes fondamentaux de réglementation* [1].

Le terme « doit » est employé pour exprimer une exigence à laquelle le titulaire ou le demandeur de permis doit se conformer; le terme « devrait » dénote une orientation ou une mesure conseillée; le terme « pourrait » exprime une option ou une mesure conseillée ou acceptable dans les limites de ce document d'application de la réglementation; et le terme « peut » exprime une possibilité ou une capacité.

Aucune information contenue dans le présent document ne doit être interprétée comme libérant le titulaire de permis de toute autre exigence pertinente. Le titulaire de permis a la responsabilité de prendre connaissance de tous les règlements et de toutes les conditions de permis applicables et d'y adhérer.

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# Performance humaine

## 1. Introduction

### 1.1 Objet

Le présent document d'application de la réglementation (REGDOC) fait partie de la série de documents de la CCSN intitulée Gestion de la performance humaine. Il précise les exigences et fournit de l'orientation et du contexte sur la manière de satisfaire aux exigences associées au programme de performance humaine d'un titulaire de permis.

### 1.2 Portée

Ce REGDOC expose les exigences et l'orientation à l'intention des demandeurs et des titulaires de permis d'installations nucléaires de catégorie I et de mines et usines de concentration d'uranium. Pour tous les autres demandeurs et titulaires de permis, le présent document sert d'orientation.

Remarque : Le terme « titulaire de permis » est utilisé par la suite pour désigner à la fois les demandeurs et les titulaires de permis.

### 1.3 Législation pertinente

Les exigences et l'orientation énoncées dans le présent document d'application de la réglementation sont associées à la [Loi sur la sûreté et la réglementation nucléaires](#) et ses règlements d'application, y compris le [Règlement général sur la sûreté et la réglementation nucléaires](#), le [Règlement sur les installations nucléaires de catégorie I](#) et le [Règlement sur les mines et les usines de concentration d'uranium](#).

### 1.4 Normes nationales et internationales

L'Agence internationale de l'énergie atomique (AIEA) a déterminé que les organismes de réglementation et les titulaires de permis devaient aborder de façon systémique les considérations liées aux humains, à la technologie et à l'organisation (HTO). Le présent document d'application de la réglementation a intégré des exigences et des concepts tirés des normes et de l'orientation de l'AIEA suivantes :

- Collection Normes de sûreté de l'AIEA n° SF-1, *Principes fondamentaux de sûreté* [2]
- Collection Normes de sûreté de l'AIEA n° GSR Part 2, *Direction et gestion pour la sûreté* [3]
- Collection Normes de sûreté de l'AIEA n° GSR Part 3, *Radioprotection et sûreté des sources de rayonnements : Normes fondamentales internationales de sûreté* [4]
- Collection Normes de sûreté de l'AIEA n° GS-G-3.5, *The Management System for Nuclear Installations* [5]
- TECDOC de l'AIEA n° 1846, *Regulatory Oversight of Human and Organizational Factors for Safety of Nuclear Installations* [6]

Voici d'autres normes importantes qui sont pertinentes au présent document d'application de la réglementation :

- Groupe CSA, N286, *Exigences relatives au système de gestion des installations nucléaires* [7]



- Norme internationale ISO 27500:16 *Organisme centré sur l'humain – Justification et principes généraux* [8]
- Norme internationale ISO 27501:2019 *Organisme centré sur l'humain – Lignes directrices pour les dirigeants* [9]

## 2. Contexte

### 2.1 Programme de performance humaine

La performance humaine se rapporte aux activités professionnelles exécutées par les personnes et les équipes, de même qu'à leurs résultats [6, 21]. Le travail tel qu'il est accompli représente ces activités, contrairement à une tâche, qui est une description générique du travail [11, 21]. Des améliorations peuvent être apportées en examinant les détails des activités professionnelles elles-mêmes, c'est-à-dire l'application pratique et concrète d'une tâche donnée [10, 19].

Les programmes de performance humaine ont une vaste portée et visent à favoriser une vision des activités professionnelles centrée sur l'humain, ce qui permet à l'entreprise de mieux comprendre le travail et son contexte et d'appuyer l'apprentissage et l'amélioration continue [8, 9, 20]. Un programme de performance humaine bien conçu renforce la capacité de l'entreprise à atteindre et à maintenir les résultats escomptés en tenant compte de l'intégration des activités professionnelles et du soutien reçu par les personnes lorsqu'elles effectuent leur travail.

Au sein d'une entreprise, un programme de performance humaine fournit une vue d'ensemble des facteurs qui influencent la performance humaine, notamment la manière dont ils sont coordonnés dans l'ensemble de l'entreprise en vue d'aider les travailleurs et les équipes à accomplir leur travail en toute sécurité et avec succès [4]. Cela consiste notamment à définir et à mettre en œuvre des pratiques qui contribuent à l'excellence de la performance des travailleurs [7].

Par l'entremise du cadre des domaines de sûreté et de réglementation (DSR), le personnel de la CCSN examine déjà divers facteurs individuels en détail, comme la formation, les facteurs humains dans la conception et l'aptitude au travail. Le programme de performance humaine ne remplace pas cet examen, mais le complète plutôt en analysant les liens et les rapports entre les facteurs qui influencent les activités professionnelles.

### 2.2 Comprendre les influences sur la performance humaine

Pour brosser un portrait complet de la performance humaine, les titulaires de permis doivent adopter une perspective plus vaste connue sous le nom d'approche systémique<sup>1</sup>. Cette approche systémique aide à établir et à rendre explicite les interactions entre les humains, la technologie et l'organisation (HTO) au sein de l'entreprise, en plus d'être essentielle à la compréhension, au soutien et à l'amélioration de la performance humaine [2, 20, 21]. Le concept HTO a été établi dans l'industrie de l'énergie nucléaire pour mettre l'accent sur les relations et les interdépendances entre trois éléments :

---

<sup>1</sup> Le terme « systémique » renvoie à un élément à l'échelle d'un système, touchant un groupe ou un système dans son ensemble ou se rapportant à celui-ci, plutôt qu'à chacun de ses membres ou éléments (à ne pas confondre avec systématique, qui signifie méthodique).

- le sous-système « humain » (H), qui comprend une combinaison d'aspects physiques, physiologiques, cognitifs et sociaux liés aux personnes exerçant des activités professionnelles;
- le sous-système « technologie » (T), qui se rapporte à la technologie elle-même et à la manière dont les systèmes technologiques transforment les intrants en extrants;
- le sous-système « organisation » (O), qui se rapporte aux arrangements et aux processus organisationnels formels de l'entreprise, lesquels sont continuellement coordonnés pour atteindre les objectifs de l'entreprise, ainsi qu'aux aspects informels et sociaux des activités professionnelles.

L'approche systémique fournit un cadre permettant de comprendre les diverses perspectives et influences sur les activités professionnelles, qui peuvent être examinées selon des niveaux croissants de complexité. Les sous-systèmes peuvent être utilisés pour décrire, analyser et comprendre le travail en tant que système dynamique au moyen d'un examen de leur fonctionnement et de leur interaction qui révélera des renseignements utiles sur la performance humaine dans le contexte du travail tel qu'il est effectué.

Un examen de l'entreprise à différents échelons peut aider à dresser un portrait des systèmes de travail, par exemple [19, 21] :

- À l'**échelle individuelle**, la façon dont un travailleur, dans un environnement donné et disposant notamment d'équipement, de formation, de procédures et d'équipement de protection particulier, accomplit ses activités professionnelles de façon sûre et conformément aux normes de performance souhaitées. Cet échelon prend en compte l'activité.
- À l'**échelle du groupe**, la façon dont les équipes/services planifient, organisent et supervisent le travail et y affectent les ressources, la façon dont ils interprètent les politiques et les priorités de l'entreprise, et la façon dont ils échangent et communiquent au sein de leur groupe et avec d'autres groupes de l'entreprise. Cet échelon prend en compte le processus.
- À l'**échelle de l'entreprise**, la façon dont les priorités et les politiques soutenues par la direction orientent et influencent la culture organisationnelle à l'échelle individuelle, de l'équipe et du service. Cet échelon prend en compte la stratégie.

Une bonne compréhension des interactions HTO à tous ces niveaux permet aux titulaires de permis de mieux se préparer à l'adoption d'une approche à l'égard de la sûreté selon laquelle les personnes au sein d'une entreprise disposent du soutien et des outils nécessaires pour faire en sorte que tout se passe bien, plutôt que de simplement empêcher que les choses tournent mal [11].

L'apprentissage continu relativement aux facteurs qui influencent la performance humaine est l'un des objectifs fondamentaux d'un programme de performance humaine. Grâce à la collecte d'information sur les activités professionnelles des personnes et leur capacité à atteindre les résultats escomptés, de même que sur la performance du titulaire de permis dans son ensemble, le programme de performance humaine peut offrir une perspective complète et intégrée de la façon dont le titulaire de permis réussit ou non à atteindre ses objectifs en matière de sûreté et de performance. Cette approche reconnaît que les personnes sont essentielles à la sûreté parce que leur capacité d'adaptation et leur souplesse inhérentes créent une résilience, particulièrement si des aspects de l'entreprise et de la technologie sont rigides [12, 21]. Un aspect important d'un programme de performance humaine consiste à déterminer dans quelles circonstances il est possible de tirer profit de cette capacité d'adaptation et de cette souplesse pour renforcer la sûreté [10].

### 2.3 Gérer la performance humaine pour renforcer la sûreté

L'analyse des événements s'arrête parfois à l'exécutant, c'est-à-dire la personne ou l'équipe considérée comme responsables des erreurs. Ce point d'arrêt nuit à un apprentissage organisationnel efficace, puisqu'une fois les erreurs analysées à l'aide de l'approche systémique, elles se révèlent presque toujours être le symptôme de problèmes plus profonds [12, 19]. Les facteurs ayant mené aux erreurs se trouvent généralement à plusieurs endroits, à différents échelons et dans divers aspects de l'entreprise, de la conception à la haute direction, en passant par la planification, l'entretien et la supervision [13].

Les titulaires de permis peuvent renforcer la robustesse en établissant une base solide dans l'ensemble du système HTO afin d'éviter que les erreurs se transforment en problèmes, à tous les niveaux de l'entreprise. Il faut d'abord comprendre l'erreur en tant que caractéristique humaine au sein d'un contexte situationnel, puis se pencher sur la question « Qu'est-ce qui a mal tourné et pourquoi? » plutôt que « Qui a causé le problème? » [14, 20].

Un environnement de travail caractérisé par l'ouverture, la confiance et l'équité, où des dispositions ont été prises afin de soutenir efficacement le travail, permet aux gens d'assurer constamment une fonction de détection et de correction, ce qui constitue une forme de résilience [12]. Une autre façon de favoriser la résilience dans le système consiste à intégrer les leçons apprises de la réussite des activités professionnelles quotidiennes, ce qui permet à l'entreprise d'être mieux préparée à faire face aux situations imprévues [16].

### 2.4 Apprentissage organisationnel

Il est possible de favoriser un travail sûr et fructueux en faisant en sorte qu'il soit facile pour les gens de faire ce qu'il faut, et difficile pour eux de faire ce qu'il ne faut pas faire [19]. Comprendre de manière active, apprendre et mettre en place des mesures pour favoriser le bon déroulement du travail améliore la sûreté. Il s'agit notamment de disposer de processus et de méthodes permettant de tirer des leçons des réussites et des échecs de l'entreprise afin de comprendre le travail tel qu'il est réellement effectué et le système dans lequel il s'inscrit. Soutenir le travail quotidien en recherchant et en traitant les facteurs connus susceptibles de perturber le travail et d'en augmenter la charge renforce la capacité des travailleurs à cibler toute condition anormale, tout facteur inhabituel ou toute perturbation, puis à intervenir à ces égards. Les personnes qui accomplissent le travail sont souvent les mieux placées pour apporter des suggestions afin d'améliorer la sûreté et la performance, de même que pour comprendre les activités professionnelles [13, 19].

Le renforcement des capacités en matière de sûreté dans l'ensemble de l'entreprise doit être mené par la direction en tant que priorité stratégique et intentionnelle active et visible [10]. La direction soutient directement la performance humaine en offrant aux travailleurs tout ce dont ils ont besoin pour accomplir leurs activités professionnelles, comme les ressources, la formation et l'équipement. La direction devrait promouvoir l'importance de l'apprentissage organisationnel comme un aspect toujours présent de l'entreprise, plutôt qu'une activité ponctuelle ou une réponse à un événement.

Une pratique exemplaire consiste à examiner une situation donnée de façon honnête, à accepter la réalité des constats, puis à se servir des connaissances acquises pour apprendre et s'améliorer. Une base solide d'apprentissage continu est créée lorsque la direction favorise un environnement dans lequel les travailleurs sont encouragés à faire part de leurs préoccupations ou de leurs suggestions d'amélioration et se sentent reconnus lorsqu'ils expriment leurs problèmes, sans

crainte de représailles [12, 14, 19]. L'esprit d'ouverture et l'échange de renseignements concernant les échecs ou les problèmes sont nécessaires afin d'apprendre et de s'améliorer.

### 3. Exigences et orientation

#### 3.1 Consigner la stratégie et les pratiques du programme

Le titulaire de permis doit consigner la stratégie et les pratiques de son approche systémique pour gérer la performance humaine en décrivant :

- a. les objectifs et la portée du programme de performance humaine;
- b. la façon dont le titulaire de permis met en œuvre une approche systémique à l'égard de la performance humaine;
- c. la façon dont le titulaire de permis aide les travailleurs dans leurs activités quotidiennes;
- d. la façon dont le titulaire de permis aide et prépare les travailleurs à intervenir en cas d'accident et d'urgence;
- e. les moyens par lesquels l'entreprise s'informe sur la performance humaine et cherche continuellement à l'améliorer;
- f. la façon dont l'efficacité du programme de performance humaine est surveillée et évaluée.

#### Orientation

La consignation du programme de performance humaine peut se faire des façons suivantes :

- une feuille de route
- un aperçu qui décrit comment les documents du système de gestion, tels que les politiques, les processus, les procédures ou d'autres documents, se rapportent à la performance humaine et y font référence
- un document autonome

Les titulaires de permis ne sont pas tenus de désigner un programme formel de performance humaine dans leur système de gestion. Cependant, ils devraient être en mesure d'identifier les documents de leur système de gestion qui se rapportent à leurs mesures de performance humaine et qu'ils considèrent comme faisant partie de leur programme de performance humaine. L'approche adoptée devrait démontrer que le titulaire de permis aborde la portée intersectionnelle et l'intégration des considérations de performance humaine dans l'ensemble de l'entreprise. Cette information ne doit être présentée qu'une seule fois.

Les objectifs et la portée du programme de performance humaine devraient préciser les services, les processus ou les procédures auxquels le programme s'applique et les circonstances dans lesquelles il s'applique aux entrepreneurs et aux fournisseurs. Cela peut également inclure la raison d'être du programme, qui explique pourquoi un programme de performance humaine est important pour l'atteinte des objectifs du titulaire de permis, ainsi que tout cadre de gestion des risques qui a été appliqué pour orienter la mise en œuvre du programme. L'application d'une approche graduelle tenant compte du risque est décrite dans le REGDOC-3.5.3 [1].

Pour documenter son approche systémique à l'égard de la performance humaine, le titulaire de permis peut décrire comment la collecte d'éléments est prise en compte dans son ensemble, y compris les relations et les influences de ces éléments, par exemple :

- décrire toute analyse systémique au sein de l'entreprise, comme des autoévaluations, des analyses d'événement ou des audits;
- identifier les indicateurs de performance et les données connexes qui doivent être analysés périodiquement;
- préciser les rôles ou les responsabilités associés à la surveillance de la performance humaine à l'échelle de l'entreprise.

Les titulaires de permis peuvent démontrer qu'ils soutiennent les travailleurs dans leur travail quotidien au moyen de formations, de procédures, de supervision, d'outils, d'équipements utilisables, etc.

Il convient de noter que le terme « travailleur » désigne toute personne de l'entreprise qui effectue un travail mentionné dans un permis [17], comme les travailleurs du savoir, les superviseurs, les gestionnaires, les travailleurs de première ligne et les entrepreneurs.

### **3.2 Mettre en œuvre une approche systémique**

Le titulaire de permis doit mettre en œuvre une approche systémique de la gestion du programme de performance humaine qui favorise un travail sûr et efficace pour tous les travailleurs.

#### **Orientation**

L'approche systémique prend en compte la performance humaine en fonction du contexte dans lequel les personnes travaillent, en considérant l'entreprise comme un système [12, 15, 19, 20, 21]. Les titulaires de permis devraient utiliser une approche systémique lorsqu'ils analysent, consignent et évaluent les facteurs HTO associés à ce qui suit :

- événements et problèmes
- travail connu comme étant difficile ou complexe
- travail réussi (cas d'excellence en matière de performance)
- rétroaction et suggestion d'amélioration provenant de diverses sources
- propositions de modifications à apporter
- résultats des modifications apportées

Voici des exemples de la façon d'y parvenir :

- mettre en place une équipe, composée d'une représentation diversifiée des fonctions clés de l'entreprise, chargée d'examiner les événements, les possibilités d'amélioration et les choses qui ont bien fonctionné d'un point de vue systémique;
- créer des schémas des systèmes pour modéliser et illustrer les liens au sein du système;
- réaliser des évaluations périodiques de la performance humaine en analysant les principales activités professionnelles pour mieux comprendre l'écart entre les tâches et les activités;
- analyser les objectifs, les flux de travail, les demandes, les pressions, les conflits, les ressources et les incertitudes associés au système [15].

### **3.3 Assigner la responsabilité de la performance humaine**

Le titulaire de permis doit assigner la responsabilité du programme de performance humaine à un membre désigné de la haute direction et établir et documenter les rôles, les responsabilités et les pouvoirs associés.

## Orientation

Les rôles et les responsabilités associés au programme de performance humaine devraient inclure ce qui suit :

- établir et communiquer les objectifs, la vision et les valeurs fondamentales associés à la performance humaine;
- établir et maintenir les mesures visant à favoriser la performance humaine souhaitée, comme des politiques et des processus qui permettent au personnel de soulever librement des préoccupations relatives à la sûreté;
- encourager la rétroaction et les suggestions d'amélioration de tout l'effectif;
- établir les exigences de l'entreprise pour l'identification et l'analyse systémique des facteurs liés à la performance humaine lors d'événements [3].

### 3.4 Mettre en valeur et appuyer l'amélioration continue

Le titulaire de permis doit mettre en œuvre des processus permettant à l'entreprise de comprendre et d'explorer les facteurs qui influencent la performance humaine et de s'assurer qu'ils sont pris en considération dans l'amélioration continue.

## Orientation

Dans le cadre du processus d'apprentissage organisationnel, le titulaire de permis devrait envisager des objectifs, comme :

- préparer l'apprentissage et comprendre les activités professionnelles ainsi que les dispositions qui les soutiennent, à l'aide d'une approche systémique;
- relever et transmettre les résultats et les connaissances à l'échelle de l'entreprise afin que la nature systémique du travail soit comprise et exploitée;
- permettre l'amélioration des activités de travail afin d'atteindre les résultats escomptés.

Lorsqu'ils analysent toute performance antérieure en vue d'apprendre et de s'améliorer, les titulaires de permis devraient prendre en compte le travail tel qu'il a été accompli en pratique (activités), ainsi que le travail tel qu'il est prescrit dans les procédures (tâches). Cela peut être réalisé au moyen d'entretiens, de commentaires des travailleurs, de revues des procédures ou d'observations de superviseur/gestionnaire sur le terrain, par exemple. Une autre bonne pratique consiste à analyser, au moyen de l'approche systémique, le contexte des modifications proposées dans l'entreprise au cours de leur élaboration pour comprendre les facteurs qui influencent la performance humaine [20].

Les processus d'apprentissage des titulaires de permis associés à la performance humaine et à la sûreté devraient comprendre ce qui suit :

- des façons d'obtenir de la rétroaction et des données sur les processus et les facteurs qui soutiennent la performance humaine attendue;
- de la formation en leadership sur le soutien et l'amélioration de la performance humaine à l'échelle de l'entreprise;
- de la formation pour tous les travailleurs sur les objectifs d'apprentissage et d'amélioration de leur travail, de même que l'incidence sur leurs rôles;

- une description de la façon dont un environnement d'ouverture et de confiance est favorisé en vue d'encourager les travailleurs à signaler les préoccupations et les problèmes;
- des analyses d'événements qui déterminent le contexte des activités professionnelles et qui sont utilisées pour comprendre les facteurs particuliers de la performance humaine;
- des mécanismes permettant de tirer profit des connaissances et de l'expérience des travailleurs pour acquérir une compréhension approfondie d'une activité professionnelle donnée, par exemple par le biais de l'approche d'équipe d'apprentissage [18];
- une évaluation des changements après leur mise en œuvre pour en mesurer l'incidence.

## Glossaire

Les définitions des termes utilisés dans le présent document figurent dans le [REGDOC-3.6, Glossaire de la CCSN](#), qui comprend des termes et des définitions tirés de la [Loi sur la sûreté et la réglementation nucléaires](#), de ses règlements d'application ainsi que des documents d'application de la réglementation et d'autres publications de la CCSN. Le REGDOC-3.6 est fourni à titre de référence et pour information.

Les termes suivants sont soit de nouveaux termes en cours de définition, soit des révisions de la définition actuelle de ce terme. Après consultation publique, la version définitive des termes et définitions sera soumise pour inclusion dans la prochaine version du REGDOC-3.6, *Glossaire de la CCSN*.

**(nouveau)**

**activité** (*activity*)

En ce qui concerne la performance humaine, travail réel accompli par des personnes et des équipes dans un milieu de travail. Aussi appelé travail réalisé.

**(nouveau)**

**approche systémique** (*systemic approach*)

Approche selon laquelle une entité présente les propriétés d'un système, comme l'interdépendance et la connexion. Remarque : Une approche systémique tient compte, par exemple, des interactions entre les aspects humains, technologiques et organisationnels d'une entreprise selon différents niveaux d'abstraction pour comprendre, apprendre et améliorer la performance.

**(ajouté)**

**entreprise** (*business*)

Entité organisationnelle avec l'imputabilité de mettre en application certaines ou toutes les exigences de la norme CSA-N286-12, *Exigences relatives au système de gestion des installations nucléaires*. (Source : CSA-N286-12, *Exigences relatives au système de gestion des installations nucléaires*)

**(modifié)**

**facteurs humains (FH)** [*human factors*] (*HF*)

Facteurs influant sur la performance humaine dans le contexte de la sûreté d'une installation nucléaire ou d'activités autorisées pour l'ensemble des étapes, qu'il s'agisse de la conception, de la construction, de la mise en service, de l'exploitation, de l'entretien ou du déclassement. Il s'agit, par exemple, des structures d'organisation et de gestion, des politiques et des programmes, de la répartition des tâches entre les personnes et les machines, de la conception des interfaces utilisateurs, des dispositions en matière de dotation, des caractéristiques de la conception des emplois, des horaires de travail, de l'élaboration des procédures, de la formation et de l'environnement physique de travail. Voir HTO et approche systémique.

**(acronyme supplémentaire)**

**HTO** (*HTO*)

Humains, technologie et organisation

**(modifié)**

**performance humaine** (*human performance*)

Activités humaines accomplies dans un contexte de travail, et les résultats de ces activités. Voir activité et tâche.



**(nouveau)****programme de performance humaine** (*human performance program*)

Groupe d'éléments du système de gestion, tels que les politiques, les processus et les procédures, qui sont liés à la performance humaine et qui sont mis en œuvre et gérés de manière coordonnée.

**(entrée supplémentaire)****tâche** (*task*)

En ce qui concerne la performance humaine, description du travail à accomplir. Aussi appelé le travail prescrit.

## Références

La CCSN peut inclure des références à des documents sur les pratiques exemplaires et les normes, comme celles publiées par le Groupe CSA. Avec la permission du Groupe CSA, qui en est l'éditeur, toutes les normes de la CSA associées au secteur nucléaire peuvent être consultées gratuitement à partir de la page Web de la CCSN « [Comment obtenir un accès gratuit à l'ensemble des normes de la CSA associées au secteur nucléaire](#) ».

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## Séries de documents d'application de la réglementation de la CCSN

Les installations et les activités du secteur nucléaire du Canada sont réglementées par la CCSN. En plus de la *Loi sur la sûreté et la réglementation nucléaires* et de ses règlements d'application, ces installations et activités pourraient devoir se conformer à d'autres outils de réglementation, comme les REGDOC ou les normes.

Les documents d'application de la réglementation préparés par la CCSN sont classés en fonction des catégories et des séries suivantes :

### 1.0 Installations et activités réglementées

- Séries 1.1 Installations dotées de réacteurs
- 1.2 Installations nucléaires de catégorie IB
- 1.3 Mines et usines de concentration d'uranium
- 1.4 Installations nucléaires de catégorie II
- 1.5 Homologation d'équipement réglementé
- 1.6 Substances nucléaires et appareils à rayonnement

### 2.0 Domaines de sûreté et de réglementation

- Séries 2.1 Système de gestion
- 2.2 Gestion de la performance humaine
- 2.3 Conduite de l'exploitation
- 2.4 Analyse de la sûreté
- 2.5 Conception matérielle
- 2.6 Aptitude fonctionnelle
- 2.7 Radioprotection
- 2.8 Santé et sécurité classiques
- 2.9 Protection de l'environnement
- 2.10 Gestion des urgences et protection-incendie
- 2.11 Gestion des déchets
- 2.12 Sécurité
- 2.13 Garanties et non-prolifération
- 2.14 Emballage et transport

### 3.0 Autres domaines de réglementation

- Séries 3.1 Exigences relatives à la production de rapports
- 3.2 Mobilisation du public et des Autochtones
- 3.3 Garanties financières
- 3.4 Délibérations de la Commission
- 3.5 Processus et pratiques de la CCSN
- 3.6 Glossaire de la CCSN

**Remarque :** Les séries de documents d'application de la réglementation pourraient être modifiées périodiquement par la CCSN. Chaque série susmentionnée peut comprendre plusieurs documents d'application de la réglementation. Pour obtenir la plus récente [liste de documents d'application de la réglementation](#), veuillez consulter le site Web de la CCSN.

## **APPENDIX C: REGDOC-2.2.1 DETAILED COMMENTS TABLE**

## Draft REGDOC-2.2.1, Human Performance, Version 2

### Comments received during public consultation / Commentaires reçus dans le cadre du processus de consultation

Comments received:

- during first round (Aug. 23 to Nov. 21, 2022): 36 comments from seven (7) reviewers
- during feedback period (Nov. 22 to Dec. 7, 2022): no comments were received

Commentaires reçus :

- lors de la première période (du 23 août au 21 novembre 2022) : 36 commentaires reçus de sept (7) examinateurs
- lors de la période des observations (du 22 novembre au 7 décembre 2022) : aucun commentaire reçu

Remarque : La CCSN publie les commentaires dans la langue officielle dans laquelle ils ont été reçus. Dans ce cas, tous les commentaires ont été soumis en anglais.

**Table A: Comments on Draft REGDOC-2.2.1, Human Performance, Version 2**

Note: For brevity, reviewers' designations were shortened in the table: BP = Bruce Power, CNL = Canadian Nuclear Laboratories, NB Power = New Brunswick Power, OPG = Ontario Power Generation, CAN = Canadian Nuclear Association, Cameco = Cameco Corporation.

#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
1.	Cameco	General	<p>Document does not apply a risk-based approach to support safe and effective work</p> <p>The Document uses a "one size fits all" model to manage human performance when licensed facilities have very different hazards, activities, and complexity all of which affects the nature and extent of the influences on each worker and the relationships among workers, technology, and the organization.</p> <p>The draft REGDOC also contains mixed messages on the expected level of detail required. For example, section 2 states a "human performance program provides an overarching view of the factors that influence human performance". However, Section 3.1.1 states the human performance program document scope down to the level of "processes, procedures, and work tasks." This is a completely unrealistic level of detail and would be impossible to keep up to date while creating an endlessly changing program document with a significant administrative burden with little to no safety benefit.</p>	<p>The response to comment 10 provides the new text that has been added to the Preface of the REGDOC about the graded approach. See comment 4 for more information about the text modifications.</p> <p>The text in section 3.1 was adjusted to clarify the human performance document scope is "management system documents, such as policies, processes or procedures, and other documents relate to human performance." However, for the final comment regarding the training of all personnel, no change was made as the intent is for all workers to understand that their organization encourages them to bring forth ideas for</p>

## Draft REGDOC-2.2.1, Human Performance, Version 2

#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>The scope of human performance requirements must be limited based on risk and the applicable human factors - which the Document does not reinforce. For example, section 3.2.2 it states that training should include "all personnel;" however, with a graded, risk-based approach it would be more appropriate to have training for "applicable personnel."</p>	<p>improvement, while also understanding how this applies to their position in the organization.</p>
2.	BP, CNL, NB Power, OPG, CNA	Overview	<p>Industry appreciates the opportunity to provide feedback on this important document that will impact the everyday activities of nuclear industry workers. Our feedback shares the practical challenges of applying the proposed text as currently written. The majority of our comments focus on improving the clarity of the final document, while a few of the comments identify inconsistencies or conflicts with other REGDOCs, CNSC guidance, or Industry best practices.</p> <p>Following a collective review by personnel with extensive experience developing human performance programs, licensees have identified several areas where clarification is required or misunderstanding may be possible; these are detailed in this table of comments. The feedback is broken in to <i>Major</i> or requests for <i>Clarification</i> comments. Of note, we are highlighting below several themes, which are of particular importance and supported by the comments identified as <i>Major</i>. These include:</p> <ul style="list-style-type: none"> <li>• Recognition of a graded, risk-based approach - There is a need to include language allowing licensees to take a risk-based approach to the application of the requirements of the REGDOC, which should include consideration of the size of the organization and the risk/hazards of the activities being undertaken. The document should provide guidance on implementation of a graded approach to the measures suggested under a human performance program.</li> <li>• Integration of human performance requirements with the Management System - The document does not acknowledge integration into existing management systems that already incorporate human performance measures.</li> <li>• Duplication, overlap, and/or compatibility with other REGDOCs – This REGDOC needs to clarify how it will interact with other related REGDOCs such as REGDOC-2.1.1, Management System, REGDOC-2.1.2, Safety Culture, and REGDOC-2.5.1- General Design Considerations: Human Factors. There is a high-potential to confuse the requirements of this REGDOC with other REGDOCs if the duplication, overlap and/or interactions are not clearly identified.</li> <li>• Inclusion of Just Culture – Further to the previous bullet, the inclusion of the concept of 'Just Culture' in this document is inappropriate. Just Culture is an aspect of overall safety culture. The CNSC already has REGDOC-2.1.2; any</li> </ul>	<p>The CNSC reviewed industry's input and responded to each comment provided. Where no changes were made to the content in response to a comment, an explanation was provided.</p> <p>The following summarizes the CNSC's response to the items highlighted by industry as having a major potential impact (further information is provided in the individual responses outlined in this document):</p> <ul style="list-style-type: none"> <li>• The Preface was amended to recognize the application of a graded, risk-based approach.</li> <li>• The intention of the REGDOC was to recognize the use of the management system to implement a licensee's human performance program. Amendments were made to the text to further clarify this point in the body of the document.</li> <li>• Potential concerns related to the compatibility of REGDOC-2.2.1 with other REGDOCs in CNSC's regulatory framework have been addressed or have been noted for future updates. For example, REGDOC-2.5.1 is due to be reviewed in 2024-2025, which will include consideration for integrating the systemic approach and HTO into its conceptual framework.</li> <li>• The term "just culture" was removed from the REGDOC, but will be considered as part of future potential updates to REGDOC-2.1.2, <i>Safety Culture</i>.</li> </ul>

**Draft REGDOC-2.2.1, Human Performance, Version 2**

#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>guidance related to culture should be part of the safety culture document to prevent conflict or confusion. In addition, Just Culture incorporates more than just the aspects referenced in this REGDOC, which could lead to further confusion.</p> <p>Our review also identifies sections of the document requiring further clarification and without this clarification the resources required to meet CNSC expectations for this REGDOC may outweigh any potential safety benefit realized as a result of the complexity of trying to articulate the interactions between all aspects of our programs and activities. Hence with this remaining uncertainty, it is difficult to assess the overall impact of this REGDOC, identify all compliance challenges or to propose all suggested changes.</p>	
3.	BP, CNL, NB Power, OPG, CNA	General	<p>It is unclear how the CNSC will inspect this REGDOC and whether similar expectations would be applied to different licensees with different levels of risk.</p> <p>Suggested change: Include language allowing licensees to take a risk-based approach to the application of the requirements of the REGDOC.</p> <p>Industry label: Clarification</p>	<p>The response to comment 10 provides the new text that has been added to the Preface of the REGDOC to clarify how graded approach applies. Note that REGDOCs don't provide information about inspections or other compliance verification activities – this is part of the implementation planning process, which is a separate activity.</p>
4.	BP, CNL, NB Power, OPG, CNA	General	<p>Organization of the document &amp; Specific Requirements for Licensees:</p> <p>There are 4 requirements for licensees that are embedded throughout the document.</p> <p>Suggested change: For clarity, it is recommended the requirements be tabled at the beginning of Section 3 with links to the applicable sections that provide context and discussion in the body of the document.</p> <p><i>3.1.1 Documenting the program's strategy and practices <b>The licensee shall</b> document the strategy and practices of their systemic approach for managing human performance by describing: [...]</i></p> <p><i>3.1.2 Implementing a systemic approach <b>The licensee shall</b> implement a systemic approach to managing human performance that supports safe and effective work for all workers.</i></p> <p><i>3.2.1 Identifying responsibility for human performance <b>The licensee shall</b> identify a member of top management who is responsible for the human performance program and define and document their associated roles, responsibilities and authorities.</i></p> <p><i>3.2.2 Developing and sustaining organizational learning <b>The licensee shall</b> implement processes to enable the business to understand and learn about factors that influence human</i></p>	<p>The document now regroups all of the contextual information in one section, and the requirements and guidance in another, for ease of reference.</p>



**Draft REGDOC-2.2.1, Human Performance, Version 2**

#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p><i>performance and to ensure they are considered in continual improvement.</i></p> <p>Industry label: Clarification</p>	
5.	BP, CNL, NB Power, OPG, CNA	General	<p>Human performance programs should apply rigour commensurate with risk. The document should recognize the need to develop human performance programs/requirements commensurate with the activities performed, the hazards present, and the size of the facility. For instance:</p> <ul style="list-style-type: none"> <li>• The degree of safety measures required (incl. measures to reduce human error) should be commensurate with the potential hazard.</li> <li>• The variety of activities within a company and the associated potential hazards may differ from each other (e.g., production vs office) thus requiring different requirements.</li> <li>• Some human performance activities may only be implementable at large facilities with dedicated human performance staff (e.g., implementation of resilience-engineering approach).</li> </ul> <p>Suggested change: The human performance program requires some mechanism to focus its effort on safety-critical aspects of the activity and/or facility. Without this focus, the program will be less efficient and/or have gaps whereby safety relevant aspects are not addressed. Furthermore, this safety focus should have as its basis a rigorous, defensible risk management framework. For example, this could be the facility safety case, safety classifications of SSCs, or it could be some type of standalone risk management framework. However, it should not be an informal judgment or undefined.</p> <p>Provide guidance for implementing a graded risk-based approach.</p> <p>Impact on industry: If not risk-based, the program will be less efficient and/or have gaps whereby safety relevant aspects are not addressed.</p> <p>Lack of risk-based requirements will result in increased regulatory burden for some facilities with no additional benefit to nuclear safety.</p> <p>Industry label: Major</p>	<p>The response to comment 10 provides the new text that has been added to the Preface of the REGDOC to clarify how graded approach applies. Licensees have various frameworks that describe how they manage risk within their organization. As part of the requirement in subsection 3.1 a, licensees can identify the risk framework they are using to manage their human performance program as part of the description of the goals and scope of their strategies and practices. To clarify this, the following guidance has been added to the second paragraph (section 3.1):</p> <p style="padding-left: 40px;"><i>“The goals and scope of the human performance program should specify the departments, processes and/or procedures and work tasks to which the program applies, and where it applies to contractors and vendors. This can also include the rationale for the program, which explains why a human performance program is important to the licensee’s goals, as well as any risk management framework that has been applied to guide implementation of the program. The application of a risk-informed graded approach is described in REGDOC-3.5.3, <i>Regulatory Fundamentals</i>.”</i></p>
6.	BP, CNL, NB Power, OPG, CNA	General	<p>The expected goal(s) of human performance programs should be clarified in REGDOC 2.2.1.</p>	<p>The goal of the human performance program is described in section 2.1: “Human performance programs are broad in scope and are meant to foster a human-centric view of work activities,</p>

**Draft REGDOC-2.2.1, Human Performance, Version 2**

#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>While the REGDOC implies that the human performance program exists to strengthen facility safety, it is not explicitly stated as the central goal.</p> <p>Suggested change: The expected goal(s) should be clearly stated, such that the policies and practices of the human performance program can be formulated to achieve that specific goal.</p> <p>Industry label: Clarification</p>	<p>which in turn allows the business to form a better understanding of the work and its context and enable learning and continual improvement. A well-designed human performance program strengthens the business' ability to achieve and sustain desired outcomes by considering the integration of work activities and how people are supported."</p> <p>Section 2.2 links human performance with safety, "By understanding the HTO interactions across these levels, licensees are better positioned to move towards an approach to safety..." and goes on to clarify that "... the human performance program can provide a comprehensive, integrated view of how the licensee is achieving or failing to meet its goals related to safety and performance."</p> <p>Minor changes were made to the text.</p>
7.	BP, CNL, NB Power, OPG, CNA	General	<p>The term "human factors" should be used in REGDOC 2.2.1.</p> <p>The term "human factors" is used very sparingly in the draft REGDOC 2.2.1 v2, appearing only in the context of "human factors in design" (aka human factors engineering). This is strange, as equivalent phrases (e.g. "factors that influence human performance [...]", "factors that influence work activities [...]", "factors that contributed to errors [...]", etc.) are used extensively throughout the document.</p> <p>Suggested change: REGDOC 2.2.1 should use the appropriate term, as defined by REGDOC 3.6.</p> <p>Reference: CNSC REGDOC 3.6, Glossary of CNSC terminology - "Human Factors (HF)..."</p> <p>Industry label: Clarify</p>	<p>While the term "human factors" has been used by professionals in the nuclear industry for more than 40 years, there has been some variation in the understanding of what this term means, such as, for example, in the specific application of human factors in engineering (or design, to use CNSC terminology). The CNSC has chosen to use the internationally recognized concept of humans, technology and organization (HTO) in REGDOC-2.2.1 to reflect a broad, systemic approach that considers the breadth of factors that influence human performance within the licensees' organizations. Given that the term human factors is still being used in the regulatory framework, the CNSC will link the definition of human factors in REGDOC-3.6 to the new definitions for systemic approach and HTO so that it's clear that these terms are related and part of the human performance terminology. As REGDOCs that use the human factors term are updated, they will be reviewed to see if the HTO terminology is more appropriate.</p>
8.	BP, CNL, NB Power, OPG, CNA	1.1	Consider renumbering the REGDOC.	The key elements of P-119/Version 1 of REGDOC-2.2.1 will be retained in the CNSC's management system as an internal policy document. Version 2 of REGDOC-2.2.1 will undergo the CNSC's

## Draft REGDOC-2.2.1, Human Performance, Version 2

#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>The purpose of this document has changed significantly between v.1 and v.2. While v.1 was a statement of CNSC policy on Human Factors (originally P-119), v.2 identifies requirements for licensees. This change is problematic as existing documents (e.g. license condition handbooks, licensee programs and procedures, etc.) currently reference REGDOC 2.2.1 v1 in ways which will be inappropriate to v2.</p> <p>Suggested change: It would be much more straightforward to assign a different REGDOC number (e.g.; REGDOC-2.2.6) to Human Performance and retain 2.2.1 as the Human Factors policy statement or obsolete it altogether.</p> <p>Industry label: Major</p>	<p>standard implementation process, including future updates to licensing materials. As a result, no change was made to the REGDOC number.</p>
9.	BP, CNL, NB Power, OPG, CNA	1.2	<p>The words "Nuclear Facilities" appear to be missing after class I.</p> <p>Suggested change: Amend final sentence to read "This regulatory document contains requirements and guidance for all Class I <b>nuclear facilities</b> and uranium mines and mills applicants and licensees."</p> <p>Impact on industry: Licensees will need to trace all existing references to REGDOC 2.2.1 in their management system documentation to make the necessary updates.</p> <p>In the interim before such updates are complete, and in the event that some references are not updated correctly, there is the potential for confusion as REGDOC 2.2.1 is cited for incorrect purposes.</p> <p>Industry label: Clarification</p>	<p>The suggested change was made.</p>
10.	BP, CNL, NB Power, OPG, CNA	1.2	<p>REGDOC 2.2.1 should apply to nuclear facilities on a risk- informed basis.</p> <p>This determination should be the primary consideration in determining the necessary formality and rigour of the human factors / human performance program. In contrast, requiring a human performance program for all Class I nuclear facilities and uranium mines and mills may underestimate or overestimate the relevance of human factors / human performance to facility safety. Some Class I nuclear facilities and uranium mines and mills may be less dependent on human performance for safe operation, by the nature of the facility design (e.g., passive safety systems). Conversely, it is entirely possible that facilities other than those specified in the REGDOC (e.g., some nuclear waste facilities, medical facilities and/or research facilities) are dependent on human performance for safe operation and would</p>	<p>The Preface of the REGDOC has a reference to REGDOC-3.5.3, <i>Regulatory Fundamentals</i>, which contains a description of how the CNSC uses the graded approach in its regulatory oversight. However, to further clarify how the graded approach applies to REGDOC-2.2.1, the following text has been added to the Preface (which aligns with REGDOC-2.1.2, <i>Safety Culture</i>):</p> <p style="padding-left: 40px;">“A graded approach, commensurate with risk, may be defined and used when applying the requirements and guidance contained in this regulatory document. The use of a graded approach is not a relaxation of requirements. With a graded approach, requirements are applied in</p>

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			<p>benefit from a human performance program. The determination of applicability should be made based on the characteristics of the specific facility and its operations and is not necessarily generalizable to the license type.</p> <p>Suggested change: In practice, the CNSC and/or license applicants should determine during licensing the extent to which facility safety is dependent on human factors / human performance.</p> <p>Impact on industry: If not addressed, excessive or insufficient rigour may be applied, relative to risk resulting in an inability to meet CNSC requirements.</p> <p>Industry label: Major</p>	<p>proportion to risks and particular characteristics of the facility or activity..”</p> <p>The CNSC acknowledges that each licensee is unique and has their own systems and way of managing human performance, which this REGDOC allows for.</p>
11.	Prodigy Clean Energy	2	<p>Previous concerns with the requirement for a discrete program called "the Human Performance Program" overseen by a specific department in the organization appears to have been resolved with a definition of the term "Program" that has been provided in the Glossary. That is, the licensee is expected to present the various coordinated 'elements' within their management system to demonstrate requirements have been met. This means that Top Management may organize these elements as appropriate such that the objectives of Human Performance are achieved and monitored on an ongoing basis.</p> <p>Impact on industry: It is fully understood that it is not the regulator's role to prescribe specific methodologies that are acceptable to use to meet the objectives in requirements and guidance. However, it is important to note that the guidance that has been provided is not sufficient if faced with the prospect of having to build these programmatic elements from first principles. Even evaluating existing programs in a large organization could prove daunting. What specific skills and training are necessary to be qualified to lead this type of internal assessment effort? So although the requirements in this REGDOC are certainly necessary to improve human performance in the conduct of activities important to safety, security and environmental protection, it is not clear how it would be consistently implemented in different sized organizations with different levels of complexity. Suggest that rolling this REGDOC out will require a series of educational workshops for practitioners to understand how to achieve strong outcomes.</p>	<p>This comment correctly describes the intent in the REGDOC. The purpose of REGDOC-2.2.1 is to clarify and explain how the Class I Nuclear Facilities requirements can be met. Note that the defined term “program” has been replaced by “human performance program”, although the same characteristics have been retained to ensure that the intent remains clear.</p> <p>Refer to the response to comment 12, which includes new text that was added to the REGDOC to ensure that licensees are clear in our understanding of the form of the human performance program. The CNSC intends to offer supports, such as webinars or information packages, as part of its implementation of this REGDOC.</p>
12.	BP, CNL, NB Power, OPG, CNA	2.0	<p>The document refers to a Human Performance Program as an entity. Some facilities' management systems no longer have a stand-alone Human Performance Program as the concepts of human performance have been integrated into the various programs in the</p>	<p>As noted in the response to comment 11, the CNSC expects the licensee to present various coordinated elements within their management system to demonstrate that requirements have</p>

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			<p>management system. The philosophy of the REGDOC is human performance is integrated in all activities and the use of the terminology Human Performance Program throughout the document implies a non-integrated approach where a stand-alone program is needed.</p> <p>As written, this requirement could result in inspectors looking for a Human Performance Program and cause time to be spent between the regulator and the licensee understanding the management system structure.</p> <p>Suggested change: Recommend clarifying the language throughout the document to allow for licensees to document the requirements of this REGDOC across multiple programs and discontinue the terminology "Program" in the document.</p> <p>Amend terminology Human Performance Program requirements and clarify if there is an expectation for documenting human performance requirements, if so, they should be exclusively stated.</p> <p>For example, section 3.1.1 guidance to be amended to:</p> <p>Documenting the human performance <del>program</del> requirements can take the form of a roadmap or overview that references and describes how the management system policies, processes, procedures, and other documents relate to human performance. The documented human performance <del>program requirements</del> may also be a stand-alone document. Separate from the documentation approach, the human performance <del>program requirements</del> should be implemented using the management system to achieve the necessary cross-cutting scope and integration in relation to the business.</p> <p>For goals and scope of the strategy and practices, the scope of the human performance <del>program requirements</del> should specify the departments, processes, procedures and work tasks to which the program applies, and where it applies to contractors and vendors. This can also include the rationale for the <del>program requirements</del>, which explains why <del>a</del> human performance <del>program requirements are</del> are important to the licensee's goals.</p> <p>Industry label: Clarification</p>	<p>been met. This means that elements may be combined such that the objectives of human performance are achieved and monitored on an ongoing basis.</p> <p>The human performance program is cited in the <i>Class I Nuclear Facilities Regulations</i>, which is why this concept is elaborated in this REGDOC.</p> <p>The REGDOC explains that licensees can use a roadmap to point to elements of their program. The roadmap provides assurance to the CNSC that all the requisite components of a program are in place, even if not consolidated in a single "Program" document or plan.</p> <p>To further clarify the CNSC's intent, the following guidance has been revised in 3.1:</p> <p>"Documenting the human performance program can be done through a roadmap or in an overview that references and describes how management system documents, such as policies, processes, procedures or other documents, relate to human performance, or it may be in a stand-alone document. Licensees are not required to designate a formal human performance program in their management system. However, they should be able to identify the documents within their management system that relate to their human performance measures and which they consider as part of their human performance program. The approach taken should demonstrate that the licensee is addressing the cross-cutting scope and integration of human performance considerations across the business. This information only needs to be presented once."</p>
13.	BP, CNL, NB Power, OPG, CNA	Section 2 bullet 2	Human performance should not only be implemented in execution phases of the work, but it should be explicitly defined while planning the work.	The proposed change has been incorporated.

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			<p>Suggested change: Consider adding the word “plan”</p> <p>At the group level, how teams/departments <b>plan</b>, organize, supervise and resource the work, the importance they place on various aspects of the work.....</p> <p>Industry label: Clarification</p>	
14.	BP, CNL, NB Power, OPG, CNA	3.1, 3.2	<p>The inclusion of the concept of “Just Culture” in this document is inappropriate. Just Culture is an aspect of overall safety culture. The CNSC already has a REGDOC related to safety culture and any guidance related to culture should be part of that document (REGDOC 2.1.2) to prevent conflict or confusion. In addition, Just Culture incorporates more than just the aspects referenced in this REGDOC, which, could lead to further confusion.</p> <p>Furthermore, processes allowing personnel to raise safety concerns freely exist outside the human performance program. Clarification is requested to acknowledge that the licensee may have these processes outside of the human performance program.</p> <p>Suggested change: Remove reference to Just Culture in this document. Potential for conflict or confusion with existing REGDOCs.</p> <p>Impact on industry: Defining a culture that is separate from Nuclear Safety and Security Culture (NSSC) introduces inconsistencies in alignment and implementation in practice. Organizationally there should only be one culture.</p> <p>If there are unique aspects of "Just Culture" that need to be implemented, it is not clear what those are or how they are different from NSSC.</p> <p>Industry label: Major</p>	<p>While the term “just culture” has been removed from the REGDOC, desirable workplace attributes that can influence human performance are noted in the text. This complements the approach outlined in REGDOC-2.1.2, <i>Safety Culture</i>. See also the responses to comments 30 and 35.</p>
15.	BP, CNL, NB Power, OPG, CNA	3.1	<p>REGDOC 2.2.1 v.2 uses the terms “barriers” and “defences”. Only one of the terms should be used to avoid confusion.</p> <p>Suggested change: Consider standardizing to the use of ‘defence in depth’ in REGDOC 3.6. Reference: CNSC REGDOC 3.6, Glossary of CNSC terminology – “defence in depth (défense en profondeur)...”</p> <p>Industry label: Clarification</p>	<p>To remove possible confusion, “of barriers and defences” has been removed from the sentence.</p>

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16.	BP, CNL, NB Power, OPG, CNA	3.1.1	<p>REGDOC 2.2.1 should be clear that the human performance program must be implemented <b>as part of</b> the management system, not "<b>using</b> the management system".</p> <p>Suggested change: This should be clarified as "implemented <b>as part of</b> the management system".</p> <p>Industry label: Clarification</p>	The proposed change was made.
17.	BP, CNL, NB Power, OPG, CNA	3.1.1 bullet a	<p>The REGDOC states the licensee shall document the strategy and practices of their systemic approach for managing human performance by describing the goals and scope of the strategy and practice.</p> <p>Does this mean the development of a 5 year plan or live document since goals and scope are dynamic?</p> <p>Suggested change: Suggest making the following change to bullet (a):</p> <p>The licensee shall document the strategy and practices of their systemic approach for managing human performance by describing:</p> <p>a. the goals and scope of the <del>strategy and practices</del> <b>human performance requirements</b></p> <p>Industry label: Clarification</p>	<p>Documents that relate to a licensee's human performance program are meant to be managed on an ongoing basis, therefore the development of a separate document or submission of a plan is not required.</p> <p>For clarity, item a in 3.1 has been changed to:</p> <p>a. The goals and scope "of the human performance program"</p>
18.	BP, CNL, NB Power, OPG, CNA	3.1.1 bullet c	<p>The bullet states "how the licensee supports workers in day-to-day work". It is not clear what is meant by "support". The impact to the licensee could be significant depending on the intent.</p> <p>The impact of implementation will not be known until the statement is clarified.</p> <p>Suggested change: Clarify the intent of bullet c under 3.1.1?</p> <p>Industry label: Clarification</p>	To provide greater clarity on the types of supports that a licensee can provide, the following guidance has been added to section 3.1: "Licensees can demonstrate that they support workers in day-to-day work through training, procedures, supervision, tools, usable equipment, etc."
19.	BP, CNL, NB Power, OPG, CNA	3.1.1 Paragraph 2 of Guidance	It is not practical to specify the departments, processes, procedures and work tasks to which the program applies as this would lead to endless changes to the document. This also contradicts the statement made in section 2 that the human performance program is overarching.	As noted in the response to comment 1, the text has been modified in section 3.1 to clarify that human performance documents are to describe "how management system documents, such as policies, processes or procedures or other documents relate to human performance." The response to

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#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>Suggested change: Suggest removing guidance to specify the departments, processes, procedures and work tasks to which the program applies.</p> <p>Impact on industry: As written, this guidance would require that the program document be updated anytime the licensee makes changes to their departments, processes, procedures and work tasks. This would be an increase in administrative burden with no benefit to nuclear safety.</p> <p>Industry label: Major</p>	<p>comment 12 also identifies new text that was added to further clarify what the CNSC understands by program (i.e. that separate documentation isn't required).</p>
20.	BP, CNL, NB Power, OPG, CNA	3.1.1 Guidance, bullet 2	<p>Regarding the content "identifying any performance indicators and how this data is analyzed". It appears the intent of this point is to have performance indicators and to periodically use them to look for trends (and then act on them). The wording of "how this data is analyzed" is problematic as it suggests the CNSC is looking for documentation on how we would physically do the analysis of the data. The intent should be to see there is data and there is something being done with it, not how we get to that outcome.</p> <p>As written, the requirement to document how data is analyzed will be challenging to do and could be subject to frequent changes as technology for trending and artificial intelligence improves.</p> <p>Suggested change: Amend the 2<sup>nd</sup> bullet on page 4 of the document (in section 3.1.1 guidance) to read:</p> <ul style="list-style-type: none"> <li>• identifying any performance indicators and <del>how</del> <b>the need to periodically analyze</b> this data <del>is analyzed</del></li> </ul> <p>Industry label: Clarification</p>	<p>The revised text now reads as follows:</p> <ul style="list-style-type: none"> <li>• "identifying any performance indicators and any associated data, which should be periodically analyzed"</li> </ul>
21.	Cameco	3.1.2	<p>Document does not recognize the existing human performance requirements in management systems</p> <p>Many licensees integrate human factors and activities effectively into various programs in management systems. As such, human performance requirements must be implemented as part of the management system and not by "using the management system" as currently set out in 3.1.2 of the Document.</p> <p>Related to the previous comment, human performance requirements achieved through integrating human performance concepts as part of the management system facilitates a licensee's ability to apply a risk-informed approach to address factors that affect human performance. Although</p>	<p>As noted in the reply to comment 16, the text has been revised to "as part of the management system", instead of "using the management system".</p> <p>Licensees are expected to have a good understanding of the broad and systemic human performance program in their businesses. Documenting the human performance program enables this understanding to be communicated, both to the CNSC and within the business to ensure that this broad and systemic approach is being driven, understood and supported.</p>



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			<p>Guidance in 3.1.1 uses “roadmap” or “overview” as an alternative for a standalone program, the requirement for a “documented program” means that licensees are expected to create a new document and potentially a new department or group and identify a member of top management to be responsible for the “program” when there is no apparent value or safety benefit to doing so.</p> <p>Cameco recommends deleting all references to “program” from the Document to make it clear that additional documents may not be required to address factors that affect human performance.</p>	<p>If the existing management system fulfils the requirements in the REGDOC, then new documents would not be needed. Text was added to the guidance of 3.1 to further clarify this point.</p> <p>See the response to comment 12.</p>
22.	BP, CNL, NB Power, OPG, CNA	3.1.2 Guidance, 3rd bullet	<p>Clarification is required with regard to using a systemic approach when analyzing, recording and evaluating the HTO factors associated with work that went well.</p> <p>Suggested change: Suggest adding examples of what this will look like when implemented (i.e., lessons learned, post-job briefs, self-assessments). Suggest adding guidelines with regard to frequency. Will licensees have the flexibility to set their own frequencies?</p> <p>Industry label: Clarification</p>	<p>The systemic approach is about analyzing and understanding how the human, technology and organization aspects of the business interact in relation to human performance and applying this approach to continually improve. For this reason, the frequencies are not prescribed in REGDOC-2.2.1. No change was made to the content. CNSC staff will provide licensees with supports, such as webinars or information packages, as part of the implementation rollout.</p>
23.	BP, CNL, NB Power, OPG, CNA	3.1.2 Examples	<p>Clarification is required to establish that the list of examples provided will not be used for compliance verification.</p> <p>Suggested change: Suggest adding a note stating that this list of examples is not meant to be used as compliance verification.</p> <p>Industry label: Clarification</p>	<p>REGDOCs do not specify the CNSC’s compliance process, which is managed through separate regulatory oversight activities. The list is provided in a guidance section, using the “can” structure, simply to assist licensees in interpreting the CNSC’s intent. As stated in the preface, “can” is used to express possibility or capability only. No change was made to the text.</p>
24.	BP, CNL, NB Power, OPG, CNA	3.1.2	<p>REGDOC 2.2.1 should emphasize that human performance programs must address human factors, not human performance directly.</p> <p>“The licensee shall implement a systemic approach to managing human performance that supports safe and effective work for all workers.”</p> <p>re: “managing human performance”</p> <p>It is unclear how exactly a licensee’s program is expected to manage human performance. Generally individual performance is managed by each worker’s direct supervisor. It would not be practical to reassign this responsibility to a central department nor duplicate that effort. As such, it may be the intent of this REGDOC that a human performance program would actually</p>	<p>The comment is correct in that the factors that influence human performance need to be identified and understood in order to manage them for safe and successful human performance. The text in 3.2 was revised as follows to emphasize that this is done through the human performance program:</p> <p>The licensee shall implement a systemic approach to managing the human performance program that supports safe and effective work for all workers.</p>

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#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>focus on addressing <i>human factors</i> which are precursors to human performance. However, this is not explicitly stated.</p> <p>Suggested change: Rephrase this clause to emphasize improvements to human factors, not direct management of human performance.</p> <p>Impact on industry: Duplication of effort would detract from efficiency, but more importantly, human performance controls consisting mainly of supplementary oversight and human performance tools would be substantially less effective than addressing underlying human factors.</p> <p>Industry label: Major</p>	
25.	BP, CNL, NB Power, OPG, CNA	3.1.2	<p>REGDOC 2.2.1 should delineate process safety and personnel safety.                      “The licensee shall implement a systemic approach to managing human performance that supports safe and effective work for all workers.”                      re: “safe and effective work”</p> <p>This section glosses over an important distinction between process safety and personnel safety. While both are important, the programmatic controls applicable to process safety will often differ from the controls applicable to personnel safety.</p> <p>Suggested change: The REGDOC should clarify whether a licensee’s human performance program should have a mandate to support process safety, personnel safety, or both. In any case, the program’s practices should in fact support the stated goals. It may be useful to refer to Todd Conklin’s work in this regard, in particular critiques of the Heinrich triangle.</p> <p>Industry label: Clarification</p>	<p>The emphasis of section 3.2 is on the systemic approach, rather than on detailed consideration of different types of safety. The term “safe and effective work” is used because it is possible for effective work activities not to be safe, in terms of both personnel safety and process safety, and both types of safety are important. Process safety is addressed in REGDOC-2.1.2, <i>Safety Culture</i>. No change was made.</p>
26.	BP, CNL, NB Power, OPG, CNA	3.1.2	<p>The draft REGDOC 2.2.1 is focused on investigation, but should also emphasize improvement initiatives resulting from such investigation.</p> <p>This section provides some examples of processes supporting this goal. While this list is good, it emphasizes investigation, analysis and assessment without much in the way of intervention.</p> <p>Suggested change: The following missing elements should be added:</p> <ul style="list-style-type: none"> <li>• Identifying potential improvements, including both organizational changes and engineering changes</li> </ul>	<p>CNSC staff notes that section 2.4 organizational learning (note this section has changed with the latest edits), is about “having processes and methods to learn from both success and failure in the business, to understand the work as it is actually done and the system within which the work happens.” In addition, the first bulleted list under the guidance in section 3.4, now renamed “Developing and sustaining continual improvement”, has been reordered, with a revised final bullet that reads:</p>

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			<ul style="list-style-type: none"> <li>• Evaluating such improvements on their relative merits</li> <li>• Nominating meritorious improvements for implementation</li> <li>• Supporting organizational and engineering changes with human factors and performance expertise</li> <li>• Reviewing the effectiveness of implemented improvements</li> </ul> <p>Impact on industry: A human performance program focused on investigation without intervention cannot improve human performance.</p> <p>Industry label: Major</p>	<p>“to enable improved work activities to achieve the desired results”</p> <p>The intent of this revision was to emphasize the importance of applying the knowledge gained through assessments to ensure that changes are made and part of continual improvement. Note that the REGDOC is not intended to focus solely on investigation, and includes the breadth of approaches for understanding work.</p>
27.	Cameco	3.2.1	<p>Document duplicates and is inconsistent with other REGDOCs</p> <p>The draft REGDOC proposes to define the term “program” as “A group of related management system elements, such as policies, processes and procedures that are managed in a coordinated way,” and notes this will be added to REGDOC 3.6. The implication of this change on other REGDOCs that use this term is not clear because “program” has been interpreted as a distinct document. If there is a need to define the term “program,” then it would be more appropriate to do this through appropriate consultation associated with a revision to REGDOC-2.1.1, Management System.</p> <p>Section 3.2.1 requires that a member of top management be identified as responsible for the human performance program. This is inconsistent with other REGDOCs, which merely state that responsibilities are assigned in line with the management system, while a few REGDOCs (e.g., radiation protection, security) refers to “senior management.” This level of specificity is unwarranted and should be removed.</p>	<p>The term “program” has been replaced with a new term and definition:</p> <p><b>“human performance program</b> (<i>programme de performance humaine</i>)</p> <p>A group of management system elements, such as policies, processes and procedures, that are related to human performance and that are implemented and managed in a coordinated way.”</p> <p>The definition for “top management” has also been removed from the glossary and the term replaced with management or senior management, as applicable, in the document.</p>
28.	BP, CNL, NB Power, OPG, CNA	3.2.2	<p>Clarification is required on how licensees can consider work as it was done in practice.</p> <p>Suggested change: Suggest adding examples of ways licensees can consider work as it was done in practice</p> <p>Industry label: Clarification</p>	<p>The CNSC’s implementation of the REGDOC will focus on helping licensees understand the key concepts associated with human performance, including understanding the differences between a task, as it is documented in procedures, versus an activity, as it was performed by the worker in a given situation. CNSC staff will provide licensees with supports, such webinars or information packages, as part of the implementation rollout.</p> <p>The following text was added to the guidance of 3.4:</p>

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#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
				<p>“This can be accomplished through interviews, workers’ feedback, procedure walkdowns or supervisor/manager observations in the field, for example.”</p>
29.	BP, CNL, NB Power, OPG, CNA	3.2.2 list of processes for learning related to human performance and safety  3 <sup>rd</sup> Bullet	<p>The third bullet currently states that Licensees’ processes for learning related to human performance and safety should include training for all personnel on the aims of learning and improving work and what this means for their roles.</p> <p>The term “all personnel” should be replace with “<b>applicable</b> personnel” as not all personnel require this training.</p> <p>Suggested change: Suggest the following change:</p> <p>training for all <b>applicable</b> personnel on the aims of learning and improving work and what this means for their roles</p> <p>Industry label: Clarification</p>	<p>Regarding section 3.4 (formerly 3.2.2), personnel was changed to worker, but no change was made to the intent of the guidance, which is for all workers to understand that their organization encourages them to bring forth ideas for improvement, while also understanding how this applies to their position in the organization.</p>
30.	BP, CNL, NB Power, OPG, CNA	3.2.2 list of processes for learning related to human performance and safety  5 <sup>th</sup> Bullet	<p>The fifth bullet currently states that Licensees’ processes for learning related to human performance and safety should include using the principles of a just culture in conducting event analyses and disciplinary measures.</p> <p>Disciplinary measures are not defined in human performance program, does this mean we might need to include roles into human performance (Human Resources for example).</p> <p>Suggested change: Suggest deleting the following: “using the principles of a just culture in conducting event analyses and disciplinary measures”</p> <p>Industry label: Clarification</p>	<p>Disciplinary processes are a factor that can influence human performance and as such are in the scope of a human performance program.</p> <p>For clarity, the fourth and fifth bullets in 3.4 (formerly 3.2.2) have been replaced with:</p> <ul style="list-style-type: none"> <li>• a description of how an environment of openness and trust is fostered to encourage workers to report concerns and problems</li> <li>• event analyses that identify the context of human work activities and are used to understand the specific drivers of human performance</li> </ul>
31.	BP, CNL, NB Power, OPG, CNA	3.2.2	<p>This section deals with various topics. The second paragraph is about analyzing past performances while the rest is about Organizational learning goals and processes.</p>	<p>The first sentence of the paragraph in 3.4 was revised as follows: “When analyzing past performance in order to learn and improve, licensees should consider...”</p>

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#	Reviewer	Section	Reviewer's Comment and Proposed Change	Response
			<p>Suggested change: Suggest clarifying the text if the intent is to link analyzing past performance as a learning tool to achieving the goals listed above.</p> <p>Industry label: Clarification</p>	
32.	BP, CNL, NB Power, OPG, CNA	3.2.2	<p>Sections 3.1.2 and 3.2.2 should be reformulated to clarify each section's distinct requirement. In the present draft, they appear to overlap significantly.</p> <p>It is unclear how the requirement in 3.2.2 differs from the requirement in 3.1.2 – it would seem necessary that data gathering, assessment and other investigative methods are necessary to manage human performance as described in 3.1.2. Furthermore, section 3.1.2 already includes example processes for investigating events and organizational learning.</p> <p>Suggested change: It is suggested to reformulate the core requirements of the REGDOC such that they are mutually exclusive.</p> <p>Impact on industry: Lack of clarity in requirements will lead to confusion and inability to implement effectively, which will contribute to churn and a fundamental inability to achieve CNSC requirements.</p> <p>Industry label: Major</p>	<p>Section 3.2 (formerly 3.1.2) is about implementing a systemic approach, which views the business as a system and includes interacting human, technology and organizational factors. The examples provided under the guidance illustrate how a licensee can demonstrate that they are implementing the HP program.</p> <p>Section 3.4 (formerly 3.2.2) is about implementing processes related to continual improvement, but with a focus on organizational learning. The requirements outlined in 3.2 and 3.4 are part of a continuum and complement one another.</p> <p>The second last bullet from the guidance in section 3.2, about learning team approach, was moved to the guidance in section 3.4 to further clarify this point.</p>
33.	BP, CNL, NB Power, OPG, CNA	Glossary	<p>The term “humans, technology and organization (HTO)” is used without fully explaining it or defining it in the glossary.</p> <p>Suggested change: Add a definition of ‘HTO’ to the glossary or other explanation.</p> <p>Industry label: Clarification</p>	<p>Text in first paragraph of section 2.2 (formerly 3) describes HTO as the relationships between the humans, technology and organization. This concept is also addressed in CSA N286-12, although the word “humans” is replaced by “individuals”. In addition to adding this acronym to the glossary section and ensuring that it is clearly referenced in the definition for systemic approach, additional details on the HTO concept were added, as follows:</p> <p><b>2.2. Understanding the influences on human performance</b></p> <p>To form a complete picture of human performance, licensees need to take a broad view, known as the systemic* approach. The systemic approach helps to establish and make explicit the interactions between the humans, technology and organization (HTO) of the business and is key</p>

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				<p>to understanding, supporting and improving human performance. [new text follows] The HTO concept was established in the nuclear power industry to emphasize the relationships and interdependencies between the three elements:</p> <ul style="list-style-type: none"> <li>• the H sub-system includes a combination of physical, physiological, cognitive and social aspects related to people carrying out work activities</li> <li>• the T sub-system relates to the technology itself and how technology systems transform inputs to outputs</li> <li>• the O sub-system relates to the formal organizing arrangements and processes of the business, as well as the informal aspects of work activities, which are continually coordinated to achieve the business' goals</li> </ul> <p>The systemic approach provides a framework for understanding the different perspectives and influences on work activities, which can be explored to increasing degrees of complexity. The sub-systems can be used to describe, analyze and understand work as a dynamic system by looking at what they do and how they interact to reveal useful information about human performance within the context of the work as it is performed.</p>
34.	BP, CNL, NB Power, OPG, CNA	Glossary	<p>REGDOC 2.2.1 v.2 now defines the term “program” as “A group of related management system elements, such as policies, processes and procedures that are managed in a coordinated way”, and notes this will be added to REGDOC 3.6.</p> <p>This update to REGDOC 3.6 will substantively alter the meaning of REGDOC 2.5.1 Part A (Human Factors Engineering Program Plan), driving a requirement for programmatic implementation, rather than project-specific HFEPs as is currently the standard practice for some Class I nuclear facilities. This is because HFEPs written as individual project plans cannot be considered as management system elements per the new definition.</p> <p>Suggested change: Consider the impact on REGDOC 2.5.1 and determine whether an expedited revision or other interim clarification is required.</p>	<p>While the definition for “program” proposed in the consultation draft would not change the understanding of a human factors engineering program plan (HFEP), the term “program” was replaced with “human performance program”, and the definition was revised accordingly. No further change was made.</p>

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			<p>Impact on industry: The implied change to REGDOC 2.5.1 impacts other licensee programs.</p> <p>Industry label: Major</p>	
35.	Prodigy Clean Energy	Glossary	<p>Glossary: It is not clear why a new term "Just Culture" needs to be introduced into the Canadian Regulatory Framework. How is it any different from "Safety Culture" which, by definition, has the same expectations of human behaviour in the conduct of activities? Suggest deleting this term entirely as it is confusing and instead tying human performance to strong safety and security culture traits. The requirements articulated in this document appear to be clear and straightforward and their tie to safety and security is clear. The guidance would benefit from the addition of information on tools or methods that have resulted in acceptable outcomes. Even experienced organizations will struggle to understand "what good looks like".</p>	<p>The term "just culture" has been removed throughout the REGDOC, as it is clearer to identify aspects such as:</p> <ul style="list-style-type: none"> <li>• the management response to problems, where issues are managed with respect, trust and fairness</li> <li>• creating trust that errors will be treated fairly</li> <li>• encouraging reporting of problems and concerns, free from reprisal</li> </ul>
36.	Cameco	Glossary	<p>Inclusion of Just Culture</p> <p>Cameco strongly opposes the introduction of 'just culture' to a human performance REGDOC. The concept of 'just culture' is an aspect of safety culture and introduction of this concept outside of safety culture introduces inconsistencies and potential for conflict. In addition, 'just culture' incorporates more than just the aspects referenced in this REGDOC. To assign subculture designations to different functions or activities serves no purpose and will not only create confusion as well as inconsistent and duplicative REGDOCs, but also will not contribute to safety.</p>	<p>See the response to comments 14, 30 and 35.</p>