

OVERALL COMMENTS

Following a collective review of this Discussion Paper, industry is united in its belief that a REGDOC on Human Performance is not required. The topics discussed in the paper already exist within licensees’ management systems and the various programs they use to comply with *CSA-N286, Management Systems for Nuclear Facilities.*, we do not see a gap to nuclear safety that requires a REGDOC to help close.

Having said that, licensees appreciate the CNSC sharing the paper since it has illuminated the importance of ongoing work through COG to agree on general definitions and best practices in the areas of human factors and human performance. It has also shown the need to better engage the CNSC in this area since common definitions will lead to even better, industry-aligned efforts. It should also be noted the definitions of human performance and human factors cited in this paper are inconsistent with those in the CNSC’s recently published glossary of nuclear terms, which underscores the need for further consultation.

To continue the conversation this paper has started, licensees encourage the CNSC to host a workshop with all interested parties before any decisions are made regarding the need for any requirements or guidance in this area. In advance of a workshop, licensees offer the following set of detailed comments on this discussion paper, its potential impacts and suggestions for the CNSC to consider.

#	Document/ Excerpt of Section	Industry Issue	Suggested Change (if applicable)	Major Comment/ Request for Clarification	Impact on Industry, if major comment
1.	General	<p>This paper speaks to a human performance program being an overarching management document even though most licensees are already required to follow management standards such as CSA N286. It seems more reasonable that a management system would be a licensee’s overarching document.</p> <p>As noted during the comment period for proposed amendments to the Nuclear Safety and Control Act, it’s inappropriate to consider human performance as a regulated program. Human performance is, of course, important in nuclear plant operations, but so are many factors that are included in the management system. This appears to be an unwarranted effort to inappropriately raise the profile of one area above others.</p>	<p>Ensure regulations contain desired outcomes relative to nuclear safety, not activities like those detailed in a human performance program. These are more appropriately included in management system standards, such as CSA N286. As such, industry sees no compelling need for regulation in this area.</p>	MAJOR	<p>The approach described in this paper could lead to significant complexity. It could result in multiple, overarching programs and the need for licensees to prepare documents that are simply lists of cross references to controls and practices that already exist elsewhere. This level of redundancy and repetition would add a significant administrative burden upon licensees that would not necessarily make operations safer, just more complex and costly.</p>
2.	General	<p>The IAEA, in <i>NG-T-2.7, Managing human performance to improve nuclear facility operation</i>, says, “The idea of creating a programme just for HPI [human performance improvement model] is not a recommended strategy.</p>	<p>The regulatory framework should be aligned with IAEA best practices.</p>	MAJOR	<p>Misalignment within the industry. This discussion paper cites the IAEA in Section 6, yet it proposes a solution for human performance that differs from the IAEA.</p>

		Rather, all the basic principles and tools for excellence in human performance should be effectively integrated into all ongoing processes and programmes at a facility to ensure the desired results. The overall strategy and structure of the nuclear facility should be designed with the alignment of its processes and values for achieving the identified and communicated operational and safety goals.”			
3.	General	<p>This paper is not clearly written and uses unfamiliar, circular definitions that make it hard to distinguish the difference between human factors, organizational factors, human performance, a human performance program and the management system. It also appears to be biased toward human behaviour alone without emphasizing the importance of how defences and redundant systems can prevent events from escalating. It says 80% of events are due to human interaction, but does not identify if the correct defences to prevent the event were in place or lacking.</p> <p><i>(See comment #9 for additional concerns and suggestions regarding the definition of human factors.)</i></p>	<p>Host a workshop with industry and any other interested parties to collectively agree upon definitions and overarching objectives and principles for the application of the following aspects of the management system:</p> <ul style="list-style-type: none"> • Organizational Factors • Human Factors • Human Performance • Human Performance Program <p>Should this discussion paper ever evolve into more formal guidance, a direct link should be made to the balance between behaviours, defences and organizational factors to prevent events at the worker-plant interface.</p>	MAJOR	There is a risk of confusion between licensees and the CNSC if human performance is not clearly defined as per industry practice.
4.	Executive Summary	Industry has concerns with the statement, “...reduce the likelihood of safety events with human performance-related causes...” This implies that human performance is a cause of safety events.	Should this discussion paper ever evolve into more formal guidance, industry suggests using a phrase such as “...reduce the likelihood of safety events where human performance was allowed to factor into cause.”	Minor	
5.	Section 1 Page 2, Why Does Human Performance	Industry has concerns with the premise and accuracy of the opening sentence of the 2nd paragraph, which says, “When something does not go as planned, it is not unusual to trace the problem to actions of a front-line	Industry suggests the CNSC not use this statement unless it is supported by appropriate evidence.	MAJOR	If the basis of an argument is inherently flawed or false, inappropriate decisions will be made when regulatory documents are developed based upon invalid

	Matter?	worker, to classify the cause as a human error, and to stop there.” Many facilities spend significant resources and work hard to determine effective root causes and avoid this scenario. Unless supported by evidence, this is not valid.			information.
6.	Section 1 Last paragraph	As written, the paragraph on the Fukushima Daiichi accident applies to a single event rather than serving as an example of human performance going forward.	Should this discussion paper ever evolve into more formal guidance, industry suggests using words such as, “While human performance is a crucial part of routine work, it is also important when people need to carry out infrequent or novel actions, such as the challenging and stressful work conditions that followed the Fukushima Daiichi accident.”	MAJOR	Leads to confusion within the industry.
7.	Section 2 Human Performance	Industry seeks clarification what is meant by the final sentence on page 2, which is ambiguous when it says, “Therefore, both the behaviours and the results of human performance provide degrees of value to the organization in terms of how they align with organizational goals, including safety.”		<i>Request for Clarification</i>	
8.	Section 2 Page 3, paragraph 3,	What is the intent of the statement in line 4, which says, “... in performing identical tasks, humans will vary the exact action and activities in minor, but potentially significant ways.”		<i>Request for Clarification</i>	
9.	Section 3 Human Performance and Human Factors	Defining human factors as “those factors that influence human performance” is overly broad and vague. All aspects of a facility -- including its management system, social and economic conditions, physical design, as well as non-work related experiences and situations -- can influence human performance. The inherent characteristics of humans, the specific characteristics of individuals or groups of workers also influence work behaviours and results. Given this, this definition in this paper does not actually provide guidance because it can be interpreted as essentially	Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC: 1) Align its definition of human factors with the one currently being developed by licensees through a COG Working Group. 2) Call the list “factors” that influence human performance rather than “Human Factors” 3) Separate “latent organizational weaknesses” to describe many of the	MAJOR	Defining human factors in this broad way adds no value but does create confusion. In reality, all items in a work environment impact human performance. This makes the human performance program the entire management system if you include the definition for human factors. As per comment #1, this would erroneously make human performance the overarching program for an organization, which should be the management system.

		<p>everything about the facility, the worker and the environment around them. Considering these components are already included in other programs, licensee’s management systems and Licence Condition Handbooks, it is unclear why they would be replicated in a separate program. This supports industry’s belief there is no compelling need for regulation in this area, as detailed in comment #1.</p> <p>The definition and supporting references in this section are also circular. They define human factors in terms of human performance by giving examples of human factors that are then used as examples of elements of a human performance program later on, e.g. fitness for duty, organizational culture, etc.</p>	<p>factors currently listed. For example, weather is a factor that may influence how a person performs a task and needs to be considered when planning work. However, a poor procedure is a latent organizational weakness that could set a person up for failure and needs corrective action to improve human performance. Distinguishing latent organizational weakness from factors allows organizations to recognize these areas and take correct action rather than simply implementing an additional barrier.</p>		<p>Such a broad definition also makes it difficult to understand the scope of how it is applied in Section 4, which says the CNSC expects human performance programs to achieve many objectives, including the “active support of human performance through managing human factors, to achieve safe and effective outcomes.” Human performance programs do not manage human factors. They provide the standard, oversight and support the facility or business line to implement human factors.</p> <p>Human factors are also explicitly linked to design in Section 5, which appears to contradict the overly-broad definition used elsewhere in the paper.</p>
10	Section 4 Human Performance Programs	<p>Licensees have concerns with the 5th bullet in the list of practices to achieve the objectives, which says, “assurance that human error is considered as a potential symptom of deeper issues, instead of the sole cause of failure.”</p>	<p>Industry suggests the CNSC consider that human error can contribute to an event but is never the sole cause. (An exception could be made in the rare instance that an event was caused by a violation.)</p>	MAJOR	<p>As written, this could be interpreted that human performance can be the cause of an event. This detracts from the purpose of human performance as a system acting to support the worker.</p>
11	Section 5 Elements of a Human Performance Program	<p>Again, the description of a human performance program concept is incomplete and confusing. The elements listed in this section are not considered part of a human performance program at all, but elements of a human factors program that can help achieve good human performance as it relates to a management system.</p> <p>In fact, the majority of these elements are already part of other programs and addressed as part of licensee’s management systems and Licence Condition Handbooks. It is unclear why they would be replicated in a separate program and difficult to understand how a</p>	<p>Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC:</p> <ul style="list-style-type: none"> • Remove the word “program” from this type of reference. • Provide significantly more detail on the concept of a human performance program so it can be truly understood and its impacts considered, particularly for different sized facilities. This would help lay the ground work for a graded approach for all facilities to create their programs and for how the CNSC will 	MAJOR	<p>This entire section provides insufficient detail for facilities to assess what is a human performance program. As per comment #9, defining human factors as factors that influence human performance seems like a circular reference that add no value to licensees. Any confusion on the scope of a human performance program detracts from its potential benefits.</p>

		separate human performance program might work in practice.	<p>regulate using a graded approach.</p> <ul style="list-style-type: none"> • Consider IAEA document NG-T-2.7 Managing Human Performance to Improve Nuclear Facility Operation, which supports a Re +Md = OE view saying strategic approach to improving Hu Performance is really defined by two elements. 1) Anticipating, preventing, catching and recovering from errors on the job. 2) Identifying and eliminating organizational weaknesses, which induce and set individuals up for failure, by establishing and managing error defences. • Consider benchmarking elements with NUREG/CR-6751: The Human Performance Evaluation Process: A Resource for Reviewing the Identification and Resolution of Human Performance Problems, March 2002 		
12	Section 7 Human Performance and Management Systems	<p>Industry seeks clarification as to how, if you are in a process model for a management system, the HU program can be defined.</p> <p>Once again, this section highlights how defining human factors as factors that influence human performance is circular and adds no value to licensees. In reality, all items in the work environment impact human performance. As per several earlier comments, this makes the human performance program the entire management system and erroneously makes the human performance program the overarching program for an organization</p>	Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC keep the management system definition used here and clarify how the HU program can be defined within a process model.	<i>Request for clarification</i>	
13	Section 8 Graded	Industry strongly believes a graded approach to human performance is important.		MAJOR	A risk informed/ graded approach would be a significant positive impact on both

	Approach				large and small licensees
14	Section 9 CNSC Expectations of a Human Performance Program	This section appears to undermine the ability of a licensee to adopt an informal “road map” approach and, to some extent, a graded approach.	Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC ensure these concepts are clearly articulated.	MAJOR	As written, this section would require a significant investment in human performance programs for all licensees and all aspects of their business, regardless of the benefit.
15	Section 9 CNSC Expectations of a Human Performance Program	The use of the term human factors in the 1 st sentence on Page 10 is circular and confusing.	Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC use the phrase “Performance Influencing Factors,” which is more appropriate in this context.	MAJOR	When human factors’ nomenclature is introduced, some users may get stuck in the human factors Engineering mindset. Performance Influencing Factors are very specific and acceptable industry wide.
16	Section 10 A Note on Human Performance Tools	Industry has concerns with the first sentence of the 2 nd paragraph, which says, “The CNSC considers human performance tools to have value when they are viewed as a final defence in preventing an error ...” This statement is open to multiple interpretations, one of which is that they are only of value when viewed as a final defence in preventing an error. In reality, event-free tools are not always a final defence. Pre-job briefs are event-free tools used before tasks are assigned and post job debriefs are tools used after a task is performed to learn and improve performance during future tasks. Individuals then rely on procedures, training, supervision, etc. Post-maintenance testing is also completed based on risk and is a barrier after a task is completed.	Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC reconsider its wording in this area. The sport’s analogy in this section tends to reinforce the “final defence” view rather than clarify that event-free tools are an important element of an overall human performance program. Wording similar to the following is suggested to convey the intended message without the sports analogy: “The CNSC considers human performance tools to be an important part of an organization’s human performance program. They work with the organization’s management system to identify and strengthen defences against events, with the various elements of the program working together to contribute to defence in depth.”	MAJOR	As currently written, this paper minimizes the importance of event-free tools or other defenses put in place.
17	Section 11 A Note on Human Error	The discussion on human error is unclear.	Should this discussion paper ever evolve into more formal guidance, industry suggests the CNSC clearly outline how the majority of the time workers don’t cause failures. Instead, they trigger the latent	MAJOR	Unless clarified, passages like those in Section 11 create confusion regarding the science of human error.

			<p>conditions that lie dormant in organizations waiting for this specific moment in time. If we fixate on consequence, the more aggressive rules will become, which creates an environment of violation. There is a need to stop seeing workers as the problem to fix to focus on how to fix the systems.</p> <p>The CNSC might consider other error definitions, like those from Sidney Dekker's <i>The Field Guide to Understanding Human Error</i>:</p> <ul style="list-style-type: none"> • Human error is not a cause of failure. Human error is the effect or symptom, of deeper trouble. • Human error is not random. It is systematically connected to features of people's tools, tasks and operating environment. • Human error is not the conclusion of an investigation. It is the starting point. 		
18.	Section 11 Page 11 last paragraph	The use of the phrase, "...to go right..." is vague. Also, the phrase "...to do the right thing..." seems to imply workers are trying to do the wrong thing.	Please explain the intent of these phrases.	<i>Request for clarification</i>	

RESPONSES TO CNSC QUESTIONS – DIS-16-05 Human Performance

Q 1. Do you agree with the definition of human performance as stated above? Are there changes or alternative definitions you would propose?

Industry does not agree with the definition introduced in this discussion paper, which includes the phrase “results of human activities.” Under certain circumstances, it may be viewed as promoting inappropriate (unsafe) behaviours to achieve a desired result. Licensees suggest the CNSC host a workshop with all interested parties to agree upon a clearly-written definition industry could align with based upon a common understanding and actual work in the field. A more accurate definition would recognize that human performance includes various factors that affect the behaviour of humans. It would also recognize the distinction between behaviours and their results (accomplishing a specific objective or task). Ahead of a workshop, licensees and the CNSC might consider the definitions used by WANO/INPO, IAEA and other established industry groups that use descriptors such as *series*, *variables* or *system*. For instance, the INPO definition says HU is a “series of behaviours executed to accomplish specific results.” The IAEA definition includes the phrase “variables that influence” while the American Department of Energy’s definition includes the phrase, “a series of behaviours.” FIT calls human performance “a system comprising People and the Work Environment.”

Q 2. Do you propose any changes or alternatives to the CNSC’s existing definition of human factors? Please provide rationale for any proposed changes or alternatives.

Industry believes defining human factors as “those factors that influence human performance” is overly broad and vague. All aspects of a facility -- including its management system, social and economic conditions, physical design, as well as non-work related experiences and situations -- can influence human performance. The inherent characteristics of humans, the specific characteristics of individuals or groups of workers also influence work behaviours and results. Given this, the definition in this paper does not actually provide guidance because it can be interpreted as essentially everything about the facility, the worker and the environment around them. Considering these components are already included in other programs, licensee’s management systems and Licence Condition Handbooks, it is unclear why they would be replicated in a separate program. The definition and supporting references in this section are also circular. They define human factors in terms of human performance by giving examples of human factors that are then used as examples of elements of a human performance program later on, e.g. fitness for duty, organizational culture, etc. Definitions as they relate to the application of human factors engineering are not outlined clearly. Again, licensees suggest the CNSC host a workshop with all interested parties to agree upon a definition of human factors this based upon a common understanding and actual work in the field.

Q3. Do you agree with the objectives and practices of a human performance program listed above? Are there items that you would add to or remove from the lists? Please explain.

Industry does not agree because the definitions of human factors and human performance program are not correct. The objectives are NOT written in a specific, measurable, achievable, or reasonable way and the practices listed for a human performance program are not all-inclusive and should not be contained in a list or be prescriptive. The description of a human performance program as a set of coordinated activities is too limited since human performance is a system that is integrated into a program, not a program itself. Achieving excellence in human performance relies on a significant, over-riding leadership component and a significant planning phase to set workers up to succeed.

For reference ahead of a potential workshop, licensees and the CNSC might consider IAEA document **NG-T-2.7 Managing Human Performance to Improve Nuclear Facility Operation**, which supports the Re+Md view saying, *"The strategic approach to improving human performance is really defined by two elements: (1) Anticipating, preventing, catching and recovering from errors on the job; (2) Identifying and eliminating organizational weaknesses, which induce and set individuals up for failure, by establishing and managing error defences."* This IAEA document also addresses human factors concepts as well as Corrective Action Program concepts. Most nuclear utilities have separate processes for documentation management, fitness for duty, ergonomics, human performance, human factors engineering, etc.

Q4. Do you agree with the elements of a human performance program listed above? Are there items that you would add to or remove from the list above? Please explain.

Industry does not agree because the definition of human factors and human performance program are not correct. Industry believes the elements are too prescriptive. As written, they could inadvertently mandate organizational design and a stand-alone program that would not take advantage of the synergies and best practices of an integrated approach within the management system. Industry does not believe the elements as listed are all inclusive. Again, industry encourages the CNSC to conduct a workshop with all interested parties to discuss the elements of a human performance program once commonly understood and accepted definitions are derived.

Q5. Do you agree with the concept of a human performance program described above? If you would propose other ways of viewing a human performance program and its elements, please describe them.

No. This is not a program, but another consideration for an integrated management system. Programs require distinct processes that can be easily described and performed with clear, measurable goals and outcomes. Industry believes the best human performance program is not a stand-alone program document, but one where the elements are integrated within the appropriate parts of the management system as outlined in *CSA N286-12* and *IAEA Safety Fundamentals No SF-1*. The CNSC references SF-1 on page 6-7 as identifying “the need for an integrated approach to human performance (sections 3.12 and 3.14).”

Q6. Do you think that the requirement to have a human performance program should be applied using a graded approach to all CNSC-licensed facilities and activities? If so, what might this graded approach look like?

Industry sees no compelling need for regulation in this area. The mandate of the CNSC is to protect the health and safety of Canadians and the environment. Imposing regulations in this area would add a significant administrative burden upon licensees which would not necessarily make operations safer, just more complex. Every facility has a variety of factors that make up risk. The higher the risk, the more focus there has to be on improving human performance. Industry believes a graded approach works well, but feels the discussion paper does not do much to enable the application of a graded approach. Instead, the paper reads very prescriptive with lists of objectives, elements, and practices. Industry supports the CNSC alternative outlined on page 8 beneath the heading Graded Approach, which says, “a human performance program may be a defined and collectively managed set of interfaced activities and initiatives, which consider the elements of human performance and aims of the program, but without being a formal program within the management system.”

Q7. Which type of human performance program (a formal program or otherwise) is most appropriate for the types of nuclear facilities most relevant to your comments, and why?

Industry disagrees with the distinction of a “formal” program or otherwise. A graded approach means some licensees will focus on certain aspects of human performance (with justification) and other facilities will focus on a different set of human performance elements (again, with justification provided in their planning/program documentation.) The focus should be on: (a) How does a licensee’s management system address the human performance elements? (b) How is this approach relevant/important for a licensee’s particular facility?

Q8. Do you propose any additional or alternative expectations of a human performance program?

Industry believes the expectations outlined in section 9 are too formal and prescriptive. In many cases, they not provide clear expectations but simply examples of application of human performance practices. Once again, licensees encourage the CNSC to host a workshop with all interested parties to discuss this and all other questions posed in this discussion paper.



February 15, 2017

Mr. B. Torrie
Director General, Regulatory Policy Directorate
Canadian Nuclear Safety Commission
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Dear Mr. Torrie:

Canadian Nuclear Association Comments on DIS-16-05: Human Performance

The Canadian Nuclear Association (CNA) and its members would like to thank the CNSC for initiating a discussion around Human Performance by issuing Discussion Paper DIS-16-05. The CNA believes that the Discussion Paper has served a very important purpose in highlighting significantly different points of view on a number of fundamental issues beginning with the basic definitions of Human Performance and Human Factors.

Industry met to conduct a collaborative review of the Discussion Paper and our comments on it as well as responses to the questions posed by the CNSC are attached. However, I would like to highlight a couple of significant comments:

- A) During industry's review of the Discussion Paper, it became clear to us that the first step in this process needed to be a fulsome discussion to develop consistent definitions and a common understanding among licensees and the CNSC as to the meaning and application of human performance and human factors.
- B) The CNA and its members feel that there is no need for a REGDOC on Human Performance. The topics discussed in the paper are all currently covered by existing licensees' management systems and programs. We do not see a gap in nuclear safety that would require a REGDOC.

Notwithstanding both the above highlights and the attached comments let me reiterate, the CNA's view, that the Discussion Paper proved valuable in highlighting the need for a continuing conversation on the topic of Human Performance. To that end, the CNA would strongly encourage the CNSC to host a workshop to begin the process of coming up with a common language around the application of human performance and human factors.

If you have questions or would like to discuss these comments further, please do not hesitate to contact me.

Sincerely,

Steve Coupland
Director, Regulatory and Environmental Affairs
Canadian Nuclear Association

The future is NU. Le nucléaire, voie de l'avenir.