Nuclear **Program**

TITLE
HUMAN PERFORMANCE

AUTHORIZATION	
DOCUMENT OWNER:	Yasamin Dadashi Senior Manager, CFAM, Human Performance, Acting
APPROVAL FOR ISSUE:	Jack Vecchiarelli VP, Nuclear Regulatory Affairs and Stakeholder Relations
AUTHORIZATION AUTHORITY:	Bob Jackowski Director, CFAM, Operations

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PURPOSE AND SCOPE

This program:

(a) Establishes a systematic framework for Human Performance (Hu) management across Ontario Power Generation, Nuclear (hereafter referred to as Nuclear).

(b) Achieves higher levels of nuclear and industrial safety, higher unit reliability, and reduced operating costs through event-free operation.

(c) Describes key accountabilities, core processes and related activities associated with the conduct of Hu management across all facets of Nuclear [e.g. Darlington Nuclear (DN), Pickering Nuclear (PN), Nuclear Refurbishment (NR), Nuclear Waste Management (NWM), and Inspection and Reactor Innovation (IRI).]

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1.0 DIRECTION

The Human Performance (Hu) program is executed through a series of documents that support management of Human Performance. Collectively, these documents illustrated in Figure 1, Human Performance Management Framework, lay the groundwork for improving and sustaining performance. Specifically, this program provides guidance to reduce the probability and consequences of human error associated with the worker – machine interface required to operate, maintain and support a nuclear power plant or facility.

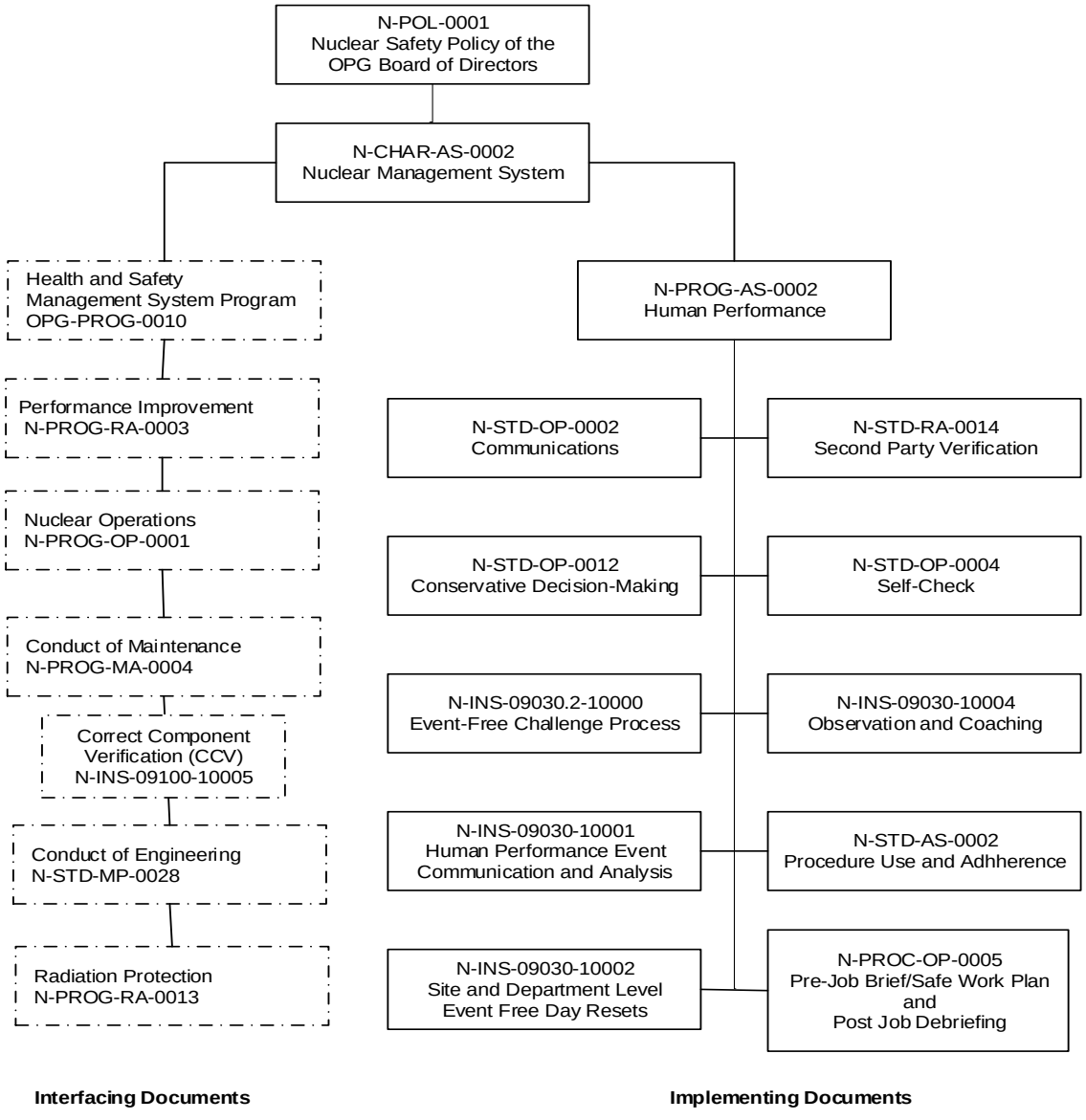

Figure 1: Human Performance Management Framework

1.1 Vision

Nuclear is recognized as an event-free operator, applying error reduction techniques and controls to achieve safe, reliable, and cost-effective generation of electricity.

The goal of the Hu program is to continually reduce the frequency and severity of events through the systematic reduction of human error and the management of defences in pursuit of zero events of consequence.

1.2 Human and Organizational Factors, and Technology (HOF&T) [B-5]

Human Performance is the behaviours of people in the work environment to accomplish results. Workers are influenced by human and organizational factors, technology, job-site conditions, and the leadership values exhibited by leaders/management.

The interaction between three categories of individuals, technology, and organization is a conceptual framework to represent a systemic approach to support excellence in worker performance. Each category is comprised of various factors that influence human performance. The worker is one part of the system in which work is carried out therefore reflecting on the multiple causes and effects that come to bear on the worker during all phases of job planning, execution and learning is necessary.

- The *Individuals* category encompasses workers including their individual capabilities, limitations, knowledge and experience, motivation, physiological and psychological fitness.

- The *Technology* category encompasses aspects of equipment and job site conditions. This includes examples such as environmental factors, i.e. noise, heat, lighting, etc., software/electronic systems, tools and human-machine interfaces.

- The *Organization* category has factors that encompass all the ways management uses to direct and coordinate work which together impact the behaviour of people including for example, standards and expectations, work processes, communication methods, and resources.

1.3 Nuclear Professional

There is a set of Nuclear Professional Performance Objectives identified in WANO PO&C 2019-1, Nuclear Professionals NP.1.

Nuclear professionals apply the essential knowledge, skill, behaviours and practices needed to conduct their work safely and reliably.

Nuclear professionals understand the risk associated with assigned jobs and apply the appropriate measures to manage risk. They first and foremost implement their work in a way that protects the operation of the reactor core and the barriers to the release of radioactivity. They also manage the potential operational, radiological, industrial and environmental risks associated with their work.

OPG fleet has developed a definition of a Nuclear Professional: "*I understand my impact on the core, my peers and our community. I care to take actions to protect them*". To behave as a Nuclear Professional is to consider this impact when performing every task, every time.

There are 15 Nuclear Professional criteria which define the desired behaviours for every worker in Nuclear. The Hu implementation documents listed in Section 1. are aligned with the appropriate NP criteria.

1.4 Reducing Errors, Managing Defences and Latent Organizational Weaknesses

(a) Reducing Errors

Reducing human error that may result in events must include risk-reduction activities and business resiliency for normal operations, emergency and abnormal events. The frequency of error may be reduced through:

(1) Organizing tasks to anticipate and prevent specific errors that may cause events.

(2) Periodic self-assessments of work processes and cultural practices to uncover weaknesses with programs, policies, processes, values, and beliefs that set people up for error and make the plant or facility vulnerable to an event.

(3) Establishing controls to either prevent or contain errors that may cause events.

(4) Strategies and plans to manage error proactively, take corrective actions when errors do occur to prevent them from recurring, and potentially leading to events.

(b) Managing Defences

People are fallible, and even the best people will make mistakes. The risks associated with human error are managed through defence in depth. Defences prevent, catch, or mitigate the effects of error. Defences are established through the following:

1) Engineered controls that optimize equipment condition and the human-machine interface.

2) Administrative controls such as procedures and training.

3) Cultural controls that address the values, attitudes, beliefs, and habits of the workforce.

4) Management and oversight controls that promote accountability for managing defences.

(c) Latent Organizational Weaknesses

Latent organizational weaknesses (LOWs) are hidden deficiencies in management control processes (for example, strategy, policies, work control, training, and resource allocation) or values (shared beliefs, attitudes, norms, and assumptions) creating

workplace conditions that do not prevent errors (precursors) and degrade the integrity of defences.

1.5 Approaches to Human Performance

1.5.1 Proactive Approach

Error precursors, flawed defences, and LOWs are proactively identified and addressed through careful examination of the following areas:

1) Current results (as examined through program owner reviews, business and strategic planning activities, and internal and external assessments).

2) Processes and values that support these results (as examined through program owner reviews, and internal and external assessments).

3) Job site conditions that set the stage for Hu (proactive identification of hazards through trending activities, observation and coaching, effective PJBs and Safe Work Plans).

4) Individual behaviours of workers executing activities (as examined through observation and coaching, supervisory activities, and internal and external assessments).

5) Leadership defining expectations, modeling behaviour, and holding the organization accountable to high levels of Hu (as examined through divisional performance monitoring and internal and external assessments).

1.5.2 Reactive Approach

Error precursors, flawed defences and LOWs are addressed through root and apparent, causal analysis, accountability analysis and Learning groups to facilitate learning.

2.0 KEY HUMAN PERFORMANCE PRINCIPLES

There is a set of fundamental human performance principles that support human performance excellence, and support licensee commitments to nuclear safety and their business goals.

These principles are enacted within the management system, which intrinsically means that leaders and individuals understand the application of human performance and human factors within their management systems.

1. Humans are fallible and even the best people make errors.
2. Errors can occur throughout the system and, as such individuals at all levels must take personal accountability to apply human error reduction techniques and managed defences to mitigate human error.
3. Individual and team behaviours and results are influenced by human and organizational factors, and technology.
4. Many error-likely situations are predictable, manageable, and preventable.

5. Encouragement and reinforcement received from leaders, peers, and subordinates contributes to high levels of performance.
6. Events can be reduced by understanding the reasons mistakes occurred as well as learning from success.

2.1 Supporting Governance

The following documents support the Hu program:

2.1.1 N-PROC-OP-0005, Pre-Job Brief/Safe Work Plan and Post-Job Debriefing [B-2]

This procedure provides guidelines for conducting verbal and written Pre-Job Briefings (PJBs) and Post-Job Debriefings (PJDs).

PJBs communicate necessary information to perform the task and ensure that personnel know what is expected of them. Effective, interactive PJBs assist in safe and efficient planning, preparation, and execution of activities. Effective PJDs provide feedback so lessons learned are recorded and subsequent performance improved.

2.1.2 N-STD-AS-0002, Procedure Use and Adherence [B-4]

This standard provides requirements for usage of, and adherence to approved procedures

2.1.3 N-STD-OP-0002, Communications [B-1]

This standard specifies requirements for both verbal and written communication practices when performing maintenance and operating activities including expectations for three-way communication and use of phonetic alphabet.

2.1.4 N-STD-OP-0004, Self-Check

This standard describes the features of the Nuclear Self-Check Program.

2.1.5 N-STD-OP-0012, Conservative Decision-Making

This standard provides management expectations for a conservative decision-making culture and establishes responsibilities and accountabilities for affected Managers to ensure conservative decisions are made.

2.1.6 N-STD-RA-0014, Second Party Verification [B-3]

This standard establishes the scope and extent of verification and degree of independence required and, to prevent errors going undetected, specifies requirements for verification when a second person confirms a specific task or activity satisfies established requirements.

2.1.7 N-INS-09030.2-10000, Event Free Challenge Process

This instruction identifies high-risk tasks and scrutinizes those tasks in a “challenge” meeting. Challenge meetings determine if a job is ready to proceed, and improves communication and coordination among those performing the task.

2.1.8 N-INS-09030-10001, Human Performance Event Communication and Analysis

This instruction provides a timely and consistent response, initial data collection, communication and analysis of Site Event Free Day Reset (S-EFDR) and Department level Event Free Day Resets (D-EFDR).

2.1.9 N-INS-09030-10002, Site and Department Level Event Free Day Resets

This instruction provides criteria for application and administration of site and department Level EFDR program. S-EFDR and D-EFDRs are indicators of Hu program health. S-EFDR performance is reported monthly into the Electronic Performance Reporting (EPR) system.

2.1.10 N-INS-09030-10004, Observation and Coaching [B-2]

This instruction provides expectations for conducting management workplace observation and coaching in Nuclear to positively reinforce the Nuclear Values, Nuclear Safety Principles, desired behaviours, and identify and coach areas for improvement.

2.1.11 Benchmarking Activities

NX-1031 – Organizational Effectiveness: Benchmarking (Institute of Nuclear Power Operations [INPO] Nuclear Exchange document) provides a process for conducting effective benchmarking.

2.2 Interfacing Programs

N-POL-0001, Nuclear Safety Policy, establishes Ontario Power Generation’s Board of Directors nuclear safety principles, expectations and objectives.

2.2.1 OPG-PROG-0010, Health and Safety Management System Program

This program implements and integrates a series of standards and procedures ensuring conventional health and safety of nuclear personnel and contractors.

2.2.2 N-PROG-RA-0013, Radiation Protection

This program implements a series of programs, standards and procedures for activities within nuclear facilities and with radioactive materials intended to achieve and maintain high standards of Radiation Protection (RP).

2.2.3 N-PROG-RA-0003, Performance Improvement

This program establishes processes to ensure deficiencies, non-conformances, weaknesses with processes, documents, service or conditions that adversely impact, or may adversely impact plant operations, personnel, nuclear safety, environment or equipment and component

reliability are promptly identified and corrected. The Corrective Action Program provides processes to ensure in-house and industry Operating Experience (OPEX) is evaluated, distributed, and applied to implement actions that improve plant safety and reliability. The Hu program relies on the Corrective Action Program as a vehicle to ensure learning from experience and to address and correct LOWs, flawed defences and error precursors.

2.2.4 Conduct of Operations, Maintenance, and Engineering

N-PROG-OP-0001, Nuclear Operations, N-PROG-MA-0004, Conduct of Maintenance, and N-STD-MP-0028, Conduct of Engineering, implement a series of standards and procedures for Operations, Maintenance, and Engineering.

2.2.5 Correct Component Verification (CCV)

N-INS-09100-10005, Correct Component Verification (CCV) receives authority from N-PROC-MA-0006, Work Performance and is applicable to all departments performing maintenance activities. The purpose of CCV is to ensure equipment and components are correctly identified and verified prior to performing work.

2.3 Human Performance Monitoring, Oversight and Coordination

To maintain oversight of organizational progress, each facility (DN, PN, NR, NWM, and IRI) shall establish monitoring and oversight forums. Hu oversight forums will review and compare performance with standards of excellence to gauge the effectiveness of performance improvement efforts; including:

(d) Trending data in the aggregate to identify strengths as well as areas for improvement.

(e) Documenting improvement activities, clearly identifying timelines, accountabilities, targets, and measures.

(f) Monitoring implementation of initiatives, corrective actions, and hold line management accountable for results.

(g) Monitoring use of the Accountability Analysis Model, as described in N-INS-09030-10001, Human Performance Event Communication and Analysis.

2.3.1 Members of these forums should hold sufficient authority to execute change in their areas of responsibility. Oversight forums may include Station Oversight Committees, Corrective Action Review Boards, Management Review Meetings, or other forums deemed appropriate by the division for addressing Hu issues.

2.3.2 In addition to division-specific forums, a Human Performance Peer Team shall be established and shall provide monitoring, oversight and coordination on Nuclear-level progress toward Hu goals, in accordance with N-INS-08400-10026, Corporate Oversight Conduct of Nuclear Fleet Peer Teams and Programs.

Monitoring, oversight and coordination is provided through the following:

(a) Periodic review of station-specific Hu goals and priorities.

(b) Identification and monitoring of Nuclear-wide initiatives for common Hu challenges or improvement opportunities.

(c) Periodic assessments of program goals.

(d) Identification of staff training needs and monitoring of the effectiveness of training.

(e) Coordination of major Hu activities.

(f) Monitoring of program costs.

(g) Establishing and maintaining standard processes across the sites and all functional areas.

(h) Managing change effectively to minimize risk and impact on safe and reliable facility operations.

(i) Establishing and maintaining key performance indicators.

(j) Monitoring monetary losses due to Human Performance. (See definition in Section 4.1)

2.4 Training

Training requirements for individuals involved in the implementation, facilitation, and management of the Human Performance Improvement (HPI) have been identified in the Human Performance Qualification, QUAL ID 42933.

Identified Hu practitioners within Hu departments or line organizations should be linked to the QUAL and are required to complete all the requirements of the qualification. This training supports the organization in becoming a High Reliability Organization (HRO) through the study and application of Human Performance principles.

In cases where a Hu practitioner has received equivalent, accredited Hu training the Hu CFAM may approve the equivalent training to deem the individual qualified.

Human Performance Advocates do not require the Human Performance Qualification to fulfil their role as advocates although they may have an opportunity to attend Human Performance training sessions required for the QUAL, and are encouraged to do so whenever possible.

Human Performance CFAM and site Managers, or delegates deliver tailored, appropriate Human Performance Training to Human Performance Advocates when the need for training is identified. This training is considered to meet the intent of their role.

2.5 Considerations for Vendor Partners

The Human Performance program has a framework that utilizes a graded approach commensurate with the risks and level of complexity for vendor activities. OPG's Human Performance expectations are extended to vendors who support OPG's operations. That is, Vendors performing work within Canada's nuclear licensees are required to meet both the client and licensee expectations.

Training for vendor partners personnel involved in the implementation, facilitation or management of Human performance may include the same Hu training delivered to OPG personnel as recommended and approved by the Human Performance Managers or the Human Performance CFAM.

2.6 Human Performance for Knowledge Workers

Errors by knowledge workers, especially engineers, potentially have the greatest adverse impact on station safety and economic performance. "In-process" errors are more subtle than active errors committed by operators and craft personnel, in that latent errors can go undetected, resulting in hidden defects in plant equipment or supporting documentation.

Latent errors may go unnoticed for long periods of time, perhaps years or decades. The latency characteristic of engineering errors limits feedback, awareness, and opportunities to prevent and catch them.

Knowledge workers spend much of their time at a desk, and their work is characterized as rule, or knowledge-based. Consequently, a higher probability for error exists and errors and defects can occur usually without one's knowledge. Therefore defenses are incorporated into work processes to help catch or minimize these latent errors.

The fundamental Human Performance tools for knowledge workers are used to maintain positive control of a work situation, especially during critical tasks or activities. These tools are used regularly for any work activity, regardless of the risk or complexity of the task, and without prompting.

The following event free tools establish the foundation for excellent human performance by engineers and other knowledge workers.

- Pre-Job Briefing, Safe Work Plan and Post Job Debriefing
- Questioning Attitude
- Validation of Assumptions
- Peer Review and Verification
- Precision in Communication/Signature

The event free tools for knowledge workers and the application of these tools are discussed in detail in N-GUID-01900-10000, Human Performance Event Free Tools for Knowledge Work.

3.0 ROLES AND ACCOUNTABILITIES

The roles and accountabilities apply to all nuclear organizations (DN, PN, NR, NWM, and IRI) except when noted.

3.1 Chief Nuclear Operating Officer

3.1.1 Ensure organization structure, staffing, and resources are in place to support the Human Performance program.

3.2 Chief Nuclear Engineer

3.2.1 Maintain Human Factors Engineering Program and ensure overall compliance to industry and regulatory standards.

3.2.2 Ensure Human Factors Program is integrated with Human Performance improvement initiatives.

3.3 Vice President, Generation Strategy and Innovation

3.3.1 Oversees the implementation and execution of CFAM for Operations and Maintenance, as well as the Centre-Led Performance Improvement, Human Performance, and Corrective Action, across Nuclear.

3.3.2 Maintains programmatic authority of the governance framework related to these areas and provides direction, oversight and guidance to the organizations executing the governance.

3.3.3 Leads operational standards through benchmarking and assessment to verify performance levels, identify gaps and work with site managers to develop solutions.

3.3.4 Provides leadership on Fleet initiatives as required.

3.3.5 As the Authorization Authority acts as the chair for DOM-DWM Peer Team Meeting and has final authority decision making on any issue that DOM-DWM Peer Team meeting cannot align on. Senior Vice President (VP) and Deputy Vice President.

3.4 Senior Vice President (Pickering Station, Darlington Station & Decommissioning, and Nuclear Waste Management

3.4.1 Site SVPs (Pickering and Darlington) plan and set strategic direction on improvements to the safety and performance of the station. The scope of the requirement work includes start-up, operations, maintenance, commissioning and decommissioning and the on-site center-led support necessary to accomplish this work.

3.4.2 Site SVPs establish site requirements and priorities, and monitor the quality and quantity of services provided by center-led organizations.

3.5 Director, Operations and Maintenance (Pickering, Darlington)

3.5.1 DOM (Pickering and Darlington) coordinates with Centre-led organizations to use resources effectively in the achievement of OPG performance targets

3.5.2 Provide oversight, and support implementation of functional team initiatives.

3.5.3 Participate in peer teams as per nuclear governance.

3.5.4 Responsible for succession planning and providing recommendations to the SVP for ensuring the right individuals are selected.

3.5.5 Responsible for multiple key performance indicators on the station report cards.

3.5.6 DOM (Nuclear Refurbishment) coordinates with Darlington and center-led organizations to use resources effectively in the achievement of OPG performance targets.

3.5.7 Serve as the chairperson for the Heavy Water Program Management Committee. (Darlington only).

3.6 CFAM/Program Owner

3.6.1 The CFAM/Program Owner is the leader of the Functional peer team.

3.6.2 Provide oversight on administrative Governance requirements, as per OPG-STD-0001, Requirements for Administrative Governance Documents.

3.6.3 Conduct reviews of processes to identify preventative actions and improvements.

3.6.4 Monitor and report on overall program effectiveness through the use of a set of tiered fleet performance indicators captured in a Functional Area summary in accordance with N-PROC-RA-0023.

3.6.5 Manage and communicate program requirements related to the Nuclear Management system administration program.

3.6.6 Create direction for annual business planning, for their respective Functional Area to account for both site specific and fleetwide core business and continuous improvement.

3.6.7 Ensures industry best practices for their functional area are clearly defined, consistently executed, actively managed and continuously improved – includes benchmarking industry.

3.6.8 Support GOSP model through strong emphasis on Governance and oversight.

3.6.9 Sets the Key Performance Indicator (KPI) definitions, goals and thresholds and identifies future KPIs.

3.6.10 Conduct departmental and divisional level self assessments to evaluate effectiveness of the functional area program, processes and activities.

3.6.11 Use of trend analysis for performance issues across the fleet and present at peer team to establish recommendations/actions to address any declining performance.

3.6.12 Acts as the main contact to functional area in the industry, and maintain contact with the industry to understand relative performance, trends and focus areas.

3.6.13 Perform oversight for Managed systems per N-STD-AS-0023 Nuclear Safety Oversight including external oversight and assessments, internal oversight and assessments, independent assessments, etc. to review, evaluate and critique the nuclear safety performance of the organization.

3.6.14 Develop functional area staffing strategies and plans to ensure future leadership and workforce talent requirements are met.

3.6.15 Provide effective fleet workforce planning that allows the business to proactively staff the organization utilizing well-established pipelines and developed leaders.

3.6.16 Work with sites (SFAMS) to identify any gaps as part of the GDAR model.

3.6.17 Obtain performance results through other avenues including peer team meetings, nuclear oversight audits, external audits, completing periodic industry evaluations through external peers to identify gaps and help improve performance of the function area.

3.6.18 Use the CFAM Elevation process as required to close gaps that have not been identified or not resolved in timely manner.

3.7 SFAM

3.7.1 The SFAM is the leader and highest level of authority for the Functional Area within a station of facility.

3.7.2 Aligns with the CFAM on the program dashboard and ensures fleet initiatives are appropriately incorporated into site activities.

3.7.3 Responsible for Functional area performance at the site.

3.7.4 Responsible for Functional area site level staffing pan.

3.7.5 Performance outcomes at the site level and delivering industry top quartile performance for the site with a focus on behaviours and execution results.

3.7.6 Provides input to CFAM, leading and guiding development and implementation of fleet standards to ensure those standards are executed effectively at the site consistent with expectations and the remainder of the fleet.

3.7.7 Attends and actively engages in Peer Team – acts as peer team lead in absence of CFAM.

3.7.8 Actively participates in resolution of fleet wide issues. Sponsors teams as required to accomplish specific initiatives and implements fleet wide initiatives.

3.7.9 Provides qualified participants for benchmarking and oversight assessments.

3.7.10 Monitors performance in a site functional area through site visits in field and meetings to document findings and support resolutions where required.

3.7.11 Supports pilots (at site or other sites or facilities).

3.7.12 Supports other sites or facilities in resolution of emergent issues when requested by the CFAM or Peer SFAM.

3.7.13 Utilizes GDAR process by identifying and documenting Gaps, Drivers, Actions and expected Results to be resolved.

3.7.14 Leads corrective action investigations and development of Nuclear event reports.

3.8 Senior Manager, Site Training

3.8.1 Integrate performance improvement actions relating to Hu into appropriate training settings.

3.8.2 Integrate Hu principles, expectations, and standards into line training programs.

4.0 PROGRAM IMPLEMENTATION

To manage the risk associated with human error thoroughly, human performance must be addressed as a core business activity. Roles that support human performance program implementation and other human performance organizational tools, such as a establishing a human performance oversight committee or establishing human performance working committees, are referred to in the appendices of this document.

5.0 DEFINITIONS AND ACRONYMS

5.1 Definitions

Behaviour is what people do or say.

Defence is a measure, including expected behaviours, that protects against various hazards or mitigates the consequence of a hazard.

Error is an action that unintentionally departs from an expected behaviour according to some standard, without malice or forethought.

Error Precursors are unfavourable prior conditions at the job site that increase the probability for error when performing a specific action (i.e., error-likely situations).

Error-Likely Situation is a work situation in which there is greater opportunity for error when performing a specific action or task due to error precursors (also known as “error trap”).

Flawed Defences are defects in defensive measures that may fail to protect plant/facility equipment or people against hazards.

Human Performance (Hu) is the system of processes, values, job site conditions, behaviours, and their ultimate results that determine plant/facility performance.

Human Performance Event is an undesirable change in the state of plant/facility structures, systems, or components or human and/or organizational conditions (health, behaviour, administrative controls, environment, etc.) caused by active or latent error.

In-Process Errors are latent errors that can go undetected, resulting in hidden defects in plant equipment or supporting documentation.

Monetary Losses due to Hu is a calculation of monetary losses based on Forced Loss Rate due to Hu events plus Critical Path Losses.

Nuclear Professional is person who applies the essential knowledge, skills, behaviours and practices needed to conduct their work safely and reliably.

Proficiency simply stated, means “being really good at something. Proficiency requires a combination of knowledge, skills, training, repetition and experience.

5.2 Abbreviations and Acronyms

COG	CANDU Owners Group
DN	Darlington Nuclear
EFDR	Event Free Day Resets
EPR	Electronic Performance Reporting
EPRI	Electric Power Research Institute
HOF&T	Human and Organizational Factors, and Technology
HPI	Human Performance Improvement
HRO	High Reliability Organization
Hu	Human Performance
HuSC	Human Performance Steering Committee
HuWC	Human Performance Working Committee
IRI	Inspection and Reactor Innovation
INPO	Institute of Nuclear Power Operations
JFG	Job Familiarization Guide
LOW	Latent Organizational Weakness
NP	Nuclear Professional
NR	Nuclear Refurbishment
NWM	Nuclear Waste Management
OPEX	Operating Experience
PJB	Pre-Job Briefing
PJD	Post-Job Debriefing
PN	Pickering Nuclear
RP	Radiation Protection
SME	Subject Matter Expert
SWP	Safe Work Plan
TPRC	Training Program Review Committee
WANO	World Association of Nuclear Operators

6.0 BASES AND REFERENCES

6.1 Bases

[B-1] CSA 286-012, CSA N286-012 to OPGN Governance Cross Matrix, Clause 7.9.2, Oral Communication. “Processes shall be in place to ensure effective oral communications regarding operational activities".

[B-2] CSA N286-012, CSA N286-012 to OPGN Governance Cross Matrix, Clause 4.5.2(e), “Expected results and behaviours of workers shall be defined”, and Clause 4.5.2(f), “Workers shall be provided feedback on their performance.”

[B-3] CSA N286-012, CSA N286-012 to OPGN Governance Cross Matrix, Clause 4.8.3, “Work activities throughout the life of the nuclear facility shall be independently verified

by workers who did not perform the work to confirm that it meets requirements. The extent and timing of the verification shall be based on the potential impact of the work."

[B-4] CSA N286-012, CSA N286-012 to OPGN Governance Cross Matrix, Clause 7.9.6 "Procedure Use and Adherence. Plant operations shall be performed in accordance with procedures that contain information and direction for operating workers on understanding and performing their work. Use and adherence direction shall be provided to the operating workers. Temporary procedures may be issued when existing permanent procedures do not apply to the work being planned. Temporary procedures shall be periodically reviewed for applicability and cancelled when no longer required."

[B-5] CSA N286-012, CSA N286-012 to OPGN Governance Cross Matrix, Clause 4.2(c) "Providing the means by which the business supports workers in carrying out their tasks safely and successfully, by taking into account the interactions between individuals, technology, and the organization, and 4.2(d) Monitoring to understand and improve culture.

[B-6] INPO 15-008, Achieving High Levels of Human Reliability – A practical approach to Human Performance.

6.2 References

6.2.1 Performance References

COG-17-9021, Principles and Guidance to support a common approach to Human performance and Human Factors in the Canadian Nuclear Industry
INPO 05-002, Human Performance Tools for Engineers and Other Knowledge Workers
N-GUID-01900-10000, Human Performance Event Free Tools for Knowledge Workers
N-INS-08400-10026, Corporate Oversight, Conduct of Nuclear Fleet Peer Teams and Programs
N-INS-09030-10001, Human Performance Event Communication and Analysis
N-INS-09030-10002, Site and Department Level Event Free Day Resets
N-INS-09030-10004, Observation and Coaching
N-INS-09030.2-10000, Event Free Challenge Process
N-POL-0001, Nuclear Safety Policy
N-PROC-OP-0005, Pre-Job Briefing/Safe Work Plan and Post-Job Debriefing
N-PROC-RA-0097, Self Assessment and Benchmarking
N-PROG-AS-0001, Nuclear Management System Administration
N-PROG-MA-0004, Conduct of Maintenance
N-PROG-OP-0001, Nuclear Operations
N-PROG-RA-0003, Performance Improvement
N-PROG-RA-0013, Radiation Protection
N-STD-AS-0002, Procedure Use and Adherence
N-STD-MP-0027, Configuration Management
N-STD-MP-0028, Conduct of Engineering
N-STD-OP-0002, Communications
N-STD-OP-0004, Self-Check
N-STD-OP-0012, Conservative Decision-Making
N-STD-RA-0014, Second Party Verification
N-INS-09100-10005, Correct Component Verification
NX-1031 – Organizational Effectiveness: Benchmarking (INPO Nuclear Exchange Document)
OPG-PROG-0010, Health and Safety Management System Program

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6.2.2 Developmental References

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7.0 REVISION SUMMARY

This is an **intent** revision.

- Revised document owner and authorization on title page to reflect organizational changes.
- Updated referenced document names to revised names throughout document (DCRs 0000143731, 0000144927, 0000146103, and 0000148284.
- Added to Section 1.5 Training paragraph 4 and 5 to clarify required training for Human performance advocates, versus training for Human performance practitioners. DCR 0000150148.
- Changed Developmental reference in Section 5.2.2 to N-LIST-08130-10025 R002, CSA N286-012 to OPGN Governance Cross Matrix.
- Removed CSA N286-05 from references, DCR 0000141535.
- Updated Section 5.0 Bases and References CSA N286-012 principles, R002 as follows: (DCRs 0000143735, 0000144758, and 0000148090)
    - Updated (B-1). Oral communication: “Processes shall be in place to ensure effective oral communications regarding operational activities.”
    - Updated (B-2). Added clause 4.5.2(f) “Workers shall be provided feedback on their performance.”
    - Added (B-5). Clause 4.2(c) “Providing the means by which the business supports workers in carrying out their tasks safely and successfully, by taking into account the interactions between individuals, technology, and the organization, and 4.2(d) Monitoring to understand and improve culture.

- Added (B-6). CSA N286-012, CSA N286-012 to OPGN Governance Cross Matrix, Clause 4.8.3 “Independent verification of work: Work activities throughout the life of the nuclear facility shall be independently verified by workers who did not perform the work to confirm that it meets requirements. The extent and timing of the verification shall be based on the potential impact of the work.

- Section 4.1, added definitions for Nuclear Professional, In-Process Errors, and Proficiency.

- Section 4.2, added abbreviations NP, HOF&T, SWP.

- Added reference in section 6.2.1, COG-17-9021, Principles and Guidance to support a common approach to Human performance and Human Factors in the Canadian Nuclear Industry.

- Added reference in section 6.2.1, INPO 05-002, Human Performance Tools for Engineers and other Knowledge Workers.

- DCR 0000145861- Aligned document with COG-17-9021, Principles and Guidance to support a common approach to Human performance and Human Factors in the Canadian Nuclear Industry, as follows:

  - Added section 1.6, Considerations for Vendor Partners. DCR 0000147831.

  - Section 2, Basic Principles, aligned principles with 6 Hu Principles in COG-17-9021.

  - Sections 3.66 and 3.6.11, added “and Vendor Partners”. DCR 0000147831.

- Added section 1.2 Human and Organizational Factors and Technology. DCR 0000148090 from CNSC Type II Inspection recommendation, and DCR 146751.

- Added section 1.3 Nuclear Professional. DCR 0000149961.

- Added paragraph in 1.4 (a), Reducing errors.

- Added in Section 1.5.2 Reactive Approach, accountability analysis and learning groups.

- Added in Section 6.2.1 Performance References, N-GUID-01900-10000, Human Performance Event Free Tools for Knowledge Workers.

- Added Section 2.6, Human Performance for Knowledge Workers. DCRs 0000143809, and DCR 0000143809.

- Added WANO Performance Objectives and Criteria, Nuclear Professionals, NP 1 in Section 6.2.1 Performance References.

- Revised the Roles and Accountabilities section to align with N-INS-08400-10026 R012, Corporate Oversight, Conduct of Nuclear Fleet Peer Teams and Programs.

- Added to Performance References section N-INS-08400-10026, Corporate Oversight, Conduct of Nuclear Fleet Peer Teams and .Programs

Appendix A**[Program Implementation]**

To manage the risk associated with human error thoroughly, human performance must be addressed as a core business activity. Although initiatives may vary from site to site, leadership support, participation and commitment is required. This commitment involves active, visible oversight to identify vulnerabilities, detect deviations in the present state of human performance from the desired state of human performance, and support for focus areas for improvement.

Department Managers

- Establish and set direction for Hu activities within their departments.
- Drive and hold accountable line supervisors and workers to effectively employ Hu practices and tools to prevent events.
- Establish department Hu improvement initiatives, aligned with fleet and division Hu plans, to address identified performance gaps and deliver expected results.
- Monitor department Hu performance trends (precursors) and adjust programs as necessary to achieve excellence.
- Leverage the Hu Steering Committee forum to share lessons learned, and collaborate with team members on the implementation of the site's Hu program.
- Participate as team members of Hu Steering Committee for the specific department.
- Seek out and support Hu advocates in supporting Department Hu plans and initiatives.
- Provide leadership support for implementation of site-wide and department Hu initiatives.

Section Managers

- Provide tactical oversight of activities in a manner that is intrusive and intervene as necessary to facilitate excellence in Hu practices and tools to prevent events.
- Ensure established expectations are met for supervisors time spent in the field observing workers, coaching and reinforcing standards and behaviours.
- Ensure cognitive trends are captured, shared and actions are taken to address gaps.

First Line Managers/Supervisors

- Promote expected behaviours through in-field observation, coaching, and reinforcement to commend on excellence and if needed, correct at-risk and unsafe practices.
- Communicate and reinforce roles, responsibilities, personal accountability, expected behaviours and high performance standards.
- Implement, support, and reinforce Hu improvement initiatives.

Human Performance Advocates

- Inspire, coach and influence people in the deployment of the Hu initiatives at their respective facility/functional area. Intervene, when appropriate, to shape behaviours, attitudes and perceptions and motivate others to pursue human performance excellence by recognizing error-likely situations and applying preventative counter-measures.
- Participate in event investigations, self-assessments, benchmarking activities, working committees.

Appendix B **[Human Performance Steering Committee]**

Vision:

Protect people and the plant/facility from human error through aggressive control of defense in depth and rigorous use of Hu tools. Event-free performance is the goal.

Purpose:

To integrate site-wide proactive (prevention and early detection) and reactive (corrective) human performance initiatives, including the following:

- Detect deviations in the present state of Hu from the desired state of performance.
- Develop focus areas for improvement.
- Ensure that causes of areas for improvement are analyzed.
- Identify the corrective actions or countermeasures needed to address the focus area.
- Determine the effectiveness of past corrective actions.
- Monitor industry best practices.

Sponsor: Senior Vice President

Requirements:

- The Committee meets at least quarterly. Additional meetings may be held, as needed.
- Endorsement of recommendations will be by majority vote of the members present, however, the chair is the decision maker.
- Minutes will be maintained by the Human Performance Manager and transmitted to all members, and meeting attendees.
- Manage site-wide Hu improvement initiatives and measures.
- Review cognitive trends at the department level and opportunities for cross-functional alignment around human performance.
- Meetings are critiqued by delegate selected at the start of the meeting.

Quorum Requirements:

- One of Director of Operations and Maintenance or Director of Maintenance (or delegate).
- The minimum number of committee members and representation from various station organizations needed in order to make legitimate decisions that affect station human performance.
- Quorum is met as established by the Chairperson or Vice-chairperson at each meeting.

Membership:

- As a minimum, line managers who oversee the performance of functional units of the site organization, who can impact plant safety and reliability, such as operations and maintenance; usually direct reports of the senior management sponsor.

Facilitator:

The Hu Manager is responsible for the administration and facilitation of the HuSC meetings, e.g., agenda, scheduling, minutes, and action items.

Expected Behaviours:

- Teamwork and collaboration are expected from all team members.
- Managers are prepared to speak to their department performance.
- Meetings are to be critiqued by delegate selected at the start of the meeting.

Appendix C [Human Performance Working Committee/Advocate Activities]

The goal of a human performance working committee or working group is to engage workers by soliciting their input to identify issues that influence facility performance and develop effective mitigating strategies to prevent consequential events.

Guiding Principles:

- The nuclear leadership team is responsible for station performance and the determination of what and how improvement in performance should be achieved.
- Evaluation of human performance improvement activities requires close and comprehensive observation and analysis of behaviors, processes, and decisions by experienced personnel.
- To the extent possible, human performance working committee or Advocate activities should complement the activities undertaken by station and fleet wide strategies.
- Line management supported by the facility Hu Manager/SPOC or delegate is responsible for the administration and facilitation of the working committee meetings, and Advocate activities, e.g., agenda, scheduling activities, etc.
- Working group line managers will be responsible for ensuring timely completion of tasks, resolving conflict, and tracking progress of strategic initiatives. The facility Hu Manager/SPOC or delegate will support and provide oversight of the activities.

Team activities:

- Openly bring issues to the table that challenges event-free performance.
- Identify top human performance issues and present department performance summaries.
- Participate on self-assessments and field initiatives, such as Hu surveillances / interventions.
- Establish / champion communication campaigns that support achieving human performance excellence.
- Communicate and collaborate with other facility peers to ensure that all facilities fully understand issues and present a unified position.
- Attend face-to-face working committee meetings, or Advocate events/activities.
- Keep their respective leadership informed of Hu working committee/Advocate direction and recommendations.
- Serve as champions in their respective work groups for department and strategic Hu initiatives.
- Provide assistance to members from other workgroups who are struggling in the area of human performance excellence.