Eskom	ADMINISTRATIVE PROCEDURE	Allocation Centre 38A	Reference Number KAA-865	Rev 0
NNR: NO No.:	KOEBERG NUCLEAR POWER STATION HUMAN PERFORMANCE PROGRAMME			PAGE 1

KORC	ACCESS	IMPORTANCE CATEGORY	NEXT REVIEW DATE	DATE AUTHORISED
NO	Nuclear Restricted	NSA	2024-03-31	2021-03-31

COMPILED/REVISED	REVIEWED	AUTHORISED
(sgd) MO TSHIVHILINGE	(sgd) K BETHEL	(sgd) V NTULI
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SENIOR ADVISOR ISED	SENIOR ADVISOR ISED	GENERAL MANAGER KOEBERG NUCLEAR POWER STATION
DATE 2021-03-28	**DATE** 2021-03-31	**DATE** 2021-03-31

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FCA	ALARA REVIEW	SUPERSEDES
HUMAN PERFORMANCE	NO	N/A

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1.0 PURPOSE

To describe the establishment and implementation of a Human Performance (HP) Programme that contributes to developing and maintaining a strong safety culture at Koeberg Nuclear Power Station (KNPS).

2.0 SCOPE

2.1 This document details the KNPS business area Human Performance (HP) programmes as a requirement of 238-28 and includes the following:

2.1.1 Provides for the establishment of a KNPS HP Programme across all levels including level 1 suppliers;

2.1.2 Establishing a common set of principles and approach to HP excellence that could serve as a basis for developing HP programmes and strategies (See Appendices 1, 2 ,3 and 4);

2.1.3 Provides for the establishment of the HP monitoring and evaluation, including Key Performance Indicators (KPI's), oversight committee and working forum;

2.1.4 Details the functioning of the Human Performance Oversight Committee (HPOC);

2.1.5 Defining the roles and responsibilities of the KNPS Management, HP Co-ordinators and HP Representative in respect to developing and implementing the HP programme and strategies.

3.0 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

3.1.1 **Human Performance** – Human Performance (HP): A combination of behaviour and results (HP = B + R).

3.1.2 **Human Error** – An action that unintentionally departs from an expected behaviour.

3.1.3 **Human Performance Event** – An unwanted, undesirable change in the state of plant structures, systems, components or human/organisational conditions (health, behaviour, administrative controls, environment, and so forth) that exceeds established significance criteria and that involves human action or inaction in the causal chain.

3.1.4 **Human Performance Coordinator** – Can be a full-time or part-time role assigned to a senior employee in each Business Area, who works under the direct mandate of the Business Area Manager, to give effect to the Business Area Human Performance strategy and initiatives.

3.1.5 **Manage Defences (Md)** – An aggressive approach to find and correct vulnerabilities with defences (events always involve breaches in defences)

3.1.6 **Non-compliance** – Unintentional/intentional infringement, breach or non-observance of a principle, standard or procedure. (Koeberg will only use the term non-compliance and the severity grading in KLA-005).

3.1.7 **Oversight** – The monitoring of the performance of a person or group and the comparison of such performance or operation with standards of excellence.

3.1.8 **Reducing error (Re)** – Actions taken to anticipate, prevent, or catch errors at the job site.

3.2 Abbreviations

3.2.1 **CAP** – Corrective Action Program

3.2.2 **CR** – Condition Report

3.2.3 **HOD** – Head of Department

3.2.4 **HP** – Human Performance

3.2.5 **HPOC** – Human Performance Oversight Committee

3.2.6 **IAEA** – International Atomic Energy Agency

3.2.7 **INPO** – Institute of Nuclear Power Operations

3.2.8 **INSAG** – International Nuclear Safety Advisory Group

3.2.9 **ISED** – Independent Safety Evaluation Department

3.2.10 **KNPS** – Koeberg Nuclear Power Station

3.2.11 **KPI** – Key Performance Indicators

3.2.12 **NEI** – Nuclear Energy Institute

3.2.13 **NNR** – National Nuclear Regulator

3.2.14 **NSA** – Nuclear Safety Assurance

3.2.15 **OE** – Operating Experience

3.2.16 **PSGM** – Power Station General Manager

3.2.17 **WANO** – World Association of Nuclear Operators

4.0 REFERENCES

4.1 Referenced Documents

4.1.1 'WANO PO&C Performance Objectives and Criteria', PO&C 2019 – 1 October 2019

4.1.2 238-1, Rev 0: Nuclear Division Integrated Management System (IMS) Description

4.1.3 238-28, Rev 3: Nuclear Operating Unit: Nuclear Safety Management Programme

4.1.4 238-105, Rev1: Nuclear Operating Unit Supplier Qualification and Audit Manual

4.1.5 335-2, Rev 5: Koeberg Nuclear Power Station Management Manual

4.1.6 335-87, Rev 0: Human Performance Oversight Committee (HPOC) Terms of Reference

4.1.7 IAEA INSAG-13: Management of Operational Safety in Nuclear Power Plants

4.1.8 INPO 07-006 Rev 1: Human Performance Tools for Managers and Supervisors

4.1.9 INPO 08-004, Rev 2: Human Performance Key Performance Indicators

4.1.10 KAA-500, Rev 13: The Process for Controlled Documents

4.1.11 KAA-688, Rev 3: The Corrective Action Process

4.1.12 KGA 094, Rev 7: Event Investigators Guide

4.1.13 KGA-053, Rev 5: Self-Assessment at Koeberg Nuclear Power Station

4.1.14 KGA-076, Rev 4: Performing Trending & Trending Analysis

4.1.15 KGA-078, Rev 3: Coaching and Job Observation at Koeberg Nuclear Power Station

4.1.16 KGA-085, Rev 4: Effectiveness Review

4.1.17 KGA-097, Rev 6: Station Event-Free Clock Program

4.1.18 KGA-122, Rev 1: Incident Analysis Method

4.1.19 KSA-011, Rev 14: The Requirements for Controlled Documents

4.1.20 KSA-049, Rev 9: Koeberg Training Standard

4.1.21 KSA-122, Rev 3: Human Performance Tools

4.1.22 NNR RD-0034, Rev 0: Quality and Safety Management Requirements for Nuclear Installations

4.2 Applicable Documents

4.2.1 32-421: Life Saving Rules Directive

4.2.2 32-1023: Recruitment and Selection Procedure

4.2.3 240-131691121: Internal and External Communication Procedure

4.2.4 KAA-598: SHE Management System

4.2.5 KAA-632: ALARA Programme

4.2.6 KAA-667: Processing a Permit to Work

4.2.7 KAA-721: Online Work Management Process

4.2.8 KAA-730: The Safety, Health and Environmental (SHE) Constitution and Meeting Format

4.2.9 KAA-778: Station ALARA Committee Constitution

4.2.10 KAA-789: Koeberg Accident Procedures Sub-Committee

4.2.11 KAA-832: Quality Assurance Monitoring Processes

4.2.12 KAA-833: Quality Assurance Monitoring Programme Development for the Koeberg Operating Unit

4.2.13 KAD-025: Processing of Operating Experience

4.2.14 KGA-051: Benchmarking Guide at Koeberg Nuclear Power Station

4.2.16 KGA-091: Safety, Health and Environment (SHE) Management Inspection and Plant Area Ownership Programme

4.2.17 KGA-095: Overview of the Integrated Management System Used in the Nuclear Portfolio in Support of Koeberg

4.2.18 KGA-100: Plant status control at Koeberg

4.2.19 KSA-119: Management and Control of Supplemental Workers Koeberg Nuclear Power Station

4.2.20 KSB-005: Operating Standards and Expectations

4.2.21 WANO GL 2002-02 Principles for Excellence in Human Performance, December 2002.

5.0 RESPONSIBILITIES

5.1 The PSGM:

5.1.1 The PSGM is accountable for ensuring that an HP programme has been established, implemented and is maintained at KNPS.

5.1.2 The PSGM shall also establish and chair HPOC that is charged with monitoring the effective implementation of the HP programme and overall HP improvements within KNPS.

5.1.3 Allocating sufficient organisational resources, such as budgets, times and staff, to give effect to the HP programme.

5.2 ISED:

The ISED Manager is responsible for:

5.2.1 Ensuring that behaviours necessary to foster excellence in HP within KNPS is demonstrated through the use performance improvement programmes.

5.2.2 The establishment, implementation and maintenance of the HP programme and strategy that will detail specific initiatives aimed at continuously improving Human-error-reduction at KNPS.

5.2.3 Ensuring that the HP programme and associated actions comply with the requirements of the NNR as stipulated in Regulatory Guide RD-0034 and 238-28.

5.2.4 Review and monitor KNPS, HP KPI and Departments' HP trends to identify emerging HP issues and develop strategy or action plans for improvement.

5.2.5 Evaluation of event, audit and review reports for possible HP improvement requirements.

5.2.6 The monitoring of HP within KNPS through HPOC, performance improvement programmes (for example, CAP, Trending, etc.) or and by obtaining feedback from KNPS HODs, Performance Improvement Managers or HP Representatives or Champions.

5.2.7 The monitoring of the KNPS Level 1 suppliers by obtaining feedback from the Procurement Quality Engineering (PQE) group and contract/project owners.

5.2.8 Leading HP self-assessment in accordance with KGA-053.

NOTE: *These functions are/shall be executed by the KNPS HP Practitioner or Co-ordinator which is a function residing in ISED.*

5.3. Station HP Practitioner or Coordinator:

5.3.1 Assist the ISED Manager with the development and implementation of KNPS HP programme or strategy.

5.3.2 Co-ordinate the activities of the KNPS HPOC in support of the ISED Manager.

5.3.3 Support the Departmental HP Representatives or Champions to ensure consistency in the HP programme implementation and maintenance throughout KNPS.

5.3.4 Assist the Departmental HP Champions or Representatives with the analysis of HP data (e.g. CAP, Observation) and the development of the action plans or strategy.

5.3.5 Recommend HP initiatives based on industry data, benchmarking and OE.

5.3.6 Co-ordinate and chair the Station HP Forum.

5.3.7 Assess HP programme and strategy effectiveness as and when the need arises and make any necessary adjustments towards improving HP effectiveness.

5.3.8 Identify HP communication, education, and training opportunities.

5.3.9 Liaise with Generation Nuclear Safety and Assurance (NSA) to obtain an external perspective on the performance of Business Unit and Departmental HP improvement initiatives.

5.4 HOD

Is responsible for ensuring that an HP Programme has been established, implemented and is maintained within the respective Department. The responsibilities include:

5.4.1 Developing, implementing and maintaining a Departmental HP programme including the HP strategy in consultation with staff at all levels within the Department and ensuring alignment to the station HP Programme or strategy.

5.4.2 Demonstrating the behaviours necessary to foster excellence in HP and a healthy safety culture within their departments through the use of performance improvement programmes.

5.4.3 Involvement in and contributing to the KNPS HP programme and strategy development and implementation co-ordinated by HPOC and led by ISED Manager.

5.4.4 Ensuring monthly or quarterly HPOC Departmental HP feedback is completed and submitted to ISED for reporting to HPOC.

NOTE: *HPOC Departmental feedback template (KFD-008) and HPOC non-production department feedback template (KFD-009) are saved in G:\Forms\ISED.*

5.4.5 Actively participating in the KNPS HPOC meetings.

5.4.6 Ensuring continuous monitoring and awareness of HP initiatives for Human-error-reduction and HP excellence at KNPS.

5.4.7 Promoting and reinforcing the use of HP tools within the Department as described in KSA-122.

5.4.8 Identifying HP communication, education, and training opportunities for the Department.

5.4.9 Appoint a Departmental' "HP Champion or Representative" who will perform the functions as stipulated in section 5.6.

5.4.10 Providing support and assistance to HP Champion or Representative in carrying out all his/her duties.

5.4.11 Familiarising themselves with the responsibilities and duties of the HP Champion or Representative and accepts responsibility and accountability should any of the HP Champion or Representative duties not be fulfilled.

5.4.12 Adhere to the process responsibilities and or requirements of this procedure and any additional requirements to the improvement HP in KNPS.

5.4.13 Accept the responsibility for ensuring that his/her staff members are trained on HP tools and their application in their work areas.

5.4.14 Ensure that the Departmental HP and training programmes emphasise the requirements of 238-28, RD-0034 and the KNPS HP programme.

5.4.15 Active involvement and contributing to the KNPS HP self-assessment co-ordinated by HPOC and led by ISE manager.

5.5 HOG

The HOG is responsible for ensuring that an HP Programme has been established and is maintained within the respective Group. The responsibilities include:

5.5.1. Establishing, developing and maintaining HP programme and strategy for their Group as directed by the respective HOD.

5.5.2 Demonstrating the behaviours necessary to foster excellence in HP and a healthy safety culture within the Group through the use of performance improvement programmes.

5.5.3 Where deemed necessary the HOG shall appoint a Group HP Champion or Representative who will perform the functions as stipulated in section 5.6.

5.5.4 Ensuring emerging HP trends are assessed and resolved or mitigations are put in place for Human-error-reduction.

5.5.5 Identifying HP communication, education, and training opportunities.

5.5.6 Support the Department HP programme and initiatives to improve overall KNPS HP.

5.5.7 Promoting and reinforcing the use of HP tools as described in KSA-122.

5.5.8 Supporting the Group's HP Champion or Representative in fulfilling his/her role.

5.6 HP Champions or Representative Functions

NOTE: *An HP Champion* or Representative *is a member of the station HP forum.*

Assist the Department/Group Manager (HOD or HOG) with developing, implementing and maintaining the Department/Group HP programme or strategy. The responsibilities include:

5.6.1 Promoting HP programme within the Department/Group and ensuring staff is aware of the initiatives implemented to improve HP within KNPS and the Department/Group.

5.6.2 Performing the Department’s/Group’s trending on HP related issues to identify emerging HP trends and develop action plans.

5.6.3 Administering the Department's/Group's Event Free CLOCK program as described in KGA-097.

5.6.4 Communicating with the manager/supervisor or personnel in the Department/ Group, on any HP programme findings in their area in order to make improvements.

5.6.5 Actively involved in the station HP forum and KNPS initiatives to improve HP, such as training and hero rewards programme.

5.6.6 Communicating the Department’s/Group’s HP related issues to the KNPS HP custodian for information or support.

5.6.7 Accepting the HP Champion or Representative appointment describing his/her roles/responsibilities as delegated by his/her manager.

5.6.8 Conveying HP information from meetings, forums or other forms of communication to their manager/supervisor or personnel in their area.

5.7 Plant Training Manager

5.7.1 Is responsible to ensure that initial and continuing training programs incorporate and promote HP behaviours needed to achieve and sustain high levels of individual and team proficiency.

5.7.2 Training programs are focused on developing and sustaining the appropriate technical knowledge, skills, and HP behaviours of knowledge workers and plant workers.

6.0 PROCESS

6.1 General Comments

6.1.1. The HP programme is aimed at documenting HP improvement initiatives and shall detail the following:

a) Training and Competence

b) Monitoring

c) Evaluation and Assessment

d) Continuous Improvement

e) Oversight

6.1.2 An HP strategy shall be adopted to address HP issues at a given point in time. Appendix 4 describes HP strategic plan that can be adopted to ensure HP improvement at KNPS, Department or Group level.

6.1.3 The responsibility for developing, implementing and maintaining the HP programme and strategy depends upon the organisation level within which the programme will be implemented. As described in section 5.0 roles and responsibilities;

- HP Programme and strategy for KNPS Business Unit – ISED responsibility
- HP Programme and strategy Department level – HOD responsibility
- HP Programme and strategy Group level – HOG responsibility

6.2 HP Programme Components

6.2.1 Training and Competence

6.2.1.1 All personnel at KNPS at all levels (individual, supervisors, managers, senior managers including supplemental personnel) are trained and coached on the use of HP error prevention tools and techniques.

6.2.1.2 Induction programmes, where applicable includes a section on human performance and safety culture, to ensure that all personnel have the same understanding of their personal accountability and responsibility for safety.

6.2.1.3 Where required, additional discipline specific HP training and awareness shall be provided to employees and contractors.

6.2.1.4 All training should be captured in position specific curriculum/training profile.

6.2.1.5 Lessons learned from events, both local and at other plants and relevant industries, which serve as examples of where poor HP has resulted in significant events, is used, where required, to inform HP training interventions and awareness.

6.2.1.6 Further safety HP interventions can be conducted on the basis of feedback from events investigations, audits, OE and reviews.

NOTE: *A graded approach to the systematic approach to training is followed for the training programmes at KNPS, in accordance with KSA-049.*

6.2.2 Monitoring

Managers continuously monitor and assess HP excellence in KNPS. The following KPI's have been developed to aid with the HP monitoring at KNPS.

a) Human "P" and "S" Level Condition Report (CR)/Events – CLOCK programme

b) Observations and Coaching programme

c) Reporting culture tracked through the CAP process

d) HP rewards and recognition programme

e) Completion of HP training required per individual (refer to 6.2.1).

NOTE: *KNPS Departments report monthly on these KPI's and feedback to the station leadership through the HPOC. HPOC Departmental feedback template (KFD-008) and HPOC non-production department feedback template (KFD-009) are saved in G:\Forms\ISED.*

6.2.2.1 Human Performance Event-Free Clock

- The event-free clock indicator is a means of measuring organisation's wide HP and to indicate the organisation's support of front-line HP.
- KNPS ensures that personnel at all levels (individual, supervisors, managers, senior managers including supplemental personnel) actively support and achieve event-free operation through the use of error free prevention tools.
- KNPS Station event-free clock program is developed and is managed as described in KGA-097.

6.2.2.2 Observation and Coaching Programme

- The Observation and Coaching programme provides a platform to collect data on behaviours, which are a leading indicator of HP issues, human errors, and significant events. The goal is to positively reinforce desired behaviours and correct adverse behaviours to prevent significant events.
- KNPS observation and coaching programme is developed and is managed as described in KGA-078.
- Observations data is captured and trended, and reviews of previous observations is performed to identify potential trends in worker behaviours, which could potentially lead to human error and/ or significant event.

NOTE: *Department observation trending is performed and feedback to the station Senior Leadership is through HPOC.*

6.2.2.3 Reporting Culture (Corrective Action Program)

- KNPS encourages the reporting culture through the CAP process (KAA-688). Personnel report unwanted or unexpected conditions or issues and incidences that negatively (or have the potential to) affect performance, without fear of retaliation or punitive action.
- HP events are investigated and analysed to determine the contributing factors (error precursors and organisational weaknesses) to deviations in performance. (KGA-122)
- HP events are communicated to the organisation, department or group in accordance with KGA-097, to ensure learning is shared amongst all personnel.

6.2.2.4 Human Performance Rewards and Recognition Programme

KNPS HP rewards and recognition system is implemented whereby desired behaviours are identified and positively reinforced. Any individual may nominate another for identifying a gap in our barriers and taking action on it.

NOTE: *Nuclear Safety Hero Nomination programme can be used as rewards and recognition programme. ISED facilitates the programme, but it is the responsibility of the Department or Group to nominate their staff.*

6.2.3 Evaluation and Assessments

6.2.3.1 Evaluation

The evaluation of the HP programme and associated strategy at KNPS is conducted through Self-Assessments process identify strengths and weaknesses in HP programme and performance, for continuous improvement. Inputs into the Self-Assessments includes some of the following data:

- Condition Reports (CR's)
- Trending data, e.g. Station Quarterly Trend Reports
- Review of Observation and Coaching
- Review of the KNPS Human Performance KPI's
- Review of KNPS Departments HPOC feedback reports
- Review reports of NSA Evaluations
- Review reports from WANO Peer Review
- Benchmarking Activities

NOTE: *The Self-assessment process within KNPS is described in KGA-053.*

6.2.3.2 Assessments

a) Internal Audits and Reviews

- Quality audits and management surveillance provide a measure of the adequacy and effectiveness of the safety management system. Internal audits findings are reported by NSA and are resolved by the corresponding department within KNPS.
- Scheduling, execution and closure of internal HP Programme management reviews will be carried out as part of the HP improvement actions or as requested by HPOC.

b) External Audit and Reviews

- Audits and reviews of KNPS HP programme are scheduled in the Safety Culture Enhancement Programme (SCEP) as part of the Safety Culture programme at KNPS.

6.2.4 Feedback and Continuous Improvement

HP programme and improvement initiatives are developed, implemented and maintained to ensure continuous and sustainable improvements of KNPS HP. This includes:

- OE feedback process and learning from both internal and external events (sourced from WANO Significant Operating Experience Reports (SOER's), Electricite De France (EDF) Affaire' Parcs and Eskom, including liaison with international bodies such as IAEA, WANO, INPO and NEI)

- Events reporting and investigating as per the requirements of the CAP process KAA-688.

- The use of performance improvement programmes such Self-Assessment are used to identify gaps and opportunities.

6.2.5 Oversight

6.2.5.1 Human Performance Oversight Committee (HPOC)

- The KNPS HP Programme oversight is performed through the monthly HPOC, which has been convened comprising of the HOD's across KNPS Business Unit to facilitate control, feedback and to encourage staff involvement in HP activities.

- The HPOC committee maintains oversight of the HP programme within KNPS Business Unit (BU) and considers actions for effective implementation of the HP error reduction initiatives.

- Advice the station and station departments on the appropriate direction for excellence in HP.

NOTE: *Further details of the HPOC roles and responsibilities are recorded in the committee's Terms of Reference (335-87).*

6.2.5.2 HP Forum

- The HP Forum is a working group that is considered a sub-committee to the KNPS HPOC, and provides a feedback loop between the Senior Leadership and the HP Champions or Representatives of various Departments and Groups within the station.

- The forum provides a platform for Department/Group HP Champions or representatives to share ideas to proactively and effectively implement the HP programme at the Department/Group level.
- Raise awareness of potential HP challenges (Including COVID-19 pandemic challenges) to safe and reliable operation of KNPS.
- Empower and support HP Champions or Representatives to effectively execute their role within their Department/Groups.
- Raise awareness of the available tools and processes that support HP programme at KNPS.
- Create a platform for the HP Champions or Representatives across the organisation to share and learn from each other.
- Communicate HP related information, from KNPS leadership or HPOC.
- Agree on how ISED can continue to support the HP Champions or Representatives in fulfilling their role for achieving HP excellence.
- To monitor, review and drive the implementation of the departmental HP awareness and improvement actions established by HPOC (Promote HP programme and initiatives).
- To identify opportunities to improve HP programme within the Station.
- Discuss emerging HP issues within the Department/Group to be communicated to the HPOC.
- Discuss mitigating strategies/recovery plans if results are not as expected and feedback to HPOC.

6.3 Contractors, Suppliers and Vendors

The monitoring of the Level 1 suppliers will be done as part of the SCEP and KNPS monitors supplier progress on safety culture enhancement, through audits, reviews of the suppliers SCEP and routine progress reports. This monitoring includes Level 1 suppliers described in 238-105.

7.0 RECORDS

The following permanent records will be produced from this procedure and will be indexed in the ISED Quality Record Listing (QRL):

7.1 HPOC Meeting minutes and actions

8.0 ATTACHMENTS

Appendix 1 – Principles of Human Performance Excellence

Appendix 2 – Approach to Human Performance Excellence

Appendix 3 – Criteria for an Effective Human Performance Programme

Appendix 4 – Human Performance Management Strategy Tools

Appendix 5 – Justification

APPENDIX 1

PRINCIPLES OF HUMAN PERFORMANCE EXCELLENCE

Human Performance is based on five principles or underlying truths. Excellence in human performance can only be realised when individuals at all levels of the organisation accept these principles and embrace the concepts and practices that support them.

Integrating these principles into management and leadership practices, worker practices, and the organisation's processes and values, will be instrumental in developing a working philosophy and implementing strategies for improving human performance within an organisation.

The Five HP Principles are:

1. People are fallible, and even the best make mistakes;

2. Error-likely situations are predictable, manageable, and preventable;

3. Individual behaviour is influenced by organisational processes and values;

4. People achieve high levels of performance largely because of the encouragement and reinforcement received from leaders, peers, and subordinates; and

5. Events can be avoided through an understanding of the reasons behind errors and application of the lessons learned from past events (or errors).

APPENDIX 2

APPROACH TO HUMAN PERFORMANCE EXCELLENCE

Our approach is one of zero events caused by human error. In order to achieve this approach is to work towards performance improvement by focusing on individual behaviours, as well as organisational factors

Reducing Error: Reduce the frequency of events by anticipating, preventing, and catching active errors at the job site. E.g. Observation and Coaching.

Managing Defences: Minimize the severity of events by identifying and eliminating latent weaknesses that hinder the effectiveness of defences against active errors and their consequences.

Reducing active errors (Re) and managing defences (Md) leads to zero significant events (ØE).

“Zero is not a number, but a vision."

APPENDIX 3

CRITERIA FOR AN EFFECTIVE HP PROGRAMME

Performance Objective:

Human performance standards and expected behaviours are defined, established and incorporated in an organisation's programmes, processes and training. These standards and behaviours are reinforced to reduce the likelihood of human error and to achieve sustainable, event-free operations.

Criteria:

1. All personnel are advocates for human performance standards and promote the use of error-reduction practices and defence-in-depth measures. Managers communicate and reinforce error-reduction practices and defence-in-depth measures frequently to promote high levels of human performance.

2. Supervisor responsibilities in human performance processes are defined to include maintaining situational awareness of job site conditions, assessing worker capability to execute tasks event free, incorporating defence-in-depth measures as needed and regularly monitoring work activities to reinforce proper human performance behaviours.

3. Workers focus on the task at hand, stop to seek assistance when faced with uncertain or unexpected conditions, and prepare themselves for potential consequences before taking actions. Workers understand and value human-performance-error-reduction standards and use them as a means to reduce errors and prevent events.

4. Human-error-reduction practices and their use are clearly defined and are embedded in procedures, processes and training.

5. Human-error-reduction practices and defence-in-depth measures are factored into worker preparation activities and work plan development. These practices identify error-likely conditions and establish appropriate compensatory measures to mitigate the likelihood and effects of human error.

6. Procedures and work documents are written and structured to minimise the likelihood of human error.

7. Guidance is provided on the use of physical barriers to prevent or mitigate human-performance-related events during site activities. This includes controls such as limiting access to risk-sensitive equipment, installing temporary barriers during work near sensitive equipment, and posting signs to highlight error-likely situations and hazards to personnel.

8. Guidance is provided and incorporated in the design change process for the use of engineered controls to reduce the likelihood of human error during the operation and maintenance of modified systems or components. Where appropriate, engineered controls are used to reduce the likelihood and the effects of human error.

APPENDIX 3 (continued)

CRITERIA FOR AN EFFECTIVE HP PROGRAMME

9. Job site conditions that increase the likelihood for human error – such as inoperable lighting, degraded labels and signage, and cluttered work areas – are addressed in a timely manner.

10. Initial training programmes incorporate human performance standards and practices, provide the necessary skills and knowledge to understand conditions that lead to human error, and train and qualify personnel on the selection and use of applicable error-reduction practices and defence-in-depth measures commensurate with the task. Continuing training programmes embed human performance practices in everyday training activities.

APPENDIX 4

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

1. HP Strategic Plan Tool

1.1 Introduction

Identifying and minimizing the risk of human error and its impact on plant equipment, personnel, and property are the aims of an effective management strategy. Minimizing the *frequency* (reducing the probability) and *severity* (reducing consequences) of plant events triggered by human error will reduce the human risk.

NOTE 1: *All stages of this strategy tool must be accomplished for successful change to occur, and the use of this tool may involve several iterations.*

NOTE 2: *The process starts with awareness, understanding, and commitment by the senior management team.*

1.2 When to Use the Tool:

- Always **–** Human performance is a continuous risk to safety and plant reliability.
- When there is no existing human performance strategy.
- After experiencing several minor events and near-miss incidents caused by human performance issues.
- During the business/budget cycle planning.

1.3 Best Practice

Stage 1 – Obtain senior management commitment.

a) Ensure the Human Performance Oversight Committee members understand the risk of human error to safety.

b) Create a vision for excellence in human performance.

c) Establish a clear business case by identifying the financial, safety, and moral benefits of a HP strategy and by understanding the costs of not having such a strategy.

d) Arrange for resources to sustain the strategy and plan.

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

Stage 2 – Establish an oversight structure.

a) Hold key line managers accountable for HP as well as executing the HP strategy in their respective Department/Group.

b) Create a management group that regularly monitors station and department HP.

NOTE 1: *KNPS has an established oversight structure HPOC and a working group HP forum.*

NOTE 2: *Department or Groups can establish internal HP Committees to monitor their HP performance and strategy if deemed necessary.*

c) Appoint a HP Practitioner, Representative or Champion to facilitate the implementation of the strategy.

Stage 3 – Identify the gaps to excellence.

a) Compare current procedures, performance, conditions, controls, barriers, values, and practices with standards of excellence, to identify performance gaps as well as other vulnerabilities.

b) Analyse data from the CAP, OE, self-assessments, and field observations, to identify current vulnerabilities.

c) Identify the most significant human threats to the safety and reliability of risk-important structures, systems, and components.

d) Conduct a training needs analysis to determine the knowledge and skill requirements for HP expectations.

Stage 4 – Develop a HP strategy.

a) Create a risk-based approach to reduce the frequency and severity of HP events with structures, systems, and components important to safety and reliability.

b) Adopt a systematic, systemic, and results-based approach to solving specific HP problems.

c) Encourage voluntary reporting of errors and conditions adverse to safety and reliability.

NOTE: *KNPS CAP process is implemented as described in KAA-688.*

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

d) Develop measures such to monitor the effectiveness of the HP strategy.

NOTE: *KNPS Performance Improvement programmes, such as Self-Assessment, Coaching and Observation, Trending etc.*

e) Establish roles, responsibilities, expectations, values, and beliefs important to excellent HP.

f) Develop an HP improvement plan that includes milestones for key initiatives, using information from Stage 3.

g) Modify the HP improvement plan based on feedback from key stakeholders in Stage 5 communications.

Stage 5 – Communicate with and engage stakeholders.

a) Develop and implement a communication strategy.

b) Solicit suggestions from all key stakeholder groups, especially first-line supervisors and front-line workers.

c) Develop and implement a reward and reinforcement plan.

Stage 6 – Implement the HP strategy.

a) Ensure that the HPOC or relevant Department/Group meeting oversees the implementation of the HP strategy.

b) Integrate the HP strategy into the business plan to ensure that resources are available to make the strategy work.

Stage 7 – Evaluate the effectiveness of the HP strategy.

a) Identify focus areas that need additional improvement (performance gaps and defence-in-depth vulnerabilities). Determine their causes and extent of condition.

b) Correct the most important focus areas that need improvement.

c) Verify that improvement actually occurs.

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

Stage 8 – Maintain the right picture of excellence in HP

a) Monitor progress in improving HP via HPOC, Departmental or Group meetings.

b) Monitor OE and conduct regular benchmarking and self-assessment activities.

NOTE: *Internal benchmarking is encouraged, to learn from other Departments within KNPS.*

1.4 At-Risk Practices:

- Delegating the responsibility for HP to a single staff individual other than line managers.
- Assuming that HP will improve and remain stable without ongoing management attention.
- Providing insufficient resources, which could cause important HP problems to persist.
- Reacting to HP problems without using systematic methods to determine their causes and contributors.
- Maintaining a performance improvement plan that does not address current HP challenges.
- Adopting a disciplinary policy that regularly punishes people for reporting their own mistakes.
- Assuming that all errors are due to poor attitudes, recklessness, or negligence.
- Assigning a person as the HP Practitioner, Representative or Champion who does not have either the expertise or an interest in the job.
- Taking overly aggressive actions that are not aligned with the short term.
- Not monitoring the return on investment generated by the HP strategy.

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

2. Leadership HP strategic tool

2.1 Introduction

- When there is a conflict between safety and production, managers, senior managers in particular fuel enthusiasm for safety by what they pay attention to, react to, and talk about. To ensure that basic work processes and controls are robust, well-supported, monitored effectively, and sustained.
- A presumption that has stood the test of time in HP is that people want to do a good job. Managers and supervisors communicate what a good job is to the workforce by what they accept.
- A robust safety culture requires aggressive leadership that explicitly emphasises the principles and attributes of a strong nuclear safety culture.

2.2 When to Use the Tool:

- When production is threatened
- During operational decision-making and in meetings
- When events occur
- When interacting with subordinates
- While recognising or rewarding individuals

2.3 Best Practice:

1) **Measures** – defining what managers pay attention to, measure, and control on a regular basis. Conveying a clear vision of good human performance.
2) **Reactions** – the individual or personal responses to critical incidents or crisis. Leaders insist on high HP standards regardless of consequences or perceived risk.
3) **Resources** – priorities used to allocate scarce resources, signifying HP as a core business success factor.
4) **Coaching** – open attempts to role model HP standards, coach, or teach in the field, while preserving healthy, professional relationships.
5) **Rewards and Recognition –** criteria used to reward, recognize, and discipline individuals to reinforce safe behaviours, good HP standards and avoid punishing honest mistakes.
6) **Promotion** – how managers recruit, promote, and dismiss employees is characterised as fair and honest

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

2.4 At-Risk Practices:

- Not having or not acting consistently with a clear set of values that make safety the overriding priority.
- Exerting intense management pressure to meet due dates or schedules, without building in quality checks.
- Diverting resources from safety initiatives to production activities in the belief that safety will not suffer.
- Using rewards inconsistently with adopted values and beliefs.
- Rewarding or promoting individuals who get results using unsafe, at-risk, or unethical behaviours.
- Not appreciating those who, by consistently being well prepared and using safe practices, avoid ”firefighting” situations (the ability to extinguish, to confine, or to escape from sudden threats to safety, reliability, or production)
- Recognizing and/or rewarding personnel who are good at “firefighting”.
- Using measures that focus exclusively on productivity efforts.
- Treating HP as less than a core business issue.
- Assuming that all errors are due to poor attitudes, recklessness, or negligence.
- Focusing exclusively on the individual(s) when investigating an event.
- Sending contradictory or inconsistent messages regarding production and safety.
- Inconsistently linking rewards or punishment with specific behaviours.

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

3. Behavioural Expectations

3.1 Introduction

Procedures do not always specify every action needed to accomplish a task successfully. Some steps or behaviours important for success, such as skill of the craft, are typically assumed (or overlooked) by the compiler of the procedure.

Expectations specify what managers and supervisors want and give people direction on how to respond or adapt to uncertainty. Many expectations are consolidated in "Conduct of …" and /or administrative procedures.

To anticipate, prevent, and catch errors, performers must use the tools competently. Performers need to know and understand the HP tools, be able to apply them and apply them rigorously.

NOTE 1: *HP tools expectations are described in KSA-122.*

NOTE 2: *Managers and supervisors need to know HP tools better than the workers. If managers, especially first-line supervisors, are going to coach workers effectively on the proper use of HP tools, they too must know the expectations – be able to explain and model each tool during in-field observations.*

3.2 When to Use the Tool:

- When defining safe practices not regularly specified by procedure or process.
- When variations in behaviour and results reveal the absence of clear expectations.
- When actual practices conflict with training

3.3 Best Practice:

A good expectation is clear to the user as to what purpose the expectation serves. Good expectations are also simple, easily recalled and applied when conditions require their use and possess the following attributes:

APPENDIX 4 (continued)

HUMAN PERFORMANCE MANAGEMENT STRATEGY TOOLS

NOTE 3: *Expectations are always developed with the end results in mind – the impact to risk important components, productions or service.*

NOTE 4: *Violations tend to multiply when the purpose of an expectation is vague and its use is unreasonable.*

a) **Active** – What is wanted versus what wanted is specified.

b) **Specific** – The preferred behaviour or action is clearly defined.

c) **Doable** – The user is able to accomplish the behaviour in the field.

d) **Observable** – Anyone can tell when the behaviour occurs.

NOTE 5: *If management personnel do not communicate expectations clearly, and they fail to reinforce, coach, or correct the expectations consistently, then behaviour standards tend to decay, evolve, or drift.*

e) Objective – Independent observers see the same behaviour.

3.4 At-Risk Practices:

- Not establishing expectations for risk-important situations not addressed by procedure.
- Not communicating expectations and their purposes to the users.
- Not positively reinforcing users when managers see expectations are used properly.
- Not comparing current expectations with industry best practices.
- Creating expectations that are too difficult to be understood or followed.
- Requiring expectations to be followed without explaining the benefit to the user.
- Assuming expectations are addressed by skill of the craft.
- Assuming desired practices or behaviours are based on common sense.
- Rationalising current performance despite evidence of decline or performance gaps with respect to expectations.

APPENDIX 5

JUSTIFICATION

Revision 0

1. New procedure demonstrating the implementation and monitoring of Human Performance at KNPS in accordance with 238-28, Nuclear Safety Management Programme.

2. Review the procedure as per the requirements of – CR114002-001CA.