

	Manual	Koeberg Operating Unit
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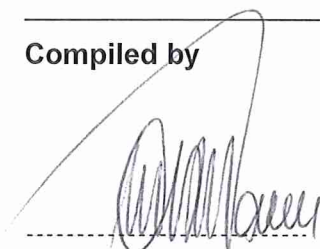
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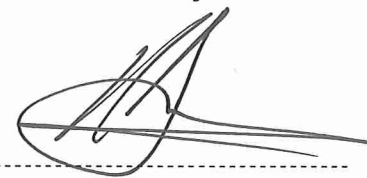
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1. Introduction

The current licensing basis for Koeberg Nuclear Power Station (KNPS) comprises the complete set of radiation protection and nuclear safety requirements for KNPS, and the principal documentation regarding the processes, programmes and practices that demonstrate compliance with these requirements. The requirements may have their origin in Regulatory Authority requirements, Licensee commitments, design bases and Eskom requirements. The current licensing basis constitutes the basis for the safe operation of KNPS and the issuance of the Koeberg Nuclear Installation Licence.

This Manual defines the licensing basis and gives the key mandatory nuclear safety principles and documents that must be complied with to control and demonstrate the safe operation of KNPS.

NOTE: *Authorisation of this Manual and any subsequent revisions thereto shall be subject to prior approval by the Regulatory Authority.*

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

To define the current nuclear licensing basis for KNPS.

2.1.2 Applicability

This manual applies to the operational and decommissioning phases of the Koeberg Nuclear Power Station (KNPS) Site, and is applicable to the Koeberg Operating Unit.

The KNPS Site includes the following nuclear installations:

- The Koeberg Nuclear Power Station, including the two nuclear reactors with shared Turbine Building
- Five Diesel generator Buildings
- Cooling Water Pumping Stations
- Spent Fuel Buildings
- Nuclear Auxiliary Building (NAB)
- Waste Treatment
- Low Level Waste
- CSB
- Chemistry Building
- Environmental Laboratory (ESL)

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems
- [2] 238-8 Nuclear Safety and Quality Manual
- [3] Nuclear Installation License NIL-01

2.2.2 Informative

- [1] National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) (NNRA)
- [2] R.388: Regulations In Terms Of Section 36, read with Section 47 of the National Nuclear Regulator Act, 1999 (Act No. 47 on Safety Standards Regulatory Practices.
- [3] Nuclear Energy Act, 1999 (Act No. 46 of 1999)
- [4] Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
- [5] IAEA INSAG – 12: Basic Safety Principles for Nuclear Power Plants (75-INSAG-3).

2.3 Definitions

2.3.1 Licensing Basis:

The licensing basis comprises the complete documented set of radiation protection and nuclear safety requirements for the licensed nuclear installation, and the principal documentation and related processes, programmes, and practices that demonstrate compliance with these requirements during the period of validity of the licence.

2.3.2 Radiation Protection and Nuclear Safety Criteria:

Criteria established with the objective of ensuring and assuring an acceptable level of protection and safety to the workers and the public from radiation hazards. These include the design criteria of the plant, NNR safety standards, and other safety criteria specified by the Regulatory Authority and / or Licensee.

2.3.3 Koeberg:

Koeberg Nuclear Power Station, Units 1 and 2.

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2.4 Abbreviations

Abbreviation	Explanation
ALARA	As Low As Reasonably Achievable
CR	Condition Report
CM	Configuration Management
DDR	Document/Drawing Change Request
EP	Emergency Preparedness and Response
ESRM	Nuclear Engineering Strategic Review Meeting
ETMM	Engineering Technical Management Meeting
FOS	Functional Organisation Structure
GDS	Generation Document System
IAEA	International Atomic Energy Agency
IMS	Instrumentation Maintenance Services
INES	International Nuclear Event Scale
IPS	Interconnected Power System
ISED	Independent Safety Evaluation Department
ISI	In Service Inspection
ISIP	In Service Inspection Programme
KAPS	Koeberg Accident Procedure Sub-Committee
KBG	Koeberg
KEG	Koeberg Event Group
KIT	Computer and data Processing System
KLBM	Koeberg Licensing Basis Manual
KNPS	Koeberg Nuclear Power Station
KORC	Koeberg Operations Review Committee
KOSC	Koeberg Operability Sub-Committee
KOU	Koeberg Operating Unit
KSRC	Koeberg Safety Review Committee

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Abbreviation	Explanation
LIMS	Laboratory Information Management System
mSv	Millisievert
MWP	Megawatt Park
NDE	Non-destructive Examination
NECSA	South African Nuclear Energy Corporation Limited
NLOITP	Non-Licensed Operator Initial Training Programme
NMC	Nuclear Management Committee
NNR	National Nuclear Regulator
NSA	Nuclear Safety Assurance
NSRC	Nuclear Safety Review Committee
NSSS	Nuclear Steam Supply System
OPG	Operations Procedure Group
OTS	Operating Technical Specifications
PSA	Probabilistic Safety Assessment
PSM	Power Station Manager
PT	Periodic Test
PTW	Permit to Work
QA	Quality Assurance
QC	Quality Control
RAR	Risk Assessment Report
RFE	Reactor Fuel Engineering
RO	Reactor Operator
RP	Radiation Protection
SAP	System Applications and Products
SAR	Safety Analysis Report
SAT	Systematic Approach to Training
SDRG	Safety Documentation Review Group

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Abbreviation	Explanation
SI	<i>Système International d'Unités</i>
SIP	Process Instrumentation System
SR	Safety Related
SRA	Safety Re-Assessment
SRG	Safety Review Group
SRO	Senior Reactor Operator
SRS	Safety Related Surveillance Manual
SSCs	Structure, System and Components
TA	Temporary Alteration
WANO	World Association of Nuclear Operators

2.5 Roles and Responsibilities

- 2.5.1 The Chief Nuclear Officer is accountable to the Group Executive Generation and is responsible for ensuring compliance with the current licensing basis.
- 2.5.2 The Senior Manager (Nuclear Licensing) is accountable to the Chief Nuclear Officer and is responsible for establishing Eskom nuclear licensing policies, strategies and processes, to provide direction and prioritisation and to ensure consistency in approach for all licensing activities for Eskom's nuclear programme.

2.6 Process for Monitoring

The Corrective Action Process and the use of Quality Assurance Audits are utilised to identify any deviations from the licensing basis. Should any non-compliance be identified, these are reported internally and to the NNR, and are investigated. Corrective actions are implemented as appropriate.

2.7 Related/Supporting Documents

As per the tables in the annexures.

3. Koeberg Licensing Basis

3.1 Principles of Radiation Protection and Nuclear Safety for Koeberg

In granting a licence to operate Koeberg, the NNR requires that the following principles be followed for all activities which have an impact on, or which could have an impact on

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radiation protection and nuclear safety (refer to Regulations R.388 on Safety Standards and Regulatory Practices):

3.1.1 Good Engineering Practice

Koeberg Nuclear Power Station must be operated in accordance with good engineering practice.

3.1.2 Accident Prevention and Mitigation

The principles of accident prevention and accident mitigation must be applied. Stringent measures that are consistent with good world practice shall be taken to prevent accidents. The remote possibility of severe accidents leading to core damage is, nevertheless, acknowledged. The possible causes and course of these accidents shall be analysed. Consideration shall be given to measures to further reduce the probability of occurrences and consequences of such accidents.

3.1.3 Defence-in-Depth

The principle of Defence-in-Depth must be applied as appropriate. This principle requires the application of more than one single protective measure for any given safety objective, such that the objective is achieved, even if one of the protective measures fail.

3.1.4 Optimisation of Protection and Safety

The process of determining what level of protection and safety would result in the magnitude of individual doses, the number of individuals (workers and members of the public) subject to exposure and the likelihood of exposure being ALARA, economic and social factors being taken into account, must be applied, and the results of the process must be implemented.

3.1.5 Fundamental Safety Criteria

It must be demonstrated that operation meets the principal safety criteria as set out in Annexure G.

3.1.6 Safety Culture

A safety culture must be fostered and maintained to encourage a questioning and learning attitude towards radiation protection and nuclear safety, and to discourage complacency.

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3.2 Licensing Basis Structure and Change Management

- 3.2.1. The Koeberg Licensing Basis Manual is structured to reflect the main groupings of requirements and processes that are adopted to ensure and provide assurance of the safe operation and decommissioning of the Koeberg Nuclear Power Station in accordance with the licensing basis. As indicated in Table 1, the requirements are grouped into general requirements that are applicable to all processes and process-specific requirements for each of the main process groupings, as identified below the "General Requirements" row in Table 1.

Table 1

Groupings of Requirements and Processes	Requirements	Applicable Documentation
General Requirements	Section 3.3	Annexure A
Safety Assessment and Licensing	Section 3.4.1	Annexure B
Operations	Section 3.4.2	Annexure C
Engineering and Configuration	Section 3.4.3	Annexure D
Plant Condition Management	Section 3.4.4	Annexure E
Radiation Protection and Emergency Preparedness & Response	Section 3.4.5	Annexure F

Each main grouping is described (in the specific section as indicated in Table 1) in terms of the functional areas within that grouping and in terms of the requirements applicable to each of those functional areas. The governing documentation of each main grouping is described (in the specific annexure as indicated in Table 1) as applicable to each functional area within the grouping, and includes the requirements, process, and implementation and compliance monitoring documentation (implementation/measures).

- 3.2.2. The requirements and process documentation listed in the annexures identifies which activities are subject to the Koeberg Safety Screening, Evaluation, and Justification procedure. This procedure controls activities that require specific safety screening, evaluation, and/or justification and/or NNR approval prior to implementation of the activity.
- 3.2.3. The implementation and compliance monitoring documentation indicated in bold, italic print in the annexures shall be submitted to the NNR for monitoring or review purposes in accordance with applicable requirements or commitments. All other

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implementation and compliance monitoring documentation shall be available for inspection by the NNR, if required.

- 3.2.4. The annexures constitute the higher level controlling documentation for each main grouping of requirements and processes. This documentation, in turn, specifies the working level licensing basis documentation.
- 3.2.5. The document revision numbers for Eskom and NNR documents are not listed in the annexures. The particular revisions as controlled by the Eskom and NNR documentation systems are applicable.
- 3.2.6. This manual will be subject to a full review on a biennial basis. The master document is kept on the Eskom Generation documentation system. The master document reflects the licensing basis controlling documentation at the time of its issue.
- 3.2.7. The authorisation of any revisions to the Koeberg Licensing Basis Manual (36-197) or to the Koeberg safety evaluation process (procedure KAA-709) shall be subject to NNR approval.

3.3 General Requirements (applicable to all processes)

3.3.1 Quality Management System

A quality management programme, including independent assurance, shall be established and implemented in order to provide adequate confidence that the licensing basis is realised.

3.3.2 Procurement and Manufacturing

Procurement and manufacturing requirements shall be established to ensure adherence to the regulatory requirements for nuclear safety level graded products and services.

3.3.3 Compliance with Regulatory Safety Standards and Criteria

Safety assessments shall be performed to demonstrate that regulatory standards and nuclear safety criteria are met, in particular to ensure that the plant is operated in conformance with the risk criteria of annexure G.

An inspection programme to ensure compliance with all conditions of the nuclear authorisations shall be implemented.

3.3.4 Safety Evaluation and Assessment

All changes that may have an impact on the Koeberg Licensing Basis shall be subject to a safety evaluation process which includes a risk assessment. Changes are furthermore subject to plant and process-specific change review, approval, authorisation and management requirements.

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3.3.5 Experience Feedback

Plant-specific and international experience shall be collected, evaluated and utilised effectively as appropriate.

3.3.6 Benchmarking

International norms and practices shall be taken into account when considering proposed modifications and changes to operating practice. In addition, the safety case itself shall be subject to review and periodic safety reassessment using an international benchmark.

3.3.7 Event Investigation

The root causes of selected significant events shall be determined, and appropriate action shall be taken to prevent recurrence.

3.3.8 Safety Assessment and Licensing Basis Validity

Processes shall be implemented which provide assurance that the safety case is valid on an on-going basis.

3.3.9 Staffing

Koeberg shall be adequately staffed by competent personnel. Emphasis shall be placed on staff selection, training and retraining. Only personnel certified as competent to perform those activities, shall perform safety-related activities.

Adequate strategic and tactical support in operational and engineering matters shall be provided for nuclear power station staff.

3.3.10 Nuclear Safety Committees

Nuclear safety committees shall be established at corporate and power station level to advise line management on safety issues.

3.3.11 Security and Safeguards

Physical protection and security measures shall be appropriate for the current evaluation of the design base threat. This includes measures against cyber security.

Safety and security measures shall be designed and implemented in such a manner that they satisfy both safety objectives and security objectives and that they do not compromise one another.

Activities associated with nuclear safety and the safeguarding of nuclear materials shall be open to examination by inspectors of the NNR and the International Atomic Energy Agency.

Appropriate security measures shall be taken for the safe transport of nuclear material to and from Koeberg Nuclear Power Station.

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3.3.12 Safety and Security Culture

Eskom's Nuclear Policy (32-83) requires the promotion of a strong nuclear and occupational safety and security culture through the development and reinforcement of good safety attitudes and behaviour in individuals and teams, with nuclear and occupational safety being the overriding priority.

3.3.13 Human Factors

Human factors shall be taken into account and good practices and good performance shall be supported to prevent human and organisational failures.

3.4 Specific Process Requirements

3.4.1 Safety Assessment

A. Objective

Safety assessments shall be performed to demonstrate that the operation of Koeberg meets regulatory safety requirements and criteria.

B. Process Requirements

(i). The safety assessment of Koeberg shall be updated periodically at a frequency acceptable to the Regulator, to reflect the current plant operational configuration and all relevant factors onsite and offsite that affect the safety assessment.

(ii). A process shall be implemented for performing safety evaluations and safety justifications for activities or plant conditions, the consequences of which could have an impact on those previously analysed or on the Koeberg licensing basis.

(iii). Quantitative risk evaluation methods shall be used to the greatest practicable extent in decision making affecting nuclear safety, in conjunction with deterministic safety analyses.

3.4.2 Operations

A. Objective

Operations shall ensure that Koeberg is operated in a safe and effective manner within the requirements of the plant's licensing and design basis, and in accordance with accepted national and/or international norms.

B. Process Requirements

Safe and effective plant operation shall be assured by respecting the following key principles:

(i) Competent Staff

Operations shall be staffed by adequate numbers of competent personnel. Emphasis shall be placed on staff selection, training, and retraining. Training programmes shall be

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developed and implemented to enable operating staff to perform their duties safely and efficiently. Only staff certified and authorised as competent shall perform operating duties.

(ii) Conduct of Operations

The responsibilities and authorisations of operational staff shall be clearly defined within the overall structure of the organisation.

The observance of procedural discipline and operational limits shall ensure that the plant is operated within its design and licensing basis.

Operations staff shall adopt a safety culture that respects the potential dangers of the core and promotes an ethos of conservative decision-making.

(iii) Operational Procedures

All modes of plant operation shall be controlled by detailed, validated and formally approved operating procedures.

The Operating Technical Specifications (OTS) shall contain requirements for plant safety, including provision for surveillance requirements as specified in the Safety Related Surveillance Manual (SRSB).

(iv) Plant Equipment Status Control

The configuration of the plant systems for all modes of operation shall be defined and controlled. Controls shall be in place to provide assurance of correct plant line-up. Equipment shall be monitored and tested to assure operability and availability.

3.4.3 Engineering and Configuration

A. Objective

To ensure that the applied engineering processes are effective in maintaining the required functions of safety related plant structures, systems and components (SSCs), and that these SSCs are configured in accordance with the design basis, with demonstrated and adequate safety margins.

B. Process Requirements

(i) Design Control

Plant design activities shall be conducted in a manner that ensures the verification, approval and documentation of the design methods and processes used, ensuring the requisite qualification of personnel, and demonstrates that the required defence-in-depth and prudent safety margins are encompassed within the design.

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(ii) Installation and Temporary Alteration Control

Modifications and other plant changes, either permanent or temporary, shall be designed and implemented in a controlled manner, commensurate with the applicable safety case and in accordance with established codes and standards. Commissioning and testing shall permit verification that the appropriate performance and operational parameters can be met. Processes shall be in place to ensure adequate controls exist for the safe installation, operation and timeous removal of temporary alterations.

(iii) Classification and Equivalency Control

Classifications shall be developed for plant SSCs, in order to ensure that appropriate design, manufacturing and testing processes are followed during fabrication, commissioning and operation. Equivalency studies shall be done in a manner that will ensure that alternative components are selected with due consideration of design, function, and mechanical and electrical fits and tolerances.

(iv) Configuration Control

Configuration Control shall ensure that activities affecting plant SSCs are managed in such a way that the plant remains within the bounds of analysed and documented design conditions.

(v) Engineering Support Control

Engineering support for plant operation, including engineering investigations and determinations, design base analysis, safety evaluations, reactor core engineering and overall plant performance management, shall be conducted in accordance with prudent engineering codes and practices, and shall be directed at ensuring safe and effective operation within the design basis envelope.

3.4.4 Plant Condition Management**A. Objectives**

The Plant Condition Management process shall ensure, and provide assurance that the physical condition of SSCs is such that the safety-related SSCs are, and remain, capable of performing their intended functions.

B Process Requirements

- (i)** The Plant Condition Management process shall contain provisions sufficient to predict, monitor and preserve the material condition of SSCs that are important to safety.
- (ii)** The process shall provide for restoring the plant to design state after degradation, failures or as part of modifications.
- (iii)** The process shall provide assurance that the licensing basis relating to physical plant condition is respected.
- (iv)** Plant technical life cycle management plans shall be used to provide strategic plant condition management.

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The element of plant life cycle plans is important to safety due to the fact that these provide for the on-going integrity and safety of the plant, and allow for the identification and proper review of exceptional safety related plant condition interventions.

Plant system operational readiness verification and functional testing is controlled in the "Operations" Process. The system functional requirements are controlled in the "Engineering and Configuration" Process.

Plant condition management of security systems is controlled by the security plan for Koeberg, included in the general requirements given in Annexure A.

3.4.5 Radiation Protection and Emergency Preparedness & Response

A. Objectives

The fundamental safety objective of radiation protection is to protect people, property and the environment from harmful effects of ionising radiation. This objective should be achieved without unduly limiting the operation of Eskom facilities or the conduct of activities, actions, practices and applications that give rise to radiation risks. Therefore, the system of radiation protection aims to assess, manage and control exposure to ionising radiation so that radiation risks, including risks of health effects and risks to the environment, are reduced to the extent reasonably achievable.

The protection objectives of radiation protection are to:

1. Prevent the occurrence of deterministic effects (harmful tissue reactions) in individuals employed at Eskom facilities by keeping doses below the relevant threshold; and
2. Ensure that all reasonable steps are taken to reduce the occurrence of stochastic effects (cancer or heritable effects) to as low as reasonable achievable in all employees occupationally exposed to radiation at Eskom facilities.

B. Process Requirements

Eskom shall establish requirements for radiation protection and the safety of radiation sources in support of the Eskom Radiation Protection fundamental safety objective, zero harm to employees, property and the environment due to activities, actions, practices and applications of ionizing radiation that give rise to radiation risks at Eskom facilities.

The Eskom radiation protection programme applies to occupational and public exposures relating to the following exposure situations:

3.4.5.1 Planned exposure situations at Eskom facilities:

- a. Activities, actions, practices and applications involving exposure to radiation or exposure due to radioactive material; and
- b. Activities, actions, practices and applications involving sealed sources and unsealed sources.

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3.4.5.2 Emergency exposure situations at Eskom facilities

- a. Activities, actions, practices and applications undertaken in preparation for and in response to a nuclear or radiological emergency.

3.4.5.3 Existing exposure situations at Eskom facilities (where applicable)

- a. Exposure due to contamination of areas by residual radioactive material arising from a nuclear or radiological emergency, after an emergency exposure situation has been declared to be an existing exposure situation; and
- b. Exposure due to natural sources including Radon-222 (^{222}Rn), thoron (^{220}Rn) and their progeny in workplaces.

4 Acceptance

This document has been seen and accepted by:

Name	Designation
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K Featherstone	Senior Manager Nuclear Support
B Mashele	Senior Manager Integrated Design
N Mtwebana	Senior Manager Nuclear Oversight
B Culligan	Senior Manager Nuclear Commercial
T Jappie	Senior Manager Nuclear Projects (acting)
M Maree	Corporate Specialist: Radiation Protection
M Bassie	Manager Engineering Process Support (acting)
M Valaitham	Koeberg Plant Manager (acting)
R Bailey	Koeberg Operations Manager
N Mabumbulu	Koeberg Maintenance Manager
T Karsten	Koeberg Radiation Protection Manager
G Smith	Koeberg Training Manager
M Stevens	Koeberg Quality Assurance Manager (acting)
T Van Schalkwyk	Koeberg Nuclear Services Manager
M Moeketsi	Koeberg Plant Engineering Manager (acting)
Dr C Nombekela	Medical Services

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5 Revisions

Date	Rev.	Compiler	Remarks
September 2017	Rev 2	JA Jooste	Update to reflect changed documentation: numbering as well as updated documents according to changed organisation
April 2014	Rev 1	JA Jooste	Updated for reference to the new OTS and SRSM, to include procedures related to the Security of Transport of Radioactive Material", as per K-19723-E, plus updated to reflect latest document status and organisational structure. Rev 1 additionally updated in April 2014 to include NNR comments on the draft rev 1.
November 2008	36-197 rev 0	JA Jooste	Updated to reflect organisational changes and to reflect latest approval status of documents listed in the appendices, as well as document number change according to latest Eskom Generation requirements.
November 2005	GGM 0984 rev 1a	JA Jooste	Document number changes in Annexure F, as a result of a change in the Eskom documentation numbering system
February 2005	GGM 0984 rev 1	JA Jooste	Routine Review and update
April 2002	GGM 0984 rev 0	JA Jooste	Original Document

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Annexure A
General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Quality Management System	LD-1023: Quality Management Requirements for KNPS RD-0034: Quality and Safety Management Requirements for Nuclear Installations 32-83: Nuclear Policy 238-8: Nuclear Safety and Quality Manual (KOU) 335-2: Koeberg Nuclear Power Station Management Manual 32-727: Safety, Health, Environment, and Quality (SHEQ) Policy	KAA-832: Quality Assurance Monitoring Processes KAA-833: Quality Assurance Monitoring Programme for KNPS	QA audit reports Integrated Monitoring Programme
Procurement and Manufacturing	RD-0034: Quality and Safety Management Requirements for Nuclear Installations PP-0012: Manufacturing of Components for Nuclear Installations	32-1034: Eskom's Procurement and Supply Chain Management Procedure	Supplier Assessments

Annexure A
General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Compliance with regulatory safety requirements, standards and criteria	National Nuclear Regulator Act (Act No 47 of 1999) R.388: Safety Standards and Regulatory Practices (SSRP) Nuclear Licence for Koeberg (NIL-01) RD-0022: Dose Limitation for Koeberg Nuclear Power Station RD-0024: Requirements on Risk Assessment and Compliance with Principal Safety Criteria for Nuclear Installations RD-0034: Quality and Safety Management Requirements for Nuclear Installations LD-1079 Requirements in Respect of Licence Change Requests to the Council for Nuclear Safety 238-18: Nuclear Licensing Requirements Manual 36-197: Koeberg Licensing Basis Manual 238-28 Koeberg Operating Unit: Safety Culture Enhancement Programme	KAA-697: Control of the Safety Analysis Report	Annexures to 36-197 SAR RAR

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Annexure A

General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Safety Evaluation	LD-1012: Requirements in respect of Proposed Modifications to the Koeberg Nuclear Power Station RD-0024: Requirements on Risk Assessment and Compliance with Principal Safety Criteria for Nuclear Installations 238-8: Nuclear Safety and Quality Manual Section 6.1.1 Nuclear Safety 335-2: Nuclear Safety and Quality Manual, Section 5: Nuclear Safety KSA-066: Standard for Nuclear Design and Licensing Basis Evaluation	KAA-709: Process for performing Safety Screenings, Safety Evaluations, Safety Justifications and Safety Cases KGA-018: Safety Case Preparation KGA-029: Safety Justification Preparation KGA-025: Screening and Safety Evaluation Guide KAA-697: Control of the Safety Analysis Report KTA-001: Training and Qualification Requirements for KORC, KOSC and KAPS KTA-005: Training and Qualification Requirements for Safety Screenings and Evaluations	Safety Screenings Safety Evaluations Safety Cases Safety Justifications SAR and RAR updates

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Annexure A
General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Experience Feedback and Benchmarking	238-83: Corrective Action Standard 238-131: Operating Experience Programme	KGA-035: Processing of Experience Feedback received through the EDF Agreement and other sources KAD-025: Processing of Operating Experience KAA-688: The Corrective Action Process	Electronic database Significant Operating Experience Reports
Event Investigation	RD-0025: Emergency Communication with the NNR LD-1000: Notification Requirements for Occurrences associated with KNPS 238-83: Corrective Action Standard 32-95: Environmental, Occupational Health and Safety Incident Management Procedure 238-11: Nuclear Division Occupational Health and Safety Requirements KSA-085: Requirements for the Safety, Health and Environmental Management	KAA-688: The Corrective Action Process KAA-685: INES Evaluation and Reporting KGA-089: Management Oversight of the Corrective Action Process KLA-005: Koeberg Event Classification and Reporting Criteria Listing KAA-768: SHE Management System	KEG reports Investigation reports Effectiveness reviews Event trends

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Annexure A

General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
	System KSA-148: The Management of Incidents, Occupational Injuries and Diseases at Koeberg Nuclear Power Station		
Assurance of Safety Case Validity	RD-024: Requirements on Risk Assessment and Compliance with the Principal Safety Criteria for Nuclear Installations Koeberg Safety Analysis Report 238-147: Periodic Safety Review of Koeberg Nuclear Power Station	Periodic Safety Re-assessment (controlled by project procedures)	<i>Safety re-assessment reports.</i>
Staffing	RD-0034: Quality and Safety Management Requirements for Nuclear Installations KSA-049: Koeberg Training Standard 32-1072: Job Evaluation Standard 238-187: Control of Organisational Structure	KTA-001: Training and Qualification Requirements for KORC, KOSC and KAPS KAA-780: Systematic Approach to Training - Analysis KAA-781: Systematic Approach to Training – Design	Koeberg Operating Unit FOS and man plan Koeberg FOS and man plan Nuclear Engineering FOS and man plan Project Engineering FOS and man plan

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Annexure A
General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
		KAA-782: Systematic Approach to Training – Development KAA-783: Systematic Approach to Training – Implementation KAA-784: Systematic Approach to Training – Evaluation	

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Annexure A
General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Nuclear Safety Committees	238-8: Safety and Quality Manual Section 5: Organisation 335-2: Koeberg Nuclear Power Station Management Manual Section 5.4: Nuclear Safety Oversight	238-204: NSRC Terms of Reference 36-260: Safety Document Review Group KAA-665: KORC Constitution KAA-687: KOSC Constitution KAA-789: Koeberg Accident Procedures Sub-Committee 331-102: Engineering Technical Management Meeting (Koeberg) 331-09: Nuclear Engineering Strategic Review Meeting (ESRM) Nuclear Management Committee (NMC) Terms of Reference	Minutes of following: ESRM NMC NSRC SDRG KORC KOSC ETMM KAPS

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Annexure A
General Requirements: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Security and Safeguards	238-14: Security Requirements for Nuclear Power Stations KSA-100: Physical Security at Koeberg Nuclear Power Station INFC-CIRK 394: Practical Implementation of IAEA Safeguard Agreement between RSA and IAEA RG-0014: Guidance on Implementation of Cyber or Computer Security for Nuclear Facilities	KAA-676: Management of IAEA Surveillance Equipment on Site KAA-809: Administration and Responsibilities for the Supply and Delivery of Nuclear Fuel to Koeberg Nuclear Power Station 24-0118792614: Operational Technology Cyber Security Programme at Koeberg Operating Unit	Security Single Process Contact meetings IAEA Audits
Decommissioning	RD-0034: Quality and Safety Management Requirements for Nuclear Installations 238-8: Safety and Quality Manual, section 9.3.8: Decommissioning	KBG-DP-1: Koeberg Decommissioning Plan	

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Annexure B
Safety Assessment and Licensing : Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Safety Assessment	RD-0024: Requirements on Risk Assessment and Compliance with Principal Safety Criteria for Nuclear Installations LG-1041: Licensing Guide on Safety Assessment of Nuclear Power Reactors 335-64: Koeberg Accident Analysis Manual	331-64: Guideline for Safety Issue Categorisation KAA-745: Production, Implementation and Control of Outage Safety Plan 331-66: Risk Profile Generation KAA-737: Process for the Review of Fuel Management Strategy or Fuel Design Changes KAA-697: Control of the Safety Analysis Report	<i>Outage Safety Plan</i> Risk Profile Reports NNR submissions involving the following are made as per specific process requirements (see Annexure C-F):- <i>SAR Updates</i> <i>RAR Updates</i> <i>Safety Cases</i> <i>Safety Evaluations</i> <i>SRA Report</i>

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Annexure C
Operations: Applicable Documents
Principal Requirement 1: Competent Staff

Functional area	Requirements	Process	Implementation / Measures
Operating and Chemistry Organisation:- <i>(Organisational structure and staffing levels are adequate to support the safe operation of the plant.)</i>	LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KSA-023: Standard for the Minimum Fire Prevention and Protection Organisation during Plant Operation Phase KSB-005: Operating Standards and Expectations KSA-049: Koeberg Training Standard	KAA-581: Fire and Rescue Organisation KAA-582: Organisational responsibilities for Fire Prevention and Protection KAD-024: Nuclear Safety Engineer Function KSC-003: The Chemistry Programme	Departmental staff and accountability list Staff duty rosters

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Annexure C
Operations: Applicable Documents
Principal Requirement 1: Competent Staff

Functional area	Requirements	Process	Implementation / Measures
Selection of Operating and Chemistry Staff:- <i>(An efficient process ensures selection of suitable staff to adequately populate the operational organisation.)</i>	LD-1077: Requirements for Medical and Psychological Surveillance and Control LD-1092: Requirements for Initial Operator Licensing at Koeberg Nuclear Power Station LG-1016: Guide to the Requirements for Medical Surveillance and Control of Nuclear Installations Personnel and Persons Engaged in Activities involving Nuclear-Hazard Material LG-1018: A Guide to the Requirements for Medical Surveillance and Control of Radiation Workers at Licensed Facilities	KAA-591: Medical and Psychological Surveillance and Control of Radiation Workers and Licensed Operators KAA-788: The Process for the Recruitment and Selection of Operators	Personal records Dept staff and accountability list Training records Koeberg Licensed Operator Health Register Psychological & Psychometric Reports Medical Reports
Selection of Operating and Chemistry Staff:- (continued)	LG-1019: A Guide to the Requirements for Medical and Psychological Surveillance and Control of Licensed Operators at Licensed Facilities 32-1250: Process Control Manual for Health and Wellness Management KSA-055: Requirements for the Medical and	240-42853779: Procedure for Health and Wellness	

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Annexure C
Operations: Applicable Documents
Principal Requirement 1: Competent Staff

Functional area	Requirements	Process	Implementation / Measures
	Psychological Surveillance and Control Programme		
Training, Assessment and Authorisation of Operating and Chemistry staff:- <i>(Staff are trained to the required level of competence to ensure that organisation needs and requirements are satisfied. SAT forms the basis of all training. Rigorous assessment and authorisation processes according to agreed standards and criteria ensure that only competent staff perform operational tasks. Competence records are established and maintained.)</i>	SAR (I-8.1.1.2; I-8.1; I-8.1.1.1; I-8.1.2.4; I-8.1.3.1) LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station LD-1077: Requirements for Medical and Psychological Surveillance and Control LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station LD-1092: Requirements for Initial Operator Licensing at Koeberg Nuclear Power Station LD-1093: Requirements for the Full Scope Operator Training Simulator at Koeberg Nuclear Power Station LG-1017: A Guide to the Requirements for Appointed Medical Practitioners LG-1022: A Guide to the Requirements for Initial Operator Licensing at Koeberg Nuclear Power	KAA-503: Modifications to Simulator KAA-580: Appointment of Fire and Rescue Team Members KAA-591: Medical and Psychological Surveillance and Control of Radiation Workers and Licensed Operators KAG-002: Emergency Plan Training Programme KAT-021: Training of Emergency Response Team Members KGA-058: Behavioural Competence Development for Nuclear Reactor Operators and Licence Candidates KGT-003: Guidelines for Generating, Administering and Grading Initial Licence Examinations KGT-020: Non-Licensed Operator Initial Training	Training programmes and records Fire and rescue training records Records of planned exercises Personal training records Simulator maintenance and changes records Minutes of training committees Assessment records Active Position Register Licence suspensions and re-authorisations Initial licensing records

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Annexure C
Operations: Applicable Documents
Principal Requirement 1: Competent Staff

Functional area	Requirements	Process	Implementation / Measures
	Station KSA-023: Standard for the Minimum Fire Prevention and Protection Organisation during Plant Operation Phase KSA-034: Examining and Authorising Personnel to comply with the Requirements of the Eskom Plant Safety Regulations and Operating Regulations for High Voltage Systems KSA-049: Koeberg Training Standard KSC-003: The Chemistry Programme KSA-055: Requirements for the Medical and Psychological Surveillance and Control Programme KSB-005: Operating Standards and Expectations KST-003: Requirements for the Initial Licence Examination of Reactor Operators and Senior Reactor Operators KSV-001: Requirements for the Medical and	Programme (NLOITP) Guide KGT-021: Non-Licensed Operator Requalification Training Programme (NLORTP) Guide KGT-022: Operator Initial Licence Training Programme Guide KGT-023: Licence Operator Requalification Training Programme Guide KGT-054: Chemistry Programme Guide KGT-024: Shift Manager Development Programme Guide KGT-025: Simulator Maintenance, Access / Operation and Initial Conditions and the Training and Authorisation of Simulator Operators KGT-026: Generic Fundamentals Programme KGT-054: Chemistry Training Programme Guide KLB-002: Active Position Register	 <i>Licence exam applications and administration as per KGT-003 Appendix 8</i> Re-licensing records <i>Applications for re-licensing</i> Koeberg Licensed Operator Health Register Authorisation records

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Annexure C
Operations: Applicable Documents
Principal Requirement 1: Competent Staff

Functional area	Requirements	Process	Implementation / Measures
	Psychological Surveillance and Control of Radiation Workers and License Operators KTV-003: Requirements for the Training of Personnel involved with the Medical and Psychological Control Programme	KTV-002: Koeberg Nuclear Power Station Response Team Training Programme	

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
Individual and Operational Responsibilities:- (Individual and operational responsibilities are defined and respected.)	LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station 335-2: Koeberg Nuclear Power Station Management Manual KSA-023: Standard For the Minimum Fire Prevention and Protection Organisation during Plant Operation Phase KSA-104: Reactivity Management Standards KSB-005: Operating Standards and Expectations KSB-007: Interface with Eskom's Interconnected Power System (IPS)	KAA-582: Organisational Responsibilities for Fire Prevention and Protection KAA-583: The Provision and Application of First Aid and Emergency Care KAA-646: Areas of Responsibility between KNPS and Transmission Group KAA-661: Fire Risk Management KAA-687: KOSC Constitution KAA-690: Operability Determinations KSC-003: The Chemistry Programme KSC-006: Chemistry Standards and Expectations	Job descriptions Authorisations RO and SRO Licenses

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
Operational limits and conditions:- (The plant is operated within design and licence limits.)	LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KBA-0022-OTS-0000001: Operating Technical Specifications (OTS) OTS Chapters: OTS Chapter 1 - KBA0022OTS100GEN1 OTS Chapter 2 - KBA0022OTS2000RP1 OTS Chapter 3 - KBA0022OTS30SDSG1 OTS Chapter 4 - KBA0022OTS4SDRRA1 OTS Chapter 5 - KBA0022OTS50MCSD1 OTS Chapter 6 - KBA0022OTS600RSD1 OTS Chapter 7 - KBA0022OTS700RCD1 OTS Chapter 8 - KBA0022OTS800DEF1	KAA-652: Accounting of Transients KNC-001: Chemistry Operating Specifications for Safety Related Systems KNC-002: Chemistry Operating Specifications for Availability Related Systems	Procedurised requirements Operational records Unit Operating logs Chemistry logs LIMS

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
	OTS Justification: Chapter I - KBA022OTSJUSTIF1 Chapter II - KBA022OTSJUSTIF2 Chapter III - KBA022OTSJUSTIF3 Koeberg Chemistry Specifications: KBA022CHEMSPEC00 Chemistry OTS Justification: KBA0022CHEMJUSTIFI1 KBA0022CHEMJUSTIFI2 KSB-005: Operating Standards and Expectations		
Operational Decision-making:- <i>(Operational and Operability decisions reflect adherence to sound operational</i>	LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station	KAA-687: KOSC Constitution KAA-690: Operability Determinations KGA-021: Operability Guide	Operational records Operability determination records

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
<i>practice and in accordance with a rigorous evaluation process and licence requirements. Operational decisions reflect a respect for the potential dangers of nuclear power.)</i>	KSA-104: Reactivity Management Standards KSB-005: Operating Standards and Expectations		Unit Operating logs Chemistry logs CRs (as per LD-1000) KEG reports

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
Control of Information and Records:- (Operational information and records are maintained available in a suitable format for review and detailed reconstruction of events and decisions. Operational events and problems are communicated as per predefined criteria.)	LD-1000: Notification Requirements for Occurrences associated with Koeberg Power Station RD-0025: Emergency Communication with the National Nuclear Regulator LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station 238-6: KOU Documents and Records Management Standard KSA-038: Requirements for Quality Records KSA-011: The Requirements for Controlled Documents KSB-005: Operating Standards and Expectations	KAB-036: Operating Department Records KAC-029: Reporting of Chemistry Results KAA-500: The Process for Controlled Documents KAA-830: Management of Quality Records	Records CRs (as per LD-1000) Unit Operating logs Verbal communications with NNR Operational records

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
Oversight, Supervision and Error Prevention:- <i>(Appropriate oversight is maintained to ensure conformance to performance expectations at all levels and appropriate measures are implemented to minimize human error.)</i>	LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KSB-005: Operating Standards and Expectations		KEG reports Job observation records Psychological reports

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
Production and Outage Plan Implementation:- (Operational activities are planned and controlled in a manner that ensures safe and efficient plant operation.)	LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KSB-005: Operating Standards and Expectations	KAA-721: Online Work Management Process KAA-745: Production, Implementation and Control of the Outage Safety Plan KAA-771: Outage Scope Control Process KAA-829: Development of Outage Plan KGA-040: Management of Outages KLA-017: Unit Refuelling Outage Hold Point Checklists	Operational records Unit Operating logs Chemistry logs Outage Safety Plan Outage plan Outage logs Pre-outage submissions to NNR Startup milestone requests

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Annexure C
Operations: Applicable Documents
Principal Requirement 2: Conduct Of Operations

Functional area	Requirements	Process	Implementation / Measures
Emergency and Off-normal Operational Controls:- <i>(The on-shift response to emergency plan events, operational events, and on-plant fires and injuries are effectively managed.)</i>	LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station 36-681: Generation Plant Safety Regulations KSA-023: Standard for the Minimum Fire Prevention and Protection Organisation during Plant Operation Phase	KAA-582: Organisational Responsibilities for Fire Prevention and Protection KAA-797: Post Trip Review KEP-056: Nuclear Emergency Plan Duties of the Operating Shift KWB-OP-CRR-006: Operating Department Response to Emergencies KAA-583: The Provision and Application of Emergency Care	Unit Operating logs Chemistry logs CRs (as per LD-1000) KEG reports Records of planned exercises

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Annexure C
Operations: Applicable Documents
Principal Requirement 3: Operational Procedures

Functional area	Requirements	Process	Implementation / Measures
OTS:- <i>(OTS defines operational limits and requirements as per defined criteria and international norms, and shall be strictly applied. Changes to OTS are made in a controlled manner as required by the safety evaluation process.)</i>	KBA-0022-OTS-0000001: Operating Technical Specifications (OTS) OTS Chapters: OTS Chapter 1 - KBA0022OTS100GEN1 OTS Chapter 2 - KBA0022OTS2000RP1 OTS Chapter 3 - KBA0022OTS30SDSG1 OTS Chapter 4 - KBA0022OTS4SDRRA1 OTS Chapter 5 - KBA0022OTS50MCSD1 OTS Chapter 6 - KBA0022OTS600RSD1 OTS Chapter 7 - KBA0022OTS700RCD1 OTS Chapter 8 - KBA0022OTS800DEF1 OTS Justification: Chapter I - KBA022OTSJUSTIF1 Chapter II - KBA022OTSJUSTIF2 Chapter III - KBA022OTSJUSTIF3	KAA-689: Control of the Operating Technical Specifications	OTS OTS change requests OTS change records Unit Operating logs Chemistry logs CRs (as per LD-1000)

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Annexure C
Operations: Applicable Documents
Principal Requirement 3: Operational Procedures

Functional area	Requirements	Process	Implementation / Measures
	Koeberg Chemistry Specifications: KBA022CHEMSPEC00 KSB-005: Operating Standards and Expectations		
Procedures and Documentation:- (Plant operation is controlled in accordance with a comprehensive suite of procedures. Procedures are complied with according to defined rules of use. Procedures are changed and authorised according to an efficient and controlled process.)	LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KSA-011: The Requirements for Controlled Documents KSB-005: Operating Standards and Expectations KSB-008: Required Competencies of OPG Staff KSB-009: The Requirements for the Compilation, Review and Validation of Operating Procedures	KAA-651: The Use and Control of Operating Satellite Documentation KAA-789: Koeberg Accident Procedures Sub-Committee KAB-018: The Operating Department Procedure Change Process KAC-030: Chemistry Specification Change Control KGB-004: Guidelines for Compilation, Review and Formatting of Operating Procedures KGB-008: Writers Guide for Optimal Recovery Procedures (ORPs), Function Restoration Procedures (FRPs), Status Trees and Operating Incident Procedures (OIPs)	Unit Operating logs Chemistry logs CRs (as per LD-1000) KEG reports Operating and Chemistry procedures Procedure change records

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Annexure C
Operations: Applicable Documents
Principal Requirement 3: Operational Procedures

Functional area	Requirements	Process	Implementation / Measures
Operating Policies and Standards:- (<i>Operating standards and expectations are clearly defined and documented. Temporary operating positions and interpretations are reviewed and issued in a controlled manner.</i>)	KSB-005: Operating Standards and Expectations		Operating Standards and Directives

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Annexure C
Operations: Applicable Documents
Principal Requirement 4: Equipment Status Control

Functional area	Requirements	Process	Implementation / Measures
Control of Plant Line-up and Configuration: - (The alignment of systems and equipment is controlled to ensure availability and safe operation.)	LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KSA-032: Control, Accountability, Replacement and Duplication of Controlled Keys KSA-062: Reactor Building Access Requirements KSB-005: Operating Standards and Expectations	KAA-851: The Control and Discipline of Fire Doors and Fire Barrier Integrity at Koeberg Nuclear Power Station KAA-704: The Process for Containment Access Control KAA-711: The Process of Plant System Control During Major outage KAA-798: The Control of Fire Door Discipline and Integrity at Koeberg Nuclear Power Station KAB-025: Control of Operating Department Keys KAB-029: Control of Plant Configuration KAC-032: Chemistry Operating Responsibilities KWB-OP-K0-007: Administrative Lockout Mechanism KWB-OP-K1-005: Using the Inhibit Keys in the Control Room	Line-up records Admin lockout records CRs (as per LD-1000) Unit Operating logs Chemistry logs

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Annexure C
Operations: Applicable Documents
Principal Requirement 4: Equipment Status Control

Functional area	Requirements	Process	Implementation / Measures
Surveillance, Monitoring and Testing of Plant:- <i>(In-service and standby equipment is checked regularly to ensure correct operation, operability and availability.)</i>	LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station KBA-0022-SRSM-00000: Safety Related Surveillance Manual (SRSM) KNC-001: Chemistry Operating Specifications for Safety Related Systems KNC-002: Chemistry Operating Specifications for Availability Related Systems KSB-005: Operating Standards and Expectations	KAA-647: Control of Non-routine Testing KAA-656: Operating Department Periodic Tests Process KAB-035: Surveillances for the Operating Department KAA-847: Control of the Safety Related Surveillance Manual (SRSM) KAB-046: Operating Duties during testing of SIP Protection Channels by IMS	PTs Rounds records Unit Operating logs Chemistry logs Chemistry analysis reports Chemistry Logs LIMS SRSM change requests/records

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Annexure C
Operations: Applicable Documents
Principal Requirement 4: Equipment Status Control

Functional area	Requirements	Process	Implementation / Measures
Work Control (PTWs, TAs):- <i>(Equipment is released for maintenance and testing according to safe and approved practices.)</i>	LD-1081: Requirements for Operator Licence Holders at Koeberg Nuclear Power Station 36-681: Generation Plant Safety Regulations	331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base KAA-648: Administration and Responsibilities for Requalification Testing KAA-667: Processing a Permit To Work KAA-708: Processing a Safety Assurance Certificate and Work in Hazardous Areas KGB-002: Preparation and Implementation of Switchboard Outages at Koeberg	PTW records CRs (as per LD-1000)

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Annexure D
Engineering and Configuration: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Design Control	RD-0034: Quality and Safety Management Requirements for Nuclear Installations 331-2: Nuclear Engineering Management Manual 331-165 (KSA-016): Nuclear Specification Standard 331-83 (KSA-113): Standard for Plant Changes Affecting the Design of Koeberg Power Station Safety Analysis Report	331-85 (KAA-560): Design Basis Documentation Change Process KAA-561: The Control of freestanding equipment that could affect SR equipment KAA-652: Accounting of Transients KAA-691: Response to Seismic events KAA-737: Process for the Review of Fuel Management Strategy or Fuel Design Changes KAF-019: Specific Cycle Core Design and Reload studies, Responsibilities and Interfaces KAF-020: Control of Installation and Changes to design related computer software 331-86 (KAA-815): Design Changes to Plant, Plant Structures or Operating Parameters	Design Studies Design Packages Transient Listings Transient Accounting KBA1222E02027 NSSS Setpoint Manual

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Annexure D

Engineering and Configuration: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Installation and Temporary Alteration Control	LD-1012: Requirements in respect of Proposed Modifications to the Koeberg Nuclear Power Station RD-0034: Quality and Safety Management Requirements for Nuclear Installations KSA-020: Software QA 331-2: Nuclear Engineering management manual, Section 15.5: Design 331-83 (KSA-113): Standard for Plant Changes Affecting the Design of Koeberg Power Station	KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications KAA-502: Project Management Process for New Facilities and Changes to Facilities 240-85520008 (KAA-503): Modifications to the Simulator 331-84 (KAA-505): Modifications to Software on the KIT System 331-88 (KAA-506): Temporary Alterations to Plant, Plant Structures, or Operating Parameters that affect the Design Base KAA-558: Modifications to Off-site Plant and Structures 331-85 (KAA-560): Design Basis Documentation Change Process KAA-664: Issuing a Construction Status Certificate/Safety Clearance Certificate 331-86 (KAA-815): Design Changes to Plant, Plant Structures or Operating Parameters	Outage modification lists Modification packages/Design Documents Temporary Alteration Forms DDR

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Annexure D
Engineering and Configuration: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
		331-87 (KGU-017): Design Engineering Guide KGF-005: Installation and Validation of Procured Software for RFE KGF-004: Modification of Design Related Computer Software for RFE	

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Annexure D

Engineering and Configuration: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
Classification and Equivalency Control	240-89294359 (KSA-010): Nuclear Safety, Seismic, Environmental, Quality, Importance and Management System level Classification Standard 331-144 (KSA-017): Standard for the Preparation of an Equivalency Study	331-143 (KAA-504): The Equivalency Process to Change Plant 331-91 (KAA-562): Control of Equipment and Software Classifications	Equivalency Assessments Equivalency Database Classifications KLA-001: Importance category classification listing
Configuration Control	RD-0034: Quality and Safety Management Requirements for Nuclear Installations KNA-002 Requirements for Data Integrity on Pigo KSA-011: The Requirements for Controlled Documents 240-99837788: KOU Configuration Management Manual KSA-038: Requirements for Quality Records 32-371: Group IT – Change Control	KAA-500: The Process for Controlled Documents 331-130 (KLA-028): Controlling documentation and responsibilities for CM at KNPS	DDR Plant Information Data System

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Annexure D
Engineering and Configuration: Applicable Documents

Functional Area	Requirements	Process	Implementation / Measures
	Standard		
Engineering Support Control	238-8: Nuclear Safety and Quality Manual, section 9.3.8, Decommissioning KSA-066: Standard for Nuclear Design and licensing Bases Evaluations KSU-009 – Code of Conduct for Plant Engineering	KAA-913 – Integrated Equipment Reliability Process KAA-840 – Non Conformance (NC) Process KGT-071: Engineering Training Programme Guide KGT-072: Nuclear Engineers Training Programme Guide KLU-001: Listing of Plant Systems and Components KAA-709: Process for performing Safety Screenings, Safety Evaluations, Safety Justifications and Safety Cases KGA-029: Safety Justification Preparation KGA-018: Safety Case Preparation KGA-025: Screening and Safety Evaluation Guide KTA-005: Training and Qualification Requirements for Safety Screenings and Evaluations	NEC / CPD Safety Screenings / Evaluations Safety Cases Safety Justifications Engineering Problem Reports Decommissioning Plans

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Annexure E
Plant Condition Management: Applicable Documents

Functional area	Requirements	Process	Implementation/ Measures
Predict, monitor and preserve the material condition of important-to-safety systems, structures and components.	KSM-LIC-001: Requirements for the Control of Maintenance KSA-105: Requirements for Station Cleanliness Control of Nuclear Systems, Equipment and Components KSA-012: The Storage and Preservation of Spare Parts at Koeberg Nuclear Power Station 240-110745414 (KSA-021): Standard for In-service Inspection Programme at Koeberg Nuclear Power Station – KSA-069: Foreign Material Exclusion KSU-009: Code of Conduct for Plant Engineering KSA-913; Integrated Equipment Reliability Standard – Preventive Maintenance Basis.	KAA-913 – Integrated Equipment Reliability Process KLM-013 Maintenance Process Documentation Listing 331-177 (KAA-572): Process and Responsibilities for the Development and Implementation of the ISI programme KAA-671: Management of Civil Structures at Koeberg Nuclear Power KAA-688: The Corrective Action Process KAA-751: Chemical Restrictions and Controls at Koeberg (CRACK) Programme KAA-840: Non-Conformance (NC) Process KAA-820: Updating the Work Management Planning Database	<i>KBA 0028 NES MA ISI 02 In-service Inspection Program Requirements Manual</i> Work Plans and schedules Controlled Documentation <i>Outage Reports</i> Preventive Maintenance Bases Implemented work packages <i>ISIP Waivers and Exemptions</i> Engineering Work Requests Engineering Problem Reports Non-Conformance Reports Requalified equipment SAP Updates Condition Reports Plant specific PSA Management review reports/indicators

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Annexure E
Plant Condition Management: Applicable Documents

Functional area	Requirements	Process	Implementation/ Measures
		KAA-679: Control and Operation of the Measuring and Test Equipment at Koeberg Nuclear Power Station	of maintenance programme Identification, Implementation and Close out of action plans QC hold points identified and executed Trained and authorised staff according to organogramme
Restoring the Plant to Design State after Degradation, Failures or as part of Modifications	331-172 (KSA-031): Standard for the Repair/Replacement of Installed Mechanical Components	KAA-501: Modifications to Plant, Plant Structures, or Operating Parameters that Affect the Design Base KAM-038: Process for Repair/Replacement of Installed Mechanical Components KAA-693: Responsibilities for the In-house Manufacture and Repair of Parts and Components for Koeberg Nuclear Power Station	Repair/replacement log and work packages Modification Safety Cases and Work Plans

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Annexure E
Plant Condition Management: Applicable Documents

Functional area	Requirements	Process	Implementation/ Measures
		331-88 (KAA-506): Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Basis KAA-840 – Non Conformance (NC) Process	
Assurance that the Plant is in an acceptable physical Condition	LG-1015: A Guide for the Licensing Requirements for the In-service Inspection of Nuclear Installations RD-0024: Requirements on Risk Assessment and Compliance with Principal Safety Criteria for Nuclear Installations 240-110745414 (KSA-021): Standard for In-service Inspection Programme at Koeberg Nuclear Power Station KSA-066: Standard for Nuclear Design and Licensing Basis Evaluations	331-177 (KAA-572): Process and Responsibilities for the Development and Implementation of the ISI Programme KAA-652: Accounting of Transients KAA-671: Management of Civil Structures at Koeberg Nuclear Power Station 331-66: Risk Profile Generation KAA-709: Process for Performing Safety Evaluations, Screenings and Safety Justifications KAA-840 – Non Conformance Process	<i>KBA 0028 NES MA ISI 02 In-service Inspection Program Requirements Manual</i> Outage Reports Reactor Vessel Radiation Embrittlement Surveillance reports Qualified NDE Procedures/Personnel Risk Profiles <i>Waivers and Exemptions</i> Safety Evaluations Safety Screenings <i>Safety Justifications/Safety Cases</i>

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Annexure E
Plant Condition Management: Applicable Documents

Functional area	Requirements	Process	Implementation/ Measures
Plant Technical Life Cycle Management	36-240: Plant Life Cycle Management 36-226; Accounting for Property, plant and Equipment – Generation and Nuclear Divisions.	331-102: Engineering Technical Management Meeting (Koeberg) KGU-011: Preparation of Life of Plant Plans (LOPPs) KAA-913 – Integrated Equipment Reliability Process	<i>KSRC Plant Life Issue List</i> <i>System life of plant plans</i> <i>Plant Position Papers</i>

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION OCCUPATIONAL EXPOSURE	238-54: Radiation protection licensing requirements for Koeberg Nuclear Power Station, Paragraph 5.1, Annex D 238-19: Generation Division Radiation Protection Manual		<i>All Implementation/Measures according to 238-54, Annexes A, B and C.</i>

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION Responsibilities and accountability: Fundamental safety requirements Statutory and regulatory requirements Responsibilities and accountability Number of competent, qualified and trained staff Radiation protection shift composition	32-226: Requirements and Rules for Radiation Protection and the Safety of Radiation Sources 32-227: Radiation Protection and Safety of Radiation Sources. 238-46: Requirements for Safety, Security and Control of Radioactive Sources. 36-681: Generation Plant Safety Regulations 238-39: Requirements for Safe Use of Industrial Gauges Containing Radioactive Sources KSH-010: Functional Responsibilities for Radiation Protection at Koeberg Nuclear Power Station	KAA-633: Control of Radioactive sources and x-ray equipment	Audit and Surveillance reports Radiation Protection Organisational Chart. Shift attendance records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION Conditions of service; Radiation exposures to pregnant workers	238-35: Radiation Protection Dose and Risk Limits	KAA-591: Medical and Psychological Surveillance and Control of Radiation Workers and Licensed Operators	Internal and external dose assessment records
PLANNED EXPOSURE SITUATION Classification of areas: Classification of radiological controlled areas;	238-36: Operational Radiation Protection Requirements	KAH-002: Radiation Surveillance Programme	Surveillance records
PLANNED EXPOSURE SITUATION Radiological supervised areas: Local rules and supervision	238-36: Operational Radiation Protection Requirements	KAA-637: Access Control to Radiological Controlled Zones KSH-011: Radiation Protection Certificate (RPC) Programme Requirements	RP Special instructions / Radiation protection certificates

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION Personal and respiratory protective equipment: Personal protective equipment Respiratory protective equipment	238-36: Operational Radiation Protection Requirements 238-50: Respiratory Protection Requirements for Radiation Protection	KAA – 635: Respiratory Protection programme	Inspection / maintenance records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION			
Individual monitoring and exposure assessment:			
Thermoluminescence dosimetry	238-42: Radiation Dosimetry Requirements	KSH – 001: The Administration and Quality Control of Radiation Dosimetry	Dose assessment records
Dose limits	238-48: Thermoluminescence Dosimetry Requirements	KSH – 001: The Administration and Quality Control of Radiation Dosimetry	Instrument quality records Dose assessment records
Internal Dosimetry	238-35: Radiation Protection Dose and Risk Limits RD-0022: Radiation Dose Limitation at Koeberg Nuclear Power Station 238-42: Radiation Dosimetry Requirements	KSH – 001: The Administration and Quality Control of Radiation Dosimetry	Dose assessment records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION Monitoring of the workplace: Monitoring of the workplace Radiation protection SI and non-SI units ALARA philosophy and Optimisation Radiological surveillance instrumentation	238-36: "Operational Radiation Protection Requirements 238-37: Radiation Protection SI units 238-34: Optimisation of Radiation Protection 238-44: Requirements for Radiological Surveillance Instrumentation	KSH-012: Radiation Protection Standards and Expectations KLA-025: Listing of Radiological SI Units and Tables KAA-632: ALARA Co-ordination KAA-584: Radiation Instrument Management	Radiological surveillance records, Radiation protection documents Radiological surveillance instruments Optimisation and ALARA records Instrument quality records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION			
Health surveillance: Medical Surveillance and control	32-282: Procedure for Medical Surveillance KAA-591: Medical and Psychological Surveillance and control of Radiation Workers and Licensed Operators LD-1077: Requirements for Medical and Psychological Surveillance and Control at Koeberg Nuclear Power Station	240-42853779: Procedure for Health and Wellness	Medical records
Radiation workers	238-43: Requirements for Radiation Workers 238-54: Radiation protection licensing requirements for Koeberg Nuclear Power Station, Annex B		Radiation worker records
Records			Records as per the radiation protection records programme.

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION PUBLIC EXPOSURE	238-54: Radiation protection licensing requirements for Koeberg Nuclear Power Station, Paragraph 4.2 238-19: Generation Division Radiation Protection Manual		<i>All Implementation/Measures according to 238-54, Annexes A, B and C.</i>

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
Control of visitors	238-36: Operational Radiation Protection	KAA-637: Access Control to Radiological Controlled zones	Records of visitors
Sources of external irradiation	238-36: Operational Radiation Protection	KAA-633: Control of Radioactive Sources and X-Ray Equipment	Radiological surveillance records
	238-40: Radiation Protection Safety Requirements for Industrial Radiography	KAA-633: Control of Radioactive Sources and X-Ray Equipment	
Radioactive contamination in enclosed spaces	238-36: Operational Radiation Protection		Radiological surveillance records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION			
Radioactive waste:			Radioactive waste reports
Radioactive waste management	238-51: Radioactive Waste Management	KWH-S-033: Process and admin of Solid Radwaste	NECSA correspondence to Koeberg
Radioactive waste consignments	IAEA Regulations for the Safe Transport of Radioactive Material as per NIL-01. VLP-WAC-001: Vaalputs Waste Acceptance Criteria	KWH-S-037: Classification of Solid Radioactive Materials and the Acceptable On- and Off- Site packaging Requirements for Such Materials KAA-634: Responsibilities for the Radioactive Material Control Programme KSA-048: Management of the Solid Radioactive Waste Programme	Radioactive material and waste transportation records
Transportation of radioactive material and waste		KEP-086: Emergency Plan for Radwaste Transport to Vaalputs	

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION Discharge of radioactive substances to the environment Liquid and gaseous effluent management Annual authorised discharge quantities	238-49: Liquid and Gaseous Effluent Management Requirements for Koeberg Nuclear Power Station	KAA-636: Management of the Radioactive Effluents Programme	Effluent management reports and records
PLANNED EXPOSURE SITUATION Monitoring of public exposure: Environmental surveillance ALARA philosophy and Optimisation	238-47: Radiological Environmental Surveillance Requirements 238-34: Optimisation of Radiation Protection	KAA-597: Environmental Surveillance Programme KAA-632: ALARA Co-ordinator	Environmental surveillance reports Optimisation and ALARA records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
Electronic products: Baggage x-ray machines	238-38: Radiation Protection Requirements for Baggage Inspection X-Ray Devices	KAA-633: Control of Radioactive sources and X-Ray Equipment	Instrument quality records
PLANNED EXPOSURE SITUATION AND EMERGENCY EXPOSURE SITUATION GENERIC REQUIREMENTS	238-54: Radiation protection licensing requirements for Koeberg Nuclear Power Station, Paragraph 4.3 238-19: Generation Division Radiation Protection Manual		<i>All Implementation/Measures according to 238-54, Annexes A, B and C.</i>

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION AND EMERGENCY EXPOSURE SITUATION Safety assessment: RP and EP requirements contained in the Koeberg Safety Analysis Report	The applicable sections contained in the Koeberg Safety Analysis Report	KAA-709: Process for performing Safety Evaluations, Screenings and Safety Justifications	Changes to the Activity Migration Spreadsheet, SAR.XLS and RP & EP SAR
PLANNED EXPOSURE SITUATION AND EMERGENCY EXPOSURE SITUATION Requirements for design: RP and EP requirements contained in the Koeberg Safety Analysis Report	The applicable sections contained in the Koeberg Safety Analysis Report	KAA-709: Process for performing Safety Screenings, Safety Evaluations, Safety Justifications and Safety Cases	Changes to the Activity Migration Spreadsheet, SAR.XLS and RP & EP SAR

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION ALARA philosophy and Optimisation:	238-34: Optimisation of Radiation Protection	KAA-632: ALARA Co-ordination	Optimisation and ALARA records
	238-51: Radioactive Waste Management	KSA-048: Management of Solid radioactive Waste Programme	Radwaste optimisation

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION Radioactive sources and radioisotopes: Unsealed radioactive sources Industrial gauges containing radioactive sources Industrial radiography Soil moisture and density gauges	238-41: Radiation Protection Requirements for the Safe Use of Unsealed Sources 238-41: Radiation Protection Requirements for the Safe Use of Unsealed Sources 238-40: Radiation Protection Safety Requirements for Industrial Radiography (appropriate parts) 238-45: Radiation Protection Requirements for Soil Moisture and Density Gauges	KAA-633: Control of radioactive sources and x-ray	Records for control of radioactive sources and radioisotopes
PLANNED EXPOSURE SITUATION Requirements for operations: Radiological incident investigation	238-54: Radiation protection licensing requirements for Koeberg Nuclear Power Station, Annex A	KSH-012, Radiation Protection Standards and Expectations	Radiological incident investigation reports

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
PLANNED EXPOSURE SITUATION AND EMERGENCY EXPOSURE SITUATION Quality Assurance: Radiation Protection Quality Assurance audits and reviews Emergency Preparedness and Response Quality Assurance audits and reviews	LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station 238-54: Radiation Protection Licensing requirements for Koeberg Nuclear Power Station, Paragraph 4.4 238-19: Generation Division Radiation Protection Manual	KAA-832: Quality Assurance Monitoring Process KAA-833: Quality Assurance Monitoring Programme for KNPS KAA-832: Quality Assurance Monitoring Process KAA-833: Quality Assurance Monitoring Programme for KNPS	Quality Assurance Radiation Protection audit reports Quality Assurance Emergency Preparedness and Response audit reports

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/Measures
EMERGENCY EXPOSURE SITUATION	238-54: Radiation protection licensing requirements for Koeberg Nuclear Power Station, Paragraph 4.4 238-19: Generation Division Radiation Protection Manual	KAA-811: The integrated Koeberg Nuclear Emergency Plan	<i>All Implementation/Measures according to 238-54, Annexes A, B and C.</i>
EMERGENCY EXPOSURE SITUATION Emergency plans: Intervention for emergency exposure situations Protective actions, intervention levels and action levels	238-53: Emergency Preparedness and Response Requirements for Nuclear Installations RD-014: Emergency Preparedness and Response Requirements for Nuclear Installations 32-227: Radiation Protection and the Safety of Radiation Sources Policy	KAA-811: The integrated Koeberg Nuclear Emergency Plan	Emergency response records

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Annexure F**Radiation Protection and Emergency Preparedness & Response: Applicable Documents**

Functional area	Requirements	Process	Implementation/ Measures
EMERGENCY EXPOSURE SITUATION ALARA philosophy and Optimisation: Meteorological requirements Assessment and monitoring after accidents Cessation of intervention after an accident Protection of workers undertaking an intervention	238-52: Meteorological Requirements for Nuclear Installations 238-53: Emergency Preparedness and Response Requirements for Nuclear Installations	KAG-006: Koeberg meteorological programme. KAA-811: The integrated Koeberg Nuclear Emergency Plan	Meteorology reports Emergency response records

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Annexure G

Principal Safety Criteria

The principal safety criteria refer to limitations on the annual individual peak risk and average risk to members of the public and workers due to normal operational exposure and exposure as a result of accidents and are established based upon the following principles;

NOTE 1: *The risk presented by regulated activities must not significantly increase the total risks to which the population is exposed.*

NOTE 2: *The risks from nuclear damage must compare favourably with those associated with other major industrial enterprises.*

NOTE 3: *Allowance must be made for demands by society for more stringent standards of safety over the period for which the regulated activity is authorised.*

	Normal operation	Accidents
Assessment type	Deterministic	Probabilistic
Public		
Average Annual Population Risk	Risk to be controlled by the application of the ALARA principle.	10^{-8} fatalities per year per site (one fatality per one hundred million per year per site).
Maximum Annual Individual Risk	0.25 mSv annual effective dose limit to the average member of the critical group.	5×10^{-6} fatalities per year (one fatality per two hundred thousand per year).
Workers		
Average Annual Risk to Workers	Risk to be controlled by the application of the ALARA principle. An ALARA target for the annual average individual dose to be less than 4 mSv.	10^{-5} fatalities per year per site (one fatality per one hundred thousand per year per site).
Maximum Annual Individual Risk to Workers	Average annual individual dose limit of 20 mSv.	5×10^{-5} fatalities per year per site (one fatality per twenty thousand per year per site).

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