Eskom	Manual	Nuclear Operating Unit

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CONTENTS

1. INTRODUCTION

This document specifies the radiological protection requirements for the Eskom Generation Division in terms of the Eskom Radiation Protection Policy, 32-227 and Eskom Radiation Protection Standard, 32-226. The Eskom Generation Division is committed to ensure that nuclear and radiation safety receives the highest priority to provide for the protection of persons and the environment against harmful ionising radiation in accordance with the safety principles and requirements addressed in the Eskom Radiation Protection Policy and Standard.

2. SCOPE

This document applies to all actions in the Eskom Generation Division where sources of ionising radiation are designed, located, produced, used, transported, disposed or otherwise dealt with. This document also applies to exposures to ionising radiation for which optimisation, justification, dose limitation and/or intervention for the protection of persons and the environment is required. In particular, this document is applicable for protection of persons and the environment against the following exposures:

- Occupational exposure;
- Public exposure;
- Potential exposure; and
- Emergency exposure.

Appendix A tabulates the Standards applicable to the Generation Coal-fired Power Stations and Koeberg Nuclear Power Station and should be read in conjunction with the normative references listed in Section 3.1. Radiation protection licensing requirements for Koeberg Nuclear Power Station are addressed in Standard, 238-54.

2.1 PURPOSE

The purpose of this document is to specify the radiological protection requirements for the Eskom Generation Division to safeguard persons and the environment by:

a. preventing the occurrence of deterministic effects in persons exposed to ionising radiation by keeping doses below relevant thresholds;

b. ensuring that all reasonable steps are taken to reduce the occurrence of stochastic effects to as low as reasonable achievable in persons exposed to radiation; and

c. ensuring protection of the environment from sources of ionising radiation by establishing and maintaining effective defence in depth against radiological hazards and to reduce exposures to the environment.

2.2 APPLICABILITY

2.2.1 The radiological protection requirements addressed in this document are applicable to the Eskom Generation Division to safeguard people and the environment from harmful effects of ionising radiation generated by the following sources:

2.2.1.1 Group III hazardous substances (electronic products) declared in Government Gazette number 13299 dated 14 June 1991, regulation number R.1302;

2.2.1.2 Group IV hazardous substances (radioactive sources) declared in Government Gazette number 14596 dated 26 February 1993, regulation number R.246;

2.2.1.3 Radioactive material not excluded from the National Nuclear Regulator Act, 1999 (Act No.47 of 1999) as declared in Government Gazette number 28755 dated 28 April 2006, regulation number R.388;

2.2.1.4 Restricted material, source material, special nuclear and waste material declared in Government Gazette number 20759 dated 23 November 1999, the Nuclear Energy Act, 1999 (Act No.46 of 1999) and Government Gazette number 31954 dated 27 February 2009;

2.2.1.5 Radioactive waste material declared in Government Gazette number 13786 dated 9 January 2009, the National Radioactive Waste Disposal Institute Act, 2008 (Act No. 53 of 2008);

2.2.1.6 The radiation protection requirements addressed in this document are applicable to the Eskom Generation Division to safeguard people and the environment from occupational, public and potential exposures in accordance with the following requirements:

2.2.1.7 Radiation protection and the safety of radiation source requirements declared in Government Gazette number 28755 dated 28 April 2006, regulation number R.388 and Government Gazette number 14596 dated 26 February 1993, regulation number R.246;

2.2.1.8 Radiation dose limitation requirements prescribed in the NNR Requirements Document number RD-0022 dated 4 August 2008;

2.2.1.9 Radiation worker medical requirements prescribed in the NNR Guide Document number LG-1018 dated 2 May 1991;

2.2.2 The nuclear emergency planning, preparedness and response requirements addressed in this document are applicable to the Eskom Generation Division to safeguard people, property and the environment from emergency exposures in accordance with the following requirements:

2.2.2.1 Nuclear emergency planning, preparedness and response requirements declared in Government Gazette dated 24 February 2000, Nuclear Regulator Act, 1999 (Act No.47 of 1999);

2.2.2.2 Nuclear emergency planning, preparedness and response requirements declared in Government Gazette number 24252 dated 15 January 2003, Disaster Management Act, 2002 (Act No.57 of 2002) and Government Gazette number 28755 dated 28 April 2006, regulation number R.388;

2.2.2.3 Public Safety Information Forum requirements declared in Government Gazette number 26112 dated 12 March 2004, government notice number 299;

2.2.2.4 Records of persons in a nuclear accident defined area declared in Government Gazette dated 4 August 2006, government notice number 778;

2.2.2.5 Nuclear emergency planning, preparedness and response requirements prescribed in the DME National Nuclear Disaster Management Plan dated 5 October 2005;

2.2.2.6 Nuclear emergency planning, preparedness and response requirements prescribed in the NNR Requirements Document number RD-0014 dated 27 June 2005 and NNR Requirements Document number RD-0018 dated 9 April 2009;

2.2.3 The transportation of radioactive material requirements addressed in this document are applicable to the Eskom Generation Division to safeguard people and the environment from occupational, public and potential exposures in accordance with the IAEA Regulations for the safe transport of radioactive material, number SSR-6;

2.2.4 The siting of new nuclear installations addressed in this document are applicable to the Eskom Generation Division to safeguard people and the environment from occupational, public and potential exposures in accordance with draft regulations issued for public comment in Government Gazette number 32349 dated 3 July 2009, government notice number 914;

2.2.5 Radiological and nuclear emergency safety assessments addressed in this document are applicable to the Eskom Generation Division to safeguard people and the environment from occupational, public, potential and emergency exposures in accordance with NNR Requirements Document number RD-0024 dated 05 August 2008 and NNR Licence Guide Document number LG-1041 dated 23 August 2002;

2.2.6 The Eskom Generation Division shall apply the draft regulations issued for public comment in Government Gazette number 33678 dated 29 October 2010, government notice number 962 to assess spatial developments in the formal emergency planning zone of the Koeberg Nuclear Power Station.

2.3 EXCLUSION

2.3.1 This Standard is not applicable to, and does not apply where the level of radioactivity concentration of each radioactive nuclide in materials is below:

2.3.1.1 0.2 becquerel per gram for artificial radioactive nuclides;

2.3.1.2 0.5 becquerel per gram for naturally occurring radioactive nuclides of uranium and thorium and their progeny except for radon;

2.3.1.3 10 becquerel per gram for potassium-40 in materials that are used in building construction or disposed of;

2.3.1.4 50 becquerel per gram for potassium-40 in all other materials; or

2.3.1.5 This Standard is not applicable to, and does not apply where the level of radioactivity content is below 1000 becquerel.

2.3.1.6 This Standard is not applicable to, and does not apply to medical and chronic exposures.

2.4 EXEMPTION

2.4.1 This Standard is not applicable to, and does not apply to actions involving radioactive material exempted by the regulator listed below:

2.4.1.1 The effective dose expected to be incurred by any member of the public due to the exempted action is 0.01 mSv per annum or less; and the collective effective dose committed by performing the action for one year is no more than 1 person-sievert;

2.4.1.2 An assessment for the optimisation of protection shows that exemption is the optimum option;

2.4.1.3 Either the radioactivity concentration or the total radioactivity content of each radionuclide in the radioactive material is below the level specified in the Regulations on safety Standards issued in terms of section 36 of the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) and the quantity possessed or processed in a period of one year is less than one tonne;

2.4.1.4 The radioactivity in the material is associated with naturally occurring radioactive nuclides that are not processed for their radioactive fissile or fertile properties, and the effective dose expected to be incurred by any member of the public due to the exempted action is less than 0.25 mSv per annum.

2.5 INSPECTIONS

Access to Eskom sites to carry out radiation protection inspections, audits and surveillance's shall be permitted to:

2.5.1 duly authorised representatives from the Generation Division;

2.5.2 duly authorised representatives from Eskom;

2.5.3 duly authorised representatives from the relevant regulatory authorities;

2.5.4 duly authorised contractors.

2.6 NON-COMPLIANCE

In the event of a breach of any of the requirements contained in this Standard, being noted, the following requirements shall be implemented:

2.6.1 The breach shall be investigated and the causes, circumstances and consequences shall be recorded;

2.6.2 Appropriate action shall be taken to remedy the circumstances that led to the breach, and to prevent recurrence of similar breaches; and

2.6.3 The Corporate Specialist (Radiation Protection) or designee should be informed of the causes and the corrective actions taken, or corrective actions that shall be taken. The communisation should be prompt whenever an emergency exposure situation has developed, or is developing.

2.7 RESOLUTION OF CONFLICTS

2.7.1 Conflict between the requirements in this Standard and new requirements should be addressed by the Corporate Specialist (Radiation Protection) or designee.

2.7.2 All promulgated statutory requirements shall be complied with and shall prevail, in the event of a conflict between this Standard and a statutory provision.

2.8 INTERPRETATION

2.8.1 Interpretation of the requirements contained in this Standard should be conducted by the Corporate Specialist (Radiation Protection) or designee.

2.8.2 Interpretation of statutory requirements should be conducted in consultation with the relevant regulatory authority.

2.8.3 Wherever the word "shall" is used in this document, it means that the requirement in question is compulsory. Where the word "should" is used, compliance is strongly recommended, but not mandatory.

2.9 SPECIAL CIRCUMSTANCES

2.9.1 Appeal on regulatory matters relating to radiation protection and the safety of radiation sources should be directed to the relevant regulatory authority in writing in accordance with the applicable regulations by the Corporate Specialist (Radiation Protection) or designee.

2.9.2 Appeals should be lodged by the Corporate Specialist (Radiation Protection) or designee in accordance with provisions contained in the Hazardous Substances Act, 1973, (Act No. 15 of 1973), the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) and the Nuclear Energy Act, 1999 (Act No. 46 of 1999).

2.10 COMMUNICATION

2.10.1 Formal communication to the relevant regulatory authority on matters relating to radiation protection and the safety of radiation sources shall be in writing, and all correspondence containing radiological units shall reflect SI units.

2.10.2 Eskom shall apply for authorisations or licenses from the relevant regulatory authority in accordance with Eskom Standard, 32-226: Requirements and rules for radiation protection and safety of radiation sources.

3. NORMATIVE/INFORMATIVE REFERENCES

The following normative references contain provisions that, through reference in the text, constitute requirements listed in this document. The normative references are part of the Radiation Protection Documentation System listed in Appendix A. Parties using this document shall apply the most recent edition of the documents listed below, unless otherwise specified in the applicable statutory and regulatory requirements:

3.1 NORMATIVE

[1] 238-34: Optimisation of Radiation Protection.

[2] 238-35: Radiation Protection Dose and Risk Limits.

[3] 238-36: Operational Radiation Protection Requirements.

[4] 238-37: Radiation Protection SI Units.

[5] 238-38: Radiation Protection Requirements for Baggage Inspection X-Ray Devices.

[6] 238-39: Requirements for Safe Use of Industrial Gauges Containing Radioactive Sources.

[7] 238-40: Radiation Protection Requirements for Industrial Radiography.

[8] 238-41: Radiation Protection Requirements for Safe Use of Unsealed Sources.

[9] 238-42: Radiation Dosimetry Requirements.

[10] 238-43: Requirements for Radiation Workers.

[11] 238-44: Requirements for Radiological Surveillance Instrumentation.

[12] 238-45: Radiation Protection Requirements for Soil Moisture and Density Gauges.
[13] 238-46: Requirements for Safety, Security and Control of Radiation Sources.
[14] 238-47: Radiological Environmental Surveillance Requirements.
[15] 238-48: Thermoluminescence Dosimetry Requirements.
[16] 238-49: Liquid and Gaseous Effluent Management Requirements for the KNPS.
[17] 238-50: Respiratory Protection Requirements for Radiation Protection.
[18] 238-51: Radioactive Waste Management Requirements.
[19] 238-52: Meteorological Requirements for Nuclear Installations.
[20] 238-53: Emergency Preparedness and Response Requirements for Nuclear Installations.
[21] 238-54: Radiation Protection Licensing Requirements for Koeberg Nuclear Power Station.
[22] 32-227: Eskom Policy, Radiation Protection and safety of radiation sources.
[23] 32-226: Eskom Standard, Radiation Protection and safety of radiation sources.
[24] GGR 0992: Eskom Plant Safety Regulations.
[25] SSR-6: IAEA Regulations for the safe transport of radioactive material.

3.2 INFORMATIVE

[26] 238-1: Integrated Management System Manual.
[27] 238-30: Documentation Compilation Guide document.
[28] 32-83: Eskom Nuclear Policy.
[29] 36-197: The Koeberg Licence Basis Manual.
[30] Disaster Management Act, 2002 (Act No.57 of 2002).
[31] DME National Nuclear Disaster Management Plan, 5 October 2005.
[32] Draft government regulations No. 914, Government Gazette 32349, 3 July 2009.
[33] Draft government regulations No. 962, Government Gazette 33678, 29 October 2010.
[34] Government regulation No. 479, Government Gazette 21171, 12 May 2000.
[35] Government regulation No. 778, Government Gazette 29078, 4 August 2006.
[36] Government regulation R.1302, Government Gazette 13299, 14 June 1991.
[37] Government regulation R.246, Government Gazette 14596, 26 February 1993.
[38] Government regulation R.247, Government Gazette 14596, 26 February 1993.
[39] Government regulation R.299, Government Gazette 26112, 12 March 2004.
[40] Government regulation R.388, Government Gazette 28755, 28 April 2006.
[41] Government regulation R.690, Government Gazette 11823, 14 April 1989.
[42] Government regulation R.740, Government Gazette 15648, 16 April 1994.

[43] Hazardous Substances Act, 1973 (Act No.15 of 1973).

[44] IAEA Safety Series No. 115, 1996: International basic safety standards for protection against ionising radiation and for the safety of radiation sources.

[45] LD 1000: Notification requirements for occurrences association with Koeberg Nuclear Power Station.

[46] LD 1008: Verbal emergency communication with the National Nuclear Regulator.

[47] LD 1012: Requirements in respect of proposed modifications to the Koeberg Nuclear Power Station.

[48] LD 1023: Quality management requirements for Koeberg Nuclear Power Station.

[49] LD 1077: Requirements for medical and psychological surveillance and control.

[50] LD 1081: Requirements for operator licence holders at Koeberg Nuclear Power Station.

[51] LG 1018: Guide to the Requirements A Guide to the Requirements for Medical Surveillance and Control of Radiation Workers at Licensed facilities.

[52] LG 1041: Licensing Guide on Safety Assessments of Nuclear Power Reactors.

[53] National Nuclear Regulator Act, 1999 (Act No. 47 of 1999).

[54] National Radioactive Waste Disposal Institute Act, 2008 (Act No. 53 of 2008).

[55] Nuclear Energy Act, 1999 (Act No. 46 of 1999).

[56] Nuclear Energy Policy for the Republic of South Africa.

[57] Radioactive Waste Management Policy and Strategy Document for the Republic of South Africa

[58] RD 0014: Emergency Preparedness and Response Requirements for Nuclear Installations.

[59] RD 0022: Radiation Dose Limitation at Koeberg Nuclear Power Station.

[60] RD 0024: Requirements on Risk Assessment and Compliance with Safety Criteria for Nuclear Installations.

[61] RD 0034: Quality and Safety Management Requirements for Nuclear Installations.

4. DEFINITIONS AND ABBREVIATIONS

4.1 DEFINITIONS

4.1.1 **Accident:** Any unintended event, including operating errors, equipment failures or other mishaps, the consequences or potential consequences of which are not negligible from the point of view of protection and safety. Public domain: published in any public forum without constraints (either enforced by law, or discretionary).

4.1.2 **Action level:** The level of dose rate above which remedial actions or protective actions should be carried out in emergency exposure situations.

4.1.3 **Assessment:** The process and the result, of analysing systematically the hazards associated with sources and actions, and associated protection and safety measures, aimed at quantifying performance measures for comparison with criteria.

4.1.4 **Becquerel:** The unit of radioactivity in nuclear transformations or disintegrations per second.

4.1.5 **Clearance:** The removal of radioactive materials or radioactive objects within actions Authorised by the authority from any further control by the relevant regulator.

4.1.6 **Competent authority:** The national authority designated or recognised in connection with the IAEA regulations for safe transport of radioactive material. The National Nuclear Regulator is the Competent Authority.

4.1.7 **Contamination:** The presence of radioactive substances in or on a material or the human body or other place where they are undesirable or could be harmful.

4.1.8 **Discharge:** A planned and controlled release of radioactive nuclides to the environment.

4.1.9 **Dose limit:** The value of the effective radiation dose or the equivalent dose of radiation to individuals, from controlled practices, not to be exceeded.

4.1.10 **Dose:** The amount of radiation received, where the use of a more specific term such as effective dose or equivalent dose is not necessary for defining the quantity of interest.

4.1.11 **Electronic product:** Any electronic product that emits ionising electro-magnetic, particulate radiation or any sonic, infrasonic or ultrasonic wave.

4.1.12 **Emergency preparedness:** The capability to promptly take actions that will effectively mitigate the impact of an emergency on persons, property or the environment.

4.1.13 **Employee:** A person who has entered into, or works under, a contract of service, or of apprenticeship or learnership with an employer, whether the contract is express or implied, oral or in writing, and whether the remuneration is calculated by time or by work done, or is in cash or in kind, and includes:

a. a casual employee employed for the purpose of the employer's business;

b. a person who has entered into a contract of service or of apprenticeship or learnership with the employer;

c. a person provided to Eskom by a Temporary Employment Service (Labour Broker) and who works under the control, instruction and supervision of an Eskom employee;

d. a casual employee;

e. a part-time worker;

f. a temporary worker;

g. an occasional employee;

h. an unattached learner;

i. a bursar.

4.1.14 **ESKOM:** is used for Eskom Holdings SOC Ltd, its Divisions and wholly owned subsidiaries.

4.1.15 **Group III hazardous substance:** Any electronic product that emits ionising and non-ionising radiation.

4.1.16 **Group IV hazardous substance:** Any fabricated radio-isotopes.

4.1.17 **Health surveillance:** Medical supervision intended to ensure the initial and continuous fitness of workers for their intended task.

4.1.18 **Intervention:** Any action intended to reduce or avert exposure to, or the likelihood of exposure to sources of radiation, which are not part of a controlled practice or which are out of control as a consequence of an accident.

4.1.19 **Investigation level:** The value of a quantity such as a dose above which investigation should be conducted.

4.1.20 **Ionising radiation:** Radiation capable of producing ion pairs in biological material(s).

4.1.21 **Medical exposure:** Exposures of radiation incurred by patients as part of their own medical or dental diagnosis or treatment.

4.1.22 **Monitoring:** The measurement of dose or contamination for reasons related to the assessment or control of exposure to radiation or radioactive substances; and the interpretation of results.

4.1.23 **Normal exposure:** An exposure which is expected to be received under normal operating conditions of an installation or source, including minor mishaps that can be kept under control.

4.1.24 **Occupational exposure:** All exposures of radiation to workers incurred in the course of their work.

4.1.25 **Potential exposure:** Exposure to radiation that is not expected with certainty to be delivered, but that may result from an incident at a source or owing to an event or sequence of events of a probabilistic nature, including equipment failures and operating errors.

4.1.26 **Practice:** Any human activity that introduces sources of exposure or exposure pathways, in addition to those of natural background radiation levels, or extends exposure to additional people, or modifies the network of exposure pathways from existing sources so as to increase the exposure or the likelihood of exposure to people or increase the number of people exposed.

4.1.27 **Protection and safety:** The protection of people against exposure to ionising radiation or radioactive substances and the safety of radiation sources, including the means for achieving such protection and safety, such as the various procedures and devices for keeping people's doses and risks as low as reasonably achievable.

4.1.28 **Protective action:** An intervention intended to avoid or reduce doses to members of the public in emergency situations.

4.1.29 **Public exposure:** Exposure incurred by members of the public from radiation sources, excluding any occupational or medical exposures and normal local background radiation but including exposure from Authorised sources and practices.

4.1.30 **Public exposure:** Exposure incurred by members of the public from radiation sources.

4.1.31 **Radiation:** See ionising radiation.

4.1.32 **Radioactive discharges:** Radioactive substances, arising from a source within a practice which are discharged as gases, aerosols, liquids or solids to the environment, generally with the purpose of dilution or dispersion.

4.1.33 **Radioactive waste:** Material, whatever its physical form, remaining from practices or interventions and for which no further use is foreseen, that contains or is contaminated with radioactive substances.

4.1.34 **Reference level:** Action level, intervention level, investigation level or recording level. Such levels may be established for any quantities determined in the practice of radiation protection.

4.1.35 **Regulatory authorities:** Authorities designated by government for regulatory purposes in connection with radiological protection and occupational health and safety i.e. the National Nuclear Regulator and the Directorate: Radiation Control, Department of Health.

4.1.36 **Risk:** The probability that an injury or damage will occur.

4.1.37 **Safety assessment:** A review of the aspects of design and operation of a source which is relevant to the protection of persons or their safety of the source.

4.1.38 **Source:** Anything that may cause radiation exposure, by emitting ionising radiation or releasing radioactive substances or materials.

4.2 ABBREVIATIONS

Abbreviation	Description
ESKOM	Eskom Holdings SOC Limited, its Divisions and wholly owned subsidiaries
KNPS	Koeberg Nuclear Power Station
NNR	National Nuclear Regulator
RP	Radiation Protection

5. RADIATION PROTECTION REQUIREMENTS

5.1 OCCUPATIONAL EXPOSURE

5.1.1 Responsibilities and accountability

5.1.1.1 The Eskom Generation Division shall comply with the fundamental safety requirements prescribed in Eskom Policy, 32-227.

5.1.1.2 The Eskom Generation Division shall comply with the statutory and regulatory requirements prescribed in Eskom Standard, 32-226.

5.1.1.3 The Eskom Generation Division shall comply with the responsibilities and accountability for the protection of workers and the public against occupational, public, potential and emergency exposures in accordance with the applicable requirements prescribed in Eskom Policy, 32-227.

5.1.1.4 The Eskom Generation Division shall comply with the radiation protection responsibilities and accountability for the protection of workers in accordance with Eskom Plant Safety Regulations, GGR 0992.

5.1.1.5 An adequate number of competent, qualified and trained radiation protection staff shall be employed in the Eskom Generation Division to execute the radiation protection and nuclear emergency planning requirements addressed in this document. Competence in radiation protection shall be built in accordance with the applicable requirements prescribed in Eskom Standard, 32-226.

5.1.1.6 Radiation protection staff in the Eskom Generation Division shall be integrated with the relevant safety review processes, the modification processes and be consulted on all decisions that may impact on radiation protection.

5.1.2 Conditions of Service

5.1.2.1 Special compensatory arrangements

The Conditions of Service implemented in the Eskom Generation Division shall be independent of the existence or the possibility of occupational exposure. Special compensatory arrangements or preferential treatment shall neither be granted, nor used as substitutes for the provision of proper protection and safety measures to ensure compliance with the requirements of this document.

5.1.2.2 Pregnant workers

a. Pregnant workers should, when becoming aware of the pregnancy, notify the person responsible for radiation protection in order for her radiation exposures to be limited.

b. The notification shall not be considered a reason to exclude a female worker from work.

c. Radiation exposures to pregnant workers shall be limited in accordance with dose limits prescribed in Standard, 238-35.

5.1.2.3 Alternative employment

Every reasonable effort shall be made to provide employees in the Eskom Generation Division with suitable alternative employment, in circumstances where it has been determined either by the regulatory authority, or in the framework of the dose limitation and health surveillance required by this Standard, that the worker, for health reasons, may not continue any longer in employment involving occupational exposure.

5.1.3 Classification of Areas

5.1.3.1 Radiological controlled areas

a. Radiological controlled areas shall be designated in areas for which specific radiation protective measures are, or could be, required for controlling normal exposures or preventing the spread of contamination and/or preventing the extent of potential exposures.

b. Radiological controlled areas shall be classified in accordance with requirements prescribed in Standard, 238-36.

5.1.3.2 Radiological supervised areas

a. Radiological supervised areas shall be designated in areas not designated as radiological controlled areas, but where occupational exposure conditions shall be kept under review.

b. Radiological supervised areas shall be classified in accordance with the requirements prescribed in Standard, 238-36.

5.1.4 Local Rules and Supervision

Local radiation protection and nuclear emergency planning rules and procedures shall be based on requirements contained and referred to in this document and the relevant Safety Analysis Reports.

5.1.5 Personal and Respiratory Protective Equipment

5.1.5.1 Workers in the Eskom Generation Division shall be provided with suitable and adequate personal protective equipment for ensuring safety and compliance with requirements prescribed in Standard, 238-36.

5.1.5.2 Workers in the Eskom Generation Division shall be provided with suitable and adequate respiratory protective equipment for ensuring safety and compliance with the requirements prescribed in Standard, 238-50 where applicable.

5.1.6 Co-operation between Employees in the Eskom Generation Division

Employees in the Eskom Generation Division shall co-operate to ensure compliance with radiological protection requirements addressed in this document.

5.1.7 Individual Monitoring and Exposure Assessment

5.1.7.1 The Eskom Generation Division shall arrange for assessment of the occupational exposure of workers on the basis of individual monitoring where appropriate, and shall ensure that adequate arrangements are made with appropriate dosimetry services under an adequate quality assurance programme.

5.1.7.2 Contractors in the Eskom Generation Division shall be responsible for arranging assessment of the occupational exposure of workers whom they employ.

5.1.7.3 Individual monitoring and exposure assessment in the Eskom Generation Division shall be performed in accordance with the requirements prescribed in Standard, 238-42.

5.1.7.4 The thermoluminescence dosimetry requirements prescribed in Standard, 238-48 shall be applied in the Eskom Generation Division where applicable.

5.1.7.5 The radiation protection dose and risk limits prescribed in Standard, 238-35 shall be applied at in the Eskom Generation Division.

5.1.8 Monitoring of the Workplace

5.1.8.1 The Eskom Generation Division shall establish, maintain and keep under review, a programme for monitoring the workplace under the supervision of radiation protection personnel.

5.1.8.2 Monitoring of the workplace shall be performed in accordance with the requirements prescribed in Standard 238-36.

5.1.8.3 Monitoring results shall be expressed in SI and/or non-SI units in accordance with the requirements prescribed in Standard, 238-37.

5.1.8.4 The Eskom Generation Division shall apply the ALARA philosophy in accordance with the requirements prescribed in Standard, 238-34.

5.1.8.5 The Eskom Generation Division shall implement the requirements for radiological surveillance instrumentation prescribed in Standard, 238-44.

5.1.9 Health Surveillance

5.1.9.1 Health Surveillance for radiation workers in the Eskom Generation Division shall be conducted in accordance with the requirements prescribed in Eskom Policy, 32-227.

5.1.9.2 Radiation workers in the Eskom Generation Division shall receive adequate information and training on health risks due to their occupational exposure, in accordance with the requirements prescribed in Standard, 238-43.

5.1.9.3 The working conditions under which individuals will be employed in the Eskom Generation Division should be categorized taking into account the following:

a. projected levels of annual radiation dose and rates of accrual;

b. types of radiation exposure;

c. potential for contamination;

d. potential for inhalation of contamination;

e. actual dose received as a radiation worker;

5.1.9.4 The medical surveillance programme shall address the following:

a. pre-employment health evaluations;

b. on-going health evaluations;

c. additional surveillances following an overexposure incident;

5.1.10 Reports and records

5.1.10.1 Radiological records and reports in the Eskom Generation Division shall be compiled and stored in accordance with an approved documentation system. A radiological record programme shall be established to reflect the type of records generated, storage requirements and storage duration.

5.1.10.2 Radiological records and reports listed in Appendix B shall be compiled and submitted to the National Nuclear Regulator at frequencies specified.

5.1.10.3 Reports relating to nuclear accidents and incidents shall be retained for 40 years from date of accident or incident.

5.1.10.4 Health registers shall be retained for a period of 40 years from the date of last entry.

5.2 PUBLIC EXPOSURE

5.2.1 Control of Visitors

5.2.1.1 The Eskom Generation Division shall control visitors to radiological controlled areas.

5.2.1.2 Visitors shall be controlled in accordance with requirements prescribed in Standard, 238-36.

5.2.2 Sources of External Irradiation

5.2.2.1 The Eskom Generation Division shall control sources of external irradiation, which may cause exposure to the public.

5.2.2.2 Sources of external irradiation shall be in accordance with requirements prescribed in Standard, 238-36.

5.2.3 Radioactive Contamination in Enclosed Spaces

5.2.3.1 The Eskom Generation Division shall restrict public exposure to contamination in areas accessible to the public.

5.2.3.2 Radioactive contamination in enclosed spaces shall be in accordance with the requirements prescribed in Standard, 238-36.

5.2.4 Radioactive Waste

5.2.4.1 The Eskom Generation Division shall ensure that the activity and volume of any radioactive waste that results from practices are kept to the minimum practicable, and that the waste is managed, collected, handled, treated, conditioned, transported, stored and disposed of, in accordance with the requirements prescribed in Standard, 238-51.

5.2.4.2 Radioactive waste consignments shall meet the criteria prescribed by the National Radioactive Waste Disposal institute.

5.2.4.3 Radioactive material and waste shall be transported in accordance with IAEA regulations for the safe transport of radioactive material, SSR-6.

5.2.4.4 Nuclear material shall be imported and/or exported in accordance with the requirements prescribed in Standard, 32-226.

5.2.5 Discharge of Radioactive Substances to the Environment

5.2.5.1 The Eskom Generation Division shall ensure that radioactive substances from Koeberg Nuclear Power Station are discharged to the environment in accordance with the requirements prescribed in Standard, 238-49 where applicable.

5.2.5.2 The Eskom Generation Division shall ensure that the Annual Authorised Discharge Quantities prescribed by the National Nuclear Regulator are complied with.

5.2.6 Monitoring of Public Exposure

5.2.6.1 The Eskom Generation Division shall ensure that radiological environmental surveillance is implemented in accordance with the requirements prescribed in Standard, 238-47 where applicable.

5.2.6.2 The Eskom Generation Division shall ensure that pathways resulting in public exposures are monitored in accordance with the requirements prescribed in Standard, 238-47 where applicable.

5.2.7 Electronic Products

5.2.7.1 The Eskom Generation Division shall ensure that electronic products capable of causing exposure to radiation due to installation, or use during practices, are monitored and controlled in accordance with the requirements prescribed in Standard, 238-38.

5.3 POTENTIAL EXPOSURE

5.3.1 Safety Assessment

The Eskom Generation Division shall ensure application of radiation protection safety assessment requirements addressed in Standard, 238-34 are complied with.

5.3.2 Requirements for Design

5.3.2.1 Prevention of accidents and mitigation of their consequences

a. The Eskom Generation Division shall ensure safety of the design for new facilities in accordance with relevant radiation protection design principles and requirements.

b. The Eskom Generation Division shall ensure that systems and components of sources that are related to protection or safety shall be designed, constructed, operated and maintained so as to prevent accidents as far as possible.

5.3.2.2 Radioactive sources and radioisotopes

a. The Eskom Generation Division shall consider factors that could affect the safety, security and control of radiation sources in accordance with the radiation protection requirements addressed in Standard, 238-46.

b. The Eskom Generation Division shall consider factors that could affect the occupational and public exposure caused by the selection of a site for a nuclear installation in accordance with relevant radiation protection requirements applicable to nuclear site selection.

c. Unsealed radioactive sources used in the Eskom Generation Division shall be controlled in accordance with the requirements prescribed in Standard, 238-41.

d. Industrial gauges containing radioactive sources used in the Eskom Generation Division shall be controlled in accordance with the requirements prescribed in Standard, 238-39.

e. Industrial radiography in the Eskom Generation Division shall be controlled in accordance with the requirements prescribed in Standard, 238-40.

f. Soil moisture and density gauges used in the Eskom Generation Division shall be controlled in accordance with the requirements prescribed in Standard, 238-45.

5.3.3 Requirements for Operations

5.3.3.1 Accountability and records

The Eskom Generation Division shall maintain accountability systems that include records relating to radiation protection and radioactive sources.

5.3.3.2 Investigations and follow-up

Radiological incidents shall be investigated and incidents shall be reported to the National Nuclear Regulator within the time frames specified.

5.3.3.3 Accident management preparedness

The Eskom Generation Division shall be prepared to take any necessary action for responding to, and correcting, any reasonably foreseeable operating incident, accident or mishap that could involve a source.

5.3.3.4 Feedback on operating experience

The Eskom Generation Division shall ensure that information on both normal and abnormal operations significant to protection or safety is disseminated or made available.

5.3.4 Quality Management

5.3.4.1 The radiation protection requirements addressed in this document shall be subjected to the Eskom Generation Division Quality Management Programme(s).

5.3.4.2 Quality Assurance audits and reviews shall be conducted on the Eskom Generation Division radiation protection processes including the RP organisation and functional control, radiation exposure, radiation work permits, radiation instrumentation, equipment and facilities, personnel dosimetry, radioactive waste management, radioactive sources, effluent monitoring and control and environmental surveillances.

5.3.4.3 The Eskom Generation Division emergency preparedness and response programmes shall be subjected to Eskom Generation Division Quality Management Programme.

5.3.4.4 Quality management audits and reviews shall be conducted on emergency preparedness and response programmes in the Eskom Generation Division including the EP organisation and functional control; emergency plans and procedures, emergency response facilities, emergency equipment and resources, training drills and exercises, liaison with public and media, radiation protection and technical support during emergencies.

5.4 EMERGENCY EXPOSURE

5.4.1 Emergency Plans

5.4.1.1 The Eskom Generation Division shall prepare emergency plans for nuclear installations in accordance with the requirements prescribed in Eskom Policy, 32-227 and Standard, 238-53.

5.4.1.2 The Eskom Generation Division shall prepare emergency plans for transportation of radioactive material in accordance with the requirements prescribed in Standard, 32-226.

5.4.2 Intervention for Emergency Exposure Situations

5.4.2.1 Justification for intervention

a. The Eskom Generation Division shall establish protective actions, intervention levels and action levels in accordance with the requirements prescribed in Standard 238-53.

b. The Eskom Generation Division shall implement meteorological requirements to support and complement protective actions in accordance with the requirements prescribed in Standard, 238-52.

5.4.3 Assessment and monitoring after accidents

The Eskom Generation Division shall implement assessment and monitoring after accidents in accordance with the requirements prescribed in Standard, 238-53.

5.4.4 Cessation of intervention after an accident

The Eskom Generation Division shall discontinue intervention after an accident in accordance with the requirements prescribed in Standard, 238-53.

5.4.5 Protection of Workers Undertaking an Intervention

The Eskom Generation Division shall ensure implementation of dose limitation for workers undertaking intervention in accordance with the requirements prescribed in Standard, 238-53.

6. ACCEPTANCE:

This following people were informed of the request submitted to the National Nuclear Regulator (NNR) via letter K-28414-E and the NNR response via letter k28414N relating to implementation of administrative changes to this document.

Name	Designation
Anari van Greuning	Hendrina Acting Power Station Manager
Avi Singh	Peaking Cluster General Manager
Bonga Mashazi	Kusile Power Station Manager
Douglas Woodhall	Corporate Consultant
Jurie Pieterse	Komati Acting Power Station Manager
Justice Bore	Camden Power Station Manager
Londi Mthembu	Majuba Power Station Manager
Lourence Chauke	Duvha Power Station Manager
Lukhanyo Ndube	Kendal Power Station Manager
Marcus Nemadodzi	Arnot Power Station Manager
Maserati Lesolang	Matla Power Station Manager
Morongwe Raphasha	Kriel Power Station Manager
Nomawethu Mtwebana	Koeberg Nuclear Power Station Manager (Acting)
Obakeng Mabotja	Matimba Power Station Manager
Refilwe Langa	Koeberg Nuclear Power Station Radiation Protection Manager
Riedewaan Bakardien	Nuclear Cluster Chief Nuclear officer
Sello Mametja	Tutuka Power Station Manager
Solly (Yangaphe) Ngcashi	Lethabo Power Station Manager
Tertius Karsten	Chief Physicist
Tshepiso Temo	Grootvlei Power Station Manager
Zweli Witbooi	Medupi Acting Power Station Manager

7. REVISIONS

Date	Rev.	Compiler	Remarks
March 2022	2	M Maree	Administrative changes implemented in accordance with letter k28414N dated, 22 March 2022.
December 2019	1B	M Maree	NNR approval via letter k26060N dated 6 December 2019 for extension of review date from October 2019 to May 2020.
September 2018	1A	M Maree	NNR approval via letter k24608N dated, 4 September 2018 for implementation of administrative changes.
March 2012	1	M Maree	NNR approval via letter k20275N dated, 12 March 2012 for implementation of Radiation Protection Standards.

8. DEVELOPMENT TEAM

This document has been developed by Marc Maree.

9. ACKNOWLEDGEMENTS

- E Flanagan
- K Featherstone
- MV Moduka

10. APPENDICES

A: Radiation Protection Documentation System.

B: Radiological reports for submission to the NNR.

APPENDIX A: RADIATION PROTECTION DOCUMENTATION SYSTEM

Eskom documents containing Radiation Protection requirements:	**Koeberg Nuclear Power Station**	**Coal-fired Power Stations**
32-226: Eskom Standard: Radiation Protection and safety of radiation sources.	✔	✔
32-227: Eskom Policy: Radiation Protection and safety of radiation sources.	✔	✔
GGR 0992: Eskom Plant Safety Regulations.	✔	✔
Generation Radiation Protection Standards:		
238-19: Generation Division Radiation Protection Manual	✔	✔
238-34: Optimisation of Radiation Protection.	✔	✔
238-35: Radiation Protection Dose and Risk Limits.	✔	✔
238-36: Operational Radiation Protection Requirements.	✔	✔
238-37: Radiation Protection SI Units.	✔	✔
238-38: Radiation Protection Requirements for Baggage Inspection X-Ray Devices.	✔	✔
238-39: Requirements for Safe Use of Industrial Gauges Containing Radioactive Sources.	✔	✔
238-40: Radiation Protection Requirements for Industrial Radiography.	✔	✔
238-41: Radiation Protection Requirements for Safe Use of Unsealed Sources.	✔	✔
238-42: Radiation Dosimetry Requirements.	✔	✔
238-43: Requirements for Radiation Workers.	✔	✔
238-44: Requirements for Radiological Surveillance Instrumentation.	✔	✔
238-45: Radiation Protection Requirements for Soil Moisture and Density Gauges.	✔	✔
238-46: Requirements for Safety, Security and Control of Radiation Sources.	✔	✔
238-47: Radiological Environmental Surveillance Requirements.	✔	
238-48: Thermoluminescence Dosimetry Requirements.	✔	
238-49: Liquid and Gaseous Effluent Management Requirements for Koeberg Nuclear Power Station.	✔	
238-50: Respiratory Protection Requirements for Radiation Protection.	✔	
238-51: Radioactive Waste Management Requirements.	✔	
238-52: Meteorological Requirements for Nuclear Installations.	✔	
238-53: Emergency Preparedness and Response Requirements for Nuclear Installations.	✔	
238-54: Radiation Protection Licensing Requirements for Koeberg Nuclear Power Station.	✔	

APPENDIX B: RADIOLOGICAL PROTECTION REPORTS FOR SUBMISSION TO THE NNR

Frequency	Report
Monthly	Meteorology Report
Quarterly	Radwaste: Solid, Liquid and Gaseous Waste Report.
Quarterly	Radiological Environmental Surveillance Report.
Quarterly	Special Persons Report.
Outage	Radiological Protection Outage Report.
Annual report	Occupation Exposure Report.
Annual report	Radiation Sources: Annual Report
Annual report	Radiological Environmental Surveillance Annual Report, including inter-laboratory comparison results if available.
Annual report	Emergency Management Annual Report
Annual report	Meteorology Annual Report