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|  Eskom | STANDARD | NUCLEAR OPERATING UNIT |
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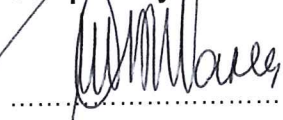
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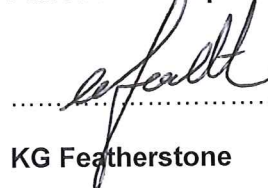
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Functional Control Area: **Radiation Protection**

NOTE:

With the changes to the Eskom structure the names in documents will be inconsistent for a period of time.

The terms Nuclear Division, Nuclear Operating Unit are to be seen as referring to the integrated high level description of the Koeberg Operating Unit.

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1. INTRODUCTION

This standard specifies the requirements for radiation workers in the Eskom Generation Division and in terms of the Eskom Radiation Protection Policy EPL 32-227 and Standard EST 32-226. Eskom 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

2.1 PURPOSE

This standard specifies the requirements for radiation workers in terms of Eskom Policy EPL 32-227, Eskom standard EST 32-226 and the Nuclear Division Manual 238-19 relating to radiation protection and safety of radiation sources.

2.2 APPLICABILITY

This standard is applicable to Group III hazardous substances (electronic products), Group IV hazardous substances (radioactive sources), radioactive material, restricted material, special nuclear material and radioactive waste defined in the Nuclear Division Radiation Protection Manual 238-19.

3. NORMATIVE/INFORMATIVE REFERENCES

The following normative references contain provisions that, through reference in the text, constitute requirements listed in this document. 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] EPL 32-227: Eskom Policy, Radiation Protection and safety of radiation sources.
- [2] EST 32-226: Eskom Standard, Requirements and rules for radiation protection and the safety of radiation sources.
- [3] 238-19: Nuclear Division Radiation Protection Manual.
- [4] 238-35: Radiation Protection Dose and Risk Limits.
- [5] 238-36: Operational Radiation Protection Requirements
- [6] 238-42: Radiation Dosimetry Requirements

3.2 INFORMATIVE

The following informative references were used during the development of this document. Although listed, the informative references are not mandatory requirements.

- [1] 238-1: Nuclear Division Integrated Management System.

4. DEFINITIONS AND ABBREVIATIONS

4.1 DEFINITIONS

- 4.1.1 **Credential review:** A process whereby the proof of achievement, or experience of an individual is compared to the requirements for a specific responsibility, post or training course.

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- 4.1.2 **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.
- 4.1.3 **Dose limit:** The value of the effective radiation dose, or the equivalent dose of radiation to individuals, from controlled practices, that shall not be exceeded.
- 4.1.4 **Electronic product:** Any electronic product that emits ionising electro-magnetic, particulate radiation or any sonic, infrasonic or ultrasonic wave.
- 4.1.5 **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 casual employee employed for the purpose of the employer's business;
 - a person who has entered into a contract of service or of apprenticeship or learnership with the employer;
 - 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;
 - a casual employee;
 - a part-time worker;
 - a temporary worker;
 - an occasional employee;
 - an unattached learner;
 - a bursar
 - a sub-contractor.
- Note:** *In the event of an injury to persons in the above categories it will be regarded as arising out of and in the course of duty, if the injured person worked under the instruction and supervision of an Eskom employee*
- 4.1.6 **Eskom:** is used for Eskom Holdings SOC Limited, its divisions and wholly owned subsidiaries.
- 4.1.7 **Exposure:** The act or condition of being subject to irradiation. Exposure can be either external exposure (irradiation by sources outside the body), or internal exposure (irradiation by sources inside the body). Exposure should be classified as; either normal exposure, potential exposure, occupational exposure, public exposure or emergency exposure.
- 4.1.8 **Group III hazardous substance:** Any electronic product that emits ionising and non-ionising radiation.
- 4.1.9 **Group IV hazardous substance:** Any fabricated radio-isotopes.
- 4.1.10 **Holder of authority:** Any person in whose name an authority has been issued, and is in force.
- 4.1.11 **Ionising radiation:** Radiation capable of producing ion pairs in biological material(s).
- 4.1.12 **Occupational exposure:** All exposures of radiation to workers incurred in the course of their work.
- 4.1.13 **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 peoples' doses and risks as low as reasonably achievable.

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- 4.1.14 **Public exposure:** Exposure incurred by members of the public from radiation sources.
- 4.1.15 **Radiation protection:** The protection of people from the effects of exposure to ionising radiation and the means of achieving this.
- 4.1.16 **Radiation:** See ionising radiation
- 4.1.17 **Radiation workers:** Any person who is potentially exposed to radiation through his/her occupation to more than 1 mSv per annum.
- 4.1.18 **Registration:** The granting of a certificate of registration.
- 4.1.19 **Regulatory authority:** Authority 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.
- 4.1.20 **Source:** Anything that may cause radiation exposure, by emitting ionising radiation, or releasing radioactive substances, or materials.
- 4.1.21 **Special person:** A person who under exceptional circumstances and for reasons approved by the Eskom Power Station/Installation Manager or his/her deputy requires entry into a radiological controlled area

4.2 ABBREVIATIONS

| Abbreviation | Description |
|--------------|---|
| ALARA | As Low As Reasonably Achievable |
| ESKOM | Eskom Holdings SOC Limited, its Divisions and wholly owned subsidiaries |
| NNR | National Nuclear Regulator |

5. REQUIREMENTS

5.1 GENERAL REQUIREMENTS

- 5.1.1 Radiation workers and special persons in Eskom employment shall be registered as required by the relevant regulator. The name of every radiation worker shall be recorded together with personal particulars with specific mention in respect of each radiation worker (and special person) of at least:
- 5.1.1.1 the date of registration and de-registration.
 - 5.1.1.2 the age at the time of registration.
 - 5.1.1.3 in the case of a female radiation worker, the periods of pregnancy, as that person notified Eskom.
 - 5.1.1.4 the date of appointment to Eskom employment and date when employment is terminated.
 - 5.1.1.5 the address at the time of termination as a radiation worker or special person.
- 5.1.2 No person shall be registered as a radiation worker unless:
- 5.1.2.1 he/she is 18 year old or older (see footnote 1);
 - 5.1.2.2 a medical practitioner has certified in the health record of the person concerned, that in the opinion of the medical practitioner that person is fit to perform radiation work.
 - 5.1.2.3 in the case of female person, a medical practitioner has informed that person pertinently of the hazard to a foetus of ionising radiation during pregnancy, and a medical practitioner is satisfied after personal enquiry that the person concerned is not pregnant.

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5.1.3 The radiation worker status of an Eskom employee should be reviewed as soon as:

5.1.3.1 a pregnant female radiation worker informs Eskom of the pregnancy.

5.1.3.2 a medical practitioner certifies in writing that in his opinion the worker is not fit for radiation work.

5.1.3.3 the relevant regulator or the worker concerned so requests, and should not be changed until, in the case of pregnancy, the pregnancy has terminated or until the worker concerned, or the medical practitioner or the relevant regulator has been consulted.

5.2 TRAINING REQUIREMENTS

5.2.1 Adequate resources shall be provided for the implementation of a training programme for radiation workers in Eskom employment.

5.2.2 Training programmes shall be structured to reflect the administrative, operational, technical and safety requirements of radiation worker duties.

5.2.3 Radiation workers shall undergo retraining routinely:

5.2.3.1 Eskom radiation workers shall undergo retraining every two years (24 months).

5.2.3.2 Contractor radiation workers shall be subject to more specific site rules, but as a minimum undergo retraining every two years (24 months).

5.2.3.3 Training records shall be maintained to provide trace ability of the training/qualifications.

5.2.3.4 The training requirements for radiation workers may be waived if appropriate on recommendation of a credential review. This shall be approved by the Eskom Installation Manager or his/her designate.

5.3 MEDICAL REQUIREMENTS

5.3.1 A comprehensive medical surveillance programme and health register shall be established and maintained for all occupationally exposed workers in a form approved by the relevant regulator.

5.3.2 Radiation workers employed at an Eskom nuclear installation shall comply with the medical requirements prescribed.

5.3.3 Radiation workers employed at an Eskom non-nuclear installation shall comply with the medical requirements prescribed by the Directorate: Radiation Control, Department of Health.

5.3.4 A radiation worker shall be examined prior to being employed or re-employed as a radiation worker. Radiation workers shall undergo periodic medical examinations and upon termination of Eskom employment.

5.3.5 Further medical examination(s) shall be performed immediately following a suspected or established over-exposure and repeated as may be necessary.

5.4 REQUIREMENTS FOR RADIATION WORKERS' RECORDS

5.4.1 Radiation workers' health register

5.4.1.1 All entries in the health register shall be made by an appointed medical practitioner or a person authorised in writing.

5.4.1.2 A radiation worker's health register shall be maintained by an appointed medical practitioner in an appropriate format.

5.4.1.3 An employee shall have right of access to his /her medical records and health register at all times.

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- 5.4.1.4 The radiation worker's health register shall be held by the holder of the authority and be available for inspection.
- 5.4.1.5 After consent has been obtained from the employee, the holder shall provide the relevant regulator access to the employee's medical records and health register. The relevant regulator may, with the consent of the employee, appoint an independent medical practitioner to assist in the conduct of a review of said records.
- 5.4.1.6 The radiation worker's health register shall contain the following information:
- a. Names of all radiation workers.
 - b. Dates and certifications, by an appointed medical practitioner, of medical fitness for a set period.
 - c. The radiation worker's health register shall be maintained and kept available for a period of 50 years after date of last entry in the register.

5.4.2 Radiation workers' dose register

- 5.4.2.1 A dose register of every occupationally exposed worker shall be established and maintained.
- 5.4.2.2 A radiation worker's dose register shall be maintained by the holder of the authority in an appropriate format.
- 5.4.2.3 The radiation worker's dose register shall be maintained and kept available for a period of 50 years after date of last entry in the register be held by the holder of the authority and be available for inspection by Eskom and the relevant regulator.
- 5.4.2.4 The Radiation Dose Register shall contain at least the following particulars:
- a. the name of the radiation worker.
 - b. the date of registration of a radiation worker.
 - c. the effective dose received by the worker on a monthly and annual basis.
 - d. the effective dose received due to any accidental exposure resulting from external or internal radiation.
 - e. the results of the Whole Body Count performed if any internal contamination has been detected resulting in a committed effective dose of more than 100 μ Sv.
 - f. any known radiation doses arising from medical radio-therapeutic treatment.
 - g. the date and reason for the termination of duties as a radiation worker.
 - h. the date a female radiation worker reported a pregnancy – and the subsequent dose received by the radiation worker during the rest of the pregnancy.
 - i. Any radiation dose received during previous employment.

5.5 REQUIREMENTS FOR SPECIAL PERSONS

5.5.1 General requirements

- 5.5.1.1 A special person shall:
- a. be 18 years old or older.
 - b. declare his/her exposure history.
 - c. be issued with suitable dosimetric devices.

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- d. be accompanied by a qualified radiation worker while inside a radiological controlled area.
- e. comply with the requirements for entry into a radiological controlled zone.

5.6 REQUIREMENTS FOR VISITORS

5.6.1 Visitors shall comply with requirements prescribed in 238-36: Operational Radiation Protection Requirements.

5.7 REQUIREMENTS FOR DOSIMETRY

5.7.1 Dose meters shall be issued to all personnel entering a radiological controlled area as prescribed in 238-42: Radiation Dosimetry Requirements.

5.8 FOOTNOTES

5.8.1 Footnote 1

Apprentices and students between 16 to 18 years of age who are training for employment involving exposure to radiation and who are required to handle sources in the course of their training should be registered as radiation workers and be occupationally exposed to the dose limits for apprentices and students prescribed in 238-35: Radiation Protection Dose and Risk Limits.

6. DEVELOPMENT TEAM

This document has been developed on behalf of the Generation Division by Marc Maree.

7. ACCEPTANCE AND AUTHORISATION

This document was reviewed by key stakeholders in the Generation Division listed in Appendix A:

8. APPENDIX

A: Acceptance and Authorisation

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APPENDIX A: ACCEPTANCE AND AUTHORISATION

Revision 0 of this document was sent for review to the following people:

| | |
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| Woodhall D (Douglas) | Nemadodzi NM (Marcus) |
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| Nair J (Julian) | Lacock R (Ryno) |
| Hector J (Jason) | |

Review comments on the draft document were addressed as required.

9. REVISION INFORMATION

| Date | Rev. | Compiler | Remarks |
|-----------|------|----------|---|
| May 2012 | 0 | M Maree | This radiation protection standard was compiled in accordance with the Nuclear Division Integrated Management System, Manual 238-1 and supersedes Eskom Standard ESKASACD5 and Generation Standard GGS 1315. |
| June 2018 | 0A | M Maree | The requirements addressed in revision 0A of this Standard remains unchanged when compared to the requirements in revision 0 as a major rewrite and full review of this Standard is in progress. All relevant improvements, changes, amendments and recommendations will be addressed in the next revision. |

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