National Nuclear Regulator

Requirements
Document

No.	Title	Rev.
RD-0022	RADIATION DOSE LIMITATION AT KOEBERG NUCLEAR POWER STATION	0

Approved:

G Clapisson
Acting Chief Executive Officer

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Unrestricted

APPROVAL RECORD

	Name	Designation	Signature	Date
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Reviewed By	L de Klerk	Senior Specialist: Assessment Group		23/07/2008
	V Majola	Senior Regulatory Officer: Koeberg Programme		14/7/2008
Recommended for Approval By	A Muller	Acting Assessment Coordinator		21/07/2008

REVISION HISTORY

Rev No.	Date Approved	Nature of Revision	Prepared by
0	22/09/2004	First issue Supersedes LD-1020 Rev 1	N Keenan

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1 INTRODUCTION

Regulations R388 [1], promulgated in terms of the National Nuclear Regulator Act [3], lay down safety standards and regulatory practices applicable to holders of nuclear installation licences.

2 PURPOSE

This Requirements Document (RD) defines requirements on radiation dose limitation for normal operating conditions and actions during emergencies at Koeberg Nuclear Power Station in accordance with regulations R388 [1].

3 OBJECTIVES

The objective of this RD is to define general requirements, dose limits and dose constraints applicable to members of the public and workforce in accordance with regulations R388 [1].

4 SCOPE

The scope of this RD covers dose limits and dose constraints for normal operating conditions, and actions during emergencies, applicable to members of the public and workforce associated with any action covered by the Koeberg Nuclear Installation Licence NIL-1 [6].

5 DEFINITIONS

5.1 Terms defined in references [1] or [3]

In this RD any word or expression to which a meaning has been assigned in references [1] or [3] shall have the meaning so assigned.

5.2 Terms not defined in references [1] or [3]

Many terms and definitions given in this RD are taken from ISO 9001:2000 [4] and are therefore not repeated in this section. Only additional definitions are provided.

5.3 Authorized action

An action authorized in terms of the National Nuclear Regulator Act [3]

5.4 Normal operation

Normal operations include all conditions which are expected to occur during the lifetime of the nuclear installation including hypothetical events with expected mean frequencies greater than 0.01 per annum.

6 GENERAL REQUIREMENTS

(1) Radiation doses arising from normal operations and emergencies must be controlled by formal procedures in order to ensure compliance with the requirements of sections 6 and 7.

(2) No practice may be adopted unless its introduction produces a net positive benefit.

(3) All exposures must be kept as low as reasonably achievable (ALARA), economic and social factors being taken into account. In the implementation of the ALARA principle, a system of dose constraints must be established and implemented which must not exceed values which can cause the dose limits specified in section 7 to be exceeded, and which will ensure as far as practicable that doses are restricted by application of the ALARA principle on a source-specific basis rather than by dose limits.

(4) The appropriate staff must be consulted on all decisions that may impact on radiation protection and nuclear safety.

7 DOSE LIMITS

7.1 Occupational Exposure

7.1.1 General Dose Limits

The occupational exposure of any worker must be so controlled that the following limits are not exceeded:

(5) An average effective dose of 20 mSv per year averaged over five consecutive years.

(6) A maximum effective dose of 50 mSv in any single year.

(7) An equivalent dose to the lens of the eye of 150 mSv in a year.

(8) An equivalent dose to the extremities (hands and feet) of 500 mSv in a year.

7.1.2 Apprentices and Students

For apprentices of 16 to 18 years of age who are training for employment involving exposure to radiation and for students of age 16 to 18 who are required to use sources in the course of their studies, the occupational exposure must be so controlled that the following limits are not exceeded:

(9) An effective dose of 6 mSv in a year.

(10) An equivalent dose to the lens of the eye of 50 mSv in a year.

(11) An equivalent dose to the extremities (hands and feet) or the skin of 150 mSv in a year.

7.1.3 Women

(12) The annual effective dose limit for women of reproductive capacity is the same as that which is generally specified for occupational exposure under 7.1.1 above. Following declaration of pregnancy, a limit on the equivalent dose to the abdomen of 2 mSv for the remainder of the pregnancy applies.

7.1.4 Emergencies

(13) In the event of an emergency or when responding to an accident, a worker who undertakes emergency measures may be exposed to a dose in excess of the annual dose limit for persons occupationally exposed as specified in 7.1.1,

(14) For the purpose of life saving or preventing serious injury,

(15) If undertaking actions intended to prevent a large collective dose, or

(16) If undertaking actions to prevent the development of catastrophic conditions.

(17) Under any of the circumstances referred to in requirements (15) or (16) above, all reasonable efforts must be made to keep doses to the worker below twice the maximum annual dose limit. In respect of life-saving interventions as contemplated in requirement (14) above, every effort must be made to keep doses below ten times the maximum annual dose limit. In addition, workers undertaking interventions which may result in their doses approaching or exceeding ten times the annual dose limit may only do so when the benefits to others clearly outweigh their own risk.

7.2 Exposure of Visitors and Non-Occupationally Exposed Workers

(18) The annual effective dose limit for visitors to the Koeberg site and those not deemed to be occupationally exposed is 1 mSv. The annual dose equivalent limit for individual organs and tissues of such persons is 10 mSv.

7.3 Public Exposure

(19) The annual effective dose limit for members of the public from all authorised actions is 1 mSv.

(20) The individual dose limit applicable to Koeberg Nuclear Power Station for the average representative of the critical group is 250 μSv year^{-1}.

(21) No action may be authorised which would give rise to any member of the public receiving a radiation dose from all authorised actions exceeding 1 mSv in a year.

8 REFERENCES

[1] Regulations R 388 (28 April 2006) in terms of Section 36, read with Section 47 of the National Nuclear Regulator Act, on Safety Standards and Regulatory Practices

[2] International Atomic Energy Agency (IAEA) International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources

[3] National Nuclear Regulator Act, Act No. 47 Of 1999

[4] ISO 9001:2000 Series

[5] LD-1020 Radiation dose limitation at Koeberg Nuclear Power Station (Revision 1)

[6] Koeberg Nuclear Installation Licence NIL-1 (current version)

A1. Title of the Circular

RD-0022 REV 0 "RADIATION DOSE LIMITATION AT KOEBERG NUCLEAR POWER STATION"

A2. Purpose

To obtain approval of RD-0022 Rev 0.

A3. Issue

LD-1020 Rev 1 needs to be updated to comply with the regulations:

Regulations R 388 (28 April 2006) in terms of Section 36, read with Section 47 of the National Nuclear Regulator Act (Act No. 47 of 1999) on Safety Standards and Regulatory Practices (SSRP).

A4. Discussion

Extensive changes were made to the document in terms of definitions and dose limits for consistency with the SSRP.

The delay in producing this document (as well as RD-0024 which will replace LD-1091) was due to the need to establish a consistent position on the following relating to RD-0024:

- Approach to multiple sites (whether the dose and risk criteria apply to all facilities on a site together or separately)
- The definition of "normal" and "accident" conditions.

In summary, the purpose of Rev 0 of RD-0022 (and RD-0024) is merely to incorporate the requirements of the SSRP. The issues referred to above will be taken up in the longer term in accordance with the Strategic Plan for 2009-2012.

The changes are given in the attachment.

LD-1020 is being reissued as RD-0022 Rev 0.

A5. Recommendation

It is recommended that RD-0022 Rev 0 be signed by the CEO.

A6. Financial Implication

None

A7. Other Implications

Eskom will submit documents in conformance with the new requirements, which will need to be assessed.

A8. Quality Assurance Trail

	Name	Designation	Signature	Date
Prepared By	T Hill	Acting Senior Manager: PRD		14/7/2008
	L de Klerk	Senior Specialist: Assessment Group		23/07/08
	V Majola	Senior Regulatory Officer: Koeberg Programme		14/7/2008
Recommended for Approval By	A Muller	Acting Assessment Coordinator		21/07/2008

ATTACHMENT

RD-0022 RADIATION DOSE LIMITATION AT KOEBERG NUCLEAR POWER STATION

(Replacing LD-1020 with same title)

Section	Change	Motivation
General	Change of format	New format for RDs as per AD-1039
2	Definitions	Definitions referred to NNRA, Reg R388 and ISO.
6	General requirements	Alignment to sections 4.4.2 and 4.5.1 of the regulations on safety standards and regulatory practices.
7	Dose limits	Alignment to regulations on safety standards and regulatory practices. Consistency with RD-0024 which replaces LD-1091. Clarification as regards impact of different sites (ie Koeberg and PBMR).