	<b>Procedure</b>	<b>Nuclear Engineering</b>
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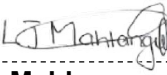
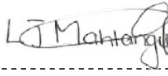
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## Content

### Page

1. Introduction.....	4
2. Supporting Clauses .....	4
2.1 Scope .....	4
2.1.1 Purpose .....	4
2.1.2 Applicability .....	4
2.1.3 Effective date.....	4
2.2 Normative/Informative References .....	4
2.2.1 Normative.....	4
2.2.2 Informative.....	5
2.3 Definitions .....	5
2.4 Abbreviations .....	5
2.5 Roles and Responsibilities .....	6
2.5.1 The DPSA manager is responsible for ensuring that the contents of this procedure are followed. ....	6
3. Process .....	6
3.1 Changes Impacting the PSA.....	6
3.2 Frequency of the Official Koeberg PSA Updates .....	7
3.3 Specific Contents of the PSA.....	7
3.4 Technical Documentation and Records Management.....	8
4. Acceptance.....	8
5. Revisions.....	8
Appendix A – SOURCES AND DOCUMENTS TO BE SCREENED.....	11
Appendix B – GUIDANCE FOR PSA IMPACT ASSESSMENT .....	12

### CONTROLLED DISCLOSURE

## 1. Introduction

This procedure defines the process for updating and maintaining the PSA.

## 2. Supporting Clauses

### 2.1 Scope

- Applicable to all personnel involved in the collection, evaluation and validation of information required to update the status of the current Koeberg PSA.
- This procedure is applicable to the update/revision of the Koeberg Probabilistic Safety Assessment. The Koeberg PSA includes all documentation, models, and software pertaining to the internal and external initiating events analysis for full power and other operating modes.
- This procedure does not cover the collection of plant specific data. This is dealt with in accordance with 331-65.

#### 2.1.1 Purpose

To describe the process requirements and responsibilities to review internal and external changes and operating experience, to ensure that the Koeberg PSA models are a true representation of the current plant status. This is required in terms of RD-0024.

#### 2.1.2 Applicability

This document is applicable to Nuclear Engineering.

#### 2.1.3 Effective date

Effective upon date of authorisation.

### 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 - Requirements
- [2] 331-2: Nuclear Engineering Management Manual
- [3] KAA-500: The Process for Controlled Documents
- [4] KAA-688: The Corrective Action Process
- [5] KAA-709: Process for Performing Safety Evaluations, Screenings and Safety Justifications
- [6] 331-65: PSA Reliability Data Collection and Evaluation

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- [7] KBA 0000 G00 1 001: Koeberg Definitions Manual
- [8] KSA-011: The Requirements for Controlled Documents

### 2.2.2 Informative

- [9] 240-156067953 [KGA-029]: Safety Justification Preparation
- [10] 331-94: Importance Category Classification Listing
- [11] LD-1023: Quality Management Requirements for Koeberg Nuclear Power Station
- [12] RD-0024: Requirements on Risk Assessment and Compliance with Principal Safety Criteria for Nuclear Installations (NNR)
- [13] IAEA SSG-3: Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No. SSG-3, IAEA 2010
- [14] IAEA SSG 4: Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No. SSG-4, IAEA 2010

### 2.3 Definitions

**2.3.1 Controlled Disclosure:** Controlled disclosure to external parties (either enforced by law, or discretionary)

**2.3.2 Plant Change:** A change to Koeberg plant design or Operating procedure

NOTE: *All other definitions in accordance with the Koeberg Definitions Manual.*

### 2.4 Abbreviations

Abbreviation	Explanation
CDF	Core Damage Frequency
CR	Condition Report
DPASA	Deterministic and Probabilistic Safety Assessment
ISED	Independent Safety Evaluation Department
KORC	Koeberg Operations Review Committee
LERF	Large Early Release Frequency
NNR	National Nuclear Regulator
OTS	Operating Technical Specifications
PSA	Probabilistic Safety Assessment
QRA	Qualitative Risk Assessment
SAMG	Severe Accident Management Guidelines
SAR	Safety Analysis Report
SRSM	Safety Related Surveillance Manual
TAF	Temporary Alteration Form
TD&RM	Technical Documentation and Records Management
TOI	Temporary Operating Instruction

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## 2.5 Roles and Responsibilities

**2.5.1** The DPSA manager is responsible for ensuring that the contents of this procedure are followed.

**2.5.2** The DPSA Group is responsible for gathering the information on plant changes and document revisions, performing the screening and reviewing of plant changes as related to the PSA models, databases, and associated documents, and for providing the recommendations regarding the necessity to incorporate the changes.

**2.5.3** Additionally, the DPSA Group is responsible for performing the necessary analysis and calculations for the purpose of incorporating the changes.

**2.5.4** Sources of information screened will be identified and summarised.

**2.5.5** The DPSA Group is responsible for updating the Koeberg PSA.

## 3. Process

### 3.1 Changes Impacting the PSA

**3.1.1** The PSA documents may require updating for various reasons. This section covers the process for the collection and evaluation of the data for the updating of the PSA Model due to the following changes:

- a. **Monitoring and Collecting Event / Change Information.** Appendix A provides a list of documents that shall be reviewed by the PSA Group. Should any screening (see guidance in Appendix B) identify potential / actual PSA model impact, then a Change Notice is raised if necessary. Any change that results in a significant change to the PSA result must be reported to KORC and the NNR by the PSA Group.
- b. **Other Causes of PSA Change.** In addition to plant change information, other items that could cause a PSA model revision include: PSA review or benchmarking comments, plant specific data updates, change in NNR requirements, change in procedures, industrial experience, changes in PSA technologies or any changes based on sound engineering judgement.

**3.1.2 Screen New Information** – Appendix B provides guidance on which key elements of the PSA may be impacted by the changes defined in the documents gathered in step 3.1.1. Appendix B defines the key elements of a PSA. The review in this step only determines whether the information has the potential to impact the PSA. If it does, a Change Notice should be raised.

**3.1.3 PSA Impact Assessment** – If the reviewed plant change documents have a potential to impact the PSA, then the information must be evaluated further, and the Koeberg PSA models updated as appropriate.

**3.1.4 Change Requests** – All changes must be justified and documented in the Change Notice database. All descriptions must have sufficient detail and be consistent enough so that these changes can be discerned, evaluated, reviewed, and reproduced. This is important for configuration control.

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3.1.5 **Revision Information** - All revised PSA documents must contain a "Revision Information" section where the changes are listed, described and justified.

3.1.6 **Review Input Documents** - When updating a PSA document that uses inputs from other PSA documents, the responsible PSA analyst must review and screen all changes made to the input PSA documents as indicated in their "Revision information" sections.

3.1.7 **Koeberg PSA Model Changes** – The Change Notice Database shall be used to document changes.

### 3.2 Frequency of the Official Koeberg PSA Updates

3.2.1 The PSA shall be updated and re-issued to reflect the plant when procedure or data changes significantly affect the PSA results, i.e., whenever the sum of the changes not reflected in the latest official PSA is expected to result in a CDF change of  $1E-6$  / reactor-year or more, or in a LERF-change of  $1E-7$  / reactor-year or more.

3.2.2 Changes such as plant modifications and component failure data will be reviewed according to the data update periodicity described in 331-65 for relevancy to the PSA update.

3.2.3 The PSA manager may decide to update and re-issue the PSA even though the cumulative impact of changes is not significant.

3.2.4 The PSA shall always be re-issued at intervals of 10 years or less.

3.2.5 Whenever the PSA is re-issued, the changes will be reviewed for impact on PSA applications in use. For example, the PSA component importance list will be reviewed to assess whether an update is required, and if so then the updated list will be forwarded to System Design Engineering for the updating of the Importance Category Classification Listing (331-94) and to Reliability Engineering for the updating of the IQReview Database.

Further examples of applications that must be assessed to determine whether an update is required when the PSA is re-issued include the Risk Matrix, the PSA study for Operating Technical Specifications (OTS) and the PSA study for the risk-informed in-service inspection programme.

### 3.3 Specific Contents of the PSA

When the PSA is updated and re-issued, it shall cover all pertinent aspects. Specifically, the following items shall be documented:

- The dominant core damage and large early release cut sets ( $\geq 10$ ) for each plant state shall be listed and reviewed to determine if they are reasonable and have physical and logical meaning.
- A review of a sample ( $\geq 10$ ) of non-significant accident cut sets (frequency  $\leq 1E-8$ /yr) shall be performed and documented to determine if they are reasonable and have physical and logical meaning.
- The dominant components and operator action basic events ( $\geq 10$ ) impacting CDF and LERF will be listed for each plant state with a discussion of the relevant modelling asymmetries.
- The total plant CDF and contributions from the different initiating events and accident classes shall be listed.

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### 3.4 Technical Documentation and Records Management

- The updated Koeberg PSA models including all documentation must be stored for the lifetime of the station. A record shall be created with KIS Reference PD3.16.1.2 and sent to TD&RM within eight weeks of approval.

## 4. Acceptance

This document has been seen and accepted by:

Name	Designation
G Dongmo	PSA Analyst
D Dreyer	Senior Physicist

## 5. Revisions

Date	Rev.	Compiler	Remarks
August 2021	8	NP Mokoena	<ul style="list-style-type: none"> <li>Section 2.2.2 is updated to include the following references:               <ul style="list-style-type: none"> <li>International Atomic Energy Agency (IAEA) SSG-3: Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No. SSG-3 , IAEA 2010</li> <li>International Atomic Energy Agency (IAEA) SSG 4: Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No. SSG-4 IAEA 2010</li> </ul> </li> <li>Section 2.4 updated to include SRSM.</li> <li>In section 3.2.5, added examples of applications that must also be assessed to determine whether an update is required when the PSA is re-issued including the Risk Matrix, the PSA study for OTS and the PSA study for RI-ISI.</li> <li>In Section 4, Herman Bosman is removed as seen and acceptance person due to resignation.</li> </ul>
July 2020	7	Guy Dongmo	<ul style="list-style-type: none"> <li>Removed all instances of KLA-001 in the document.</li> <li>Included Section 3.4 "Technical Documentation and Records Management".</li> <li>Safety Screening S10665 was performed for this revision</li> </ul>
June 2019	6	B Tighy	<ul style="list-style-type: none"> <li>ASME review comments based on NECSA Peer Review (QU-D4 and QU-D3) incorporated into sections 3.1.1 and 3.3.</li> <li>Appendix B improved for PSA impact screening.</li> <li>Removed redundant Appendix C.</li> </ul>

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Date	Rev.	Compiler	Remarks
			<ul style="list-style-type: none"> <li>Editorial changes were done throughout the document.</li> <li>Safety Screening 2019/0363 was performed for this revision.</li> </ul>
May 2016	5	L Jacobs	<ul style="list-style-type: none"> <li>Safety Screening S2016/0184 was performed for this revision.</li> <li>In Sections 1.3 and 3.1 corrected reference from old reference number of KAU-020 to new reference number of 331-65.</li> <li>In Section 3.1 corrected reference from old reference number of 36-188 to new reference of 335-2.</li> <li>In Section 1.3 updated revision numbers of documents.</li> <li>Incorporated the Change Notice Database as a means to document model updates.</li> <li>S Ghoorun was changed to S Fagan.</li> <li>PN and PR changed to CR to be consistent with the station CAP programme.</li> <li>Section 6.2.2 changed to specify reviewing failure data every reactor cycle to reviewing according to the period specified in 331-65.</li> <li>Reference to EPMS was removed since the system has now been replaced with Devonway.</li> </ul>
October 2014	4	E Lamprecht	<ul style="list-style-type: none"> <li>In Section 6.25, added responsibility to assess whether PSA importance list needs to be updated following the re-issuing of the PSA, and if so to forward the updated list to the relevant stakeholders.</li> </ul>
August 2014	3	S Fagan	<ul style="list-style-type: none"> <li>Included section 6.1.5 to add a requirement for all PSA documents to contain a "Revision Information" section where changes are described and justified.</li> <li>Included section 6.1.6 to ensure that the PSA Analyst reviews and screens the input information to assess its applicability to the revised documents.</li> </ul>
February 2013	2	L Jacobs	<ul style="list-style-type: none"> <li>Editorial changes to improve clarity. Furthermore, updated the procedure to add a requirement to review currently active PSA applications following a PSA update.</li> </ul>
December 2012	1	E Lamprecht	<ul style="list-style-type: none"> <li>Editorial changes to improve clarity.</li> </ul>
May 2012	0	E Lamprecht	<ul style="list-style-type: none"> <li>Update of KAU-019 to comply with new number system.</li> </ul>

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## **6. Development Team**

The following people were involved in the development of this document:

- Danette Dreyer
- Guy Dongmo

## **7. Acknowledgements**

N/A

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**Appendix A – SOURCES AND DOCUMENTS TO BE SCREENED**

DOCUMENT	INITIAL SOURCE	FREQUENCY
Plant modifications	Modifications Screening Report	per change
TOIs, TAFs, OTS Changes,	Safety Evaluation File	per change
Operating Procedure Changes	Safety Evaluation File	per change
Operating Configuration Changes	Shift Log	as required
SAMG Procedures	Safety Evaluation File	per change
SAR	Safety Evaluation File	per change
All CR Types	Devonway	Six (6) Monthly
Outage Safety Plan	Outage Group	per change
RI-ISI		per change
AMP		per change
QRAs	ETMM Concern Statement	per change
CURA risks (linked with QRAs)	ETMM Concern Statement	per change

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**Appendix B – GUIDANCE FOR PSA IMPACT ASSESSMENT**

PSA Study		Key Elements
<b>Reactor</b>	Level 1	Screening of modelled phenomena
		Fault Trees
		Event Trees
		Basic Events / Parameter Data
		Initiating Event Frequencies
		Common Cause Failures
		Human Error Probability
		Plant Operating States
		Success Criteria
		Other
	Level 2	Screening of modelled phenomena
		Fault Trees
		Event Trees
		Basic Events / Parameter Data [Split Fractions]
		Common Cause Failures
		Human Error Probability
		Phenomenology
		Source Terms (Output)
		Other
	Level 3	Screening of modelled phenomena
		Regulatory Changes
		Assumption Changes
		Population Data
		Weather Data
		Emergency Plan Actions
		Other

PSA Study		Key Elements
<b>Spent Fuel Pool</b>	Level 1 & 2	Screening of modelled phenomena
		Fault Trees
		Event Trees
		Basic Events / Parameter Data
		Initiating Event Frequencies
		Common Cause Failures
		Human Error Probability
		Plant Operating States
		Phenomenology
		Source Terms (Output)
		Fuel Handling Strategy
		Other

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	Level 3	Screening of modelled phenomena
		Regulatory Changes
		Assumption Changes
		Population Data
		Weather Data
		EP Actions
		Other

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PSA Study	Key Elements
<b>Site Personnel Risk Assessment</b>	Screening of modelled phenomena
	Initiating Event Frequencies: All Accidents
	Waste Treatment
	Fuel Handling accident
	Fuel Handling Strategy
	Other
<b>Cask PSA</b>	Screening of modelled phenomena
	Initiating Event Frequencies
	Cask Storage Building Qualification
	Cask Qualification
	Loading Plan/Schedule ( <i>Number of Operations per year</i> )
	Human Error Probability
	Source Term
	Fuel Handling Strategy
	Other
<b>External Events</b>	Screening of modelled phenomena
	Initiating Event Frequencies
	Site Safety Reports
	International OE / Local OE
	Human Error Probability
	Other

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